VOL. XVII NO. 1

UNITED STATES NAVAL
MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

ISSUED BY
THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF INSTRUCTION AND PUBLICATIONS
COMMANDER H. W. SMITH, MEDICAL CORPS, U. S. NAVY
IN CHARGE

EDITED BY
LIEUTENANT COMMANDER W. M. KERR, MEDICAL CORPS, U. S. NAVY

JULY, 1922

(MONTHLY)

Compiled and published under authority of Naval Appropriation Act for 1922, approved July 12, 1921

WASHINGTON
GOVERNMENT PRINTING OFFICE
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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume I, No. 1, April, 1907.
Volume II, No. 1, January, 1908.
Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
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TABLE OF CONTENTS.

PREFACE.

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comments on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form, such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

U. S. NAVAL MEDICAL BULLETIN

Vol. XVII. July, 1922. No. 1.

SPECIAL ARTICLES.

THE SANITARY INSPECTOR OF THE COMMUNITY.

By W. H. Bell, Captain, Medical Corps, United States Navy.

"*Without responsibility there can be no efficiency;*
Without efficiency success can only be accidental."

It may be said without fear of contradiction that one indication of the spirit of the times is the mobilization of every form of science in an effort to contribute to human progress and efficiency.

The tendency to reach into the realms of science for additional facts or the discovery of new principles has been stimulated by the assurance of their speedy application to the solution of various problems of everyday life. The recent war has given an impetus to this spirit of investigation, and by it alone may the world "expect ultimately to overcome the telling advantages, both in war and peace, which Germany long enjoyed because of the organization and development of her scientific resources."

Every form of scientific research is important in building the firm foundation upon which enduring advances depend. Thus, "Euclid, working out problems in pure mathematics in Alexandria, prepared the way for the calculations of the engineer. Galileo, discovering the satellites of Jupiter, convinced the world of the truth of the Copernican theory, broke down absurd medieval conceptions which prevented scientific progress, and stimulated exploration and advance in every field. Pasteur, studying the optical properties of certain crystals, with no thought of practical result, was led to his investigations of bacteria and his epoch-making discoveries for the benefit of mankind."

Not only are scientific bodies organizing their educational and research resources in the interest of efficiency, but teaching and research institutions are arranging their facilities along lines calculated to foster progress in a precise and effective fashion. Everywhere one notes the attempt to overcome the sluggishness with which the public receives and applies scientific information, and by the word "public" we mean the individuals who compose military as well as civil communities. It has long been noted that whatever a military organization may be considered to gain by virtue of authority is often lost in the persistence of a traditional conservatism, a conservatism which is often expressed as a resistance to reforms. This resistance is found in civil as well as military communities and is the factor which prompts reformers to exaggerate the conditions which are under consideration in order to emphasize the necessity of reform.

It is difficult, however, to exaggerate the ill and far-reaching consequences of a disregard to the dictates of health. Yet they are often so subtle and intangible to the average citizen who can not readily connect an obscure cause with possibly an unseen effect, that efforts to didactically impress the public with the necessity of precautions regarding public health are often futile. The mind is so constituted that unfortunately the value of experience derived from some public disaster is soon forgotten, and no matter how good the intention may be to continue preventive measures in the future, they often degenerate into a routine and then pass into oblivion.

So discouraging an outlook does this suggest and so often has it been the stumblingblock to adequate and timely preparation for the prevention of public calamities, that the development of a preventable disaster is frequently a needed object lesson to arouse public interest in matters pertaining to public health.

It is particularly in connection with matters relating to hygiene and sanitation that cause and effect are not apparent to the average individual who at the present time has not been educated up to a satisfactory appreciation of the value of public-health measures. His education is a huge task, to be completed by various means, one of which forms the subject of this paper, namely, the sanitary inspector of the community.

It may be interesting and helpful at this point to outline briefly the development of the science of sanitation from an educational viewpoint and to review the facilities at present available to students who aim to make public health their life work.

As early as 1865 the Medical College of the New York Infirmary for Women and Children made hygiene and public sanitation a compulsory part of its curriculum. Even before this the Woman's Medical College of Pennsylvania had taught hygiene in connection with physiology. The University of Michigan, when its medical department was founded in 1850, taught the principles of the analysis of drinking water to its students, and in the early seventies lectures on hygiene were given not only to medical students but to others, including those taking the classical course. Later, in 1876, a course of lectures was established, with the professor of hygiene in charge. In connection with pathology or clinical subjects, as early as 1881, Western Reserve, in Cleveland, Ohio, taught state, or as it is now termed, preventive medicine and hygiene. At Harvard, lectures on hygiene were instituted in 1876. In 1892 the Institute of Hygiene of the University of Pennsylvania was established. Foundations for the financing of instruction in hygiene were likewise provided in other medical schools, such as the University of California and Cooper Medical School, in San Francisco. The department of hygiene in the latter institution, now Leland Stanford, gave way to the department of bacteriology. Not long ago Western Reserve recognized the importance of hygiene and appointed a full-time professor in this branch. A similar change took place at Yale and at the University of Chicago. With all this, hygiene as a major subject, with a trained scientist giving his entire time to studying its problems and teaching its principles, until recently existed in but 6 of the 38 reputable medical schools in the United States.

This was not a highly creditable showing in comparison, for example, with Germany, where all of the 22 universities teaching medicine had their hygiene institutes, or with Great Britain, where every graduate in medicine must have followed a course in public health, and passed an examination in it. This state of affairs in the United States was, perhaps, only a reflection of the apathetic public sentiment which seemed content that its interests in health requirements should be supervised in the main by so-called "part-time" health officers—often politicians, appointed without regard to fitness for the office they were expected to fill—and with such inadequate recompense as to inspire a primary interest in their original gainful occupation as a means to livelihood. This vicious practice is still too prevalent; but better things are coming to pass, though we are a long way from realizing practically all that our scientific knowledge makes possible. The methods of handling health conditions are changing and they began to change with marked strides even before the World War gave such an impetus to the public-health movement. Strong and able men and women are behind this movement and the public is opening its eyes and its purse with the realization that there are grave facts to be faced with intelligence and honesty, and that there is much of an intangible nature and remote benefit that is worth paying for in advance of delivery.

In preparation for the proper utilization of this awakened public understanding and the scientific economic disbursement of funds allotted, as a result of the growing confidence in public-health undertakings, the idea of developing personnel to handle this tremendously important work is taking practical form.

The study of disease and its prevention has always come within the province of the doctor of medicine, but in this new field of endeavor—the care of the health of a community—there is room for other workers whose objective also is "the study of health and how to maintain it."

Much is being done by various powerful agencies such as the United States Public Health Service, the Medical Departments of the Army and Navy, health departments of large cities, and educational institutions to lift our knowledge of preventive medicine out of the realm of the casual and to make the use of it the general practice of individuals and communities, to educate the public up to a full understanding of its responsibility regarding preventive medicine, and to build up a body of public-health workers, men and women whose efforts are devoted to the prevention of disease.

The requirements of the health official are to-day receiving most careful attention by such men as Sedgwich, Reinhardt, Whipple, Rosenau, and Overton, and out of a recognized necessity not only are books on the subject being written but special schools with graded courses are being established for instruction in this subject. In July, 1915, Rosenau stated that "hygiene is included as a major subject in the curriculum of only three medical schools in this country, namely, the University of Pennsylvania, the University of Michigan, and Harvard." On the other hand, Reinhardt in February, 1913, with regard to the division between preparation for preventive and curative medicine, stated: "The division has evidently come to stay, because it is recognized and provided for in some of the best institutions of learning in our country; in Harvard, in the Universities of Pennsylvania, Wisconsin, and Michigan complete and separate courses are given to students who attain the degree of M. D. (doctor of medicine) and the degree of D. P. H. (doctor or diploma of public health). Johns Hopkins University also has a school of hygiene and public health. Although the University of California has no degree in public health, nor as yet any definite course leading to the degree in public health, it is rapidly working to that end and has long supplied courses adequate for the need of general students. It will perhaps be interesting, and in connection with the development of schools of public health it is pertinent, to note that "what is virtually *a certificate of public health* (based upon methodical and appropriate courses) was established in Lyon, France, as early as 1905, and that, in 1919, 209 persons had received the certificate, 135 having been physicians or medical students and 74 nonmedical men—pharmacists, chemists, architects, engineers, etc."[1]

In the United States the school for health officers conducted by Harvard University and the Massachusetts Institute of Technology represents the greatest and most substantial step in this direction, and

[1] Rosenau, Journal A. M. A., Vol. LXV, No. 4, p. 321; Reinhardt, Journal A. M. A., Vol. LX, No. 6, p. 427; Sedgwich, W. T., Am. Jour. of Public Health, Vol. X, No. 4, p. 352.

at present awards a certificate of public health (C. P. H.). A doctorate of public health (D. P. H.) is conferred in connection with the training at this school of Harvard University as one of its highest degrees. "The primary object of the school for health officers is to provide the scientific groundwork in the sanitary sciences which underlies efficient health administration,"[2] for satisfactory practical work is done and economically done only "by those who have a secure scientific foundation." The school recognizes, it is understood, four general subdivisions of the field of public service for which it undertakes to train, viz, the teacher, the research scholar, the technical expert, and the administrator. The scope of the training for the technical expert is perhaps comprehensive enough to include what may be termed the sanitary agent and the district health inspector, but the requirements for admission to, and the required period of study within, the school exacted of candidates for even its lowest award, the C. P. H., are such as to exclude the class from which are recruited the grade of public health servant at present so largely depended upon for the details of field inspection and work—the grade of public health servant which constitutes the sense bulb of the ultimate ramification of public health organizations. I refer to the corps of field workers which comes in daily contact with the people of a community as the representative of health departments in their effort to secure general recognition of health dictates and obedience to health laws.

As above indicated, much has been and is being done to develop a competent personnel in the upper stratas of health organizations; but it seems that little well-directed or systematic attention has been, or is being, given to the question of creating a high-toned, efficient, and dependable corps of sanitary inspectors, or of making the remuneration sufficiently attractive to assist such creation. It has been estimated by Farrell[3] that fully 7,000 sanitary inspectors are required for work throughout the United States on the basis of a conservative minimum organization of public health units per 20,000 of population. This would be independent of special problems and undertakings. Little or nothing has been written in this country touching the peculiar requirements as to fitness, training, and service of those who would fill this office. I have looked almost in vain, outside of English publications, for anything except the most superficial outline of daily general routine duties.[4]

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[2] Rosenau, Journal A. M. A., Vol. LXIV, No. 10, p. 795.

[3] Farrell, J. A., Journal A. M. A., Vol. 77, No. 7, Aug. 13, 1921, p. 514.

[4] For example, Frank Stockman says in the chapter on "Duties of sanitary inspectors in London," in his Practical Guide for Sanitary Inspectors:

1. Must obey and carry out instructions and directions of sanitary authority.

2. Must attend meetings as required by sanitary authorities. Should report at these meetings all matters requiring action, etc.

(Footnote continued on p. 6.)

Yet these people bear the same relation to the doctor of preventive medicine as does the nurse to the doctor of curative medicine and are quite as important in the scheme of things. They represent administrative assistance reduced to its lowest possible equation, but which is none the less indispensable as a factor depended upon for results in the distal reaches of a health department's daily concerns.

A sanitary inspector is anything but a theorist. His business is the observation of things as they are and the collection of information which shall reflect facts. The success of any system of sanitation or organization in the interest of public health, assuming it is well directed, will in the last analysis depend upon the type, training, and general efficiency of subordinates, the thoroughness with which they have been indoctrinated in the aims of the institution and their enthusiastic, persevering fidelity to the objective.

The aim of all health organizations is, definitely and broadly, the physical and mental improvement of the human race—the progressive recognition, establishment, and observance of the utmost any given time in the interest of health, as a thing in itself, and as the basis of all that spells the best in life. Contributions to civic betterment in any and every direction should be one of the aspirations in the breast of every worthy member of society. It is from such an element that we should seek to recruit sanitary inspectors. Unfortunately in the present state of our progress and facilities these are in the main without special training. Dependence for sanitary aides in civil life, by virture of inadequate compensation, has been upon a class of citizens less self-respecting and less conscious of its responsibilities than is desirable. This fact has suggested the very attractive proposition that the staff of visiting nurses which is a part of every properly organized health establishment be enlarged and given the additional duties of sanitary inspectors[5] or that sani-

(Continued from p. 5.)

3. He is to make systematic and periodical inspections of his district to keep himself informed as to its sanitary condition and especially to keep sharp lookout for those nuisances which require immediate attention and abatement.

4. On receiving complaint of nuisance should immediately inspect the place and take necessary action to remove the cause.

5. Should report to sanitary authorities any damage done to any waterworks or other works belonging to them. Also any defects in water supply of any house.

6. He is to make from time to time inspections of slaughterhouses, and of shops, and markets where butchers' meat, poultry, fish, vegetables, in short, all articles of food are kept for sale; and in case any article appears to be unfit for sale he shall cause it to be seized and dealt with by a justice.

7. Shall procure samples of food, drink, or drugs for analysis when required by sanitary authority to do so.

8. Should report overcrowding in any house and existence of any nuisance injurious or dangerous to health.

9. Shall keep all books the sanitary authority requires him to keep.

10. Shall carry out instructions of medical officer of health and give him all information in his power, and produce any books relative to his duties when required to do so.

[5] Overton and Denno, The Health Officer, 1919, express themselves as of opinion that the public health nurse may also do much as a sanitary inspector. "She is an inspector and instructor of persons, while the sanitary inspector deals with their environment," but you can't get away from the one in dealing with the other.

tary inspectors be carefully selected from the female citizens of a community. In either case the services of those who by nature or early training are "housekeepers" are secured. In the first case the advantage of fortifying the duty of exacting, with the persuasive influence of service, would be realized as an asset in getting results.

But whatever the source of personnel for this service, when there is combined with the general aspiration of good citizenship, an identification with a calling of vital moment to the welfare of society in one specific direction, nothing which will add to the mental equipment, fire enthusiasm, and fix determination to devote the very best efforts to the work in hand, can be neglected by the individual in office. "He must be alive to conditions, awake to discoveries, and conversant with the success or failure of methods in other localities; he can better afford to lag behind the science of which he is an exponent, but should be ambitious to hasten its advancement; this he can accomplish if he will dignify his least undertaking as a definite problem in research." It is the small things that count in building up big results just as the wonderful creation represented by the living body is made up of billions of little cells. Each sanitary inspector may be likened to an individual cell of an organ, and, as in the living body, the well-being of the whole depends upon the perfection with which the heart, liver, and kidneys perform their functions, both individually and in relation to one another, so the effectiveness of a given health department depends upon the perfection with which the corps of sanitary inspectors does its particular work in cooperation with other divisions of the department concerned. It is the administrative possibilities in the make-up of a sanitary inspector that count so much in rating his efficiency, for he alone comes in daily contact with the individuals of a community.

Before taking up the several points I have in mind let us analyze and give practical meaning to the term "sanitary inspector." In doing so I will take the last word first and change its form from "inspector" to "inspection." "Inspector" is a designation of office, a title; "inspection" represents the execution—the function which is the realization of the office. What does it mean? It means a routine periodic or a special investigation of operations or conditions to ascertain whether or not the subject of the inspection is as the best interests of all concerned dictate that it should be. And what is its purpose? Its purpose is to obtain periodically assurance that all is right, or to learn definitely what is wrong, and, in the first case, to commend and encourage the responsible parties to continue effort and, in the second case, to guide and urge to better effort and to correct the fault in one way or another, immediately if possible, but certainly by starting the necessary corrective machinery.

The psychologic understanding with which the function of inspection is entered upon, or the lack of it, and the spirit with which it is carried out when human contacts are involved, spell success or failure.

What are apt to be the results if the inspection is undertaken in a spirit of gruff destructive criticism with a crude display of authority? In the first place we note resistance which essentially is opposed to one's best interests—opposed to the work in hand—to one's reputation as an official of the sanitary department. Everybody within the field of the inspection will assume the defensive, and tenaciously withhold that information or cooperation so essential to success in securing the desired results. And thereafter will follow a long train of ill consequences in comparison with which failure, and the importance of it to one personally, fades into insignificance. An insanitary condition and the spread of preventable disease entails far-reaching damage to the community. The benefit or damage, as the case may be, to the community and to oneself runs parallel and is effected by the same end result.

What, on the other hand, are apt to be the results of the inspection if undertaken in a spirit of kindly constructive criticism and helpfulness with tactful firmness based on precise knowledge as the only show of force? In the first place, respect for and sympathy with the aims of the office will be noted. The sanitary inspector comes in direct contact with the individuals of his field of responsibility and must take their varying religious and racial susceptibilities, customs of life, and temperamental and habit tendencies into account. He is the one who must carry the health propaganda to the home not only by word but by objective teaching. The secondary rewards earned by a proper spirit and bearing in carrying out the duty of inspection, and which are a direct product of the respect and sympathy thus won, are the helpful cooperation of the individuals inspected, and their open and frank response to inquiry in all matters of concern to the inspector. Many inspectors fail because they promptly kill the goose that lays the golden egg—their source of information—by improper methods.

The true criterion of efficient general sanitary inspection is not the number of reports of nuisances or violations of the law that are turned into headquarters, but the health of the district a given inspector may be assigned to supervise as shown by statistics from month to month, or, to take for example an inspection in which special training and experience is necessary, such as the inspection of a dairy farm, the criterion of efficient inspection is the maintenance of the required standard of the dairy product as shown by laboratory examination. Of course reports have to be made, and they serve the important purpose of showing conditions as they exist, and of bringing to one's assistance the power of higher authority, but I want to keep away from the idea that they are more than a small part of the full duty of the office. I want to avoid the possible false notion that the fulfillment of the obligation of the office is the sum total of unfavorable criticism and the unearthing of some culpable error or omission. It is the part of administrative wisdom, rather, to look for evidence of compliance with the sanitary code and general sanitary principles, taking careful note the while of those features in which there seems opportunity for improvement, and to look with surprise upon failure to render that measure of cooperation which is to be expected from those possessed of intelligence and honest purpose. Occasionally one will be called upon to exercise all the force resident in the office but, in general, the aim should be to lead rather than to drive. When there are adequate laws and adequate authority, force is the shortest road to a desired action, but there are few laws perfect enough to admit the elimination of discretion or that do not present some loop hole of escape—some defect which can be taken advantage of for purposes of evasion. The work of the inspector, therefore, is in part a campaign of education to convert a community to sanitary living and, as in religion or politics, it is impossible to convert by force.

And now as to the word "sanitary," which precedes the word "inspector" and completes the title: It stands for that condition of our surroundings, immediate and remote, which conduces to physical well being, and brings contentment and happiness, not only as a reflection of a state of health but by preserving unstained and unmarred the native beauty of God's gifts. Furthermore, the word "sanitary" represents a condition upon which is based the possibilities of progress and accomplishment in all those enterprises wherein human energy is a determining factor.

The title "sanitary inspector" is one of which to be proud, and it designates an office which is growing in importance. Indeed, it has become a specialty within a profession dignified by its identification with the great undertakings in tropical latitudes during recent years. Cuba would not be to-day the well-ordered, prosperous country that it is if the work of the sanitary inspector had been faulty. The Panama Canal would not be to-day accommodating the ocean traffic of the world if the sanitary inspector had been unequal to the task intrusted to him. Each of the 25 districts into which the Canal Zone was divided, as far as general sanitary work was concerned, was in charge of a sanitary inspector who had under his control a properly trained body of men, consisting of from 20 to 100 laborers, with assistants and foremen as necessary.[6] "No case of yellow fever, smallpox, or plague originated in or was brought to the Isthmus during the

[6] Gorgas, W. C., Sanitation in Panama, 1915. D. Appleton & Co., "The work of the sanitary inspector," p. 182.

month." This represented the usual statement of the chief sanitary officer in his monthly report upon health conditions during the construction of the canal and reflected the work of the sanitary inspector.

The obvious duties of the sanitary inspector will vary according to locality, season, and peoples. The difficulties in executing these duties will increase or decrease according to the temper of the community collectively, and that of the individual families composing it regardless of the personality of the inspector. In the Tropics, for example, the duties are concerned, to a large extent, with the control of protozoal diseases, whereas in northern climates, except in malarial districts, the bacterial diseases constitute the burden of concern. Urban communities present quite different requirements from those of rural settlements; manufacturing centers present sanitary problems distinct from those of business or purely residential districts and peoples of different races and religions present superstitions or habits or rites each of which, in its own way, imposes new and perhaps peculiar duties, or the exercise of ingenuity, to the end that the inherent violation of sanitary principles may be overcome with entire deference to religious or ritual considerations.[7]

As an example of the general outline of duties which are formulated and issued for the guidance of sanitary inspectors, I quote the prescription "by the local government board for sanitary inspectors in the metropolis, in the sanitary officer's (London) order dated December 8, 1891."

1. He shall perform, either under the special directions of the sanitary authority, or so far as authorized by the sanitary authority, under the directions of the medical officer of health, or, in cases where no such directions are required, without such directions, all the duties specially imposed upon a sanitary inspector by any statute or statutes, or by the orders issued by us, so far as the same apply to his office.

2. He shall attend all meetings of the sanitary authority when so required.

3. He shall by inspection of his district, both systematically at certain periods, and at intervals as occasion may require, keep himself informed in respect of the nuisances existing therein that require abatement.

4. On receiving notice of the existence of any nuisance within his district, or of the breach of any by-laws or regulations made by the sanitary authority for the suppression of nuisances, of any by-laws made by the London County Council which it is the duty of the sanitary authority to enforce, he shall, as early as practicable, visit the spot and inquire into such alleged nuisance or breach of by-laws or regulations.

5. He shall report to the sanitary authority any noxious or offensive businesses, trades, or manufactories established within his district, and the breach or nonobservance of any by-laws or regulations made in respect of the same.

[7] In this connection it is interesting to note that in some parts of the Tropics the holy water fonts of Roman Catholic Churches, which were prolific breeding places for the yellow-fever mosquito, have been transformed into inclosed receptacles, the precious water being obtained by the devout through a device similar to the liquid soap dispensers in Pullman cars.

6. He shall from time to time, and forthwith upon complaint, visit and inspect the shops and places in which is exposed for sale, or in which is deposited for the purpose of sale or of preparation for sale, any animal, or any article, whether solid or liquid, intended for the food of man, and examine any such animal or article which may be therein. If any such animal or article appears to him to be diseased or unsound or unwholesome or unfit for the food of man, he shall seize and carry away the same himself or by an assistant, in order to have the same dealt with by a justice according to the provisions of section 47 of the public health (London) act, 1891: *Provided*, That, in any case of doubt arising under this clause, he shall report the matter to the medical officer of health, with the view of obtaining his advice thereon.

7. He shall, when and as directed by the sanitary authority, procure and submit samples of food, drink, or drugs suspected to be adulterated to be analyzed by the analyst appointed under the sale of food and drugs act, 1875, and upon receiving a certificate stating that the articles of food, drink, or drugs are adulterated, cause a complaint to be made, and take the other proceedings prescribed by the act.

8. Whenever it appears to him that the intervention of the medical officer of health is necessary in connection with any nuisance, he shall forthwith inform such officer thereof. He shall also, subject to the directions of the sanitary authority, attend to the instructions of the medical officer of health with respect to any measures which can be lawfully taken by a sanitary inspector under the public health (London) act, 1891, or under any other statute or statutes.

9. He shall enter from day to day, in a book to be provided by the sanitary authority, particulars of his inspections and of the action taken by him in the execution of his duties. He shall also keep a book or books, to be provided by the sanitary authority, so arranged as to form, as far as possible, a continuous record of the sanitary condition of each of the premises in respect of which any action has been taken under the public health (London) act, 1891, or under any other statute or statutes, and shall keep any other systematic records that the sanitary authority may require.

10. He shall at all reasonable times, when applied to by the medical officer of health, produce to him his books or any of them, and render to him such information as he may be able to furnish with respect to any matter to which the duties of a sanitary inspector relate.

11. He shall, if directed by the sanitary authority to do so, superintend and see to the due execution of all works which may be undertaken under their direction for the suppression or removal of nuisances within his district.

12. In matters not specifically provided for in this order he shall observe and execute any instructions issued by us, and the lawful orders and directions of the sanitary authority, applicable to this office.

Another example of later date is given by Porter.[8]

These are prescribed in the order of 1910, which details the duties of the medical officer of health, which, in some respects, they resemble. He is required—

1. To perform all duties imposed upon inspectors by the public health act, 1875, and other statutes.

2. To attend meetings of the sanitary authorities when required.

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[8] Porter, Charles, Sanitary Law, London, 1920. Section 1, "Sanitary administration," p. 4.

3. To inspect this district and keep himself informed as to nuisances calling for abatement.

4. To inquire on the spot into any complaint as to nuisance or breach of by-laws or regulations made for the suppression of nuisances.

5. To report to sanitary authority as to noxious or offensive businesses and breaches of by-laws or regulations relating thereto.

6. To report any damage done to water supply, works, or fittings and any case of waste or fouling of water.

7. To visit butcher's and other food shops and inspect the meat, etc., and seize and deal with it if it is unsound; in doubtful cases to consult the M. O. H. (medical officer of health).

8. To take samples under the sale of food and drugs act, submit them to the public analyst, and if they are reported adulterated, take proceedings.

9. To notify the M. O. H. of outbreaks of disease, and any cases of overcrowding or nuisance injurious to health.

10. To attend to the instructions of the M. O. H. (so far as the sanitary authorities direct) as to the taking of measures which an inspector may take under the public health acts for the prevention of disease.

11. To keep a daily journal and books recording the action taken under the public health acts.

12. To produce his books to the M. O. H. and furnish him with any information relating to his work.

13. To superintend work undertaken by the sanitary authority for the suppression or removal of nuisances.

14. To act, if required, as officer under the diseases (animals) acts, and orders and regulations thereunder.

15. To obey the orders and directions of the sanitary authority and L. G. B. (local government board).

It makes little difference from where the examples are derived. Such formulations of duties will vary according to the conception of the prescribing authority. It frequently happens, of course, that sanitary inspectors are assigned to special fields which absorb their whole time, at the expense of attention to the duties of the general inspection above indicated, and in which they must become experts.

This brings me to the character and peculiar fitness requirements of the office, and as an introduction to this section of my paper I quote from The Sanitary Inspector's Handbook, by Albert Taylor (London, 1914).[9]

In general terms, a person to be fully competent to perform the duties of a sanitary inspector should have the following qualifications:

He should be the owner of a good, sound constitution and be able to follow the rules laid down to preserve it, including temperance.

He should be able to write legibly, spell correctly, and have a fair knowledge of arithmetic.

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[9] The preface to the last edition says that this book was compiled with the desire of furnishing to the sanitary inspector and those seeking to qualify for such appointment a useful vade mecum upon the subjects pertaining to the office. The book aims to supply practical information on the various matters which come daily under the notice of the sanitary inspector, and not at being an exhaustive work of scientific reference. As it is in its fifth edition, it would seem that the book has met a demand and filled a useful purpose.

He should have a thorough knowledge of building construction, including plumbing, and the methods of water supply and drainage; also the proper principles of ventilation of rooms, and should know the best and most suitable sanitary appliances to use under varied circumstances.

He should have an observant eye, a quick ear, and a sensitive nose, and be able to detect any defective or faulty sanitary arrangements of dwellings and other buildings.

He should be thoroughly acquainted with the provisions of the various public health acts and model by-laws relative to the duties of sanitary inspectors.

He must make himself acquainted with the various kinds of infectious diseases and know the best means to adopt for preventing the spread of such diseases.

He should acquire a knowledge of the different kinds of disinfectants in use and know those best fitted for safely and effectually disinfecting houses and fever localities.

He should have a thorough knowledge as to the different methods adopted for the collection and disposal of house and other refuse.

He should be of pleasing address, and in his dealing with the public he should be calm and collected, learn to restrain his temper, and to endure hard speeches.

He should bear himself with a sympathetic aspect to the many bereaved widows, mothers, and orphan children he so frequently meets in the performance of his duties. Civility and kindness must characterize all his actions, and rude behavior or supercilious officialism should find no place in his conduct.

He should at all times attend promptly to any special complaints, and frequent inspections at irregular periods are necessary as regards slaughterhouses and other similar businesses.

Sanitary authorities are sometimes disposed to disregard anonymous complaints, but it is the duty of the authority to investigate every specific complaint made to them without regard to the means by which it comes to their knowledge; and, if satisfied, upon inquiry, that such complaints are justified, they should direct that measures be taken to remove the ground of complaint. It is essential, however, to exercise the greatest care when inquiring into such complaints, otherwise the authority and its inspector may be made the victim of ill-will or spite.

Speaking from the Engish point of view again, and in a rather quaint vein, as indicating great expectations and the extremely large order that some in authority were wont to impose upon the occupant of a hitherto miserably compensated office, it has been said, " That in order to carry out the multifarious duties of his office, an inspector should be partially educated in the following trades and professions, viz, that of a plumber, in order to detect bad work and be able to fill in his notices how the bad work is to be rectified; that of a butcher, in order to detect and intercept bad meat; that of a veterinary surgeon, in order to observe animals that may be suffering under the contagious diseases (animals) act, and also in connection with his visits to slaughterhouses; that of a lawyer, in order that he may be well cognizant with all the acts and regulations under which he carries out his duties, and to enable him to form a judicial opinion upon all statements of facts; that of an architect, in order that he may understand plans, and, if necessary, make sketches of anything that comes under his notice in connection with his duties; that of a clergyman, in order that he may preach the good tidings of sanitation, and may by his precept and example further the good work he is engaged upon, and also that he may be able to patiently bear the abuse which he may sometimes receive for what is called his 'prying interference.' Lastly, he must try to educate himself in common sense—that most valuable commodity without which book learning availeth not much."

Discussing the character and temperament of the sanitary inspector, Taylor[10] says:

"To carry out his duties efficiently, the sanitary inspector must exercise great forbearance, tact, and good temper; sometimes technical objections will be raised to his proceedings; vexations, delays, and evasions will often occur in the fulfillment of his notices; nuisances, which the officer is anxious to suppress, may elude his authority; when he would force one person to refrain from tainting the atmosphere with the result that his tenants were better housed than cattle, he will often be reminded of the rights of property and of an Englishman's inviolable claim to do as he will with his own.

"With private affairs he should interfere only when they become of public import, and with private liberty only when it becomes a public encroachment.

"Thus neither the personality nor the office should be magnified. To do this is to court the contempt of ordinary men and women. Officialdom is the curse of any administrative body. Therefore, the man who goes about his duties in a way that compels respect, and whose tactful demeanor impresses others that the thing he is asking for can not be denied, is the one who will win his way to the front. Owners and occupiers are but human, and they like to feel they are receiving the attention of a friend although an official."

And again, on page 38 of his book, Taylor says under the heading "Qualifications":

"Sanitary authorities do not and have not always sought to appoint the person best fitted for the post of inspector. They have too frequently appointed the man who could command the greatest influence with its members without the slightest regard to his qualifications. The important duties which sanitary inspectors are now called upon to discharge, and the large discretionary power that must be vested in them, demand that only qualified persons should receive these appointments, and experience has undoubtedly rendered it necessary to establish some mode of testing the competency and qualifications of persons offering themselves as candidates to fill such appointments. Some assurance should be given to the public that

[10] Taylor, Albert, Sanitary Inspector's Handbook, London, 1914, p. 38.

the persons entrusted with these responsible duties are properly qualified.

"Evidence of special training and of potential efficiency as represented by character and temperament ought to be regarded as basic, and when the question of qualifications has been thus determined and appointment has been made, a fixity of tenure should obtain.

"Every sanitary inspector is entitled to security of office, for he it is who is brought into personal conflict with property owners more than any other officer appointed by the local authority."

The Secretary of Health and Charities in Cuba, speaking of his local chief sanitary officers, said: "They can all feel perfectly sure that they will not be removed from their offices while they comply with their duties in a satisfactory manner, because I sustain the view that the employee who fulfills his obligations competently should be respected, defended, and protected."

Needless to say, definite knowledge on a variety of subjects is of the utmost importance, but the best professional equipment may be a total loss if its possessor lacks a personality which is considered essential to the effective application of such knowledge. In seeking to outline the right personality I am conscious of dealing with the main factor in success. Indeed, so clearly is this the case, that if something in one or the other qualifications must be sacrificed in the candidate it had better be in the direction of technical training. Professional shortcomings can be more easily corrected than defects in personality.

The difficulties and perplexities which beset a conscientious inspector are rarely mentioned or are insufficiently dwelt upon by the instructors in sanitary science who are primarily interested in the technicalities of this or that particular subject, and who may be merely preparing students for examination. This fact the inspector may be sure of, namely, that to frame requirements is one thing, and to see that they are carried out is quite another. There is no doubt many who, through lack of serious intention, through laziness, mental or physical, or through sheer lack of ability and perception, skim along lightly over things and avoid annoyance and difficulties but effect nothing. Others fail for want of adequate training; for want of a sanitary point of view, a sanitary interest and ambition, sanitary ideal, and a sufficient acquaintance with sanitary problems or satisfactory practical methods of solving them. Ingenuity and resourcefulness, which are so imperative, are to such a group total strangers. But the vast majority who find employment as sanitary inspectors, and are appointed without regard to their qualifications, fail to do more than to keep their own skirts clean—fail to realize the reward of perhaps an honest ambition and purpose because they are not temperamentally constituted to be a telling figure in that field of work.

What sort of personality fits the job and makes for its utmost possibilities? It is impossible to lay down any hard and fast rules or to treat this phase of the subject briefly. It finds concentrated expression in the thought that once an inspector succeeds in persuading the people to accept him as a friend, working as much in their interest individually as in the public welfare—even though a friend who tells home truths—the battle is largely won. Difficulties there will always be under the best of circumstances, difficulties which may have been increased by want of wisdom or tact on the part of a predecessor, but the gratification of a victory in spite of them is great, and the self-satisfying consciousness that something positive is really being accomplished—that progress is being made through one's personal effects—is a large reward.

A number of contributors to the literature of public-health work have touched upon the element of personality in the make-up of sanitary inspectors, but the one giving most systematic and sympathetic consideration to it is Edith L. Maynard in her book entitled "Women in the Public Health Service." It is written from the English point of view, as is the case of most of the literature on the subject, but it is not the less applicable to either men or women in field work anywhere, and so nearly expresses my own views that in the following paragraphs I have drawn largely upon it.

"It must be borne in mind that public-health work of whatever sort consists mainly in trying to make people do what, if left to themselves, they would not do." The bringing about of a new order of things, then, is the real crux of the task, and it should appeal to one's sporting nature. It is a contest as to which shall win—the exponent of progress or of the obsolete—and its very difficulties and tenacity of purpose is a characteristic of women which men will do well to imitate, and it is particularly necessary to the reformer in the guise of a sanitary inspector, for he can not afford to compromise with principle. He can do so only as a means to an end. In other words, if a thing can't be done one way, it can be done in another way, and it is the inspector's duty to be practical—to familiarize himself with all the details involved in a given problem and to find reasonable means for meeting reasonable objections. It is a matter of managing people, of exerting and proving oneself in the most interesting game imaginable, and "it is not everyone who can deal satisfactorily with others."

Owing to the variety of classes and racial peculiarities or habits and shades of self-conscious social caste that will be met in the course of the day's work, the background of the inspector, in other than the mere matter of education, is not an inconsiderable item in the total making for potential efficiency. The environment from which he is drawn is important and should be such as to give promise that he possesses that savoir faire which will make it possible for him to discern both the nature of a situation and its opportunities or impediments. He should entertain a sense of the importance of his work and assume the quiet dignity and full measure of responsibility which properly attaches to his office, but he should be one who has found himself, in a worldly-wise sense, and is not disposed either to take himself too seriously or to patronize those with whom he comes in contact. There must be a nice appreciation of ethical relationships as shown in his bearings and intercourse. "But this, obviously, is not enough, for there are people of all classes who have the (unhappy) knack of rubbing others up the wrong way, and such an one is of no use in the Public Health Service."

"To whatever class the public-health officer belongs, he must possess tact. The tactful official will quickly ascertain the frame of mind of those whom he visits, will know when to praise and when to blame, when to be firm and when to use persuasion only. Many unpleasant truths will have to be told if the work is to be effective, but he will know how to take the sting out of them. He will possess that true sympathy which understands the greatest difficulties which are in the way of those who would endeavor to rise above their often debasing surroundings. But weakness is quite another thing, and there is no place in public-health work for such a characteristic. It is uphill work all the time, and the worker must possess the strength of mind which will enable him to persevere in spite of the most disheartening results of his efforts."

Determination and patience therefore are also essential. In the exercise of these qualities the inspector should know whereof he speaks; he should be sure that the knowledge of his subject is precise. Glittering generalities sound well, but they do not leave as deep an impression on those he seeks to guide as do simple instructions given in a manner at once kindly and convincing, which seems to invite rather than compel cooperation. In this connection too much stress can not be laid upon the importance of demonstration and memoranda. Whenever possible, resort should be made to object lessons, and written instruction expressed in the simplest phrases should be given, because, however well intentioned, people will forget, and the mere fact that they are being called upon to do something strange or unusual fosters that unfortunate trick of the mind—forgetfulness. The need of patient repetition will be realized when the well-nigh universal resistance to any change from an old order of things which has become the habit of life is taken into account. People get into a groove and the older they grow the deeper that groove becomes and the harder it is to get them out of it. Because they have done a particular thing a certain way for years they rebel against having a new way of doing that same thing imposed upon them.

For this and other reasons the credulous person will not accomplish much. Deception will be met with daily in almost every branch of the work, and the inspector must be observant, critical, accurate, and thorough. Nor does the "cocksure," self-opinionated individual usually go very far. It is necessary for the inspector "to keep an open mind as to the methods of work and to look out for opportunities of learning from those engaged in the various branches of social service as well as from others in his own profession. A constant effort will have to be made against becoming stereotyped in either methods or ideas, and the public-health worker, above all others, needs to remind himself frequently that the work of his department, important though it is, is only part of a great endeavor which is being made in many directions, by multifarious agencies, toward social amelioration. If, therefore, the inspector is to be saved from isolation and incompetency, he must contrive to keep in touch with other agencies, learn their aims and methods, and look out for every opportunity to cooperate."

Furthermore, the inspector must be self-controlled. An "easy-going" person will never make progress, but a bad-tempered person will always be getting into difficulties and stultifying the effect of work which otherwise might have been valuable. There is ample cause for annoyance and irritation. Indeed, "the inspector may look for any sort of treatment—quiet patronage, insolent opposition, irritable impatience at disturbance, a quiet acceptance of inspection as one of the ills of life, or a marked anxiety to please." His temper must be controlled throughout, and an endeavor to see the point of view of the one responsible for the condition or property under inspection will make compliance with this injunction easier. "It is by no means a pleasant thing to be inspected. The interruption alone is a serious annoyance to a busy person and the very fact of possessing the right of entry should make the official all the more careful to treat the occupier courteously and respectfully. This is quite compatible with a quiet dignity. In most cases the work can be carried out without friction if this is borne in mind. It is not always easy for an employer to keep discipline among workers, and the difficulty will be increased if an inspector walks into a premises as if it belonged to him and speaks autocratically to the occupier before the workpeople. It is always best to act as if it were taken for granted that everything would be found in due order. The majority of occupiers err through ignorance, or carelessness, or press of work, and are often quite unable to grasp the necessity of the legal standard."

Again, no one who is dependent upon direct orders as a basis for his activities will ever "get through more than 'jog-trot' routine work." Success in the office demands initiative and resourcefulness for situations constantly arise requiring action without opportunity for reference to higher authority, and the inspector can not afford to appear incompetent in emergencies. Serious trouble can often be averted through quick decision and rapid action, and failure in this direction may also lower the service in the eyes of the public.

Not only are the requirements exacting as regards the temperamental make-up of the individual, but the need "for good health must be emphatically emphasized. The work is extremely hard; it involves a mental as well as a physical strain and makes demands upon the strongest." Mere freedom from organized disorder is not enough.

Finally the disposition of the inspector should be such as to teach by example as well as precept. The development of a health conscience in the public is a progression hoped for as an asset to public-health organizations—to the inspector in facilitating his work—and every sanitary inspector should be a nucleus of enthusiasm for the health propaganda and spread an understanding of its principles throughout his district. But in doing so he must remember that acts speak louder and carry greater force and conviction than words. His own personal appearance and the conduct of his own life and surroundings must therefore illustrate his advice.

As regards general education and special training, others have spoken and will speak. This phase of the question of fitness was not contemplated in the discussion planned for this paper other than to touch upon the need, as has already been done, for a wider insistence upon the degree of fitness represented by a certificate or diploma on sanitary sciences. It is perhaps sufficient to say here that, both in general and technical education, the highest is none too good if the inspector is to be able to enter intelligently into the wider aspects of his work and is to perform satisfactorily the various duties that may be properly imposed upon him, to say nothing about the importance of well-written letters and reports, an understanding of statistics and usefulness of a working knowledge of languages other than his own.

"It is certain also that every public-health worker will be called upon sooner or later to speak in public. It may be only to give a 'friendly talk' to a mothers' meeting, but even this is no simple matter if it is to be given well, for simplicity and conciseness are rarely combined with a limited capacity."

It is incumbent upon all sanitary inspectors to see to it that the possibilities of their profession do not fail of realization because of their neglect to inform themselves of the advances made in sanitation.. They must always do the best they can. Well enough is not sufficient. A mere show of enthusiasm and energy will not satisfy. To have no deeper interest, no higher ambition, than the accomplishment of that which suffices to save him from censure by his superiors, exhibits an attitude of mind toward his profession which is bound to be barren of anything worth while and which in the long run will make his work a dull occupation. It is a safeguard to his own personal contentment and essential to his success that he thoroughly acquaint himself with both the theoretical and practical sides of his job and discern all the possibilities in his field of work.

Probably the large majority of those men and women who are serving as sanitary inspectors in this country to-day have not had a practical course in sanitary science, but that handicap is not, and need not be, a serious impediment to success, nor should it have any other effect than to inspire a determination to learn by reading, observation, and otherwise, anything and everything that bears upon the profession. All those thus situated are in the same position as doctors and lawyers who, in the early days when there were few if any schools and many students, simply read medicine or law under the direction of a preceptor. At a certain period of the world's progress some of these men of the old order, so to speak, had, of course, to measure themselves with the product of scientific schools, and they did it creditably by just the process that is open to the sanitary inspector of the old order, or what is hoped will soon become an old order. In other words, it is the urgent duty of the sanitary inspector of this class to readjust his ideas to the fast-coming new order of things, and to place his services on the substantial basis of scientific knowledge. The need that all persons occupying the position of sanitary inspector shall, by every available means and an unflagging acquisitiveness, improve their fitness for office is, of course, imperative; but, on the reasoning that the process of rusting is more reprehensible than the failure to develop, the obligation to keep in touch with progress which rests upon those who are happy possessors of scientific training as a background, is as vital as self-preservation.

As intimated above, in the last analysis the tell-tale of the efficiency of the sanitary inspector is the health of his district. By this I wish to be understood as referring to the relation of his work to that of the doctor. The sanitary officer precedes in the field, and it is only where his failures crop out in relation to preventable diseases that the doctor steps into the breach. The sanitary inspector should be and is coming to be, more and more, a valuable accessory for the dissemination of sanitary gospel and, in addition, he stands ready to ameliorate the situation where preventive efforts have failed, but the sanitary inspector must square himself with his conscience and with the public and with his chief that he has honestly and faithfully done everything that was humanly possible in the circumstances to prevent the demand for the doctor's healing assistance.

ACID-BASE EQUILIBRIUM.

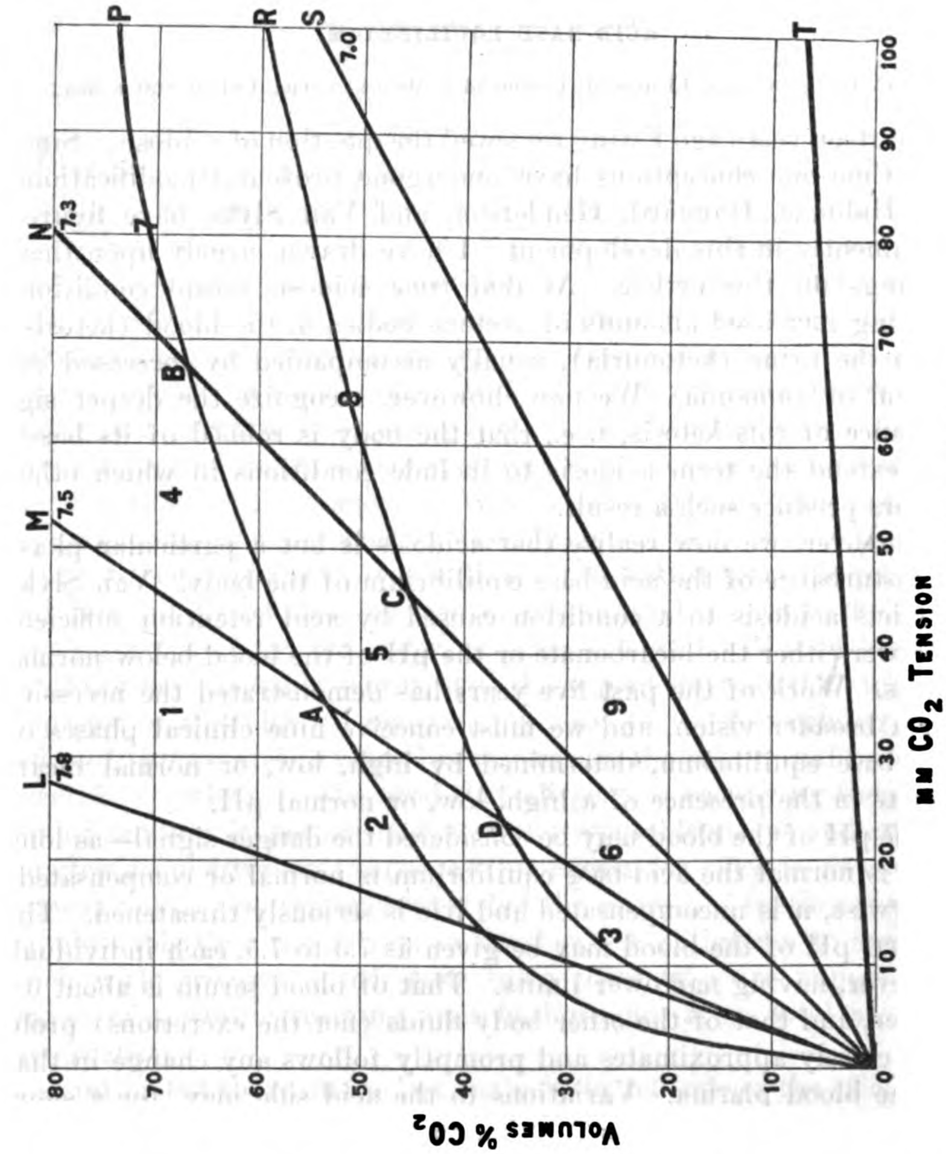
By C. W. O. Bunker, Lieutenant Commander, Medical Corps, United States Navy.

Fourteen years ago Ewing reviewed the question of acidosis. Since that time our conceptions have undergone profound modifications, and Haldane, Haggard, Henderson, and Van Slyke have figured prominently in this development. I have drawn largely upon their writings for this article. At that time acidosis meant conditions showing increased amounts of acetone bodies in the blood (ketosis) or in the urine (ketonuria), usually accompanied by increased excretion of ammonia. We now, however, recognize the deeper significance of this ketosis, i. e., that the body is robbed of its bases, and extend the term acidosis to include conditions in which other factors produce such a result.

Moreover, we now realize that acidosis is but a particular phase of disturbance of the acid-base equilibrium of the body. Van Slyke restricts acidosis to a condition caused by acid retention sufficient to lower either the bicarbonate or the pH of the blood below normal limits. Work of the past five years has demonstrated the necessity for a broader vision, and we must conceive nine clinical phases of acid-base equilibrium, determined by high, low, or normal bicarbonate in the presence of a high, low, or normal pH.

The pH of the blood may be considered the danger signal—as long as it is normal the acid-base equilibrium is normal or compensated; otherwise, it is uncompensated and life is seriously threatened. The normal pH of the blood may be given as 7.3 to 7.5, each individual, however, having narrower limits. That of blood serum is about 0.2 higher, and that of the other body fluids (not the excretions) probably closely approximates and promptly follows any change in that of the blood plasma. Variations to the acid side may, for a short time at least, be as low as 7, although not much lower without fatal results; 7 is considered as the point where coma occurs. Variations to the alkaline side (*alkalosis*) beyond 7.8 are accompanied by symptoms of tetany, although one is not at present justified in assuming that all tetany is either caused or accompanied by alkalosis. So the extreme range of reaction compatible with life probably lies approximately between pH of 7 and 7.8.

The hydrogen-ion concentration (or its derivative, pH) of the blood varies as the ratio between the concentrations of dissolved carbonic acid and bicarbonate (generally indicated by $\frac{[H_2CO_3]}{[BHCO_3]}$, in which B represents the metal, such as Na, K, etc., in the bicarbonate), i. e., a relative increase in the H_2CO_3 increases the hydrogen-ion



Carbon dioxide absorption curves.

concentration (C_H+) and lowers the pH, and vice versa. A full appreciation of the significance of this ratio is the basis of an intelligent comprehension of acid-base equilibrium.

The accompanying chart (modified from Peters, Barr, and Rule, and Van Slyke) is a graphic representation of essential facts in acid-base equilibrium. Ordinates represent total CO_2 (content, which comprises that in simple solution and that as bicarbonate) of *whole blood* in volumes per cent, and abscissæ the millimeters CO_2 tension in the blood as withdrawn. The line OT gives the proportion of total CO_2 present in simple solution. pH values are shown by the lines OL, OM, etc. The extreme normals for carbon-dioxide-absorption curves are OP and OR. These curves are obtained by plotting the total CO_2 of whole blood after being drawn and equilibrated with different percentages (tensions) of CO_2. The intersection of such a curve with total CO_2 value of the blood as drawn would give the CO_2 tension in the blood and also the pH.

The actual state of the acid-base balance can only be determined by the use of any two of a number of interdependent variables, such as total CO_2, CO_2 tension, pH, H_2CO_3 concentration, other buffers than bicarbonate, plasma chloride, ratio of oxyhemoglobin to hemoglobin, etc. Findings that fall within ABCD and at about 40 millimeters tension indicate a normal equilibrium for the resting individual at ordinary altitudes; or, such a normal would be a total CO_2 of about 49 (43–56) volumes per cent for whole blood, and 50–65 volumes per cent for plasma. The normal for the individual falls within narrower limits. The CO_2 tension of alveolar air may be the same or vary as much as 20 millimeters below, while that of venous blood will be about 6 (0.8–10) millimeters higher than that of arterial blood. So, although the CO_2 tension in alveolar air is usually approximately that in arterial blood, it is not an accurate measure of the latter, being dependent upon the extent to which pathological processes may influence ventilation of alveoli or alter their walls so as to impair diffusion, etc. The "CO_2 capacity (combining power)" of plasma may be as much as 15 volumes per cent more than the total CO_2 of whole blood.

The ratio, $\frac{[H_2CO_3]}{[BHCO_3]}$, is influenced by many factors, of which the following is an analysis.

To increase or protect bicarbonate:

1. Administration of same.
2. Loss of gastric HCl caused by obstructing the pylorus, and regularly washing out the stomach for some days.
3. Processes indicated by increased excretion via the urine of ammonia (probably diverted from urea formation) and titrable acid (including buffer acids, such as acid phosphates).
4. Possibly a shift of HCl to the tissue cells from the plasma like that from the plasma to blood cells.

To decrease bicarbonate:

5. Acid substances.
   (*a*) Increased production.
   (*b*) Decreased elimination.
   (*c*) Administration of same.
6. Diuresis, and elimination via the urine.
7. Lack of factor three above.
8. The hyperpnœa of oxygen want.

To increase carbonic acid:

9. Administration of same.
10. Impaired diffusion in the alveoli of the lungs.
11. Slowing of respiration.

To decrease carbonic acid:

12. Hyperpnœa.
    (*a*) Voluntary.
    (*b*) Due to disease processes.
    (*c*) Due to low oxygen content of air.
    (*d*) Emersion from warm water.
13. Low atmospheric content of CO_2.

If either the H_2CO_3 or bicarbonate vary from normal values, there is apparently an effort on the part of the body to adjust the other so as to maintain at least a normal pH (compensation). This is accomplished by respiration, or by diverting alkali from, or recalling it to, the blood stream. In the chemical complex presented by the body fluids, the CO_2, or H_2CO_3, is the easily variable factor, at the same time activating and being itself regulated by the respiratory center. The latter is extraordinarily sensitive to the slightest alteration in the reaction of the blood toward the acid side. C + is, so to speak, the hormone of respiration. Normally, the bicarbonate (represented in the ratio by $BHCO_3$) is maintained at a definite level, so much so as to be a physiological constant (more so than temperature or osmotic pressure). In case the respiratory control of H_2CO_3 is inadequate to maintain a normal pH, some bicarbonate will disappear from the blood stream if the $[H_2CO_3]$ is diminished. A relative increase in $[H_2CO_3]$ recalls bicarbonate to the blood stream, or an increase of the latter is effected by the hemoglobin as noted below. Such is the normal mechanism by means of which the constancy of the ratio, and, consequently, the pH, is preserved.

Another powerful factor, however, also aids in the control of the pH of the blood, i. e., the buffers. Such substances in solution afford a high resistance to change in reaction—they tend to minimize the effect of added acid or alkali so that the pH is but little affected. The body fluids contain a mixture of such chemical substances that is probably as satisfactory as could be devised, being effective in colloidal as well as aqueous solution. The important blood buffers are bicarbonates in plasma and cells, proteins (especially hemoglobin), and phosphates in the cells.

The hemoglobin, in addition to its general buffer effect as a protein, is especially important since, by virtue of it and the reversible reaction

$$H_2CO_3+NaCl=HCl+NaHCO_3,$$

the erythrocytes not only control the $[BHCO_3]$ but also transport 80 to 95 per cent (sometimes possibly all) of the CO_2 to the lungs. The HCl passes into the cell and is probably held by the hemoglobin, although, when the latter is overburdened, another buffer may be called into play, i. e.

$$HCl+Na_2HPO_4=NaH_2PO_4+NaCl.$$

The relatively slight remainder of alkali necessary for transportation of the rest of the CO_2 is supplied by the other buffers, i. e., cell phosphates, plasma proteins, and bicarbonate. In the lungs, the CO_2 is excreted and NaCl reformed. The acid phosphate would be excreted in the urine.

This ability of the hemoglobin to form bicarbonate is important, inasmuch as it not only aids in the regulation of the $[H_2CO_3]:[BHCO_3]$ ratio, but also because the corpuscles can thus conceal 5 to 10 times as much acid as the plasma bicarbonate can ordinarily neutralize. Moreover, by so controlling the acid, H_2CO_3, itself, the hemoglobin enables the cells to use their reserves of buffer alkali to maintain a constant pH in the plasma.

The numbered regions of the chart are associated with various clinical conditions, e. g., tetany from 1, 2, and 3; the acidosis of diabetes mellitus, nephritis, or infantile marasmus with 6 or 9; pneumonia, morphine narcosis, and breathing of air containing 3 to 5 per cent CO_2 with 7 or 8; emphysema with 4; some cardiac cases with 9; overdose of bicarbonate with 1 or 4; fever with 2; as the result of high altitudes, 2 or 3, or, when acclimated, 6; shock (handling of the intestines), deep ether anesthesia, and carbon-monoxide asphyxia with lowered bicarbonate.

Relative to these areas, I will further brief a recent article by Van Slyke, and refer to the factors influencing the $[H_2CO_3]:[BHCO_3]$ by their numbers in the analysis above.

Area 1 is uncompensated alkali excess. Factors 1 (overdose) and 2 will produce it. It will be accompanied by compensatory factors, such as 6 (may excrete several grams bicarbonate per hour), 7 (titrable acid may become a negative quantity), and 11.

Areas 3 (partial compensation) and 2 cover uncompensated carbon-dioxide deficit, 2 representing the first result of lowering the $[H_2CO_3]$ in the blood by a respiratory stimulus other than either the blood hydrion or the $[H_2CO_3]$. Genesis, factors 12 a, c, or d. Compensatory, factor 6 (only a fraction of a gram of bicarbonate excreted per hour), and retention of acid metabolites as shown by factor 7.

Area 4 is compensated alkali excess or carbon-dioxide excess. Genesis of former, factor 1 (the moderate overdose orally administered, which usually is not absorbed rapidly), and as entire compensation for area 1. Genesis of compensated carbon-dioxide excess, factors 10, possibly 4, and as entire compensation for area 7. Differential diagnosis, compensated carbon-dioxide excess is associated with cyanosis, either permanent or caused by slight exertion.

Area 5 is the normal for the resting individual in health at ordinary altitudes. May be final compensatory result from adjacent areas.

Area 6 is compensated alkali deficit or carbon-dioxide deficit. Genesis of former, factors 5 a or b. Compensatory for former, factors 3 or 12 b. Genesis of latter, factors 12, 13, and as entire compensation for area 3. Compensatory for compensated carbon-dioxide deficit, factor 8.

Areas 7 (partial compensation) and 8 are uncompensated carbon-dioxide excess. Genesis, factors 9 (air with 3 to 5 per cent CO_2), 10, and 11. Compensatory, factors 3, 12, and probably 4.

Area 9 is the premortal uncompensated alkali deficit. Genesis, from area 6.

Normal metabolism results in the constant formation of acids (H_2CO_3, H_2SO_4, H_3PO_4, etc.). H_2CO_3 is probably the most important, being one of the chief end-products of catabolism of carbohydrates, proteins, and fats. Fats and amino acids give rise to fatty acids, the process normally terminating in butyric acid. These acids react with the alkali (fixed bases) of the tissues, and are excreted as salts of Na, K, Ca, Mg, etc. The animal body furnishes the curious anomaly of alkaline tissues eliminating acid excretions (principally CO_2 from the lungs and acid phosphates from the kidneys). So beneath all metabolism is a constant diminution of alkali, notably blood bicarbonate. Unless this depletion is repaired, acidosis develops. Normally, of course, the alkalis are restored by the food.

This, however, is not the entire story of the blood alkali. Haggard and Henderson call such a diminution, i. e., as the result of acids, the *acidotic process.* They have also demonstrated that the bicarbonate may be varied in another manner, by the *acapnial process.* In the latter, variations in $[H_2CO_3]$ automatically divert bicarbonate from, or recall it to, the blood stream, as noted previously, in the apparent attempt to preserve the $[H_2CO_3]:[BHCO_3]$ ratio and thus a normal pH. " Various influences and conditions excite the respiratory center through agencies other than increase of hydrogen-ion concentration. This results in overbreathing and an excessive elimination of carbon dioxide which leaves the blood abnormally alkaline. A gradual compensatory disappearance of alkali from the blood follows." Slowing of respiration will tend to produce an acidosis by reason of retention of H_2CO_3, and alkali will be recalled. So, an alkalosis may be a compensatory effort, just as, under such conditions, an acidosis may be a restorative process.

The acidotic process above may become accentuated in disease by reason of the presence of acid substances in increased amount. This is due to increased production (or ingestion) or to decreased elimination. Ketosis is the important example of acidosis due to abnormal formation of acid substances, while retention of acid phosphates is that of decreased elimination. In both cases, the body is robbed of its alkali. As regards lactic acid, it is very ineffective in the production of acidosis, and Haggard and Henderson say, "It is improbable that such a condition as 'lactic acid acidosis' ever occurs in life. An increase of lactates in the blood or urine is probably an indication, not of acidosis, but of low ratio of $H_2CO_3:NaHCO_3$; that is, alkalosis."

Fats normally are oxidized to butyric acid. When, however, there is a deficiency of, or lack of proper tolerance for, carbohydrates this oxidation is incomplete and defective, and acetone bodies (acetone, diacetic acid, and β-hydroxybutyric acid) are formed in increased quantity. Normally there is a slight but definite production of acetone bodies. To prevent ketosis, one molecule of carbohydrate must undergo combustion for every three molecules of higher fatty acids.

Acid neutralization normally results in the production of acid phosphates (such as NaH_2PO_4) from basic phosphates (such as Na_2HPO_4). The former are then excreted by the kidney, and constitute about 90 per cent of the phosphates in the urine. Pathologically and probably as the result of impaired kidney function the acid phosphates are retained.

I have indicated above the means by which the organism meets the attack of acids upon its alkali, viz, respiratory control of CO_2, hemoglobin control of bicarbonate, the action of buffer substances, and ingestion of alkali in food. The average total alkali of normal human blood available for the neutralization of invading acids is equivalent to 63 volume per cent of bicarbonate CO_2, of which 46 volume per cent belongs to bicarbonate alkali and 17 volume per cent to the other buffers (mostly hemoglobin). Buffers from the tissues or other body fluids also become available in extreme cases. The bicarbonate first meets the onslaught, and it will maintain a normal pH until reduced to one-fourth (perhaps even to one-eighth) of its normal value. If, nevertheless, the pH falls (and only then), the other buffers are used; and if it reaches 7 most of the remaining bicarbonate becomes available.

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In connection with this defensive mechanism, ammonia must be mentioned. Nash and Benedict present strong evidence to the effect that there is probably less NH_3 in the blood than usually believed, and also that it, as well as the urinary NH_3, is the product of an active synthetic function of the kidneys themselves. They believe that the "kidney, instead of excreting NH_2 from the blood, forms the NH_3 which it excretes, while at the same time it contributes a small amount of NH_3 to the blood." The source of the NH_3 may be the blood urea, or, possibly, from deamination of amino acids. Such NH_3 is available for the neutralization of acid radicles only as they are excreted, and, in such neutralization, alkali is preserved for the blood. With impaired kidney function the result might be a retention of acid radicles or defective NH_2 formation. The former would deplete the alkali reserve; the latter would permit excessive loss of base during excretion of the acid.

The acid-base equilibrium of the body, then, is controlled by a marvelously sensitive mechanism that constantly and automatically endeavors to preserve a normal alkali reserve and a normal pH. Failing in the former, it at least functions to maintain compensation (a normal pH), if possible. In dealing with pH values, one usually does not appreciate the extremely small magnitudes in question. It might be well to place the extreme range of reaction compatible with life (pH of 7 to 7.8)—not the lesser normal range of 7.3 to 7.5—in other terms. Thus, if life is to be preserved, the weight of hydrogen ion per liter of blood must not be more than one ten-millionth of a gram, nor can it be so little as one one-hundred-millionth of a gram.

The appearance of acidosis in disease constitutes a serious complication demanding immediate attention. This is especially true for females and infants and children, because their plasma bicarbonate is normally lower than in men. This difference amounts to about 8 volume per cent CO_2 with women, and about 10 volume per cent CO_2 with children.

I have already called attention to several clinical conditions associated with disturbance of some phase of acid-base equilibrium. The acidosis in the cases of carbon monoxide asphyxia and deep ether anesthesia is the result of acapnial processes. We must also be prepared for acidosis in terminal malignancy, starvation (whether the result of ulcer, malignancy, or otherwise), severe eclampisia, wood-alcohol poisoning, salicylate poisoning, and following chloroform anesthesia. Acidosis is usually present at time of death, and may be its immediate cause.

The surgeon is particularly concerned with the influence of anesthesia upon acid-base equilibrium, as well as with the detrimental effect of acidosis upon convelescence. Ether causes a decrease of 4 to 17 volume per cent in plasma CO_2 capacity, and chloroform has an even more pronounced effect. In spinal or gas-oxygen anesthesia, the fall is but slight. Hemorrhage and shock accentuate the danger.

The acidosis of diabetes mellitus is characterized by a ketosis, ketonuria (as long as kidney function for acetone bodies is not markedly impaired), and increased ammonia quotient of the urine. The blood phosphates are not increased.

Kidney function is commonly impaired in nephritis, and then there may be decreased elimination of acid radicles, and interference with the ammonia function. This change in function does not necessarily parallel that for chlorides or urea. The acidosis is largely due to retention of acid phosphates, figures as high as 23 mg. per 100 ml. blood serum being obtained for inorganic phosphates. There is also probably an increased production of acid radicles, although there is no ketosis nor material increase of lactic acid. The NH_3 quotient is variable, as one would expect, and is of little clinical significance. Generally there is not even a moderately severe acidosis without considerable nitrogen retention (a blood urea nitrogen of over 30 mg. per 100 ml. demands examination for acidosis). All fatal cases with marked nitrogen retention show severe acidosis, sufficient to be the immediate cause of death. Acute nephritis may show a pronounced acidosis but no nitrogen retention. Acidosis is usual with a two-hour phthalein test of under 30 per cent; with over 30 per cent, however, it is only found if there is severe toxemia, such as occurs in active parenchymatous types and in infections.

Infants and children are especially susceptible to acidosis by reason of their normally low level of CO_2 tension and plasma bicarbonate, and, with them, it constitutes a very fatal complication. It may occur alone, or as the result of improper diet, or be a feature of other dieases, especially alimentary tract disturbances (diarrheas, cyclical vomiting, etc.), and pneumonia. It is said that infantile diarrhea with ileocolitis shows a marked ketosis, but, lacking the ileocolitis, the ketosis is only moderate and the acidosis is then due to phosphate retention.

The acidosis resulting from ether is not only acapnial in origin but often shows a ketosis.

Ketosis may also occur in fever, malignancy, psychoses, and lesions of the central nervous system, delayed chloroform poisoning, hyperemesis gravidarum, inanition, cachexia, starvation, etc.

The symptomatology of disturbances of the acid-base equilibrium is well known. Alkalosis accompanied by tetany may be expected to present the symptoms of the latter, including carpopedal spasm, Chvostek's sign, Erb's sign, Trousseau's sign, etc. The classic evidence of acidosis is Kusselmaul's air hunger—a respiratory disturbance manifesting hyperpnœic dyspnœa without cyanosis, perhaps even with an abnormally bright color of the mucous membranes. This hyperpnœa is the best of all the signs of acidosis to be obtained by physical examination alone. Such symptoms, however, occur only with the severer degrees of disturbance of the acid-base equilibrium, and earlier evidence must be sought in the blood and secretions by laboratory procedures if timely intervention is to be secured. Van Slyke's résumé above relative to different areas of the chart indicates some points in diagnosis. Dyspnœa on exertion may precede the true hyperpnœa.

Van Slyke also calls attention to the fact that two variables are necessary for an exact estimate of the status of acid-base equilibrium, as noted above. But he furthermore states that the conditions (diabetes mellitus, nephritis, metabolic disturbances of infants, and most other pathological as well as normal conditions) most commonly examined in this respect usually present a normal pH, and, when only one determination is made, either the carbon-dioxide tension or the carbon-dioxide combining power of whole blood (preferably) or plasma will suffice. With an abnormal pH, however, determination of only one variable will be inadequate to accurately define the condition.

Clinical methods comprise tests for whole blood or plasma CO_2 or bicarbonate, alveolar CO_2 tension, bicarbonate (soda) tolerance, pH of blood or urine, Sellard's test, NH_3 quotient of urine, or presence of abnormal acids (particularly acetone bodies) in blood or urine. The first two methods are the ones of choice, particularly the first, as by it one can estimate the reserve of the very important blood buffer, bicarbonate, and its result closely indicates the total buffers. Free H_2CO_3 is present in the body fluids in such concentration that it automatically converts into bicarbonate all bases not bound by other acids. The bicarbonate, therefore, represents the excess of base which is left after all the nonvolatile acids have been neutralized, and it is available for the immediate neutralization of further acids. In this sense, it constitutes the alkali reserve of the body. The entrance of free acids reduces bicarbonate to an extent proportionate to their amount.

The determination of plasma bicarbonate (CO_2 capacity, or CO_2 combining power) by either the gas or titration method of Van Slyke is not difficult. It may be considered the standard method, and the cooperation of the patient is not needed. Normal values for men were given as 77 to 53 volume per cent; 53 to 40 means mild acidosis without symptoms; 40 to 30, a moderate to severe acidosis, possibly with symptoms; less than 30, severe with symptoms; 20 is usually fatal.

The alveolar CO_2 tension is a practical measure of the blood bicarbonate, but the cooperation of the patient is desirable. The sample of expired air obtained at the end of a full expiration after a *normal* inspiration should approximate the CO_2 tension in the arterial blood, although, as already noted, it may be on occasion as much as 20 millimeters lower. One obtained by rebreathing is closer to that of venous blood. Results are affected by many conditions, e. g., pathological processes, especially pulmonary and advanced cardiac disease, drugs, emotion, atmospheric conditions, position of the body, digestion, etc. The tensions in infants is 3 to 5 millimeters lower than in adults. For the latter, 40 to 45 millimeters is normal, 30 to 35 indicative of mild acidosis, 20 millimeters means imminent danger, and 8 to 10 may be observed in coma.

The tolerance for bicarbonate is a very convenient and practical measure of acidosis, and means the dose of sodium bicarbonate required to produce a urine alkaline or amphoteric to litmus. A normal finding is 5 to 10 grams; 20 is required with a mild; 30 to 40 with a more severe; and more than 40 grams with extreme degrees of acidosis. In coma, it is usually impossible to produce an alkaline urine. Kidney function does not interfere with bicarbonate excretion, and tolerance is the result of a need for fixed bases.

Determination of the pH is clinically unsatisfactory, especially in the urine where it is particularly unreliable. In the blood, the change is small and late, and results lack uniformity by reason of the technic. Titration does not measure hydrion, and is unsatisfactory as the proteins interfere with a clear end point.

Certain changes in the urine are recognized and acceptable as indirect evidence of acidosis, but they are not synonymous and are dependent upon renal integrity and other factors for constancy. These comprise acetone bodies, NH_3 quotient, and titrable acidity. The last is of no real service clinically, and it must be borne in mind that acetone bodies are not necessarily present in, nor is the NH_3 quotient necessarily affected by, acidosis. The changes neither parallel the severity of acidosis, nor measure the efficiency of compensatory processes. They have diagnostic value, but are not safe clinical guides otherwise.

The ammonia quotient $\left(\frac{\text{ammonia nitrogen}}{\text{total nitrogen}}\right)$ of urine, as usually determined and upon a mixed diet, is normally about 5 per cent. Values of 10 to 40 per cent occur in acidosis. It may be increased by diet, disturbances of protein metabolism, ammoniacal fermentation, etc., and there may be no increase in certain diseases with acidosis. It is said that the NH_3 parallels the acetone bodies. and is a better measure of ketosis.

Acetone and diacetic acid have the same clinical significance; a progressive increase gives a grave prognosis, and it is generally considered that the presence of β-hydroxybutyric acid indicates greater severity. It is well to bear in mind that the sodium nitroprusside tests for acetone are really delicate tests for diacetic acid. But as these substances have the same significance, it is wasted effort to attempt to clinically differentiate them. It is said that the kidneys do not excrete acetone but do diacetic acid, the latter changing into the former in the urine, which, when freshly passed, contains about 10 times as much diacetic acid as acetone. More acetone forms as the urine stands. The qualitative test for acetone bodies in the breath is sensitive, and yields positive results earlier than Gerhardt's test on urine. Moreover, it is useful when impaired kidney function prevents excretion of acetone bodies via the kidneys. One might mention in passing that the sweetish odor in such a breath is not due to acetone, but to some associated unidentified substance.

Intelligent treatment demands a recognition of the etiological factors involved. With acidosis, is it acapnial or acidotic in origin? In general, the former calls for administration of CO_2, and the latter for bicarbonate; the use of the wrong one is dangerous. The former is employed as a 6 to 10 per cent mixture in oxygen. Marriott and Haessler call attention to a point that may have therapeutic bearing. With phosphate retention, the calcium in serum may be decreased to 1.5 mg. per 100 mils. Administration of phosphate causes an increased elimination of calcium via the feces, and the converse is also true. Bicarbonate (sodium bicarbonate) seems especially efficacious in conditions associated with phosphate retention. It is now about a decade since Sellards obtained his brilliant results in the acute nephritis of cholera, and since Fischer advised alkalinization in similar conditions. Bicarbonate is less effective in the presence of ketosis. Glucose is indicated in conditions with ketosis due to carbohydrate deficiency, *providing the organism can assimilate it.*

The administration of bicarbonate is best controlled by estimations of the plasma CO_2 capacity; 0.5 gram $NaHCO_3$ per 19 kilograms body weight will raise it 1 volume per cent. Palmer, Salvesen, and Jackson recommend its oral administration (nausea is a contraindication) in 100 mils of water every 30 minutes, using 2, 5, and 10 grams as the dose in cases showing plasma CO_2 capacities of over 50, 40 to 50, and less than 40 volume per cent, respectively. For more severe acidosis they advise administration every hour. The effect is determined by blood examinations, the frequency of which they lessen by following the pH of the urine colorimetrically before each dose. An increase of 0.3 to 0.4 in the pH calls for a determination of plasma bicarbonate. The more usual procedure, however, is to stop the bicarbonate when the urine is alkaline or amphoteric to litmus. Methyl red is a better indicator for the urine than litmus in that, by ceasing administration when the urine produces a yellow color with methyl red, one lessens the danger of overdosage.

Relative to the administration of bicarbonate in treatment, there is now a decided reaction against the use of injudicious amounts, by reason of the danger of alkalosis. There is a tendency to employ it only in decompensated acidosis, and certainly to control it by estimations of the plasma CO_2 capacity. It is distinctly contra-indicated in conditions with a low plasma CO_2 capacity due to acapnial processes. L. J. Henderson states that any attempt to treat a disease like nephritis by the *indiscriminate* administration of large amounts of alkali is malpractice. Small amounts over a long period are justifiable and make acidosis impossible. In most pathological cases, the urine does not become more alkaline than the blood until the plasma bicarbonate is above normal. Therefore, reliance upon a urine alkaline to litmus may involve the use of unnecessary and possibly injurious amounts of bicarbonate, and erroneous deductions as regards the severity of the acidosis.

In surgery, as noted above, evidence of even slight acidosis should be corrected prior to operation by the administration of bicarbonate. Frank states that the patient is not in the best possible condition to undergo any surgical procedure when he has a blood pH of below 7.35, an alveolar CO_2 tension below 35 millimeters, or a soda tolerance test above 15 grams. One should add a plasma bicarbonate under 53 volume per cent CO_2. Women and children should be especially considered in view of their normally low alkali reserve. For the very depressed condition following prolonged etherization, Haggard and Henderson recommend the use of the CO_2 mixture noted above, as it induces hyperpnœa, helps remove the anesthetic, and restores the plasma CO_2 and bicarbonate.

Alkali is of only minor value in the acidosis of diabetes mellitus Its effect is temporary, being often lost in a few hours, and heroic injections are often required. It is of definite value only in long and stubborn acidosis, or to combat coma in certain severe cases. Twenty-five grams in 5 per cent solution may be used intravenously for impending coma. Death is not necessarily caused by the reaction of the blood, for alkalinization may keep it normal, but the patient may die in coma with typical ketosis. The ketosis is better controlled by other methods, especially periods of fasting alternating with periods of properly adjusted diet, combined with rest and warmth. Fasting is more apt to be followed by acidosis in a normal person than in a diabetic. The ketosis is not necessarily due to lack of carbohydrates, but, perhaps, they do the most to control it by insuring proper oxidation of fats, and the rates of protein and fat metabolism must be lowered to meet that of carbohydrate. It must not be forgotten that proteins yield 48 to 80 per cent glucose in metabolism, depending upon the variety. As with all methods of treatment, acidosis is more to be feared than hyperglycemia, but especially with the Allen method. The plasma bicarbonate should be closely followed, and, with the Allen treatment, a certain drop is permissible before interruption of the fast. With an initial plasma CO_2 capacity of 77 to 53 volume per cent CO_2, a drop to 45 is allowable; with 53 to 40, a further drop of 5 to 10 volume per cent; with 40 to 31, a drop of 2 to 3; with less than 31, interrupt the fast in 6 to 12 hours unless the value rises by reason of the fast and alkalinization.

Alkali is of real value in nephritis, especially in acute types. Even in the chronic or in the uremic cases, it affords at least much symptomatic relief. Sellards separates the frankly parenchymatous types as having a very low bicarbonate tolerance, small doses often producing an alkaline urine; and one should be careful in any attempts at alkalinization in such cases, as they may react violently. With the other types, the effect of a course of bicarbonate lasts for a comparatively long time, a normal response occurring after possibly even weesk. Acidosis itself is not infrequently the immediate cause of death in the nephropathies.

As regards infants and children, restortaion of bases may produce a normal blood bicarbonate and alleviate hyperpnœa, but the child dies nevertheless. Alkali gives good results with older children, but an acidosis once established in infants may result in death despite it. It is, therefore, desirable to begin alkalinization even before acidosis is demonstrable. Rapid action should be sought, and any method may be used, although a 4 per cent solution intravenously is considered preferable; the alkali is administered until the usual urine reaction is obtained, and even 10 grams per 24 hours has been given to an infant aged less than one year. With ketosis, no glycuresis, and a normal blood sugar, give glucose. One should also administer much water.

AVIATION MEDICINE IN THE UNITED STATES NAVY.

By J. F. Neuberger, Lieutenant, Medical Corps, United States Navy.

HYGIENE OF THE AVIATOR.

As has been repeatedly stated, aviation medicine has as a primary function the task of keeping the flier physically and mentally fit. When the United States entered the war medical officers had had little opportunity to study the effects of continuous flying on the airman. It was soon realized that the ordinary standards of fitness for the regular officers of the line and staff of the Army and Navy were not applicable to the aviator. The first aim of the leaders in aviation medicine was to determine standards of fitness required in air work and to find an explanation for the physical and mental deterioration observed among aviators.

The Army early recognized the necessity of keeping their fliers in the pink of condition and physical directors were provided for the various training fields of the air service. These physical directors cooperated with the flight surgeons not only in keeping the men in the best condition possible, but also in teaching them how to increase their natural strength and endurance, to sharpen their powers of alertness and to obtain quick, cool action, and muscular and mental coordination. These physical directors did wonderful work during the war and were in no small way responsible for the excellent work of the air service in the armies of the Allies.

In the Army's publication, Aviation Medicine in the A. E. F., it is stated that experience has shown that in sports, in which the subject is undergoing great physical and nervous strain, the period of efficiency is limited. It is impossible to fix the exact duration of this period. It depends upon the physical endowment of the subject and the care he gives his body. However, each athlete has his day, some lasting only a short period, some for months or even years. The strain in aviation, especially in war times, demands more of the human mechanism than any other sport. It also follows, therefrom, that the period of efficiency is limited. The exact duration of this period will depend upon the effort demanded from the subject, the condition under which flights are made, and above all, upon the mode of life of the aviator. The necessity for health comes from the fact that the aviator has need of all his physical energy and intelligence. Flying is a question of an active· well-balanced, decisive mind, and of quick reflex actions. Not a thing can be left to chance. Every flier must quickly recognize the slightest difficulty with his machine. His senses must give him accurate information of changes in the rhythm of his motor, of the sing of the air across the wires of his machine, and of his position in space. He must be master of his impressions and be ready to make prompt decisions in a calm, cool manner. His correcting movements should be made with precision and without exaggeration. It is clearly recognized that the aviator's reaction to stimuli are disturbed by disease, worry, fatigue or after excesses. A delay of a second or a part of a second in correcting an error in the air or in landing mean all the difference between a crash and safety. Excellent physical condition permits the body to react with more adequate compensation to altitude and cold. Hygienic living is necessary to keep the body and mind in good condition.

Sleep is most important. Firm-nerved men become vacillating and irritable on account of lack of sleep, and are quick to take offense. Troubles that would be laughed away by rested men are magnified by sluggish brains. Eight hours of sleep is a good average. A few men seem to be able to do efficient work with seven hours or less. Edison is one of these. It is said Napoleon was another. But it is known that Napoleon in his later years showed a loss of energy due to accumulated fatigue, as he often dropped asleep in the midst of important matters. To get the sleep one needs, often takes courage, the courage to refuse the invitations of pleasure. It is believed that lack of sleep is responsible for many minor illnesses, because it lowers the vitality or resistance of the body, thereby increasing its susceptibility to infection.

Alcohol.—The alcohol problem, despite prohibition and many opinions to the contrary, is still a grave one. The consequences of drinking are too well known to every one to even be discussed, except to show that too much indulgence in alcohol has been the cause of the loss of many a good flier to the service. It is often claimed, however, by aviators that a man can fly better when slightly under the influence of alcohol. The writer's experience, however, does not confirm the above statement. Excessive alcohol will remove the sense of fear so that the flier becomes reckless and careless and does not use his best judgment in case of difficulty. Major Dunlap at the research laboratory, Mineola, has shown by experience that alcohol produces the same effect as high altitude or low oxygen. It is very easy for a pilot to lower his physical condition to the point of uselessness by the constant use of alcohol. He may be able to fly, but he is not flying at his best. Clouded brains prove dangerous and are not fit to direct an air or sea plane.

Smoking.—Smoking when carried on to such an extent as to cause nervousness, palpitation of the heart, faintness, or impairment of vision must be curtailed. Most aviators smoke too much, and in talking to them about it they will all admit it, yet they keep on smoking. Excessive smoking makes the flier turn out of bed heavy of head and this in turn, together with lowered vitality, causes loss of enthusiasm in his work and has a tendency to break down his morale. Underwood and Reeves, in writing on "The effects of smoking on the visual acuity," state that one of the greatest difficulities encountered in their work was that most of the workers are habitual smokers and are never free from any such effects as smoking may have. This makes a control test, in the strict sense of the word, almost impossible. Such clinical disturbances, both in vision and of other bodily functions, as have been ascribed by medical men to the use of tobacco have been held to be the result of long-continued use. Apart from the graver functional and anatomical disturbances there is a possibility that functional depression, short of anything that might be held to threaten permanent disability, could result from continued smoking and become fatal to the flier by reason of the exacting requirements of his work.

Drugs.—Many fliers come to the hospital and ask for aspirin. It gives the medical officer a clue to the fact that the flier is not feeling well. Drugs do not render one fit, but only temporarily hide the symptoms of fatigue and illness. When the flier comes to the sick bay and asks for medicine, the medical officer has to handle him with a great deal of tact. If the medical officer uses his authority and immediately places the flier on the sick list, the aviators will not report to the sick bay, being afraid that the medical officer will not allow them to fly. I have always made it a point to enter into a personal conversation with the flier and talk his case over with him and specifically ask him whether he thinks himself capable under his present condition to fly as well as he does on other days when he feels normal. He, usually, answers "No." By talking it over with him in this manner, he feels that one is only doing what is best for him and he himself usually suggests a relief from flying.

Overeating.—It is a known fact that work in the air produces a very keen appetite and there is a great tendency to overeat. Overeating produces a sense of fullness and general sluggishness, conditions which are not desirable in flying. The effects of overeating are particularly manifect after lunch, as a great deal of flying is carried on in the afternoon. The midday meal or lunch should consist of a very light repast, sufficient, however, to supply the desired amount of energy. Eating between meals, as well as the constant or frequent eating of confectionery is not advisable.

Physical exercises.—In the Army's publication, Aviation Medicine in the A. E. F., it is stated that physical exercise, judiciously employed will do much to secure physical fitness and serves to arrest the onset of staleness; it will also put the body in condition to sustain the compensations needed when flying at high altitudes. A man in good physical condition is much more resistant to altitude sickness than the physically "soft" man. The ability to endure high altitudes is dependent upon adaptive changes in respiration, circulation, and the blood itself. The untrained individual breathes more frequently and shallowly than the trained man whose breathing is low and deep. Shallow breathing does not ventilate the lungs effectively. The habit of deep breathing can be cultivated by exercise, but not so satisfactorily by voluntary effort. It is also known that at high altitudes, physical exertion makes a greater demand upon the heart than the same amount of work does at sea level.

Men in good physical condition can stand the strain on the heart better than individuals weakened by dissipation and fatigue. Consistent physical work increases the percentage of hemoglobin in the blood. Capt. William L. Culpepper, United States Army, has shown that the hemoglobin and the red blood cells are temporarily increased in the aviator during flight, which is very advantageous at high altitudes.

Exercises must necessarily be arranged according to the temperature and the weather. Mass athletics are very much desired, as football, soccer, baseball, pushball, and basketball. Tennis, handball, and calisthenics are beneficial.

General hygienic principles.—The general hygiene of the airman scarcely differs from that of other sportsmen. As in the case of all other forms of exercise, the younger he is the better he will be able to adapt himself to it. Training in flying after the age of 32 is not recommended, although some men above this age have developed into good flyers.

Airmen need regular intervals of rest. Some writers recommend three weeks' rest after four months' flying. It is believed a better method would be to give a rest after so many hours of continuous flying. At most air stations it is necessary for the pilots to stand officer of the day's duty. This necessitates making frequent inspections at night and being subject to call at all hours, and oftentimes the flier does not obtain the necessary amount of sleep. I can not too strongly recommend that any flying officer standing officer of the day's duty should be excused not only from flying but from all other duties the day following, in order to enable him to make up for the loss of sleep, thereby regaining his energy and putting him back to his normal physical condition. The writer knows of several instances in which crashes followed such a tour of duty and could only attribute them to a lack of the proper amount of sleep. The commanding officers of air stations should be made to realize the above facts. After all, for the flier, the danger is personal. His life is in his own hands. It is he who pays the penalty, irrespective of where the responsibility lies.

Another point of importance in connection with the hygiene of the aviator is the attention to the needs of nature. It is desirable to move one's bowels and void urine before going up in an airplane in order to avoid, in case of fall, the rupture which may result from a loaded intestine or bladder. The cold of high altitudes leads to an increased formation of urine, and this causes distress unless relieved. Certain appliances for aviators have been designed with this point in view, which will be described in a later article.

Clothing worn while flying should not fit too tightly. Clothing next to the skin should be made of wool, as this material counteracts most advantageously the loss of heat. A combination suit, fur lined, and fur-lined gloves and boots are very satisfactory as an outer covering.

Frostbites, parching, and chapping of the skin, cracking of the lips, and dryness of the nose are often the result of flying in high altitudes. These conditions can be prevented by applying an ointment of petrolatum.

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PERSONAL HYGIENE OF AVIATORS.

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[Translated and condensed by Capt. J. S. Taylor, Medical Corps, United States Navy.]

Aviation is comparable to no other form of endeavor and only partially resembles mountain climbing. The human organism is unlike that of birds and is not designed by nature for flight. Eagles and vultures have been observed at altitudes of 7,000 meters. Cigna, over a century ago, reported a swallow that resisted for more than half an hour a pressure of 229 milimeters, which is greater than would be endured at the summit of Mount Everest—a height of 8,840 meters.

The high development of the semicircular canals in birds; and the air spaces in their bones and feathers, are features which enable them to confront the chemico-physical conditions of flight. Man's state is abnormal from the moment he leaves the ground until his return.

There is diminished oxygen and low temperature at high altitudes, and the aviator experiences a change from stable to unstable equilibrium as soon as he leaves the ground. He is aided by certain compensatory actions on the part of the respiratory and circulatory organs. The respiratory rate is reduced; breathing is deeper and intermittent. There is an increase of blood pressure and the cardiac systole becomes more frequent.

In no other form of human effort is the personal equation so striking as in aviation. The weak, cachectic, abnormal, those in a state of exhaustion can not support the variations of external physical agents encountered and must be prevented from flying. But even individuals who are sound in a psychic and physical sense show differences of reaction during flight: There are all shades of difference between the bird man and the one who can not rise a few meters above the earth without experiencing all the torments of hell.

Psychophysiological examination usually helps to exclude those less fitted for aviation and liable to fatal accidents, but does not positively determine the individual reaction. A man's behavior under atmospheric rarefaction is only forecast by the pneumatic chamber. Somewhat as we judge our Alpine troops, the Americans attempt to classify aviators by the altitudes they can safely negotiate.

1. Those who can go to the highest altitudes.
2. Those who should not ascend above 5,000 meters.
3. Those who should not ascend above 2,500 meters.

Intolerance of aerial flight presents itself in two distinct forms. One resembles the picture of the disturbances common to going to sea and develops at low levels—malaise, vertigo, nausea, and vomiting. The second form, called altitude sickness, or aviator's sickness, appears at high altitudes, and the phenomena are serious and complicated—headache, vertigo, cyanosis, roaring in the ears, impairment of vision, respiratory distress, cardiac palpitation, syncope, somnolence, and sleep.

The most pronounced symptoms concern the nervous system. The muscle sense is obtunded; muscular contractions are feeble and the psychic control of muscular movements is impaired.

Visual acuity is reduced; likewise the peripheral field of vision. The shape and distance of objects is imperfectly perceived. Concentration of attention is reduced; the will is enfeebled and absolute intellectual inertia develops. This impairment of the psychic powers acquires special significance from the fact that the subjects thereof give no warning of the change from a physiological to a pathological condition and go forth entirely unconscious of it to meet the dangers that threaten. The type of symptoms varies with the individual.

Altitude sickness and mountain sickness differ in that the latter appears at lower altitudes, owing to increased oxygen requirements following muscular exertion.

The sense of equilibrium, as in the case of sea goers, readily adapts itself after a few flights to the new positions of the body with reference to the outside world and disturbances of equilibrium gradually cease to develop. But on the contrary man does not possess the power to become accustomed to altitude sickness in the sense of recognizing the symptoms, though there is some increase of toleration for them.

The statistics of the World War show that out of 100 milder casualties in the air, 2 were due to circumstances of battle, 8 to defects of apparatus and motors, 90 to causes inherent in man. This proves that the most important factor in successful flight is a personnel not only trained technically but, above all, physically adapted thereto.

Flight must be restricted as far as possible to men physically perfect and endowed with the best psychic and physical qualities. Every government requires a severe test for the personnel of aviation. The Italian Navy conducts its examinations through the psychophysiological bureau attached to the Royal Naval Medical School, Naples.

Aviation, like athletics, involves great expenditure of nervous energy and, as in the case of sports, the capacity therefor is limited. Aviators after a continuous service of months or years show signs of incapacity and must temporarily or permanently be excused from further flight. The incapacity shows in a technical way by less able handling of the machine, especially in landings. In a medical way the incapacity is evidenced by tremor of the hands and eyelids, insomnia, deficient muscular control, increased reflexes and psychic irritability.

Nervous exhaustion is a not unusual cause of casualties, many of which may be ascribed to the fact that through false pride the exhausted ones have insisted in continuing a flight and paid dearly for their imprudence. Guynemer in his later period was nervous and irritable, in spite of which and despite advice to the contrary, he insisted on starting on that last flight.

The individual's constitution and his habits of life determine full capacity for flight. Incapacity results from loss of sleep, excessive fatigue, sickness, and above all from nervous exhaustion following excesses. Such excesses—smoking, gambling, drink, and sexual indulgence—flow in part from a certain fatalism imposed by the aviator's very calling. The authorities are not in a position to regulate the minor details of an individual aviator's private life. Hence the necessity that all concerned should appreciate the scientific basis for rules of health bearing on flight and the importance of a maximum of efficiency and a maximum of service.

For successful flight, apparatus and motors must be in good order; on his side the aviator must have a maximum of physical and moral energy. The human machine is fully as complicated and requires just as minute care as the airplane.

HYGIENIC RULES.

The function of preventive medicine is not fully accomplished by the mere selection of the fit and the elimination of the unfit; but it must include preservation of forces. The cardinal rule is: Moderation in all things.

FOOD.

Food is important both as to quality and quantity. Abnormal digestion and constipation weaken both the physical and mental powers and predispose to altitude sickness. Flight sharpens the appetite and predisposes the aviator to eat heavily which is injurious.

The hours for meals are matters of importance. One should not eat heavily just prior to flight. (Less blood to brain; more to stomach, predisposition to vomiting, nausea, etc.) The morning meal should be light and taken about noon, after the morning exercises. These exercises should not be resumed before 4 p. m. The principal meal of the day is best taken at night, when the work of the day is over.

During flight, hot drinks from a thermos bottle (e. g., chocolate) and sweets are best. Between flights a sandwich, coffee, or a light broth containing a farinaceous ingredient (noodles, etc.) are beneficial.

REST AND SLEEP.

Flights should not be too prolonged and should alternate with suitable periods of rest. When the aviator returns to camp, showing unusual fatigue, the rest period must be correspondingly prolonged, eight hours being the minimum period of sleep to restore him.

CLOTHING.

Clothing must be warm to protect against the cold of high altitudes which favors discomfort and aggravates symptoms due to high altitude. But garments must not constrict the body. Undergarments next to the skin should be woolen; outer garments should be fur lined throughout. Fur-lined gloves for the hands and linen shoes lined with fur for feet add to the aviator's comfort.

PERSONAL CLEANLINESS.

Personal cleanliness is of special importance in the event of injury so as to lessen chances of infection. A tepid shower or tepid bath is favored; warm baths if prolonged and oft repeated are depressing to the nervous system.

EXERCISE.

Physical exercise of a kind agreeable to the individual and not entailing unusual expenditure of nervous and physical energy is highly desirable. Stunts, athletic meets, and the like are objectionable. Mountain climbing, sailing, swimming, and polo are the best pastimes.

In the United States the training of aviators includes physical drills calculated to promote muscular coordination rather than muscular strength, and to develop visual, acoustic, and static control.

VISION.

Perfect vision is as important to the aviator as to the mountain climber. Aviation involves ocular strain and in bright weather the excess of solar rays dazzles the eyes and reduces vision. The high velocity of flight causes a current of air which tends to dry the conjunctiva and cornea and all minute foreign bodies impinge on the eye with force and favor trauma and infection.

The wearing of goggles is imperative. Usually aviators dislike wearing them. Still the benefits of goggles largely compensate for some reduction of the field of vision and acuity of vision.

Mica lenses have been recommended, through dread of possible injuries if crystal lenses should be broken. Mica is far less transparent than glass and the danger of injury to the globe from broken eyeglasses is much exaggerated. Wilmer and Berens, during two years on the American front in France, saw only one case of eye injury due to broken glasses, but it was accompanied by general lesions serious enough to cause the death of the victim on the day following.

The best goggles are made of crystals having at least 2 millimeters of thickness. The surfaces are plain and parallel. A pure white glass capable of transmitting 90 to 100 per cent of incident rays is commonly used, but it is better to use glasses with a slight yellow-green tint to absorb short-wave actinic rays. These do not affect color perception and are a comfort in traversing snow fields, large bodies of water, and cloud strata. The lenses should be round or slightly ovoid, set in a metal frame, and retained by metal rods. They must be easily removable during flight, and the aviator should have spare lenses.

The spectacles must be strongly made and easily taken off, with one hand only. All metal parts must be sheathed in leather or cloth to avoid frostbite.

In order to protect the eye from frostbites the goggles must close hermetically over the orbits, even at the sides. This results in condensation of moisture and when temperature is below freezing a fine frost collects on the glasses which interferes seriously with vision. In some models the full protection is obtained by metal gauze at the sides to favor the escape of water vapor. It must be admitted that, to date, all types leave much to be desired from this point of view.

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THE EAR.

Hearing and equilibrium are of the greatest importance in flight. The aviator must be able to determine by its rhythm the regularity of operation and the number of turns of his propeller. Also he must be able to estimate his position relative to the medium in which he is immersed.

The care of the ear is therefore of immense importance. Accumulations of wax must be prevented, since they interfere with vibrations of the tympanum. Further, there must be a balance between the outside air and the contents of the tympanum to prevent vertigo, subjective sounds, and pain, occurring when communication is interrupted. The closure of the Eustachian tube becomes specially serious in connection with the rapid and powerful disturbance of balance between the inside and outside air as in hurried landings from high altitudes. Gradenigo, the high authority serving as consultant to the psychophysiological bureau at Naples, insists on full and constant patency of the Eustachian tube. He advises frequent acts of deglutition during recompression, and even the Valsalva method of deep expiration with mouth and nostrils closed.

RESPIRATION.

While respiration is automatic, still, within limits, it can be modified by the will. This is not recommended. Aviators should be required to breathe through the nose, with the mouth closed, in order to moisten, warm, and filter the inspired air and reduce the pressure of the strong air current due to the velocity of the machine. This is also essential because the teeth are sensitive to cold. Mouth breathing under these conditions parches the pharynx. Agazzotti advises holding a swallow of water in the mouth at frequent intervals.

The nostrils must be kept clean. Flights should be forbidden if the nasal passages are obstructed.

MENTAL STATE.

Intellectual faculties and special senses are under a great strain during flight. When the psychic state is in good balance, flying is a source of pleasure. With the nervous system in perfect equilibrium, resistance to high altitudes is greatest; the reverse holds when the aviator is dispirited, fatigued, etc. Every sort of entanglement causing mental preoccupation and worry makes for casualties. Three seconds give time for irreparable disaster.

ALCOHOL.

Aviators commonly hold that a moderate dose of alcohol raises the courage in the face of danger. Experience and physiology teach the very opposite of this.

When alcohol is used, after a fleeting period of excitation, there is a paralyzing effect on the nervous system and especially on the higher centers—in the psychic faculties. The abuse of alcohol suspends inhibition; if persisted in alcohol wholly incapacitates a pilot for handling his machine. Casualties among troops on high mountains during the war showed corresponding disadvantages of alcohol. According to Mosso, mountain troops should not go into action on the day following holiday celebrations, etc., and I consider this still more important in the matter of flying. Italian aviators are noted for their sobriety. Neverthless caution may properly be enjoined regarding use of alcohol prior to flight. Of course the ordinary wine with meals is not harmful.

TOBACCO.

Usually aviators smoke too much. Tobacco damages the system partly through the action of pyridine bases, partly through the collidine, carbon monoxide, and other substances formed during combustion of cigars and cigarettes. Tobacco has local action—irritative and congestive—on the mucous membranes of the mouth, pharynx, Eustachian tubes, and even on the tympanic cavities—also a general toxic and depressing effect on the central nervous system, nerves of special sense, and particularly on the optic nerve. During the war numerous casualties were attributed to tobacco, hence aviators should be most abstemious in the matter of smoking.

DRUGS.

Aviators very commonly resort to drugs like aspirin, phenacetin, and to secret remedies against seasickness to avoid discomforts of high altitudes. This is a bad habit which only masks the real situation and often leads to casualties. Narcotics such as cocaine, morphine, and opium are of course the most dangerous. It is imprudent to fly after generous doses of quinine.

PREPARATION FOR FLIGHT.

The aviator who feels indisposed and is lacking in confidence should refrain from flight and consult the doctor because ailments that are negligible on the ground may seriously handicap the physical and psychic side of the aviator and seriously reduce his capacity for flight. After sickness or accident the aviator should always be reexamined by a physician.

According to Guilbert the old precept "head cool, feet warm, belly clear" is as valuable in aviation as in any other contingency of life. The intestinal functions should be carefully regulated. Symptoms of intoxication may arise from constipation and destroy the fineness of perceptions. Kidney functions should also receive attention. Aviators should always empty the bladder before climbing into the machine.

At high altitude ultra-violet rays combined with the cold lead to erythemas and chilblains. Mosso has shown experimentally that the best protection for the skin is to smear it with burnt cork. This method has never become popular. Instead most aviators prefer vaseline, lanoline, or cold cream. These agents protect the skin from rapid evaporation, but not from the ultra-violet rays.

PROPHYLAXIS OF HIGH-ALTITUDE SICKNESS.

The first symptoms, confined to the sphere of the vegetative functions, are usually well tolerated by most men. Very few, however, can withstand the later developments involving the neuro-psychic feature. Of these, sleepiness is the most constant sign and indicates depression of the nervous centers. When it develops the aviator should come to the ground.

The primary cause of these disturbances is reduced atmospheric pressure. This is not the place to discuss the details of etiology; whether it is due to insufficient exchange of oxygen between the air and the blood or to diminished tension of carbon dioxide in the blood.

Mosso thought the administration of oxygen useless in mountain sickness, but admitted that it had some value when taken at an elevation above 7,000 meters. English and American physicians believe that oxygen saved the lives of many aviators during the war. Oxygen can not be employed by the apparatus commonly used in medicine. Special apparatus is necessary for aviators. It must be easy to handle and not interfere with movement. The aviator's hands must be free. The inhalation must be by means of a mask and entirely automatic, that is to say, the oxygen feed must accommodate itself automatically to the requirements of changing elevations. The apparatus devised by Colonel Dreyer has been used with satisfaction in the American Aviation Corps.

Mosso insists that carbon dioxide should be distributed along with the oxygen. Agazzotti has shown by experiments with the pneumatic chamber that the proportion giving the best results is 15 to 20 parts carbon dioxide and 85 to 80 parts oxygen. As the effects of oxygen persist for four to six minutes after inhalation has ceased, the gas should be repeated at intervals of not more than six minutes.

Administration of oxygen should be the rule, not the exception, when the aviator has reached the height of 3,000 or 4,000 meters. Oxygen may be used to advantage when the aviator lands after a long flight to overcome as quickly as possible his sensations of fatigue.

GAS WARFARE: ADOPTION, METHOD OF USE, PROTECTION OF TROOPS.[1]

By Maj. W. R. Galwey, O. B. E., M. C., Royal Army Medical Corps.

The legitimacy of the employment of noxious gas as a weapon of warfare has recently been much discussed in both the public and scientific press.

At the meeting of the British Association in Edinburgh in September, the president in his opening address, called upon the association to use its every endeavor to persuade scientists to cease research into chemical methods of destruction as derogatory to the high call of science.

Much might be said regarding the humanity of inflicting casualties by gas rather than by high explosive, of the high percentage of permanent recoveries after the former as against the latter and the low percentage of deaths, but it seems to me that two fundamental facts are ignored by those who write and speak against gas warfare:

(1) That, in the highest sense, all weapons in war are inhuman; and

(2) That the use of gas in warfare is an accomplished fact.

It has proved a most effective weapon, so that any nation fighting in the future for its existence must be prepared to combat it and use it. Research into new compounds capable of overcoming existing methods of defense can be carried out in secrecy in the laboratory without attracting the attention of foreigners—many of the poisonous compounds are intimately connected with the chemical industries. Therefore it appears that so long as war remains the ultimate means of settlement of international strife, and until the League of Nations can enforce its mandates, so long must each nation continue to prepare for gas warfare.

Two facts are significant:

(1) During the inquiry into German methods of making mustard gas which followed the armistice one of the respondents asked: "Why are you worrying about this, when you know perfectly well that this is not the gas we shall use in the next war."

(2) Of the total American casualties, about 30 per cent were due to gas, and of these about 90 per cent were due to skin burns; of the gas casualties 3 to 4 per cent died and about 95 per cent recovered completely. The Americans have laid to heart the lesson taught by these figures and have established a Chemical Warfare Service on a peace footing with a personnel numbering about 1,600 and have budgeted for an annual expenditure of $4,500,000 for research into this branch of warfare.

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Adoption.—In ancient times the Spartans in the fourth century before Christ, used gas in the form of sulphur and pitch fumes against the Athenians.

Greek fire, which is of the same nature, was employed by the Byzantine Greeks against the Saracens and by the latter in turn against the Crusaders.

In modern times the first suggestion to employ this method of offense was made by Lord Dundonald. It was seriously advocated by the chemist, Lord Playfair, at the time of the Crimean War, as a humane method of overpowering the enemy, and the use of sulphur fumes was suggested as an aid in the reduction of the Redan redoubt. The suggestion was considered by experts and dismissed as inhuman.

Later The Hague Convention, to which Germany was a signatory, practically forbade its use. It was the treachery of Germany in this case as much as the nature of the weapon she employed which raised the storm of execration against her in April, 1915.

At the end of the last century poisonous gases were investigated in Germany by Lehmann and his pupils with the ostensible purpose of making dangerous trades safe; but in England, although many of the compounds afterwards used had been met with in chemical research, practically nothing was known of their production on a large scale or of their action on the human organism. It is true, however, that useful work had been done prior to the war in South Africa by medical officers to mines in investigating cases of poisoning from nitrous fumes given off after the discharge of explosives in blasting operations.

The first German gas attack was made against the French and our second army in the Langemarcke sector on April 22, 1915. The surprise was absolute and our line simply ceased to exist, since those who did not retire were either killed or incapacitated. The Germans captured 60 guns and a large extent of territory. A second cloud gas attack was delivered in the same sector on April 24, and was chiefly directed against the Canadians. The Germans did not realize the power of the new weapon and neither used it over a sufficient extent of front nor followed up their initial success. Had they done so the war might have ended in a German victory by the summer of 1915.

The first attacks were quickly followed by others, some of which were on a large scale, during the months of April and May; all were in the Ypres sector.

The gas used in the early attacks appears to have been pure chlorine, though later phosgene was combined with it. It was delivered from steel cylinders, each of which contained some 45 pounds of compressed chlorine.

Gas attacks followed each other rapidly until May 24, and then there was a lull until December, 1915. The last cloud gas attack was on August 8, 1916.

Various statements have been made as to when the Germans first began to use lethal gas in projectiles. The earliest certain date is July, 1916, when lethal gas shells were used, and from that time the enemy developed this mode of attack more and more. In all he used no less than 18 different gases against us and our Allies. It is unnecessary to detail these, and in my next paper I hope to put before my readers a classification of war gases according to their pathological effects. It will suffice to say here that the three main types of gas shell were known as green cross, blue cross, and yellow cross. The green cross contained phosgene alone, or combined with such substances as chlorpicrin and chlorarsines. Green cross 3 contained various arsenic compounds. Blue cross contained chlorarsines, cyanarsines, and N. ethyl carbazol. Yellow cross contained dichlorethyl sulphide or mustard gas. At first gas shells were fairly easily distinguished from others, owing to the small bursting charge they contained, but later they were mixed with bombardments of high explosives, and the gas shells themselves contained large quantities of high explosives; so that it became difficult to say whether a bombardment was simple or mixed, and a constant outlook had to be kept for gas.

Gas warfare reached its zenith in 1917 when the Germans introduced mustard gas—a weapon, which although of minor importance from the point of view of death, causes a great number of casualties from its insidiousness and persistence and which can be used to render ground untenable by troops for considerable periods.

The last development was the use of large projectors which discharged by means of bombs enormous quantities of gas over small areas, so that concentrations were arrived at when one breath incapacitated if it did not kill a man. The projector attack was introduced by the British in April, 1917, and adopted by the Germans in December of the same year.

I may mention that toward the end of the war our use of gas far surpassed that of the Germans, as our defense was better; so that they were very literally hoisted with their own petard, and must have bitterly regretted their treachery in introducing this weapon.

Methods of use.—As the science of gas warfare was developed, three definite purposes emerged for which this weapon is effective: (1) To inflict casualties; (2) to reduce the fighting efficiency of troops by compelling them to wear respirators; (3) to render positions temporarily untenable.

1. The best substance to employ is that which answers the particular purpose of the general staff, and the fact that a substance is

lethal need not necessarily give it preference over one whose effects are only temporary and do not permanently incapacitate, but which quickly puts men out of action. Thus a lachrymator might in particular circumstances be more effective than phosgene.

The first gas attacks caused very numerous casualties but it is impossible to estimate numbers with any great degree of accuracy as so many men were killed outright or died before they reached medical units. But as our defense developed the casualties diminished, so that in the last cloud attacks they were confined to units, and individuals, where gas discipline was slack or defensive apparatus was not properly cared for or adjusted.

With the advent of mustard gas the casualty list lengthened until the troops had again learned how to combat this new evil.

2. The second purpose for which gas is employed—to diminish the fighting efficiency of troops—is more difficult to combat. The respirator is uncomfortable to wear, and if worn for any length of time the resistance to breathing and general discomfort diminishes the fighting and working power.

The greatest sources of discomfort are the mouthpiece and nose clip, but, so far, it has been impossible to dispense with them. Intercommunication and accuracy in handling delicate instruments also suffer. Two examples will illustrate how efficiency is impaired:

(*a*) It was noted that if, when shelled by the enemy, our batteries replied with gas shell, in 20 to 30 minutes the accuracy of the enemy's shooting, as indicated by "overs," "duds," etc., was greatly diminished.

(*b*) The French experimented to see how long men could wear respirators. An area was chosen in the rear, where men were made to carry out light work or left at rest wearing respirators continuously and not even removing them for food or drink. The men were exposed to a gas, nonlethal, but causing intense lachrymation with the least dose. Forty-eight hours' leave was given to each man for every two hours he could stick it over six hours, but though a certain number of men managed to accumulate a considerable spell of leave, the best result that could be obtained was that 70 per cent were efficient at the end of 24 hours. The French mask is more comfortable than ours.

3. The third purpose for which gas is used is to render positions untenable. Mustard gas has so far given the best results on account of its persistence. It is therefore imperative when occupying a position which has been shelled to make certain whether gas has been used and to warn troops against handling objects which might be contaminated, and against drinking water contaminated by gas. Numerous casualties were caused in France by neglect of these precautions.

Though the means by which an enemy attains his object in a gas attack, i. e., gas tactics, is primarily the business of the general staff and gas services, it is important that all troops, officers, and men alike, should understand the general idea in the use of gas.

Cloud gas is used to inflict casualties and as a preliminary to an infantry attack.

The gases used must have the following properties: (1) Must be heavier than air; (2) must be easy to liquefy; (3) must be lethal in fairly low concentration.

Not many substances fulfill these conditions, and for this reason and because our protective measures had become almost perfect against it, the Germans abandoned the cloud attack.

Weather conditions must be closely considered with all kinds of gas warfare but they are particularly important in cloud attacks.

The best wind is a steady breeze from 4 to 9 miles per hour, but attacks have been made with winds from 2 to 20 miles per hour.

The effects of cloud attacks has been felt as far back as 20 miles from the point of liberation, but the usual distances for serious casualties is 5 to 6 miles.

Heavy rain is unfavorable, but slight dampness keeps the gas low—fog gives opportunity for surprise.

Nighttime is most favorable both on account of surprise and because cold currents coming downward keep the gas low.

The usual number of cylinders employed was one per yard of frontage and the front attacked was about 3,000 yards.

An attack can be recognized by the hissing noise as the gas emerges from the cylinders and by the greenish color (becoming white in damp weather) of the cloud in the case of chlorine.

Gas shells are used both for surprise attacks and to inflict casualties, and also to harass communications and prevent arrival of reinforcements. The news of a cloud attack can be quickly passed to the rear, but the gas shell is its own herald. In the last stages of the war the only way of recognizing gas shells was by the smell of the compounds they contained.

The projector attack combines the advantage of both cloud and shell and is more deadly because of the enormous concentration which it can give.

The projector discharge can be recognized by:—(1) Noise on discharge—like an ammunition dump going up, (2) flash along the line, (3) whining noise of the drums in flight, (4) sight of drums flying, (5) at night by the trail of sparks emitted from the drums.

For a big projector attack as many as 1,500 drums, each containing some 31 pounds of liquid, were used, one drum being sufficient to overcome the German respirator at the point of impact.

It has been well said that "Gas warfare resolves itself into a contest between offensive materials and protectice devices, and there is no finality in regard to either; so that the chemical substances employed must necessarily vary from time to time, as well as the tactics adopted to using them."

Protection of troops.—Though the first attack found us totally unprepared, efforts were at once made to counteract this new weapon. On April 23, under telephone instructions from the Director General Medical Services, General Headquarters, the Director of Medical Services, First Army, issued a circular recommending the use of a solution of bicarbonate of soda, which should be kept in buckets, etc., and that men should be instructed to use handkerchiefs or cloths dipped in the solution to cover the nose and mouth.

On the following days various other appliances were improvised; for instance, on 27th and 29th, Professors Haldane and Baker visited France, and the latter recommended the use of cloths, etc., moistened with urine, or of earth folded in cloth or inclosed in a bottle from which the base had been removed.

A German respirator captured at this time proved to be a pad of cotton-waste soaked in hyposulphite solution and contained in a gauze bag which was provided with tapes for tying over the face.

In the meantime the War Office authorities at home had turned to the Army Medical Service, and it was very largely due to the scientific knowledge and unfailing resource and energy in organization of Col. Sir William Horrocks and Colonel Lelan that the menace to our troops was met and disaster averted.

It was known that for the moment chlorine was the gas to be dealt with, and the chemical problem was therefore simple, though the provision of the appliances for making pads within a few hours was far otherwise.

However, so nobly was the call met that within 60 hours 98,000 pads of cotton waste in muslin containers, dipped in hyposulphite solution and dried, were available at the front; 300,000 were available in a week, and 2,000,000 within a month.

It was, of course, recognized that this provision was at most a temporary expedient, the life of the pads was short, and they were not effective in high concentrations; if a heavier charge of gas absorbent were added the obstruction to breathing became serious. Moreover, they were only effective against chlorine gas, and, once gas warfare had been established, it was obvious that the enemy could and would use higher concentrations and different and more potent substances.

A research laboratory was therefore started in the Royal Army Medical College. The history of the evolution of our present protective apparatus records a story of untiring zeal, energy, and dogged pluck not surpassed in the story of scientific research.

At the same time a research laboratory was organized in France and the closest liaison was maintained between workers at home and abroad. Every development in the use of gas was foreseen and provided for, so that our gas defense in a short time equalled and then surpassed that of the enemy.

A brief account of the various types of protection evolved will serve to illustrate the problems which must be met and solved in chemical warfare.

The original cotton-waste respirator was soon superseded by those of black veiling-cotton waste impregnated with hyposulphite of soda and glycerine. Two problems called for immediate solution:

1. To make the filtering area greater; and
2. To make the absorbent substance such as would withstand not only chlorine but other gases which, it was recognized, might be used.

The filtering area was increased by substituting a helmet for a pad, thus providing an area of 3½ to 4 square feet through which the air could enter and reducing the resistance to between 0.3 and 0.5 inch of water. The air current was also slowed so that the absorbent had more time to neutralize the noxious gas.

Suitable materials had to be found and in sufficient quantities. After a few days of testing on individuals a manometric device was devised for rapid testing at a definite standard pressure.

The color of materials used in making helmets was also important, for if light colors were used men wearing the helmets would furnish an easy target for enemy fire.

The question of sight when wearing the helmet was also a knotty problem. At first mica windows were used, but these proved too brittle; cellulose acetate and chromicized gelatine were also unsuccessfully tried. Finally nonsplintering triplex glass disks fixed in tin rims that clamped the textile of the helmet firmly by being screwed into flanged collars were adopted and proved most successful.

Polyvalency of the absorbent was first secured by adding sodium carbonate to the thiosulphate of soda and glycerol. This helmet could be donned in four to six seconds, gave 10 times as great protection as the pad, while its effective life against chlorine at a concentration of 1 in 1,000 was five hours. A new solution was made necessary by the fact that the absorbent afforded no protection against phosgene (carbonyl chloride) or hydrocyanic acid, and several other gases. An effective absorbent was, however, found after many trials in sodium phenate, but it was found that the solution rotted the woolen fabric of which the helmets were made. This difficulty was met by adopting a cotton material which took up more alkali, and for a double thickness of cotton gave a resistance of 0.2

to 0.3 inch of water, as against 0.5 inch for a single thickness of wool. The problem was further complicated by the discovery that the CO_2 given off in expiration neutralized the protective alkali, so that after a time it ceased to protect against HCN. It therefore became necessary to provide a valve through which the wearer could expire and so get rid of his CO_2 outside the helmet. The simple and effective respiratory valve still in use was the outcome of this research.

One more addition to the absorbent impregnating the helmet was made in January, 1916, i. e., hexamin—suggested by Russia—this substance removed the remaining phosgene (carbonyl chloride) which had escaped the sodium phenate.

With this final improvement the P. H. helmet, as it was called, removed 100 per cent of 1 in 1,000 phosgene and HCN. Of these helmets, from the first issue in July, 1915, until the final withdrawal in February, 1918, in favor of the box respirator as the sole issue. nearly 27,000,000 were made—many were supplied to our allies as well as to our own troops.

In addition to protection against lethal gases of the asphyxiant type, protection had to be afforded against a group of substances known as lachrymators whose chief action is on the eyes. The majority act in minute proportions so that as small a quantity as one part per million causes intense lachrymation which throws the victim out of action. These lachrymators were first used against us in the autumn of 1915, and the first protection against them sent to France was a goggle of rubber with glass eyepieces similar to motor goggles. This failed in many cases owing to the difficulty of obtaining close adjustment over the bridge of the nose. To obviate that trouble the French pattern was next adopted. This was of impervious cloth with flannelette lining and celluloid eyepieces, the fit over the bridge of the nose being obtained by malleable wire sewn into the lower edge of the fabric. These were found serviceable against low concentrations, but against higher concentrations the best fitting results were obtained with rubber sponge. In a final pattern the base was of stiff impervious fabric (gelatine formalin impregnation) lined with soft material to which were cemented and sewn the two halves of an oval sponge—holes being cut in the sponge and the base into which were fitted screwed metal and glass (helmet) eyepieces. Elastics were provided for attachment.

The P. H. helmet was also fitted with rubber sponge round the eyepieces and was issued as the P. H. G. helmet.

Goggles were finally withdrawn after the issue of the box respirator, since they tempted a man to put on his goggles rather than his respirator, and so continue to inhale small quantities of gas which would have a cumulative effect.

No helmet could ever be completely polyvalent. For one thing it is impossible to impregnate so thin a layer of material with both oxidizing and reducing substances. The realization of this fact led to the research which culminated in the production of the present box respirator. The object was to produce a container filled with strata of different absorbents, through which air could be drawn—each group of noxious gases being removed or neutralized in its appropriate stratum. The box respirator was issued only one month before the enemy attacked with gases which the helmet could not have withstood.

Very extensive and exhaustive trials were made by Lieutenant Colonel Harrison and his colleagues before a granule was made which was sufficiently active, and at the same time hard enough to withstand the shaking and general rough usage which the respirator must necessarily undergo and yet remain active.

The box respirator was originally charged with successive layers of: Sodium sulphite (reducing); soda lime manganate (neutralizing and oxidizing); animal charcoal (absorbing and condensing); each layer being separated by plaques of cellulose. This was found to be completely polyvalent against every gas which the enemy had then used against us, and to give very slight resistance to respiration. It was efficient against carbonyl chloride for three hours, against chlorine for eight hours, and withstood a sequence of six gases run through it in succession, each for one hour. But it was found that gas tended to pass up the smooth interior against the side of the box so that this channel became ineffective, whilst the remainder of the box remained effective. This defect was remedied by corrugating the sides of the box and so lengthening this route, leaving large air spaces above and below the absorbent layers to equalize the flow and by arching the base of the lowest absorbent layer so as to divert the flow from the sides. Two valves were necessary—an inspiratory flap valve in the base of the box and an expiratory valve, like that in the helmet, between the mouthpiece and the box, so as to prevent expired CO_2 neutralizing the soda-lime-alkali. A closely fitting face piece with eyeglasses and nose clips was added. The whole apparatus could be adjusted in 25 seconds [since reduced to 10 seconds].

There were several slight modifications of the box respirator, and the small box respirator as at present in use replaced all other gas protection appliances in February, 1918.

Work is still being carried out on it to make it more perfect and to decrease its resistance to the passage of air to the lowest possible amount. The resistance of the present pattern is equivalent to about 3 inches of water.

The above sketch of the evolution of the methods of individual protection against lethal gases will show you the essentials to be aimed at in devising such apparatus:

1. The apparatus must be capable of very rapid adjustment.

2. It must be able to neutralize all forms of noxious gases and clouds and vapors which may be used against the troops wearing it for a reasonable length of time.

3. It must offer as little resistance to breathing as possible so as to avoid diminution of the working powers of troops.

4. It must be strong and light.

The box respirator has, so far, resisted all gases used against us, but it will be readily understood that constant research in defensive measures must proceed pari passu with new discoveries of substances which may be used in chemical warfare.

The soldier must be taught that if his respirator is kept in good condition, and he has learned to adjust it with the necessary quickness, he can place complete reliance upon it.

Very frequent inspection of respirators is necessary to see that they are in good condition. Periodical inspections are carried out by the antigas officer with the formation concerned, but it is the duty of all officers commanding units or sections of units to see that their men's gas equipment is thoroughly effective.

The most serious causes of damage to the respirator are: (1) Water entering the container and damaging the chemicals, (2) injury to the mask, (3) injury to one or both valves.

It is of the utmost importance in reference to (2) and (3) to see that nothing is carried in the satchel but the respirator and antidimming outfit for cleaning the eyepieces.

I hope to deal with the question of the disinfection of respirators in my last paper.

The container, as finally issued, should be replaced after it has been breathed through for 40 hours. A record card is therefore issued with each container, and on this should be entered the time during which the apparatus has been worn during cloud gas attacks or gas shell bombardments. The number of hours during which the respirator has been breathed through for training are entered in the bottom three rows under shell gas. The date of issue is also stamped on the card. A fresh card is issued with each container.

I have dealt above with the apparatus supplied for the protection of troops, and it is unnecessary to do more than remind you that in gas warfare everything depends upon the quickness and efficiency with which troops apply their protection. It is, therefore, necessary in preparation for war, to train all troops thoroughly in gas drill, i. e., in systems adopted for spreading gas alarms, in recognizing conditions whether of weather or environment when gas may be used, and in recognizing when gas shell is being used and the type, and in circulating information to all who may come into a gassed area.

In conclusion, therefore, I will refer briefly to the secondary means of protection against gas attacks.

1. When cloud gas attacks were made, various methods were adopted to disperse the gas, e. g., firing and throwing bombs in the gas; lighting fires in the trenches. Fans were also supplied for removing gas from dugouts and trenches.

2. Solutions of hyposulphite and hexamine with sprayers were also issued for spraying the air in trenches, dugouts, etc.

3. With the development of gas warfare and the use of lethal gas shells these methods had to be revised, and additional measures taken for the protection of important dugouts, pill boxes, and aid posts. It was recognized that if possible the dugout should be evacuated until the gas had dissipated, but short of this it was found that an effective measure was to light a fire in the middle of a dugout after a gas bombardment. It was necessary to take care that the ground outside the dugout was free from gas before the fire was lighted, otherwise the fire merely drew the gas into the dugout.

In the case of dugouts which could not be evacuated—e. g., aid posts, advanced dressing stations, headquarters—a gas-proof curtain was devised as a method of protection. One method of applying this curtain is as follows: A frame of 4 inches by 1 inch timber covered with blanket material is fixed flush with the wall, sloping outwards at an angle of 20° from the vertical. Antigas material—i. e., a special cloth to be treated with a solution of sodium thiosulphate and sodium carbonate in water—is cut to the required size, so that when fastened to the top of the frame it will close the entrance completely and leave about 9 inches resting on the ground. Three pairs of laths are nailed horizontally to the curtain to keep it stretched. The lath on the underside must be left shorter than those in front so as to clear the frame. The lowest of the laths should be 4 inches from the ground but must not touch it. Two curtains should be provided, the upper as near the top of the staircase as possible (otherwise a pocket of gas may lodge and be carried into the dugout). The frame for the inner curtain should, if possible, slope inward. A similar contrivance was used to protect pill boxes.

When mustard gas came into use it became necessary to protect men handling objects contaminated with it and to find some means of removing it from clothing.

For men specially liable to contamination—e. g., gunners and stretcher bearers—in addition to their respirators special gloves were provided. After trial of various substances leather gloves treated with unboiled linseed oil were found efficient. With them two pairs of cotton gloves were issued to be worn over the leather. Although efficient in preventing burns, these gloves were large and clumsy and hindered delicate manipulation.

To obviate the hardening of the leather with age the Americans adopted: (1) Gloves of a waterproof material coated inside with gelatine-glycerine-formalin composition and protected outside by another waterproof coating, and (2) gloves of a fabric coated with a softened layer of cellulose nitrate.

An effort was made to provide clothing which would withstand mustard gas. We used cloth treated with boiled linseed oil, and the Americans cotton sheeting impregnated with boiled linseed oil, castor oil, and paraffin wax.

These proved efficient, but difficulties of transport and of readiness when wanted were great obstacles to their use.

To destroy mustard gas in clothing three methods were tried: (1) Treatment with steam or hot water; (2) treatment with chlorine gas; (3) exposure to fresh air.

As heavily contaminated or directly splashed clothing can not be effectively cleaned without damage to the cloth, it is considered that it should be buried.

Treatment with steam is the surest method of degassing contaminated clothing, and this can be effectively carried out by means of Colonel Lelean's sack disinfector or in a plant of any delousing station.

The Americans found hot (not quite boiling) soapy water efficacious.

The French used water at 90° C. containing mild alkalis to neutralize the acid formed by hydrolysis of mustard gas.

A solution of washing soda is safe, but it must be in correct proportions; too much or too little retards destruction of the mustard gas.

Keeping men whose clothing has been contaminated in a chamber containing 1 per cent chlorine for five minutes have been found effective. This treatment can be carried out with cylinders of chlorine gas in dugouts.

For slight contamination exposure of clothing in open air for 48 hours suffices, but if the contamination is heavy or the weather cold, a much longer time is necessary.

Dugouts may frequently be contaminated by infected mud brought in on boots. Washing with a stiff brush and water and sprinkling with chloride of lime have been recommended.

If dugouts are contaminated, it is well to evacuate and destroy them. If this can not be done, the contaminated soil and beams should be removed, the walls and floor treated with chlorine, and the dugout shut up for 24 hours. After this period it should be well ventilated by placing a lighted brazier in it and shifting the position from time to time. The atmosphere may be slightly lachrymatory for some time, the chlorine masking the smell of mustard.

Chloride of lime may also be used for this purpose and for treating shell holes. In the latter case the lime should be covered with fresh earth, the latter being employed to prevent chlorine masking the smell of mustard and to render the hole less conspicuous. Two pounds of chloride of lime per square foot of surface gives excellent results, but this amount is prohibitive. One-half to 1 pound gives fair results.

In the time at our disposal it has only been possible to outline the chief points in measures of protection. Everything depends upon efficient preparation and training and in the impressing upon the troops that given these they may have every confidence that they will escape unscathed.

THE FUNCTIONS AND ORGANIZATION OF MEDICAL CORPS UNITS SERVING WITH THE MARINE CORPS IN THE FIELD.[1]

By S. N. Raynor, Major, United States Marine Corps.

THE ORGANIZATION OF THE BRIGADE.

[Introductory Note.—The writer has undertaken to prepare for the United States Naval Medical Bulletin a series of articles dealing with the functions and suggested organization of Medical Corps units serving with the Marine Corps in the field. Up to the present time there has been no special organization for that service. If the necessity for such special organization can be demonstrated, the quo animo of this series shall have been attained.]

Before taking up the question of the organization of Medical Corps units for service with the Marine Corps in the field it seems advisable to devote some time to a consideration of the organization of the military or fighting units. In general, the function of the Medical Corps during active operations is to provide sufficient personnel for first aid and part of the litter evacuation. It is obvious, therefore, that the organization of the Medical Corps personnel attached to any fighting unit must be governed primarily by the organization and functions of that unit.

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[1] In the editorial section of the January issue of the United States Naval Medical Bulletin reference was made to the establishment of a correspondence course for naval medical officers to be conducted by Maj. S. N. Raynor, United States Marine Corps. It is believed that this course offers many advantages to medical officers, particularly those serving with the Marine Corps in the field. The Surgeon General is desirous of having all medical officers who are available for duty with the marines enroll for this course. Applications should be forwarded promptly to Maj. Raynor at the Marine Corps Schools, Marine Barracks, Quantico, Va. The maps used in this course will be supplied by the Bureau of Medicine and Surgery.

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At the present time the largest organization in the Marine Corps is the brigade. In this article, therefore, we will take up the organization of the brigade and of its component parts.

As a result of the experience gained in the World War, and after a careful and exhaustive study of innumerable reports and of the conditions which presented themselves in various phases of the war, the Army Tables of Organization have been completely revised. The underlying principle in the revision of the tables was to provide organizations that would meet all the requirements for field service under conditions of modern warfare.

As the reasons for using the Army Tables of Organization may not be manifest to all, a brief explanation may not be inappropriate. While the Marine Corps normally functions in conjunction with the Navy, Marine Corps forces may be, and, in recent years, frequently have been, detached for service with the Army. Such being the condition which must be met, the Marine Corps organization and that of any Medical Corps units serving with the marines, should be such as to fit in with, and readily function with and as a part of the Army machine.

While the Marine Corps organization differs in many respects from that of the Army, due to the nature and diversity of the duties which it is called upon to perform, this dissimilarity is one of practical adoption to conditions of service rather than the result of any divergence in the fundamental principles underlying their respective organizations.

By analyzing the Army organization, in so far as it concerns this problem, we should get a picture of a machine whose efficacy has been proven, and thus enabled to more readily determine our own requirements.

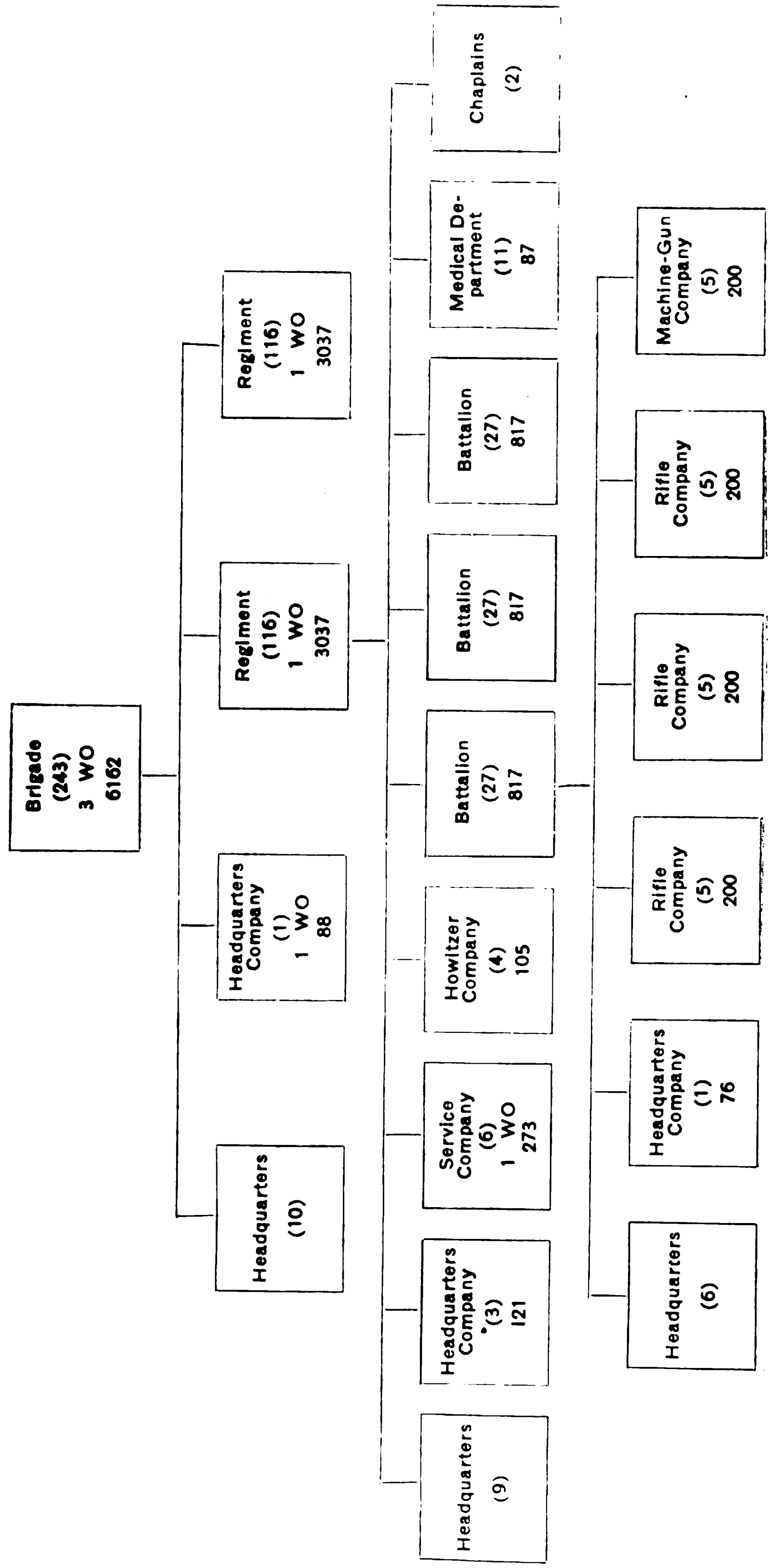
In the Army an Infantry division is composed of two brigades of Infantry and various auxiliary troops and services. A brigade, as a part of a division, is a purely tactical unit; i. e., it has no administrative functions. When a brigade is detached from the division for independent duties it becomes necessary to provide an administrative staff along the lines prescribed for that of a division. (Staff organization will be the subject of a subsequent article.)

The new infantry brigade is organized as follows: Brigade headquarters (10 officers); headquarters company (1 officer, 1 warrant officer, 88 enlisted men); 2 regiments of Infantry (each consisting of 103 officers, 1 warrant officer, and 2,950 enlisted men).

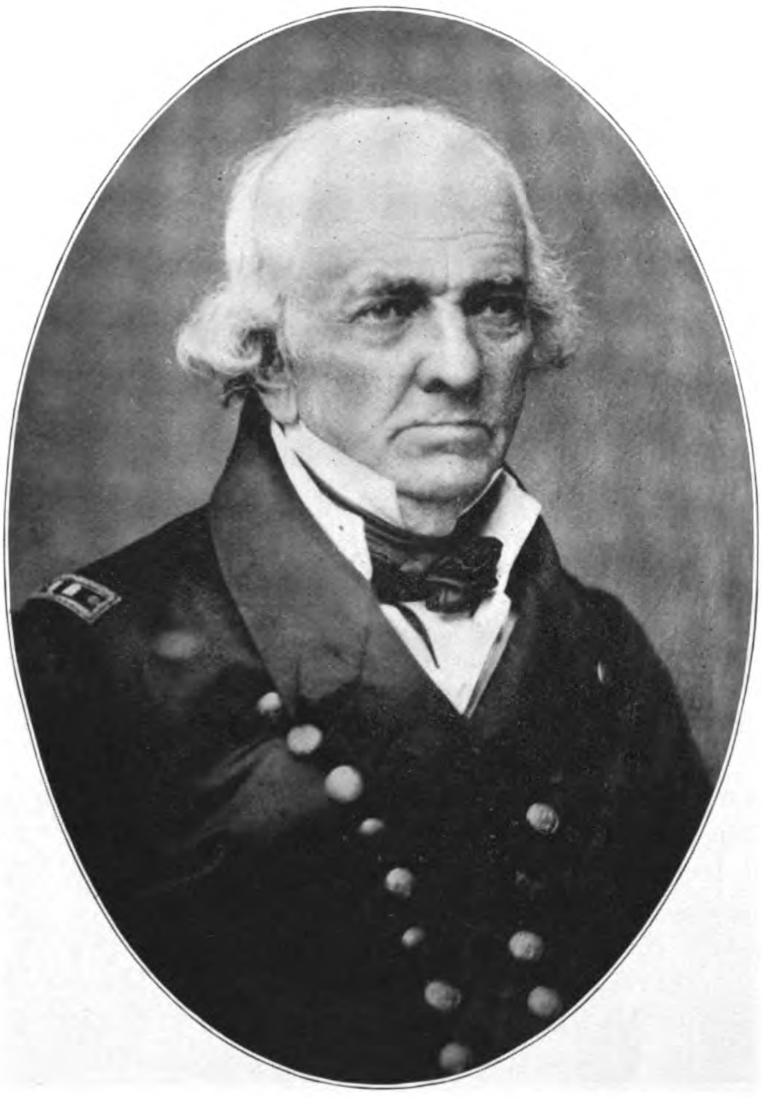
Attached to each regiment are 11 medical officers, 87 enlisted men (Medical Corps), and 2 chaplains, making an aggregate for the brigade of 243 officers, 3 warrant officers, and 6,162 enlisted men. (See accompanying diagram).

ORGANIZATION OF AN INFANTRY BRIGADE.

[NOTE.—Figures in parentheses indicate commissioned officers. WO means warrant officers. Figures without parentheses indicate enlisted men of all grades.]



It will be noted that no provision has been made for brigade surgeon and the necessary personnel to assist him. As will be seen later, this is because the regimental surgeons function under the direction of the division surgeon when the division is intact. When a brigade is acting independently it is necessary to assign a medical officer to it for duty as brigade surgeon, and a quota of officer and enlisted personnel from the medical regiment of the division from which the brigade has been detached. This personnel, when so assigned, forms, for the Medical Corps, a brigade headquarters detachment which functions as a part of the brigade staff.



JONATHAN COWDERY
Surgeon in the United States Navy

HISTORICAL.

JONATHAN COWDERY, SURGEON IN THE UNITED STATES NAVY, 1767–1852.

PART 1.

By Capt. F. L. PLEADWELL, Medical Corps, United States Navy, and Lieut. Commander W. M. KERR, Medical Corps, United States Navy.

Jonathan Cowdery, the subject of this biographical sketch, was appointed a surgeon's mate in the Navy on January 1, 1800, and he lived to be the oldest officer in the service. A review of his life is not without interest to the medical officer of to-day for early in his naval career he took part in the war with Tripoli, was taken prisoner on the occasion of the loss of the U. S. frigate *Philadelphia*, and held captive by the Tripolitans for over a year and a half, during which time he kept a journal which throws much light on an historical event now almost forgotten.

He was a descendant in the sixth generation from William Cowdery, who came to New England in 1630 from Weymouth, England, settling first at Lynn, Mass., and later at Reading in the same State, where he died in the year 1687.

Jonathan Cowdery was born on April 22, 1767, at Sandisfield, Berkshire County, Mass. His father, Jabez Cowdery, was a physician who practiced his profession for many years in Tunbridge, Vt. His mother was Ruth Wickham, born at Glastonbury, Conn. Where Jonathan received his medical education is not definitely known, but he probably served a quasi-apprenticeship with his father, and he appears to have attended lectures for two winters at Dartmouth in Hanover, N. H., so it is not unlikely that this school was his alma mater. At any rate we find that by the time he had reached the age of 22 he felt himself qualified to support a wife, for in 1789, at New Marlboro, Mass., he married Mary Bryant, daughter of Col. Richard Bryant, of Revolutionary fame.

At this period of his life, Doctor Cowdery seems to have been somewhat of a rolling stone, for during the next six years he and his wife lived in three different localities where he practiced his profession. However, he was happy, as in each of these places a child came to bless his home. A son, Benjamin Franklin, was born in 1790, at New Marlboro, Mass.; another, Isaac Newton, was born in 1792, at Salisbury, Conn. In later years this child became a musician, playing the violin very skillfully. He taught music and penmanship. A daughter, Mary, was born in 1795, at Livingston, N. Y. She died the same year, and during the following year, 1796, Mrs. Cowdery died.

After his wife's death Doctor Cowdery returned with his two sons to his father's home in Tunbridge. Leaving his children with his mother, he settled in the little town of Hudson, N. Y., where he was practicing medicine at the time he received an appointment as surgeon's mate in the Navy of the United States, as the naval force of the country was called in its early days. His commission was dated January 1, 1800, and was signed by John Adams, the second President of the United States. His first cruise was on the frigate *Philadelphia* commanded by the elder Commodore Decatur, in operations in the West Indies against the French.

The first mention of him in official correspondence occurs in the following letter signed by Robert Smith, then Secretary of the Navy:

NAVY DEPARTMENT. *23 Oct. 1802.*

Doctor JON. COWDERY, *Hampton, Virg^{a}.*

I have received your letter of the 19th instant and sincerely regret, as well on your own as on the public account, the occurrence that has deprived us of your services on board the John Adams the present cruise.

On receipt hereof, you will consider yourself on furlough until again called into service and you will be pleased to report yourself to this department when you shall have recovered your health and are again fit for duty.

R^{t} SMITH.

On July 18th, 1803, we find Doctor Cowdery once more sailing as one of the junior medical officers in the frigate *Philadelphia*, at this time commanded by Capt. William Bainbridge, United States Navy, for service in the Mediterranean against the Barbary States. The senior medical officer of the vessel was Surg. John Ridgely, United States Navy.

The Barbary States, Morocco, Algeria, Tunis, and Tripoli, lie along the northern coast of Africa, between the Mediterranean and the Sahara, stretching from the Straits of Gibraltar to Egypt, a distance of 2,000 miles. The Mohammedan population of this strip of coast, consisting of Moors, Arabs, Berbers, and Turks, had long been engaged in piracy, especially since the Conquest of Granada in 1492, which was followed by the exodus from Spain of thousands of Moors who passed over to Africa carrying with them a hatred of the Spanish and a thirst for vengeance which early found vent in piratical raids on the commerce of Christian nations trading in the Mediterranean. These pirates continued to infest the Mediterranean until their extermination in the nineteenth century.

The captives taken in these raids were reduced to slavery and many of the pirates grew immensely and rapidly rich upon the plunder seized and the ransom of their captives. The redemption of slaves was procured with money raised by missions, contributions, and collections, and individuals and families sometimes impoverished themselves to ransom friends and relatives.

William Eaton, United States consul at Tunis, writing of the corsairs in 1799, says: "Their mode of attack is uniformly boarding. For this their vessels are peculiarly constructed. Their long, lateen yards drop on board the enemy and afford a safe and easy conveyance for the men who man them for this purpose; but being always crowded with men, they throw them in from all points of the rigging and from all quarters of the decks, having their sabers grasped between their teeth and their loaded pistols in their belts, that they may have the free use of their hands in scaling the gunnels or netting of their enemy. In this mode of attack they are very active and very desperate. * * * Proper defenses against them are high nettings, with chains sufficiently strong to prevent their being cut away, buckshot plentifully administered from muskets or blunderbusses, and lances. But it is always best to keep them at a distance, that advantage may be taken of their ignorance at maneuvering."

"The attitude of Europe toward the Barbary States was cowardly and dishonorable from first to last. The action of the stronger powers was prompted largely by policy. In order to injure their enemies and to crush the commercial competition of their weak neighbors they were willing to bribe and subsidize the pirates, submitting to the indignity and dishonor of being tributary nations and encouraging a system of ruthless piracy and slavery."[1]

Shortly after the Revolution a new flag appeared in the Mediterranean which the pirates soon learned to recognize as that of a young, weak power in distant America, likely to fall an easy prey to their vessels. Before long there were many Americans held in captivity in Barbary, who addressed letters and petitions to the President, to Congress, to the ministers of various denominations, and to Col. David Humphreys, United States minister to Portugal, who, in a letter to the American people, suggested a lottery as the means of raising the necessary funds for the ransom of their fellow countrymen.

Various diplomats, commissioners, and agents were appointed to the difficult task of negotiating with the Barbary powers, but their efforts met with indifferent success. The rulers of the Barbary coast maintained that they were the sovereigns of the Mediterranean, and that no nation could navigate that sea without a treaty of peace with them.

[1] Our Navy and the Barbary Corsairs, by Gardner W. Allen. Houghton, Mifflin & Co., Boston, 1905.

In 1792, the Senate favored paying $100,000 annually for peace with Algiers, Tripoli, and Tunis, and $40,000 ransom for the captives; but many of the leaders of that time favored the early and energetic employment of force against these piratical States and through their influence three ships were built and launched in 1797, the *United States*, *Constitution*, and *Constellation*; forming the nucleus of the American Navy.

A treaty of peace and amity with Algiers was ratified by the Senate, March 2, 1796, and it cost up to January, 1797, nearly a million dollars, exclusive of an annuity in naval stores valued at about $25,000. This treaty was not so liberal as one concluded with Morocco, but it was the only one which stipulated the payment of tributes. A treaty was also concluded with Tripoli and Tunis at great expense.

Looking backward to those times it is easy to see how the employment of force would have saved time and money and won respect for our infant nation, but, as Gardner W. Allen says, "to judge the question fairly it is necessary to look at it from the point of view of that time. Most of those who favored following the precedent of Europe by paying tribute to barbarians, and who opposed a navy, did what they thought was best for the country and many of them were among the foremost public men of the day." The money received only enabled the rulers of the Barbary States to prepare for further depredations upon commerce and each waited for a pretext and opportunity to break peace with the United States.

The pasha of Tripoli apparently did not make as good a bargain in the conclusion of his treaty with the United States as did some of his fellow pirates. Accordingly he became dissatisfied. Difficulties arose between him and the American consul, Mr. Cathcart, and finally on May 10, 1801, the pasha declared war against the United States. Without delay he sent out his corsairs in search of American prizes but with little success, as his hostile act had been anticipated by the American Government and a timely warning had put American merchantmen on their guard.

About June 1, 1801, a squadron under the command of Commodore Richard Dale, set sail from Hampton Roads for the purpose of observing the situation in the Mediterranean and protecting American commerce against the threatened attacks of Tripoli. This squadron consisted of the frigates *President*, 44 guns, flagship, Capt. James Barron; *Philadelphia*, 36 guns, Capt. Samuel Barron; and *Essex*, 32 guns, Capt. William Bainbridge, and the schooner *Enterprise*, 12 guns, Lieut. Andrew Sterrett. The squadron arrived at Gibraltar July 1. Here Commodore Dale found two Tripolitan cruisers which had left Tripoli with the intention of sailing into the Atlantic to prey upon American merchantmen off the straits, and by forestalling their passage through the Straits of Gibraltar he doubtless prevented severe losses to American commerce.

The *Philadelphia* was ordered to cruise in the straits and watch the Tripolitans, and the *Essex* was ordered to collect the American merchantmen in different ports and give them convoy through the straits. The commodore with the *President* and *Enterprise* cruised along the Barbary Coast where his appearance produced a salutary effect. During this cruise the *Enterprise* fell in with a Tripolitan vessel of 14 guns and 80 men. The two vessels were about evenly matched. They at once engaged at close range and fought for three hours. Allen gives the following account of the encounter and its results:

"By his superior skill in maneuvering, Sterrett was able to avoid the enemy's attempts to board, and by choosing his position, to rake him repeatedly. Twice the Tripolitan struck his colors, and when he thought he had his adversary at a disadvantage, reopened his fire, hoisting his flag again. The third time, there being no longer hope of making up for his poor seamanship and gunnery by treachery or stratagem, he threw his flag into the sea, and by supplicating gestures begged for quarter. Porter was then sent aboard the corsair to take possession. All her guns and small arms, with everything elese of value, were thrown overboard, and she was sent back to Tripoli an empty hulk. Sterrett's report to Commandore Dale, dated at sea August 6, 1801, is as follows: 'I have the honor to inform you, that on the 1st August I fell in with a Tripolitan ship of War, called the *Tripoli*, mounting fourteen guns, commanded by Reis Mahomet Sous. An action immediately commenced within pistol-shot, which continued three hours, incessant firing. She then struck her colors. The carnage on board was dreadful, she having twenty men killed and thirty wounded; among the latter was the captain and first lieutenant. Her mizzen-mast went over the side. Agreeable to your orders, I dismantled her of everything but an old sail and spar. With heartfelt pleasure I add, that the officers and men throughout the vessel behaved in the most spirited and determined manner, obeying every command with promptitude and alertness. We had not a man wounded, and sustained no material damage in our hull or rigging.' Sterrett received the thanks of Congress and a sword, and his officers and men a month's extra pay. The *Tripoli* crept slowly home, and on her arrival the pasha was filled with rage and chagrin. The unfortunate Mahomet Sous was mounted on a jackass, paraded through the streets, and bastinadoed. The effect of this severity was that men were greatly discouraged from serving in the corsairs then fitting out. For some time after this, very few Tripolitan cruisers ventured from port."

The remainder of the year 1801, was devoted to a blockade of Tripoli, which was effectual in that it caused a great scarcity of food in the capital. In 1802 the American Government determined to prosecute the War against Tripoli with more vigor. As the terms of enlistment of Commodore Dale's men had nearly expired, it became necessary to send out a new squadron to relieve the vessels in the Mediterranean. The command was given to Capt. Richard V. Morris, who hoisted his pennant on the frigate *Chesapeake*, 36 guns. This squadron having reached the Mediterranean, the *Philadelphia*, together with some of the other vessels, returned to the United States.

Commodore Morris operated in the Mediterranean until the fall of 1803 when he was relieved of his command by Capt. John Rodgers by order of the Navy Department because it was believed that he was not producing the results desired. When it was decided to recall Morris, a new squadron was fitted out, the command of which was given to Commodore Edward Preble.

Commodore Preble's instructions from the Secretary of the Navy, Robert Smith, were dated July 13, 1803. The vessels of the squadron sailed as they became ready for sea in the following order: *Nautilus*, 12 guns, Lieut. Richard Somers, June 30; *Philadelphia*, 36 guns, Capt. William Bainbridge, July 18; *Vixen*, 12 guns, Lieut. John Smith, August 3; *Constitution*, 44 guns, Commodore Preble's flagship, Lieut. Thomas Robinson, jr., acting captain, August 14; *Siren*, 16 guns, Lieut. Charles Stewart, August 27; *Argus*, 16 guns, Lieut. Stephen Decatur, September 8. The *Enterprise*, 12 guns, Lieut. Isaac Hull, already in the Mediterranean, was to remain there as one of the new squadron, but on the arrival of the *Argus*, which was a larger vessel than the *Enterprise*, Hull, being senior in rank to Decatur, was to exchange commands with him.

The *Philadelphia* arrived at Gibraltar August 24, 1803, in the vicinity of which place she cruised in search of enemy vessels, until on the arrival of Commodore Preble, she was sent together with the *Vixen* to establish the blockade off Tripoli before which port the vessels appeared on October 7. Bainbridge was informed by the captain of a brig, coming out of Tripoli, that two Tripolitan vessels of war were out upon a cruise. Thinking they were probably to the westward, he sent the *Vixen* to cruise off Cape Bon where these vessels would most likely be met if returning from that direction, and where it was safer for the schooner than off Tripoli, as the season for heavy storms was approaching. The *Philadelphia* from then on, maintained the blockade alone.

On the last day of October an event occurred which, according to Allen, is narrated by Captain Bainbridge in his report to the Secretary of the Navy, dated November 1, 1803, as follows: "Misfortune necessitates me to make a communication the most distressing of my life; and it is with deep regret that I inform you of the loss of the United States frigate *Philadelphia*, under my command, by being wrecked on rocks between four and five miles to the eastward of the town of Tripoli. The circumstances relating to this unfortunate event are: At 9 A. M., being about five leagues to the eastward of Tripoli, saw a ship inshore of us standing before the wind to the westward. We immediately gave chase; she hoisted Tripolitan colors and continued her course very near the shore. About 11 o'clock had approached the shore to seven fathoms water, commenced firing at her, which we continued by running before the wind until half past 11, being then in seven fathoms of water; and finding our fire ineffectual to prevent her getting into Tripoli, gave up the pursuit and was bearing off the land when we ran on the rocks in twelve feet of water forward and seventeen feet abaft. Immediately lowered down a boat from the stern, sounded and found the greatest depth of water astern. Laid all sails aback, loosed topgallant sails and set a heavy press of sail-canvas on the ship, blowing fresh, to back her off. Cast three anchors away from the bows, started the water in the hold, hove overboard the guns excepting some abaft to defend the ship against the gunboats which were then firing on us; found all this ineffectual. Then made the last resort of lightening her forward by cutting away the foremast, which carried the main-topgallant mast with it. But labor and enterprise were in vain, for our fate was direfully fixed. * * * Striking on the rocks was an accident not possible for me to guard against by any intimation of charts, as no such shoals were laid down in any on board, and every careful precaution, by three leads kept heaving, was made use of on approaching the shore to effect the capture of a Tripolitan cruiser. And after the ship struck the rocks all possible measures were taken to get her off and the firm determination made not to give her up as long as a possible hope remained, although annoyed by gunboats which took their position in such a manner that we could not bring our guns to bear on them, not even after cutting away part of the stern to effect it. When my officers and self had not a hope left of its being possible to get her off the rocks, and having withstood the fire of the gunboats for four hours, a reinforcement coming out from Tripoli, without the smallest chance of injuring them by resistance, to save the lives of brave men left no alternative but the distressing one of hauling our colors down and submitting to the enemy whom chance had befriended. In such a dilemma the flag of the United States was struck. * * * The gunboats in attacking fired principally at our masts; had they directed their shot at the hull, no doubt but they would have killed many. The ship was taken possession of a little after sunset and in the course of the evening myself and all the officers, with part of the crew, were brought on shore."

Captain Bainbridge was greatly depressed in spirits over the loss of his vessel. His officers sympathized deeply with him, and in a letter signed by all of them, November 1, 1803, expressed their feelings in the following words: "We, late officers of the United States frigate *Philadelphia*, under your command, wishing to express our full approbation of your conduct concerning the unfortunate event of yesterday, do conceive that the charts and soundings justified as near an approach to the shore as we made, and that after the ship struck, every exertion was made and every expedient tried to get her off and to defend her, which either courage or abilities could have dictated."

On November 2, a heavy wind caused the *Philadelphia* to float. The Tripolitans succeeded in pulling her off the reef the next day and brought here into the harbor, amid the rejoicing of the people and to the great mortification of the Americans.

The officers and crew of the lost vessel had a long bondage before them. Doctor Cowdery kept a journal during his captivity which gives much information about the fortunes of the prisoners, and which will form the subject matter of the historical essay in the BULLETIN next month. The officers were well treated at first, and were allowed some recreation on the roof of the house where they were confined, but after three or four days this privilege was denied them and soon they were removed to the prison where the men were confined. Doctor Cowdery attracted the attention of the pasha, who employed him as his physician, and he was allowed more freedom than any other officer.

The men fared much worse than the officers. The different classes of mechanics were put to work at their various trades, and the others were employed at all sorts of hard labor, chiefly on the fortifications. They were beaten and maltreated by many of their taskmastters, and sometimes basinadoed.

When Commodore Preble heard of the *Philadelphia's* situation he determined to destroy her and selected Lieutenant Stephen Decatur for the task. On the night of February 16, 1804, with the *Siren* and the ketch *Intrepid*, Decatur entered the harbor of Tripoli and set fire to the captured vessel which, as Admiral Nelson said, when he heard of it, "was the most bold and daring act of the age." Without a doubt the burning of the *Philadelphia* added much to the reputation of the Navy both at home and abroad.

In July, 1804, Commodore Preble assembled his entire squadron before Tripoli and on August 3, he began a series of bombardments which lasted a month and which caused great destruction of the gunboats in the harbor, and much damage to the city. He was relieved by Commodore Barron, who continued the blockade.

Two letters written by Doctor Cowdery after the bombardment throw some light on the condition of the American captives in Tripoli at this time. One letter dated November 7, 1804, and addressed to his father, Dr. Jabez Cowdery, at Tunbridge, Vt., is as follows:

My Dear Father, No doubt you have often heard of the loss of the Frigate *Philadelphia*, and the capture of its whole crew (by the Barbarians). Among whom is your unfortunate son. We were taken on the 31st of October, 1803, and entirely robbed of our property even the greatest part of the clothes on our backs were taken from us. Our seamen were immediately put to hard labor, without mercy, and have suffered much for the necessities of life. Five have paid their last debt to Nature, and five have turned Turk. Myself and fellow officers were permitted to occupy the house where our Consul Mr. Cathcart resided, while in Tripoli. On our first arrival, we signed a Parole of Honour, but have not been allowed to enjoy it. The Bashaw (or the head of the regency) compels me to exercise my profession in his Palace, and among his slaves; to relieve the distress of the latter is a pleasure to me. About the first of February we were removed to the Castle and placed in close confinement under a powerful guard of Turks, who examined every paper and letter with the utmost scrutiny, to prevent our having any communication with our squadron off the town, which they much feared. What few letters we received from our friends are opened before we get them; no doubt many have been suppressed. Mr. Nissen, the Danish Consul, has done us many favours, and is entitled to our utmost gratitude. We live in hopes of being liberated in due time, and in a manner that will do honour to our country whose service we were in, and whose wrongs we were avenging, when by a sad misfortune we fell into the hands of a Monstrous foe, who divested us of liberty and property, and plunged us into a Prison, from thence we were removed to a more gloomy one, the dreary cells of a Castle, the gloomy walls of which bespeak the miseries of Christian slaves. who erected them under the lash of Tyrants, the glimmering light of which is admitted through an Iron grating in the top; the doors are secured by large locks and bars of iron, and guarded by infamous Turkish soldiers, who are ready to plunge their daggers into our hearts, at the nod of a tyrant, who preserves us only for the ransom which he expects from our country.

We hope and expect that the Free Sons of Columbia will soon relieve us, their oppressed countrymen, and restore us to our native shore, that we may join them in the protection of its rights, and the enjoyments of its blessings. May the day soon arrive, when we may have the pleasure of joining our Countrymen hand in hand to erect dungeons for vice and temples for virtue. May we teach the haughty tyrant, and the barbarian that our rights, the common rights of man, are sacred, and not to be infringed, that we will establish and maintain them in spite of the enemies of Mankind. Ever since our captivity the Bashaw has been possessed in favour of me; I have had two fits of sickness, one of the Dysentery and the other Ophthalmia, both very severe during which the Bashaw paid me every attention that could be expected from a Turkish foe. On the 30th of July he took me from the prison of my brother officers, and gave me a pleasant and well furnished apartment in his palace; I now have liberty to walk about the town when I please, and to take a short ride into the country on a mule. Occasionally a Turk who speaks the English language, is appointed to walk and ride with me, to prevent my running away, or meeting with insult, and to act as interpreter; he is very polite and pays me every attention, I can speak Arabic (the language of the place) tolerably well; I have received some of the books which were taken from me when we ran on the rock, them I make use of as my best companions, I spend the best of my time in perusing them and in attending the sick slaves, particularly my countrymen. I am not allowed to hold any conversation with our officers (and our letters to each other are examined with the utmost scrutiny) who are still in close confinement. Our worthy Captain Bainbridge has established a credit with Dr. Davis, our Consul at Tunis, and with the French and Danish Consuls in this place so that we draw a little money when we are in want, by this our seamen are often supplied with bread, or perhaps they would perish with hunger. The harbor is closely blockaded by the American Squadron under Commodore Barron, who lately relieved Commodore Preble, in consequence of which there is great scarcity of provision in this place, and I fear it will be worse among us before we get from hence. Our Squadron made five vigorous attacks upon this place last summer, in which much blood was shed. Terms of Peace have been offered, without effect. The Bashaw demands $1,000,000 of dollars. Our Government has offered through Commodore Preble one hundred and twenty thousand dollars, a very wide difference; an additional amount is expected from our country in the spring, I suppose you know more of this than I do. We expect warm work next summer. I assure you it is not very pleasant to be a prisoner in a besieged city, but God is our protector. The present Bashaw has been on the throne about eleven years. On the death of his father, the former Bashaw, he usurped the throne, by killing one of his elder brothers, and driving the other out of the dominion into Egypt. He is very cruel to his subjects, when he finds them guilty of crimes; for murder, treason &c he beheads them; for theft, housebreaking &c he takes off the left hand and right foot, at the joint and dips the stump into boiling tar; for less crimes he gives them from five hundred to a thousand bastinadoes as the Turks call it; this is done by tricing up the feet with a rope and beating upon the soles of the feet with a large stick; they often perish under the operation. Yet this cruel prince is remarkably fond of his children, and kind to the poor. He is about thirty-five years of age. He has two wives, one white and one black; by the former he has five and by the latter four children, a plurality of wives is allowed in this country. The Bashaw is a white man of middling age, rather portly, and tolerably handsome. He has a bombproof room, which he occupies during the rattling of shells and shot and the sounding of Columbian Thunder. The laws of our country allow us full pay and rations during our captivity; this is of some consolation to us in this savage land. How long we are to remain here, God only knows; I am in hopes of once more seeing my Parents, I wrote you a letter directly after our captivity. I have an opportunity of sending this letter to the Island of Malta by a particular friend, from thence it will be sent to America, by our Consul who resides near that place, it therefore will escape the scrutiny of my new masters; I am in good health and spirits, thank God, and hope for better times soon. My respects to all friends, I am with the greatest respect, Your affectionate son,

Jon^{a} Cowdery.

Dr. Jabez Cowdery.

The other letter, dated 24 November, 1804, was addressed to a friend, a Doctor Mitchell, and it was published in the National Intelligencer at Washington, D. C., August 5, 1805.

Dear Sir: I hope you will excuse me for the liberty I take in suggesting to you a few remarks which have occurred since my captivity. The Bashaw has taken me from the prison where my fellow officers were confined and ordered me to attend his sick slaves who are principally Neapolitans, negroes and our unfortunate crew. Some of the latter I this morning saw chained to a cart loaded with stones which they were dragging through the town to repair the fortifications. They complain much of hunger, cold, hard labor and the lash of the whip. I confess I never saw anything that wounded my feelings equal to the sight of those poor fellows. I have liberty to walk in the town but am attended by a Turk who is loaded with weapons of war. I am not allowed to visit any of the fortifications nor any of the foreign consuls. Capt. Bainbridge's endeavours to relieve the wants of his crew are often countermanded by our new masters. Five of our countrymen have turned Turk, and five have paid their last debt to nature. Diarrhea and Dysentery have often appeared among our crew, but on a free use of carbonate of soda (Natron) which is found in abundance in this country and often white washing the walls of the prison with lime where they sleep, it soon disappears. Our crew are not very healthy.

During the several attacks upon this town by our squadron under command of Commodore Preble, many Turks were killed and wounded and several men much burnt by the explosion of their own powder. I had an opportunity of seeing their method of curing burns in particular, many of which extended over the whole body. The Bashaw has all his wounded brought to an apartment in the castle where he visits them and makes them a present of ten dollars each. He then orders his surgeons and Mamelukes to dress their wounds; he often assists with his own hands. The Mamelukes are his body guards; the *Marabouts* are employed to expell evil spirits, and make intercession with Mahomet their prophet, for their recovery. Those that were burnt, were first annointed with honey, carefully preserving the skin as much as possible and keeping the parts exposed to the air. They then sprinkled the ulcerated parts, if any, with a fine powder of white lead (Ceruse:) this they repeated at short intervals until a scab is formed, that is carefully preserved until a cure is accomplished, which is remarkably soon.

I hope and expect that in due time my country will honorably and to the astonishment of Barbarians and Tyrants liberate us from the chains of slavery and restore us to our native land, that happy land the thoughts of which is a healing balm to our souls in their miserable bondage."

Commodore Barron maintained the blockade through the winter of 1804–5, but his health at last became so impaired as to make it impossible for him to manage the affairs of the squadron. Accordingly, on May 22, 1805, he turned the command over to Captain Rodgers, the commanding officer of the *Constitution.*

On June 4, 1805, Captain Rodgers, together with Col. Tobias Lear, the American consular general at Algiers, who had been invested by the President with full power and authority to negotiate a treaty of peace with the pasha of Tripoli, effected an amicable settlement of the differences between that country and the United States. Colonel Lear in his report to the State Department, writing of the termination of hostilities says: "I went into the harbor in the *Constitution's* barge, with the flag of the United States displayed, and was received at the landing place by the American officers, who had been in captivity, with a sensibility more easily to be conceived than described.

An immense concourse of people crowded the shore and filled the streets, all signifying their pleasure on the conclusion of the peace. * * * On the 4th of June, at 11 a. m., the flagstaff was raised on the American house and the flag of the United States displayed, which was immediately saluted with 21 guns from the castle and ports and was returned by the *Constitution.*"

The American prisoners, after a captivity of over 19 months, were released and sent aboard the ships. On June 21 the American vessels left Tripoli, leaving behind as chargé d'affaires, Surg. John Ridgely, one of the late captives and formerly the senior medical officer of the *Philadelphia.*

Doctor Cowdery, as we see by the following letter, reached home in the fall of 1805.

TUNBRIDGE, VERMONT, *Nov. 1, 1805.*

I arrived here yesterday where I intend staying until spring if not sooner honoured with your command. I have the honour to be, Sir, with the greatest respect,

Your Obt. Serv't,

JON[n] COWDERY.

ROBERT SMITH, Esq.

After Doctor Cowdery's return to the United States his fortunes are best followed by a perusal of letters which he wrote from time to time to the Navy Department or to relatives or friends.

With him in captivity in Tripoli was a private of marines named William Ray, who also kept a journal. In July, 1807, Doctor Cowdry, who evidently was on leave at his father's house in Tunbridge, Vt., received the following letter from Ray:

DEAR SIR: My volume is nearly complete and will be put to press in a very short time, but I should nevertheless be very thankful to receive the remainder of your journal, for I have already taken the liberty of extracting from that part of it which was published in the Hudson Balance; and have made some remarks on the extracts, which perhaps, from a view of the whole, I might be induced to alter, I should also be happy to receive from you any interesting remarks you may be pleased to make; particularly information relative to the origin of the war. I have received both from General Eaton and the Secretary of the Navy, all the information in their power; but they are not explicit, as respects the true rise of hostilities between the United States and Tripoli. I wish, likewise, for a list of the United States vessels of war which were lying at Gibraltar when we first arrived there. What arrivals while we lay there, and what ships of war of the U. S. were lost at that place, for I have but an imperfect recollection. I enclose you two subscriptions which I would thank you to circulate and return to Mr. John Barber, Printer in Albany, within a couple of months, by which time it is expected the work will be nearly printed. As the time is short, I must beg you to forward the papers which you have been kind enough to promise me, with all possible expedition, to the Gentlemen above mentioned. I am, sir, very respectfully,

Your obedient Servant

W[m]. RAY.

Dr. JOHN COWDERY, *Tunbridge, Vermont.*

Evidently Dr. Jonathan only "circulated" one of the "subscriptions" as there is one folded in the letter. The following is a copy:

"To Readers,
Who search for knowledge, mental food of man,
"Roam the wide field, and gather all you can;
"Sweet's the repast where reason guides the way,
"But ah how bitter if from her we stray;
"Here taste the product of that barb'rous clime,
"Where truth is error—virtue is a crime.
"No venal motive has the writer shown,
"The Author's benefit is all your own;
"Subscribe, persue the volume, and you'll find
"Both pain and pleasure thrill the pensive mind,
"Mark the strange thesis, count the loss and gain
"And feast on pleasure at the expense of pain.

"Proposals.
"For Publishing by Subscription, A volume entitled
"Horrors of Slavery
"or
"The American Tars in Tripoli;
"Containing
"An account of the loss and capture of the United States Frigate Philadelphia,—Treatment and suffering of the Prisoners, Description of the place, manners, customs &c of the Tripolitans, Public transactions of the United States with that Regency, including Gen. Eaton's expedition; interspersed with interesting remarks, Anecdotes, and Poetry on various subjects,—Written during upwards of nineteen months Imprisonment and vassalage among the Turks.
By William Ray"

"Specimen of the Work.
"Extract from a Piece written by the Author in Tripoli, 1804.
"Published in the Port Folio.

"Ye lurid domes! whose tott'ring columns stand
"Marks of the despot's desolating hand;
"Whose weed-grown roofs and mould'ring arches show
"The curse of Tyranny, a nations woe;
"In ev'ry ruin—ev'ry pile, I find
"A warning lesson to a thoughtful mind;
"Your dreary cells expressive silence break,
"Echo to groans, and eloquently speaks;
"'The Christian's blood cements the stones he rears,
"'This clay was moistened with a Christian's tears.
"'Pale as these walls a pris'ner oft has lain
"'Felt the keen scourge, and worn the ruthless chain,
"'While scoffing foes increasing torture pour,
"'Till the poor victim feels, alas! no more!'
"Here thy brave tars America are found
"Lock'd in foul prisons, and in fetters bound."

Conditions.

"This volume will be handsomely printed on good papers, with a fair type. It will contain about 300 duodecimo pages, and be afforded to subscribers, neatly

bound and lettered, at One Dollar, payable on delivery of books. The work will be put to press as soon as a sufficient number of subscribers appear to defray the expense of publication.

ALBANY, *Feb., 1807.*

This book was to be published in Troy, New York, in 1808, but all efforts to find a copy have been in vain.

Among letters found in "Officers Letters," Navy Department Library, are some which show Doctor Cowdery's resentment at his delayed promotion.

In a letter written July 22, 1807, at Tunbridge, Vt. (near Chelsea, Vt.), he acknowledges receipt of orders to New York, and makes request for the promotion, which the Secretary had assured him that he should have, upon the occasion of their last meeting.[2]

In another letter, written at New York on August 7, 1807, he reports his arrival from Vermont, and states that he has reported for duty to Commodore Rodgers, who has assigned him to duty as surgeon's mate under Doctor Marshall.[3] States that he expected a "higher station," as he has been for a long time the oldest in the list of surgeons' mates. Mentions that he has attended the medical lectures at Hanover[4] the last two winters, and has been recommended by Doctor Mitchell[5] and others to the Secretary for promotion.

Doctor Mitchell was a teacher of rare attainments and wide knowledge in both science and medicine. His name appears in several of Doctor Cowdery's letters.

In this letter Doctor Cowdery declares his fondness for the Navy and for the gentlemen belonging to it and is anxious to be of service to the country in "the present critical situation,"[6] but protests against being continued as a surgeon's mate, when younger men are promoted over him. He requests the rank which was promised him when he and Lieutenant Stuart waited upon the Secretary in Baltimore.

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[2] This letter as well as those which follow are addressed to the Secretary of the Navy, R. Smith.

[3] S. R. Marshall, surgeon's mate, 14 May, 1799; Surgeon, 16 January, 1800; died 20 May, 1828.

[4] Dartmouth College (at Hanover, N. H.) established a medical department in 1797.

[5] Probably Dr. Samuel L. Mitchell of the Columbia College and the College of Physicians and Surgeons, N. Y., who may have given lectures at Hanover.

[6] The *Chesapeake-Leopard* affair had occurred only two weeks previous. On June 22, 1807, the frigate *Chesapeake*, Capt. Charles Gordon, bearing the broad pennant of Commodore James Barron, got under way from Hampton Roads bound to the Mediterranean. A squadron of British ships of war had been at anchor in Lynnhaven Bay for several months watching some French frigates that lay at Annapolis. As the *Chesapeake* stood down toward Cape Henry, one of the British vessels, the *Leopard* got up anchor and preceded the American frigate to sea by several miles. When both vessels were well off the land the British frigate approached the *Chesapeake* and hailed her, informing Commodore Barron that she had dispatches for him. In a few minutes a boat from the *Leopard* came alongside the *Chesapeake* bearing an order to search the vessel for deserters from the British ships. This Commodore Barron refused to permit, stating that he knew of no such deserters on board. The British officer returned to the *Leopard*, and almost

NAVY YARD, NEW YORK, *August 17, 1807.*

D[r.] SIR: On my return from captivity in Tripoli I did myself the honour of calling upon you and in addition to letters of recommendation sent to you by Dr. Mitchell, and commanders in the Navy, whom I had the honour of serving under as surgeon's mate, I delivered to you two letters of recommendation, one from Captain Bainbridge and one from Dr. Ridgely,[7] late Surgeon of the *Philadelphia*. You read them with great satisfaction and applauded my conduct in the Navy. I then told you that I had served a number of years as surgeon's mate and now hoped you would grant me a higher station. You replied that I should be promoted when I should again be called into service. You have again called me into service, and I am on duty as surgeon's mate, which, under the circumstances, is very humiliating to me indeed, and I now beg you will send me a surgeon's commission, or, if you deem me inadequate to this, I beg you will send me a discharge from the service.

Yours with esteem,

JO[n] COWDERY.

Hon. R. SMITH,
Secretary of the Navy.

Fortunately, the "discharge from the service" was never sent, and Doctor Cowdery was promoted to the rank of surgeon in the Navy on the 27th of November, 1807. He was ordered from New York to Norfolk, Va., where he made his home until his death in 1852. On May 15, 1807, he bought some land of Israel Chase, in Tunbridge, Orange County, Vt., and it seems that he had left his son Isaac Newton in charge of his brother, Elihu. The following extracts are from letters written to his brother Elihu:

NORFOLK, VA., *Jan. 26, 1808.*

DEAR BROTHER. I had the pleasure of receiving two letters from you since being on this Station, one was dated Dec. 3, and the other Jan. 3, in which I am pleased to find that you and our Family enjoy Health. In your letter of Jan. 3d you mention that you fear that I would receive your letters with reluctance were it not for the Business you have in Charge for me,—This, my brother, is a needless fear. You may rest assured that I esteem you as I ought to do as my Brother, both by Nature and by Art, our former trifling disputes ought to be

without warning the vessel fired an entire broadside at the *Chesapeake*, wounding Commodore Barron and his aid, who stood in the gangway.

The gunfire was continued from 15 to 18 minutes, when Commodore Barron ordered the colors to be hauled down.

The *Chesapeake* immediately sent a boat to the *Leopard* to say that the ship was at the disposal of the English captain, who then directed his officers to muster the American crew. Four men, claimed to be deserters from British vessels, were carried away, and the *Chesapeake* returned to Hampton Roads.

The attack on the *Chesapeake* aroused public sentiment in the United States against Great Britain and almost led to an immediate declaration of war.—Cooper, J. Fenimore: The History of the Navy of the United States of America, 1853, Vol. II, p. 13.

[7] Dr. John Ridgely. Appointed 2 July, 1803. He was surgeon on the *Philadelphia*, Jonathan Cowdery and Nicholas Harwood being the surgeons' mates. Dr. Ridgely was appointed chargé d'affaires of the United States to the Regency of Tripoli in June, 1805, upon the recommendation of Commodore Rodgers. He resigned in 1808 and settled in Annapolis, Md. The practice of appointing medical officers to diplomatic posts in the Mediterranean was not unusual in these days. In addition to Dr. Ridgely's appointment to Tripoli, Commodore John Rodgers appointed Dr. James Dodge, surgeon of the *Constitution*, to act as chargé d'affaires at Tunis, and Commodore Richard V. Morris, in 1802, appointed Dr. George Davis to be consul at Tunis.

forgotten, they were of too trifling a nature to even remember. I wish often to receive your Letters as from a Friend and a Brother.

As for my horse I wish him to be used by a careful hand until he can be sold. Sell the saddle and bridle, Sell my sow as soon as she will fetch the highest price. As for my Friends who enquire for me and wish me to return to exercise my Profession among them, tell them of the Esteem I have for them, and as I intend marrying in their vicinity if * * * I intend to return and settle among them as soon as our Navy is layed up, which I hope and expect will be soon.

If Newton learns fast and well and wishes to persist, I wish him to continue in it, in a manner you may deem the most advantageous to him, and my circumstances. If he does not learn well, and is willing to go to a Trade, I wish you to consult Austin and put him to a Good Trade, if any, and under a Good and Severe Master. I am in Health and am employed the fore part of every day visiting and prescribing for the sick and Lame in the Hospital Vessel and in the Navy Yard, etc. My Mates and attendants put up the Medicine and do the other Duty of the Medical Department, the afternoon and evenings I spend in Reading, Writing and among my new friends and acquaintances in Norfolk and in Portsmouth.

They are of both sexes and are very Hospitable to the officers of the Navy and Army, who are here in abundance. We are invited to all of their public amusements, etc., etc. The British officers of the Frigate which brought Mr. Rose as a minister to our Government, come on shore occasionally, they visit but little except at the British Consular House (Col. Hamilton). We all treat them much cooler than they have been used in the American Ports. Lieut. John Davis, one of our officers who Commanded Gun Boat No. 1, put an end to his existence the other day, by discharging a pistol through his Brains while lying in his Bed in the Cabin of his Gun Boat.

He had been disgraced for bad conduct, he was much given to Dissipation, he found that he was despised and neglected by all his Brother Officers, and was much in debt, which is supposed caused an insanity and was the reason of his committing the horrid deed of Suicide. I was called to him before he was dead, but could not help him. * * * The winter is very Pleasant, but the summer is to be dreaded by us northern people.

(Signed) JON[n] COWDERY.

The winter was indeed very pleasant for him as will be seen by the following letter:

NORFOLK, VA. *Feb. 13, 1808.*

DEAR BROTHER: I this evening am to marry a Woman whom I think is one of the best in Creation. She is of Good character, has a handsome property, is of Good Family. is amiable in her Disposition and manner, and above all she is a woman I ardently admire, her name is Eliza Reddick, widow of the late Capt. Thomas Mill Reddick, who for many years commanded and sailed in different ships out of this Port, and was lost on his return from the West Indies the winter before last. I shall immediately quit my quarters on board the hospital vessel and live with my wife in Norfolk, but shall continue in the same duty in the Navy in this Station as before. I intend coming to Tunbridge as soon as my services in the Navy will admit, perhaps I shall bring my companion with me to visit our friends, if not to settle among you. [Here he gives directions about selling his property in Tunbridge.] My respects to our friends, particularly our Parents, and my dear Son, tell him to

be a good son, to be obedient to his Grandpa and Grandma and learn well his book and his father will not forget him. N. B. an extract from the Norfolk Ledger. "Married on the evening of the 13th Dr. Jonathan Cowdery, Surgeon in the U. S. Navy (one of our late sufferers in Tripolitan Captivity) to the much esteemed Mrs. Eliza Reddick, of this place, widow of the late Capt. Thomas M. Reddick, Feb. 15, 1808."[8]

(Signed) JON[n] COWDERY.

As we see by the following letters, he was not permitted to enjoy the comforts of his Norfolk home long.

NEW YORK, *Nov. 26, 1808.*

MY DEAR BROTHER: We are about getting under way for another Cruise off Boston, Portsmouth, etc. I beg you or Austin, or both of you will write me immediately at Boston on board the U. S. Brig *Argus* to the care of the Navy Agent at that place. We expect War with England and France, our Country is in a woful condition, I wish you to send my Great Coat and my Blue Straitbodyed Coat to me at Boston to be left with the Navy Agent of that place until called for, I wish you to put them up in my leather thing that I used to carry my Great Coat in. Seal them up and send them by a safe hand. Inform me what you have done with Newton. I wish you to send the things soon for we shall have a cold cruise.

(Signed) JON[n] COWDERY.

NEW YORK *Jan. 4, 1809.*

DEAR BROTHER, I have the pleasure of again addressing you; we lately returned from a very tedious cruise on the coast of New England, we had almost constant gales of wind with much Snow and Rain. Many of our Crew were much frozen. I had thirty on my list at one time, who were frost bitten in a greater or less degree. I have saved all their limbs and the most of them are again on Duty; We are now taking in Provisions, Water, &c for another cruise to the northward to enforce the Embargo Laws, and to prevent Insurrection in the forests of New England. The Embargo is an oppressive law, but as it is the choice of the majority of our Country, it is the duty of us all to Support it, I have suffered much in the cause of my country, and I am willing yet to serve it at the hazard of my Property, my Health, my Comfort and if Necessary my life. But in Vermont I was called a Federal Tory by those who are now violating the Embargo by smuggling into Canada, and these very men voted for the Member in Congress from Vermont who voted in Congress for the passing of the Embargo Laws; but I am happy to see a change in your People. I see that you in Vermont as well as in all the New England States have a large majority of Federal Republicans for the next Congress. I hope that the liberty and Character of our Country will yet be saved. I saw Brother Austin's name in the proceedings of the Grand Lodge of Vermont, in the newspapers at Boston. I wrote him that I wished not to meddle much with politics while I was in the service of my Country, but I now feel in a tone for it. I lately applied for a furlough and got an answer this morning that I could not have one, but must go another cruise among my Brother Yankees, etc. I wrote you when I was here before to send my Great

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[8] Five children were born of this union. George Washington, born Dec. 13, 1808; Camelia Wickham, born Jan. 22, 1811; Theodoria, born Dec. 15, 1812, died Oct. 13, 1813; Ann Eliza, born June 30, 1814, died 1894; and Alexander Augustus, born May 11, 1817, died 1899, who lived for many years with his sister, Ann Eliza, in Philadelphia, Pa.

Coat and small coat to the care of the Navy Agent at Boston, which I presume you have done before this. If you have not, you need not send it. We did not stop at Boston on our return owing to bad weather, but we expect to be there within a few days to Blockade their harbor, when I expect to find the articles requested, and a Letter from you.—I want to hear from you all, and the state of my affairs in Tunbridge. I also wish to know the state of our infant Medical Society which we were establishing when I left you. Give my respects to such of the members as you are acquainted with, and tell them that I wish them to send me a Sketch of their establishment and the name of their officers, etc. I wish to give them a place in the Medical Repository.[9] I am with much esteem

Yor loving Brother, JON^n COWDERY.

His letters written during the year 1809 indicate that the state of his health was not the best.

One dated Norfolk, June 7, 1809, acknowledges orders to the *Nautilus* and expresses regret for a delay until his health is sufficiently recovered to comply with it and join the ship before she is ready for sea, "during which time, if you may deem it proper and will be pleased to command me, I will attend to the procuring the necessary medicines, instruments, etc., which may be procured at this place on very reasonable terms."

Another, dated Norfolk, July 14, 1809, and addressed to Hon. Paul Hamilton, Secretary of the Navy, acknowledges orders to the *Ferret*, but he reports himself ill, though better of the lameness which he mentioned to Mr. Goldsborough[10] when last in Washington. He has a complaint in the breast which is no better and is much emaciated and debilitated. His infirmity originated from sufferings on board the *Argus* the previous winter off the coast of New England, when he contracted a violent cold, since which he has not enjoyed a well day. "I have yet reason to hope it will not prove to be a confirmed decay. I am now in a course of medicine and diet under Drs. Barraud and Hansford, (both very eminent in their profession) which I hope in a few weeks will relieve me sufficiently to join Lieut. Gadsden on the *Ferret*. At present am not able to perform the duty required of a physician or surgeon on a vessel of war."

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[9] The first medical journal published in America was the Medical Repository, a quarterly, under the editorship of Samuel L. Mitchill, Edward Miller, and Elihu Smith. It was founded in 1797 and continued until 1824.

[10] Charles W. Goldsborough was for many years chief clerk of the Navy Department and the author of the uncompleted work, the United States Naval Chronicle. One volume only was published in 1824. Goldsborough's connection with the Navy Department continued over a period of 44 years. He was chief clerk under Secretaries Stoddert, Smith, and Hamilton and secretary of the Navy Board of Commissioners until the separate bureaus were established, when he was appointed Chief of the Bureau of Provisions and Clothing, being the first chief of that bureau. (His portrait hangs in the Paymaster General's office.)

Dr. Cowdrey reported to Lieutenant Gadsden on August 3 as "sick and afflicted with cough, spitting of blood, and pain in my breast. I have not been out of my chambers from the day I saw you. It is with much regret that I am not able to join the *Ferret* under your command." On August 12 Lieutenant Gadsden reports to the Secretary that Doctor Horseley [11] has reported.

The doctor writes from Norfolk, under date of October 4, 1809, that he has spent 10 years in the Navy—19 months of which he was in captivity in Tripoli. He has lost considerable property as a result, and also the vision of the right eye,[12] and has suffered much impairment of health. He states that he has a wife and three children to support, and asks if he can have duty at the navy yard at Gosport when Doctor Heerman leaves, the latter being not averse to a change of station.

In a letter written on board the frigate *United States* on February 20, 1811, he reports joining this ship, in accordance with orders, and reporting to Commodore Decatur. He expresses the hope that the cruise will benefit his health, but requests permission to visit Washington on the return of the ship to Norfolk in order to settle his accounts at the Navy Department and obtain a furlough, during which he desires to make arrangements to provide for his family (a wife and four small children).

In several letters written in 1808–9 and 1810, Doctor Cowdery speaks of having established a drug store in Norfolk, Va., and also mentions owning the Chase, Newhall, and Stanley places in Tunbridge, Vt. The settlement of his affairs in Tunbridge seems to have been the cause of much perplexity, and some misunderstanding between him and his brother, and his brother-in-law, Samuel Austin. After much correspondence on the subject, Doctor Jonathan writes to his brother Elihu, on July 8, 1914. "I have written Mr. Paine, the attorney, to settle with you and Austin on amicable terms and not to put you to any cost or inconvenience if he possibly can avoid it. I had rather lose a thousand dollars than wrong either of you one cent. I therefore desire you and Austin will come to a settlement with him of everything concerning me. I deprecate family disputes. I therefore hope you will settle everything amicably. I am on duty in the Navy on this Station. We have about 700 men in the service, and I have had the good fortune not to lose but one man since I had the medical charge of them, which is a year last spring. We hope for Peace soon, but are under apprehension that

[11] In later years Horseley became surgeon on the *Lawrence* with Commodore O. H. Perry, and was present in the Battle of Lake Erie on Sept. 10, 1813.

[12] Conjunctivitis was very prevalent in Tripoli.

the war will last many years. England being left to contend with us alone, I fear will take ground that our Government cannot with the dignity of an independent Nation, submit to. My particular Love to our aged Parents. I beg you will not let them suffer, should they be in want I am ready and willing to contribute to their comfort and support." In a letter written on August, 1815, Dr. Cowdery appoints "My honored Father Jabez Cowdery of Tunbridge, Vermong, my true and lawful attorney."

Nothing appears in the files of the Navy Department's correspondence concerning Doctor Cowdery until 11 years later, at which time we find him ordered to sea and apparently feeling the weight of his years and the disadvantages of ill health.

In a letter written at Norfolk, on April 16, 1823, in reply to the Secretary's order of the 10th to join the *Hornet*, he states that ill health will prevent, that he is 56 years old on the 22d day of this month and in the Navy 23 years, and has made no complaints about orders until now. He asks to continue on the station and have his orders to sea revoked. He inclosed a letter from Surg. George J. Kernays which states, "that Doctor Cowdery for 12 months has feared that he was losing use of one leg and thigh. He requires care to prevent a termination in a general paralytic affection of the lower extremity."

Indorsement by the Secretary of the Navy. "The order may be revoked, another must be obtained."

From Norfolk, under date of January 9, 1824, he writes that he has been with Commodore Porter in former days and in trying scenes, but by reason of ill health he is not able now to render service to him and under his command "in the contemplated cruise against the enemies, not only of our country but of the human family." He wishes to have a position on the station (i. e. Norfolk) and states that he was "in all wars since the Revolution to the end of the last British war—out in the *Argus* and in the *United States* during the greater part of the embargo. In the Navy 24 years on the 1st of this month and 58 years old next April and been in sea service (I believe) more than any surgeon in the Navy." He suggests that he may be useful at the recruiting service attending the sick and disabled officers and seamen not accommodated at the hospital and explains the he "is now attending some of this description and assisting the younger surgeons in making out their requisitions, etc., and in examining old or damaged articles of the Medical Department belonging to vessels after a cruise, and in attending sick seamen on Crany Island who may be quarantined, as I did the last two seasons."

This letter bears the following indorsement by the Secretary of the Navy: "Countermand orders and leave him as he was before. 16 Jan. 24, Samuel L. Southard." [13]

A letter from the U. S. R. S. *Alert*, dated April 19, 1827, indicates that Doctor Cowdery was still at Norfolk.

When 63 years of age, Doctor Cowdery was ordered to sea as medical officer of the U. S. S. *Warren* and as he was to be the senior medical officer in the Mediterranean Fleet he was exceedingly anxious to secure the denomination as surgeon of the fleet and accordingly wrote the following letter to Andrew Jackson, the President of the United States:

NAVY YARD, NEW YORK, *30 June 1829.*

SIR: I hereby take the liberty of addressing your Excellency on a subject which to me is of vast importance, and for which I have reason to believe you will have the goodness to excuse, and duly appreciate.

I have belonged to the Navy of the United States as a Medical Officer nearly thirty years, have been on duty at sea and on shore stations the whole of this time, excepting about two years after being released from Tripoli captivity and I flatter myself to believe that I have performed my duty to the satisfaction of all whom I have the honor to serve. I lately received orders from the Hon[ble] Secretary of the Navy to proceed to New York and report to Commodore Chauncey for a passage to the Mediterranean and then report to Commodore Crane for duty on the U. S. Ship of War *Warren*. I resolved to *obey the orders* as far as was in my power, and did myself the honor of calling on and taking leave of your Excellency, and also the Hon[ble] Secretary of the Navy.

I then wanted to confer on the subject of my rank, but found your excellency so much engaged that I concluded it would be best to write you on the subject, and not delay the obedience of my order. The Act of Congress for the organization of the Medical Department of the Navy of the U. S. of 24th of May 1828, 2nd Section, authorizes the President of the U. S. to appoint to every fleet or squadron of the Navy a surgeon then in the naval service of the U. S. to be denominated Surgeon of the Fleet. Therefore if I am to be the oldest surgeon on the Mediterranean Station I do most respectfully ask your Excellency to grant me my rank. It would be humiliating to serve under a younger surgeon. From your Excellency's military renown and kindness of heart, you can duly appreciate the feelings of an officer on a subject of this nature. I hope I may not be allowed to leave my country, my friends, my wife and children, with a heavy heart. As for my naval, or professional character, I refer your excellency to Commodore Barron under whose command I last had the honor of serving on the Norfolk Station.

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[13] This letter indicates that Doctor Cowdery had been ordered to Commodore Porter's squadron, which had been operating in the West Indies against pirates, then infesting these waters. Commodore David Porter had resigned his position as Commissioner of the Navy to assume the command of this expedition. He took his squadron to sea on the 14th of February, 1823, and after successfully suppressing piracy about Cuba and Porto Rico, arrived at Thompsons Island (Key West) late in the year. Here yellow fever broke out in several ships and soon forced the sailing of the squadron to the northward. Porter's action during this campaign in landing an armed force at Fajardo, on the island of Porto Rico, in an attempt to force an apology for harsh treatment of some of the officers and men, brought about his trial by court-martial and his suspension from duty for six months.

I am to take passage to the Mediterranean in the U. S. Ship *Ontario;* she is to sail from this port; it is likely that she will be detained several weeks for want of seamen, whom are slowly procured, therefore I hope to be honored with a reply to this communication before leaving this country.

I am respectfully, Sir, Your Excellency's Obedient and very humble servant,

JON[a] COWDERY, *Surgeon.*

His Excellency,

ANDREW JACKSON, *President.*

(Indorsed by the President:) "Referred to the Secretary of the Navy for answer. A. J."

The following letter, which was written to his son, Benjamin Franklin Cowdery, then ir Geneva, N. Y., gives some insight into Dr. Cowdery's character.

NEW YORK, *Aug. 17, 1829.*

MY DEAR SON. It is a considerable time since I had the pleasure of hearing from you. As this may be the last time, I feel it a duty now to address you. I am about to leave my Dear Country, family and friends, on another cruise of perhaps three years in the Mediterranean. I was in hopes that my former services and age, would induce the Government to allow me a shore station the balance of my days. On my receiving orders for this service, while I was on duty as Surgeon of the Naval Station at Norfolk, in Virginia, and where my wife and four children now reside, I went to the city of Washington to see the President of the United States and the Secretary of the Navy on the subject of my being ordered to sea in my old days, they both urged the necessity of my complying with the order and said that my services were particularly required in the fleet as being an old and experienced surgeon.

I concluded that it was my duty to obey the call and again go on foreign service for my country. I am to go out a passenger in the U. S. Ship of War *Ontario;* she is fitting out on this station. We expect to sail within two or three days for the Mediterranean to join our Squadron at Port Mahon, where I expect to be put on duty as fleet surgeon. The *Delaware* 74, Commander Crane, is to return to the U. S. Commander Riddle is to take command of the Squadron. A Mr. Lee, Consul General of Algiers, two or three Lieutenants, two young Gents who lately graduated at Yale College, and several Midshipmen are going as passengers in the ship. I have left my son G. W. Cowdery in charge of my family in Norfolk. He will be twenty one years of age next December; he is a moral, steady, studious and promising youth. I place great confidence in him, and hope he will become a Christian and an ornament to his fellow mortals. My son, before closing this epistle I will say a few words on this important subject of Religion. I for several years have been under serious impression on this subject. I am convinced of the truths of Christianity, as it is set forth in the Holy Scriptures. I hope that God has forgiven the many sins of my younger days, I feel a confidence in him and a thankfulness for his many and continued blessings bestowed on me and mine. I am a member of his Holy Church. I read his Word and pray for his Blessings and Salvation. What is this world without religion. Joys at best are but transitory, all checkered with afflictions, even if we live a hundred years, life is but a phantom in comparison to eternity, therefore is it not best to strive to serve God, with the hope of his benediction in this world, and the world to come. My love and best respects to your Dear Family, and that all of you may be constant in serving God and our fellow mortals is the prayer of your affectionate father,

JON[a] COWDERY.

Fourteen years pass. We assume that Doctor Cowdery finished his cruise in the Mediterranean and returned to duty at Norfolk, but detailed information relating to this period is lacking. He is now well along in years, but evidently not willing to be superseded by a younger man, as the following letter to the Secretary of the Navy indicates.

It is not in his usual handwriting and the signature is that of a hand tremulous with age:

NAVAL RENDEZVOUS,
Norfolk, March 31, 1843.

SIR: Dr. G. W. Codwise, who has just arrived here from the North, I am informed either has, or intends applying for the situation, which I have the honor of filling, as the recruiting medical officer at this place, I have, I believe, faithfully gone through every species of service, incident upon my profession, and after 40 years servitude, find myself at the head of the list of Surgeons. I am now, Sir, 76 years old, and too infirm for the more active and rougher duties of my profession. I believe the duties of the Rendezvous, are, and can be still, performed by me, as well as any one else, and as I do not desire to be supplanted, unless the good of the service requires it, I most respectfully. Sir. request that I may not be detached from my present position.

I have the honor to be,
Very respectfully your obt. Servt. etc.

Jo[n] COWDERY.

Hon. A. P. UPSHUR,
Secretary of the Navy.

[Indorsed as follows:] Dr. J. Cowdery having punctually performed all the duties of medical officer at the Rendezvous to my entire satisfaction I cheerfully request for him a full consideration of his application.

JNO. P. YOUNG,
Comg. Naval Rendezvous, Norfolk.

[Indorsed by the Secretary:] This removal is not because of any deficiency or neglect on his part but in compliance with a rule which is applied to all officers of the service that they shall hold such places only three years.

Ans[d] 7 April 1843.
Det[d]. and waiting orders.
Apr. 7, 1843.

Apparently his successor did not like the detail at Norfolk and Doctor Cowdery, learning that he was desirous of leaving, writes requesting the duty.

NORFOLK, VA., *October 23, 1844.*

SIR: As Doct[r] Codwise is desirous of leaving the Rendezvous of this station and as my infirmity of age renders me unfit for very active service, and as I desire to render some benefit to the service, I hereby respectfully ask to be ordered to attend the Naval recruiting service as surgeon of the Rendezvous on this station.

Respectfully Sir Your Obt. servt.

Jo[n] COWDERY,
Surgeon, U. S. Navy.

Hon[ble] JOHN Y. MASON,
Secretary of the Navy.

[Indorsement on letter:] Surgeon Cowdery is the oldest surgeon in the Navy, to whom this duty would be particularly acceptable, on account of his age and incapacity for active service. Should the Department see fit to grant this application, it would be an act of kindness to him, very gratifying to himself and friends.

Very respectfully, etc.

W. C. BOLTON.

Ref^d to Bureau of Medicine and Surgery J. Y. M.

It is recommended that this application be granted, that the transfer occur the 1st of November and that Dr. Codwise be relieved and granted 3 months' leave.

Respectfully,

THOS. HARRIS.

Done, 2 Nov. 1844.

A letter dated November 6, 1844, acknowledges the receipt of orders of the 1st instant to attend the naval rendezvous at Norfolk, and indicates that Doctor Cowdery has reported to Commander Bolton and Commander Armstrong.

A letter of July 14, 1845, gives some details of a report of survey on a midshipman, "affected with bilious pleurisy, which has terminated in chronic hepatitis and pleuritis. He is also threatened with Phthisis Pulmonalis. We respectfully recommend change of residence, as we consider such change essential to his recovery. Jon. Cowdery, Surgeon, U. S. N. Danl. Egbert, Surgeon, U. S. N."

The following correspondence indicates that his service at Norfolk was once more interrupted:

U. S. NAVAL RENDEZVOUS,
Norfolk, June 6, 1850.

SIR: On the 21st of May last Commodore Sloat ordered me to take the place of Surgeon Thomas Williamson at this Rendezvous, the duty of which I continued to perform from the date of this order. I now respectfully desire the Department to be pleased to confirm the order.

Very respectfully your obt. servt.

JO^N COWDERY.

SURGEON THOMAS HARRIS,
Chief of the Bureau of Medicine and Surgery.

Referred to Department recommending confirmation of orders.

THOS. HARRIS.

[Indorsement by Secretary:] Is this (?) able to perform this duty? W. B. P.

[Indorsement by the Chief of the Bureau of Medicine and Surgery:] Dr. Cowdery is believed to be fully competent to the duty for which he has been above detailed.

Very respectfully,

THOS. HARRIS.

Order him. W. B. P.
Order confirmed, 11 June 1850.

U. S. NAVAL RENDEZVOUS,
Norfolk, Va. June 13, 1850.

Acknowledges Secretary's confirmation of orders to duty at Rendezvous
To: Hon. WM. BALLARD PRESTON,
Secretary of the Navy.

Doctor Cowdery's death occurred on November 20, 1852. The Norfolk Beacon of that date in referring to him said: "Few men have borne a more unblemished character or been held in such high and universal esteem for all the qualities of head and heart that constitute the efficient officer and worthy citizen."

He was buried in Cedar Grove Cemetery in Norfolk, in a lot with his wife Eliza, and his sons, Alexander, Augustus, and George Washington. His remains are in a small vault resting on the ground, the sides of which are granite and the top marble. One visiting his grave to-day may read the following inscription covering the marble slab of the vault:

"In Memory of
Jonathan Cowdery,
Surgeon of the Navy of the United States
He was born April 22, 1767,
And died November 20, 1852.

Affectionate in his nature, faithful in the performance of his duty, and pure in spirit, He has left, as a patriotic christian, a character without stain, and an example worthy of emulation.

He was upwards of fifty-two years in the service of his Country, and at the time of his death held the oldest commission in the Navy."

(The writers of this article wish to acknowledge their indebtedness to Dr. Southgate Leigh, of Norfolk, Va., for much material relating to the personal history of Doctor Cowdery and for assistance in securing the loan of the daguerrotype from which the portrait appearing in this article was reproduced.

It so happened that when one of us had decided that Doctor Cowdery had probably spent his last days in Norfolk, Doctor Leigh was addressed with a request that he indicate some one who might give information of the place of burial of Doctor Cowdery and supply biographical data relating to him. The selection of Doctor Leigh was entirely accidental but very fortunate since he proved to be a great grandson of Dr. Jonathan Cowdery.)

(to be continued)

EDITORIAL

AN INVESTIGATION OF THE ETIOLOGY OF EPIDEMIC ENCEPHALITIS.

The causative agent of epidemic encephalitis (lethargic encephalitis) has apparently been demonstrated by Strauss, Hirschfeld, and Loewe, working in the pathological laboratory of Mount Sinai Hospital, New York City. Their work has been confirmed wholly or in part by others in France (1), England (2), and the United States (3). The investigation was exhaustive, conclusive, and all the steps were well controlled. The results were published in a series of articles entitled "Studies in epidemic encephalitis," appearing in various periodicals. The first of this series (4) describes results obtained by subdural or intraperitoneal inoculation of seven monkeys, with material obtained from human cases or from artificially infected monkeys. A saline emulsion of brain tissue from a fatal human case produced lesions in a monkey similar to those of human cases. Washings from the nasopharynx of a human case were passed through a Berkefeld filter and injected subdurally and intraperitoneally into a monkey and produced a paresis of both hind legs and an increase in the spinal fluid cells. A similar filtrate, from the mucous membrane of the nasopharynx of a fatal cardiac case, produced no apparent lesions in the monkey up to the date of the presentation of the report.

The next report (5) describes experiments with a group of rabbits and the further results on the first seven monkeys as well as several additional ones. Rabbits were injected intracranially with a Berkefeld filtrate of nasopharyngeal material from a patient suffering from encephalitis, and others with material from control cases. At the same time, others were injected with material from rabbits dying from the induced infection. By this series of experiments the authors demonstrated that a filterable virus from the nasopharynx would produce lesions in rabbits and monkeys similar to those in the human brain, and that this virus could be recovered from the nasopharynx of animals which had been previously inoculated intracranially. Approximately 50 per cent of rabbits seemed to have a natural immunity. One infected monkey that recovered was found to have developed an immunity. Up to this time attempts at culture, using the ordinary ærobic and anærobic methods, were unsuccessful.

Another paper (6) describes the successful cultivation by the method employed by Noguchi (7) of an organism resembling in appearance of colonies, of growth, and of morphology the organism described by Flexner and Noguchi in poliomyelitis (8). Details of the method of culturing and of appearance of the organism are given more fully in a separate report (9). The media used consisted of sterile kidney fragments covered with 3 or 4 cubic centimeters of sterile ascitic fluid in test tubes of 20 by 1.5 centimeters, and which was incubated for 48 hours. Contaminated tubes were discarded when contamination was detected by gross examination or by dark-field illumination of smears. Better results were obtained when an old ascitic fluid was used. This should be bile-free and of high specific gravity; the presence of fibrin helps the growth of the organism. The best material was that obtained from decompensating cardiac cases. The tubes were first inoculated and then ascitic fluid was added to make a column 10 centimeters high. Petrolatum of low melting point was added to make a layer of 1 centimeter in thickness. Alboline may be used, but with this a Novy jar is necessary. As control tubes they employed combinations of ascitic fluid with petrolatum; inoculum, ascitic fluid, and petrolatum; ascitic fluid, kidney tissue, and petrolatum. As inoculum they used brain fragments, spinal fluid, blood, and nasopharyngeal washings. The tubes were inoculated at 37° C.

In no instance did the organism grow on solid media from infectious material, and only grew on solid media on subculture. A successful growth appeared by the fifth to the seventh day as a clouding of the media about the kidney tissue. The optimal solid media was of gelatinous consistency, made so by the addition of one part of 2 per cent nutrient agar to four or five parts of ascitic fluid with kidney tissue. The organism appeared in solid media as minute colonies, more numerous near the kidney tissue. All controls were negative in both solid and fluid media. The organisms were fixed in methyl alcohol and stained with Giemsa's or Loeffler's alkaline-methylene blue for one or two hours. They appeared as small globular or spherical bodies stained purple or blue and arranged singly, in pairs, chains or clumps. The organism lived in culture media for at least six weeks and in the older cultures showed larger degenerated forms. The organism was nonmotile. Gram staining varied with age and with the culture media; young cultures on solid media were mostly gram positive. Morphologically, it is like the organism of poliomyelitis of Flexner and Noguchi, but it differs from the latter in its action in animals, particularly in the susceptibility of rabbits to this organism. The virus was carried through 12 generations on culture media, and the seventh and eighth were still fatal for animals. The organism was obtained from the following locations:

1. Berkefeld filtrate of extract of nasal mucosa, 7 of 10 cases.
2. From the washings of the nasopharynx, 15 of 23 cases (66 per cent of the human cases).
3. Spinal fluid in 12 of 24 cases (8 negatives from other diseases).
4. Rabbit nasal mucosa in 3 cases.[1]
5. Rabbit brain, 36 of 56 positive, (64 per cent).[1]
6. Monkey brain, 5 of 6 cases.[1]
7. Human brain, positive in a few rapidly fatal cases observed.
8. Human blood, positive in 2 cases tried.

Rabbits were readily inoculated while monkeys were relatively refractive—the reverse of poliomyelitis. The spinal fluid of poliomyelitis patients is innocuous to rabbits or monkeys, while encephalitis is produced in animals by injection of spinal fluid from positive cases.

Successful inoculations of monkeys and rabbits having demonstrated the presence of the virus of epidemic encephalitis in the nasopharynx and in the spinal fluid of patients with the disease, it was suggested (10) that this be employed as a means of making a differential diagnosis. They used nasal washings or material obtained on a swab from the nasopharynx, which was emulsified in saline, passed through a Berkefeld filter and inoculated intracranially. Spinal fluid was used for inoculation, in quantities of 0.5 c. c. or less. An inoculation with Berkefeld filtrates of nasopharyngeal material produced characteristic lesions of epidemic encephalitis in rabbits in 78 per cent of cases tested. A small coccoid body was recovered from cultures of filtered nasopharyngeal washings in 11 of the 17 cases (64 per cent). The spinal fluid from 12 of the 16 patients, or 75 per cent, when inoculated into rabbits intracranially produced characteristic lesions. Cultures of spinal fluid were positive in 10 of the 20 cases (50 per cent). The positive results with spinal fluid sharply differentiate encephalitis lethargica from poliomyelitis. Numerous controls were entirely negative.

In France, Levaditi (1) and Harvier (11) found a virus fatal to rabbits in four to six days in many cases of epidemic encephalitis. A Berkefeld filtrate of the virus from human cases was nonpathogenic to monkeys, but became pathogenic after passing through

[1] These animals were inoculated cases.

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several rabbits. It could also be preserved in glycerine. A crossed immunity between poliomyelitis and epidemic encephalitis could not be induced. The serum of a convalescent from one disease had no effect on patients suffering with the other. Their cultural experiments were negative, but they did not employ the technique of Noguchi.

In England, McIntosh and Turnbull (2) injected subdurally into monkeys an emulsion of the central nervous system from a patient who died of lethargic encephalitis, as well as a Berkefeld filtrate of this emulsion; both animals showed characteristic lesions of the disease. No attempts were made to culture.

In the United States, Thalhimer (3) has confirmed the findings of the Mount Sinai Hospital Laboratory, using material from four cases of the disease—two of the fulminating type, one with marked myoclonus, one with marked lethargy. A Mandler filtrate of the central nervous system of all four cases was used as a source of material as well as the spinal fluid of one fulminating and one convalescent lethargic case, with fading symptoms. He used about two hundred rabbits, giving intracranial injections through the temporal plate, and found that they withstood the injection of 1 c. c. very well. Infected animals showed varying symptomatology. A few died of intracranial hemorrhage. Most of them died in from 2 to 4 weeks and some as late as 10 weeks. Material in each instance was inoculated into groups of from three to eight rabbits. Some groups showed 100 per cent mortality, while others as low as 50 per cent. Two strains of the virus have been passed through a Mandler filter and reinoculated into six groups of rabbits. The lesions in the nervous system produced by the disease are scattered, and extensive study is necessary or they will be missed in many cases. Several series of controls were negative.

In the cultural work, Thalhimer (3) used Noguchi's media and method. Spinal fluid was inoculated directly, while an emulsion of central nervous system was passed through a Mandler filter and the filtrate inoculated. Growth appeared in 5 to 10 days, and was similar to that described by Loewe and Strauss. Cultures were obtained from the brains of the four cases studied, and from the two spinal fluids. Some cultures were carried to their sixth successful subculture. Cultures were recovered from about 84 per cent of the brains of the animals successfully inoculated. A positive culture from a rabbit's brain from the sixth series or generation was obtained. All subcultures were made from a Mandler filtrate of positive cultures. Original material and cultures inoculated on ordinary media and Rosenow's ascitic fluid glucose agar were all negative except for occasional contamination. Control cultures from the spinal fluid obtained from patients with other diseases were all negative.

In summing up his work the author stated that infectious agents were apparently constantly associated with epidemic encephalitis. The infectious agent passed a Mandler filter and produced a disease in rabbits very similar to that in man. The original dose of virus was passed through six animals, and if it were not a reproducing virus it would be so well diluted that it could hardly be held responsible for the lesions produced. On Noguchi's media he cultivated an organism like that of Loewe and Strauss. The organism was recovered from 80 per cent of inoculated cases and from animals inoculated from cultures. (Loewe and Strauss produced the disease in animals with the eleventh generation of the organism.)

Loewe and Strauss diluted a filtered virus through six diluting tubes, putting 0.2 cubic centimeter into 15 cubic centimeters of ascitic fluid in each instance, and demonstrated that the virus was so diluted as to be innocuous in the sixth tube, thus proving that the virus must proliferate in animals in order to continue producing the disease.

Amoss (12) confirmed the absence of crossed immunity by controlled experimental inoculation of monkeys, showing that serum from epidemic encephalitis cases would not protect against poliomyelitis virus.

Other workers have reported several other organisms recovered from the blood stream or the brain of cases of epidemic encephalitis, but all from limited groups of cases. The organisms varied as to type, source, and pathogenicity for animals. The latter investigations were not sufficiently thorough and complete to be conclusive and may very well be disregarded, whereas the work at Mount Sinai Hospital was very thorough and conclusive. Koch's postulates were fulfilled and at the present writing it would seem that we have a definite causative organism for epidemic encephalitis.

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A DISSERTATION ON SOUP.

In an experience of about 16 years of hospital service (civil and naval, ashore and afloat), the writer has often been impressed with the fact that, except as concerns patients on "special diet," all food is consumed during a period of about 10½ hours in each day.

This is partly due to custom and partly to practical considerations relating to employees, but it does not seem to be the best possible arrangement as regards those who are being fed. Especially is it unsatisfactory where it is desired to build up men whose physical condition is impaired from any cause, and this includes a large proportion of all hospital patients—postoperative cases, and convalescents from acute infections of whom only a fraction are usually carried on the "special" list, for "8 o'clock nourishment."

For about two months an experiment has been tried at a certain naval hospital, which is felt to have given such successful results as to merit report and which it may be desired to try elsewhere.

Each day a large kettle of soup is prepared in the main kitchen. After supper it is transferred to the ward kitchen, in charge of the ward supervisor, and during the early evening is reheated on the gas range. Later in the evening the soup is served in Navy bowls, with bread (no butter) to all applicants—patients, Hospital Corps men, and those employees who are subsisted at the hospital. The only restriction on its issue is that the supervisor on watch shall see that a sufficient quantity is reserved for the night force coming on duty at 9 p. m., and it is allowed to be taken to the bedside or the ward table or to be eaten in the ward kitchen.

The cooks are given wide latitude but are instructed to vary the kind of soup as much as may be done conveniently. The main points to be observed are that it shall be nutritious, ample in quantity, appetizing, and economical.

A "stock pot" is kept constantly in use and receives all suitable bones, meat trimmings, and other proper ingredients. If soup has been served at dinner any residue that may be left is utilized. All available "odds and ends" and "left-overs" find their way into the soup kettle, and a very large proportion of these would otherwise go to the garbage can as the quantity is not sufficient to serve to a mess and it is not practicable to serve any article to a few persons only. This utilizes any small surplus of materials remaining in the ice box or in the serving dishes such as cold beans, peas, potatoes, tomatoes, macaroni, bits of asparagus, carrots, turnips, cabbage, and oatmeal. Occasionally a plain bean or pea soup is served, or a regularly made "cream of celery" or potato soup but, in general, it is an "olla podrida" and best liked when it has "lots of vegetables."

I believe that the serving of soup in this way not only utilizes materials which would otherwise be wasted but that the absorption of calories and other food values contained in the evening issue reduces the amount consumed at other meals by more than enough to offset the cost of the bread served with it; therefore I think it may be said that the cost is nothing, the satisfaction immense.

One evening, an ex-patient, who was visiting a friend in the hospital, was asked, "Did you come up to have a bowl of soup with us?" and his reply was "No–o, I came to see X, but I *surely* will *miss* that soup."

I feel that this serving of soup and bread may also have some effect in the direction of reducing the desire to "go ashore" in the evening, which makes for the men's good in other ways besides reducing their expenditures in restaurants. It is possible that in larger hospitals difficulties would be encountered, but it is also possible that they might be surmounted. If there is a "night cook" regularly on duty, as was the case at one hospital under my command, the necessary service and care of utensils is easily arranged.

Why should this idea not be given a try out, not only in other hospitals but at receiving ships and barracks and even on board cruising ships? A steaming cauldron of soup, one man in the galley, a row of serving pots, each supplied with a ladle and kept filled, a pile of cut "chunks" of bread, and a bowl and spoon for each man who wishes to come and "help himself" at any time from 8 o'clock to "taps," would not be impossible nor even difficult, and the soothing sensation of repletion following a "night cap" of bread and hot soup would add luxury to the swaying hammock and prove a real asset of welfare, comfort, and contentment, to be looked forward to by the men as an agreeable break in the long evenings on board ship. Perhaps even the officer of the deck would find not disagreeable the performance of his duty in "inspecting" this issue of food. (M. F. G.)

ON ACUTE APPENDICITIS.

In the Annual Report of the Surgeon General of the Navy for the fiscal year 1921, we find that 1,038 patients were admitted to the sick list during the period covered by this report with a diagnosis of acute appendicitis. Of this number, 861 came to operation, and of these 16 died. The causes of death were ascribed in 1 case to carcinoma, in 1 to ether poisoning, in 1 to pneumonia, and in 13 to peritonitis—truly a satisfactory showing for the naval operating surgeon; yet might not the 13 deaths from peritonitis have been reduced in number or avoided altogether by perhaps an earlier diagnosis or an operation in the early stage of the disease?

The mortality from acute appendicitis is practically nil in cases which are operated upon early in the disease; the mortality is high in cases operated upon late. After the infection has invaded the peritoneum and resulted in peritonitis, either localized or general, the disease becomes a serious affair. If the diagnosis can be made within the first 12 hours after the onset of the symptoms, a prompt operation, with removal of the appendix and closure of the incision without drainage, will usually result in a prompt recovery. If, however, operation has been delayed until peritonitis has set in, the peritoneum must be drained, and the patient has not only to combat the effect of the operation but must also overcome the peritonitis. Often he is unable to do this and dies, when he might have been saved by earlier diagnosis or earlier operation.

Three wrong principles of so-called medical treatment of acute appendicitis are partly responsible either for the errors in diagnosis or the hastening of necrosis of the tissues of the inflamed appendix.

The first is the administration of morphine to relieve the initial pain before any diagnosis has been made. Before giving any narcotic to a patient with belly pains every effort should be made to establish the diagnosis, for as soon as a patient is under the influence of morphine the symptoms are masked. Spasm and rigidity, two very important signs in appendicitis, disappear; the patient feels better and when seen later in the day it is often impossible to make a diagnosis.

The second error in the treatment of abdominal pain of unknown origin is the administration of cathartics, usually castor oil, calomel, or salts. Any one of these excites a violent peristalsis and if appendicitis is present, not only tends to spread the infection over the adjacent peritoneum, but often induces a perforation.

The third error is the indiscriminate use of the ice bag. Capt. A. M. Fauntleroy, Medical Corps, United States Navy, writing in the Medical Record of August 3, 1912, calls attention to a series of cases of acute appendicitis coming to operation on the U. S. S. *Solace*. In

60 per cent of these cases the appendix was gangrenous, about to perforate or pus was present. The health records of this series showed that an ice bag had been applied in 50 per cent of the cases. Fauntleroy observed that when the ice bag was used there was a noticeable lack of effort on the part of nature to wall off from the rest of the abdominal cavity the appendix, which was frequently very much congested, gangrenous, or perforated.

Every medical officer knows the symptoms of acute appendicitis, yet when we stop to think of the seriousness of the disease, a review of the symptoms may not be out of order.

In a typical case of appendicitis the symptoms are somewhat as follows: The onset of the disease is generally ushered in with severe abdominal pain which extends over the whole abdomen. However, the first pain may be referred to the epigastrium, or it may be in the appendix region. The pain is usually followed by nausea and vomiting. In a few hours the pain localizes in the right iliac fossa and the patient is exquisitely tender at McBurney's point. The temperature is usually elevated, but it may be normal.

The pulse is usually accelerated and there is pronounced rigidity or spasm over the right rectus muscle. Constipation is usually present, but occasionally there is diarrhea. Symptoms referable to the bladder may be present when the appendix is long and hangs over the brim of the pelvis. The pain and tenderness are usually referred to the left iliac fossa or they may be referred high up on the right side when the appendix is retro-cecal.

Examination of the blood at this time will usually show a marked leucocytosis and an increased percentage of the polynuclear cells. A low leucocyte count may indicate a lack of reaction on the part of the patient with a consequent poor prognosis.

The severest types of appendictis may present the mildest symptoms. The writer has operated on cases presenting few symptoms in which the appendix was found full of pus and ready to rupture.

In considering a diagnosis of acute appendicitis one should not neglect to examine the patient's general physical condition. Often the pain of a pneumonia on the right side is referred to the region of the appendix.

The symptoms and signs of acute appendictis are usually clear and unmistakable. As soon as the diagnosis is established, the appendix should be removed at once. The treatment of acute appendicitis is surgical, not medical. During the first 12 or 18 hours following the onset of the disease, the abdomen can usually be closed without drainage and the patient will make a prompt recovery. When the peritoneum, however, becomes involved, drainage must be employed, and if the patient recovers, convalescence is prolonged and often stormy. (W. M. K.)

ON THE USE OF IODINE AS A SKIN DISINFECTANT.

The use of tincture of iodine as a disinfectant for the skin, particularly for the field of operation, and for the treatment of injuries, came prominently before the medical profession about 1905 and has been used extensively since that time. It was found that a 3 or 3½ per cent alcoholic solution gave the best results. The use of a solution of this strength accomplished sterilization in a few minutes. Furthermore, it was found that if a healing wound was subjected to slight irritation by iodine a much smaller scar would be left than if it was allowed to heal normally.

An excellent résumé of the development of the use of iodine up to the latter part of 1910 by J. F. Wollheim appeared in the American Journal of Surgery for November, 1910. Little or nothing has been written on this subject since 1912 or 1914, so to get some expression of the present uses of iodine, particularly in industrial work, inquiries were sent by Dr. F. L. Rector, who writes on "Iodine as a wound disinfectant," in the Nation's Health for January 15, 1922, to about 75 physicians asking what preliminary cleansing was done to wounds and what strength iodine was used.

Replies were received from 65 physicians, all of whom were doing industrial work or surgery closely allied to industry. Of this number, 2 use 10 per cent solution, 18 use U. S. P. 7 per cent tincture, 21 use 3½ per cent, 10 use 3 per cent, and 3 use 2 per cent solutions. The other 11 physicians reported use of solutions of 4 per cent to 5 per cent strength. It is thus seen that a majority use a solution of 5 per cent strength or less.

A few of the men said they did not use iodine. One preferred camphophenol, others used dichloramine-T, chlorazene, Dakin's solution, 7 per cent sodium oleate, picric acid, 5 per cent liquor cresolis compositus, 10 per cent calendula for large lacerated wounds, alcohol, bichloride of mercury 1:2,000 in 95 per cent alcohol, to which 2 per cent hydrochloric acid has been added.

Several of the physicians emphasized the importance of having the surface perfectly dry before iodine is applied. A damp surface interferes with the penetration of the antiseptic. Earlier writers laid stress upon this point. The most satisfactory method of preparing the wound area for iodine is to use alcohol and ether as final cleansing agents.

For the preliminary treatment of wounds gasoline alone or in conjunction with benzine or ether was used by 23 physicians. With 4 men soap and water was the agent of choice with the addition of gasoline or benzine if grease was present. Tincture of green soap was preferred by 6 men.

From the replies received by Doctor Rector it would seem that the use of iodine as a skin and wound disinfectant still holds first place in surgical technic in the industrial field, in spite of the great popularity attained by the chlorin compounds in the treatment of war wounds. Such objections as were raised were against the danger of burns and the discomfort iodine caused rather than against its efficiency as a sterilizing agent. The Conference Board of Physicians in Industry has since its organization recommended the use of a 3 to 3½ per cent solution of iodine, and in the light of present experience feels that this recommendation is justified. (W. M. K.)

ON THE REMOVAL OF FOREIGN BODIES FROM THE EYE.

In discussing the removal of foreign bodies from the eye, H. D. Bruns, writing in the New Orleans Medical and Surgical Journal for February, 1922, points out the value of a good hand magnet, not with the idea of extracting magnetizable foreign bodies from within the eyeball, but for the purpose of pulling out those stuck in the conjunctiva.

There is probably no small operation more embarrassing than the removal of a nonmagnetic splinter which has penetrated the cornea. If the point of such a splinter enters, or almost enters the anterior chamber, the accepted practice is to pass a keratome through the margin of the cornea while the eyeball is steadied with a fixation forceps. The point of the keratome is held against the penetrating end of the splinter to prevent its being driven in further as the operator grasps it with fine forceps. If the splinter has penetrated the iris and lens as well as the cornea an incision must be made embracing the point of entrance of the splinter. With a Graefe knife the cornea is transfixed a few millimeters from the wound, the knife is passed across the anterior chamber, and brought out at a point about the same distance on the other side of the point of penetration. By cutting outward the incision is completed. The end of the splinter lies free in the incision and can be grasped and the object removed. If prolapse of the iris occurs iridectomy is indicated. Metallic splinters may often be removed by a good hand magnet, especially if they have only penetrated the superficial layers of the cornea.

Foreign bodies on the cornea which are not magnetizable must be removed by some instrument under cocaine anesthesia. The writer prefers a probe with a little cotton tightly twisted about its end. Standing behind the patient, who sits facing the source of light, the operator holds the lids with the thumbs and forefinger of one hand. Having located the foreign body, with a quick motion of the fingers he makes the cotton-wrapped tip of the probe describe a short curve from above downward, which strikes the body at the height of its convexity at the point where the curve is tangent to the cornea. This should be done lightly at first and then with more force until he is convinced that the body can not be removed in this way. If one is successful, the foreign body should be found sticking to the cotton on the probe or in the lower conjuctival cul-de-sac where it has been knocked. If the body is not removed by this manipulation, one must resort to the use of a dull-edged spud, flat on one side, rounded on the other and with no point, using it as he used the cotton-tipped probe. Failing in this, the end of the spud should be placed above and against the foreign body, and with a quick downward and outward flip an attempt is made to turn it out of its bed. If this fails, the point of an old Graefe knife or a flattened discission needle inserted behind the body may dislodge it. Foreign bodies either on or in the conjunctiva are easily removed after eversion of the lid.

In all manipulations about the eye the greatest surgical cleanliness is necessary. Instruments and dressings should be sterile. The method of cleaning an eye in use in a New Orleans clinic consists of repeated instillations of fresh 10 per cent solution of argyrol as repeatedly washed out with sterile normal salt solution or freshly made borax—boracic-camphor water. Fresh argyrol, in *freshly made* solution of a strength not greater than 15 per cent, used not longer than two weeks at a time, does not irritate the eye. The diffusibility of argyrol is pronounced; it penetrates everywhere; it dislodges old secretions from the lachrymal sac and thoroughly cleans the conjunctival sac.

After a foreign body has been removed and the eye thoroughly cleaned it should be occluded by a sterile dressing, which should be renewed every day after cleansing the eye until all abrasions are healed. If the abrasion is small and the patient cleanly and intelligent, argyrol solution may be instilled every hour until redness and the rough sensation on winking have disappeared. Bathing the closed eye frequently with *hot* water favors this and gives comfort.

The Berger binocular loup and its accessory condensing lens, together with the 5 per cent solution of fluorescine, are very useful in locating foreign bodies. The binocular magnifier greatly increases the information we derive from the examination of any small lesion, and the fluorescine solution, after it has been instilled for three or four minutes and then washed out, reveals the tiniest body by surrounding it with a bright green ring; or if the foreign body has been swept away by the tears, the abrasion caused by it is shown by a small spot of an intense green color.

If the search is not successful in the daylight, it must be continued in a dark room with the aid of artificial light. Indeed the search for a foreign body must never be abandoned until one has made use of oblique artificial light in a dark room. (W. M. K.)

ON KALA AZAR.

With the exception of the discovery of the specific action of tartar emetic in the treatment of kala azar, Wenyon finds, in reviewing the recent literature on this disease in Tropical Diseases Bulletin for February, 1922, that very little has been added during the last 10 years to our knowledge of this infection. In addition to the well-known endemic centers in North China, India (particularly Assam), the Caspian region, Mediterranean littoral, and the Anglo-Egyptian Sudan, new foci have also been discovered in Mesopotamia, Sumatra, and Siam and in the districts around Lake Chad (Africa).

The rôle of animals in spreading kala azar has not been determined; in several regions, notably the Mediterranean littoral and the Caspian region, canine kala azar occurs as does the human disease, whereas in other regions only one of the two has been demonstrated. Even if it is admitted that the two types are caused by the same organism, Wenyon does not believe that the dog plays any essential rôle in the spread of the human disease.

The diagnosis of kala azar depends upon the discovery of the parasite, and spleen puncture still remains the most reliable and rapid means of attaining this object.

The organism is frequently discovered by direct examination of the peripheral blood, where it generally appears in the mononuclear leucocytes, although it may occur in other cells. Painstaking search is often required before the parasite is found by this procedure. Blood culture on NNN medium has yielded very good results in the hands of some observers. There is a certain disadvantage in using this method, however, because the number of parasites inoculated in the medium is so small that often two or three weeks must elapse before flagellates are detectable. It should always be done, however, especially in cases in which spleen puncture is contraindicated.

The prevalent idea that the Mediterranean type of the disease attacks only children and the Indian type only adults must be discarded in view of more recent and careful observations. Mackie, Muir, and Knowles in India, Cochran and Wylie in China, and various observers in the Mediterranean littoral have shown that the respective "types" may attack all ages, thus removing the mark of distinction between the two forms.

The greatest advance has been made in the treatment of the disease. Since Gaspar Vianna in 1913 first treated American cutaneous leishmaniasis with such remarkably good results, the specific action of tartar emetic has been confirmed both in Italy (Doctors Christina and Caronia) and in India (Rogers, Muir, Knowles, etc.), in the general infections occurring in these countries.

Attention has been drawn several times to the toxic effects of this drug. It was realized that great care had to be exercised in administering the drug, and that it was necessary to commence with small doses and gradually to increase them. Deaths have been reported in a few instances. Long-continued treatment is essential to bring about cure and to prevent relapses. Muir states that injections should be given every second day till fever has been absent for a month and then once a week for two to four months. Unless these weekly injections are continued relapses may occur. Knowles, in Shillong, has presented some very interesting facts regarding the effect of treatment.

The immediate result is the rapid disappearance of the parasites from the peripheral blood, later followed by disappearance from the spleen and finally by cessation of the fever. The body weight increases, while the spleen decreases in size and a normal blood pressure is restored. Knowles recommends that the potassium salt (the "heavy powder" and not the "light powder") be used. He employs a 1 per cent solution in normal saline, autoclaved at 110° C. for 10 minutes and kept in a rubber-capped flask. If there is the least trace of deposit or opalescence in the solution it is discarded as not being safe to use. The initial intravenous dose is 3 to 4 cubic centimeters for an adult. Injections are given on alternate days, the dose being gradually increased until 10 to 12 cubic centimeters are given toward the end of treatment. The intervals between the doses should be increased as there is some evidence of accumulative action. The standard course at Shillong is a course of 200 cubic centimeters distributed over a period of two and a half to three months. The injections should not be given within two hours of a meal. The sudden appearance of edema should be a danger signal. Other antimony compounds have been introduced for the treatment of kala azar, notably stibacetin and colloid antimony sulphide. Rogers treated 10 cases with the latter preparation and regards it as a distinct improvement over the soluble antimony tartrates in the treatment of kala azar.

The problem of transmission is still unsolved. Attempts have been made to inculpate many insects, especially the flea and bedbug. As yet, however, no satisfactory evidence has been forthcoming to substantiate claims made.

In a telegram published in the Indian Journal of Medical Research, January, 1922, Mrs. Adie states that she has found a swarming infection of Leishman-Donovan bodies in the salivary glands and ducts of Cimex rotundatus caught in the bed of a suspected kala azar case, and that this discovery positively proves that the bedbug is capable of transmitting the disease through biting. In a letter to the editor of the Lancet, published February 25, 1922, C. M. Wenyon discusses this announcement of Mrs. Adie's and in a well-arranged argument shows that in spite of her discovery convincing evidence is still needed to prove that the bedbug is the vector of kala azar.

Some of Wenyon's points are: Numerous previous experiments on the bedbug, apparently successful, have been shown not to be conclusive when the results have been critically analyzed. In Mrs. Adie's case it is evident that the bug came from a bed, not of a case of kala azar but only a suspected case, and there is no proof that the bug had even fed on this particular individual. Proof is also needed that the parasites found are Leishman-Donovan bodies. It is possible that the bedbug may occasionally harbor a flagellate of its own, although this has never been shown before.

Prophylaxis as carried on in India to-day is based on the apparent fact that kala azar is a house and family disease. Segregation of all families having the disease is attempted, especially in Assam. That the newly introduced treatment by tartar emetic will undoubtedly play an important rôle in facilitating the eradication of this disease is pointed at by McCombie Young. (E. P.)

IN MEMORIAM.

MIDDLETON SEMMES GUEST.

1869–1922.

Surg. Middleton Semmes Guest, United States Navy (retired), died at the United States Naval Hospital, Annapolis, Md., on January 7, 1922, following a protracted illness. Surviving him are his widow, the daughter of Athanase Branchand, K. C., of Montreal, and one daughter, Ann Branchand Guest.

Doctor Guest was born on May 23, 1869, at the navy yard, Portsmouth, N. H. He was the son of Commodore John Guest, United States Navy, who died in 1878 while commandant of that yard, and of Anna Josèphine Pleasonton, daughter of Gen. Augustus Pleasonton, of Philadelphia, and niece of Gen. Alfred Pleasonton, United States Army.

He chose medicine as his profession, graduated from the University of Pennsylvania and, drawn by his associations, and the love for the service which remained such a prominent characteristic throughout his life, he entered the Navy as assistant surgeon in 1891.

His professional career was marked by evidence of his conscientious devotion to the details of duty, and a nice sense of discrimination in estimating the value of the rapidly succeeding advances in the theory and practice of medicine. Unfortunately, Doctor Guest was not given to writing for publication and consequently relatively few realized the shrewd, sane judgment he habitually displayed in matters of medical practice and administration.

He exhibited similar reticence in his personal intercourse, and only intimates knew what an acutely observing mind functioned actively beneath his usually reserved exterior. His fund of reminiscence was a source of unending enjoyment to his friends, lightened as it was by a wit that was keen and penetrating, and yet always kindly.

As is common with men of a retiring disposition, he found his recreation in the active pursuits of fishing, gunning, and the sailing of small craft. Of these amusements he never tired, and on occasions when the actual sports were impossible he passed much of his leisure in studying the natural history of game birds and fish. He took great pride in his strength and endurance, so that the misfortune of prolonged invalidism was hard for him to understand and doubly hard to bear.

Doctor Guest possessed an ardent love for the service, its customs, traditions, and even the minor features of a ship's routine. This devotion to the Navy was so absorbing that his retirement in 1910 came to him as a great shock, the separation from the service entailed quite overshadowing in his mind the personal significance of his disability; and when the United States entered the recent war, against the advice of those near him, he earnestly requested active duty. It was given him, but he could not carry on for long. The disease for which he was retired became active, and it proved necessary again to place him in an inactive status. In reference to this, he wrote in a private letter, "This is a villainous blow and upsets my hopes and plans completely. I hoped to have kept on until the close of the war and at least to have released some younger man for sea duty * * *; but it seems that my desire was greater than my strength to perform * * *."

Comment would add nothing to these characteristic phrases. Living comfortably, his disease quiescent, and urged by all his advisers to remain inactive, he could not tolerate the idea of taking no part in the struggle going on. Although, when the end was approaching, he realized clearly that his war duty had activated the disease, he had no regrets. By no other course could he have remained at peace with himself.

REPORTS.

A REPORT OF THE HOSPITALIZATION OF THE VETERAN AT GREAT LAKES.

By R. G. Davis, Lieutenant Commander, Medical Corps, United States Navy.

The hospitalization of the veteran of the late war has become an important function of our naval hospitals and we are constantly seeking the best method to efficiently administer to his needs and expedite the treatment that will make possible his complete vocational rehabilitation.

The usual hospital routine in professional, administrative, and clerical procedures becomes widely varied when an institution is handling and treating a class of patients largely unacquainted with naval customs. The veterans admitted to the naval hospital at Great Lakes, Ill., differ greatly in mentality, temperament, and in their general attitude toward any form of treatment due probably to their experience in other hospitals or to seemingly unsatisfactory compensation adjustments.

The admission of ex-service men began in a small way early in 1921, when 50 beds were allotted to patients of the Bureau of War Risk Insurance. Those admitted were distributed among the Navy patients with no specific supervision other than general hospital care, and as there were no very definite regulations for handling them there soon arose petty disputes over working details in general. As the Navy patients decreased more beds were assigned to the War Risk patients, and it was deemed advisable to establish a special office apart from the main hospital offices in which business in connection with these patients could be carried out. A medical officer was placed in charge of this office. His specific duties are to admit all patients, explain the plan of treatment and something of the hospital administration. He is concerned with all matters relative to ex-service patients during their stay in the hospital.

After the passage of the Sweet bill, September 9, 1921, the Veterans' Bureau was established, replacing the Bureaus of War Risk and Vocational Rehabilitation. By Executive order that portion of the naval hospital at Great Lakes known as Camp Ross, was turned over to the Veterans' Bureau for the care of 300 neuropsychiatric cases under naval administration. The bed capacity of the main hospital was enlarged to 300 general medical and surgical cases, making a total of 600 beds available for the care of ex-service men.

All patients for observation, treatment, and final diagnosis are received through the eighth district office in Chicago representing Illinois, Wisconsin, and Michigan. A board of three medical officers make a recommendation for the disposition of each case which, accompanied by a clearly stated word picture in the medical history, makes possible a proper compensation adjustment when the case is reviewed by the rating board. A network of subdistrict officers in these States keeps the central office in Chicago supplied with cases needing hospitalization, and after a medical examination, authority for the admission of each patient to enter one of the various hospitals throughout the district is issued. From 10 to 30 patients are admitted daily at Great Lakes. Each man is assigned to the department especially fitted to care for his particular ailment. On arrival these patients report to the special office representing the Veterans' Bureau which is connected with the receiving ward. A special inpatient report card, the Navy Form F card, and an identification card is made out, after which the medical officer takes a brief history of the case, recording the dates of enlistment and discharge from the service, together with the chief points of the present complaint.

After a preliminary examination, the patient signs a receipt for a copy of the hospital rules which also contains excerpts from General Order 27–A issued by the Veterans' Bureau. A short explanation of the plan of treatment is given to him and any questions answered, so that the patient is sent to his ward with a clear understanding of what is expected of him by the hospital authorities regarding his cooperation in the treatment. All patients pass through a general routine of laboratory, dental, and X-ray examinations. A complete urinalysis is made, also a blood count and blood Wassermann test. There are repeated examinations of the sputum in all suspicious cases, examinations of the stools of all patients coming from southern Illinois, where hookworm infection is prevalent. A spinal Wassermann test is made on cerebrospinal suspects in addition to other observations on the spinal fluid.

The X-ray department radiographs and fluoroscopes all suspicious chests and makes fluoroscopic examinations of all gastrointestinal cases which are referred for an opinion. The dental officers note all cases of infectious and carious teeth for treatment.

About 75 per cent of the medical cases are admitted as being possibly tuberculous. Special wards are set apart for these patients and a regular routine is followed. Preceding the first physical examination, the following three-day temperature, pulse and respiration chart is filled in and the routine X-ray examination is made.

TEMPERATURE PULSE RESPIRATION CHART.

First day (in bed.)	Second day.	Third day.
7 a. m.	7 a. m.	7 a. m.
9 a. m.	9 a. m., before exercise.	9 a. m.
11 a. m.	9.30 a. m., after exercise.	11 a. m., after 2 hours exercise.
1 p. m.	10 a. m., after rest in bed.	11.30 a. m., after ½ hour rest in bed.
3 p. m.	1 p. m.	2 p. m., before exercise.
5 p. m.	3.30 p. m., after ½ hour exercise.	4 p. m., after 2 hours exercise.
7 p. m.	4 p. m., after ½ hour rest in bed.	4.30 p. m., after ½ hour rest in bed.
9 p. m.	7 p. m.	7 p. m.
	9 p. m.	9 p. m.

The sputum of each suspicious case is examined daily until five to seven negative reports or three positive findings are obtained. In negative cases a second series is started after an interval of one week. Physical examinations of the chest are made weekly. A large number of the negative cases are found to be suffering from nose and throat infections which, when removed, result in a cessation of the symptoms simulating tuberculosis. About 10 per cent of the cases are really tuberculous and are promptly transferred by the district office to a suitable sanitarium. The negative cases are discharged to take up light work, vocational training, or dispensary treatment.

The 300 beds set apart for neuropsychiatric cases are generally filled. The average period of hospitalization for this class of patients is about 90 days. The larger per cent are neurasthenic and require protracted study by the various departments of the hospital in order to rule out organic disease. The following outline which has been found very useful is employed in recording the history of each case of this type:

Name.
Organization.
Claim No.
Date admitted.
Nativity.
Age.
Education.
Occupation.
Religion.
Social status.
Address.
Date of induction.
Date of discharge.
Status on admission.

Family history:
- Grandparents.
- Parents.
- Brothers and sisters.
- Collaterals.

Personal history:
- Prenatal.
- Birth.
- Infancy and early childhood.
- Education and school life.
- Character and home environment.
- Industrial history.

Disease of adult life and injuries:
- Habits.
- Sexual life.
- Venereal history.
- Crimes and misdemeanors.
- Marital history.

Psychobiological make-up.
- Disposition.
- Temperament.
- Instinctive demands.
- Adaptability.
- Military or naval history.

Present illness:
- Before discharge from service.
- After discharge from service.

Physical examination:
- Cranial nerves.
- Sensori-motor-general motility.
- Nutrition of muscles.
- Tone of muscles.
- Active movements.
- Coordination of movements.
- Motor irritation.

Reflexes:
- Deep.
- Superficial.

Special senses:
- Sensation.

Mental examination:
- General attitude.
- Psychomotor state.
- Emotional status.
- Delusions.
- Hallucinations.
- Dreams.
- Insight and judgment.
- Orientation.
- Disorders of attention.
- Intelligence tests.

Special tests and examinations:
- Spinal fluid.

Approximately 70 per cent of the neuropsychiatric cases represent the various types of psychoneurosis and 20 per cent are suffering from mental and nervous diseases. Epileptics are transferred to their home or to special institutions, and the insane are sent to the Cook County Psychopathic Hospital for further commitment to a State institution.

The majority of the neuropsychiatric patients possess little education and fail to appreciate the problems incurred in settling their claims. The present economic depression has resulted in the hospitalization of many border-line incompetents.

A reconstruction center has been established in Camp Ross with an educational director in charge, to give prevocational training and to gauge the individual's qualifications for a new vocation after considering his educational qualifications, intelligence, past experience and present handicap. Courses are offered in elementary academic and commercial branches, also in mechanical drawing, drafting, automechanics, machine-shop practice, electrical, wood and cabinet work, printing, shoe and watch repairing, truck gardening, poultry raising, bee husbandry, and in the arts and crafts.

The local Red Cross chapter is rendering very valuable assistance in obtaining social histories and furnishing financial assistance to dependent families while compensation claims are being adjusted. They are fully equipped to file claims, assist in obtaining the essential affidavits and to investigate delays.

The general morale of the ex-service patients has been excellent, and serious infractions of discipline have been few. Every effort is made to assist each patient in straightening out his difficulties and to prevent trivial complaints and misunderstandings from assuming any degree of seriousness. The hospital office of the Veterans' Bureau is constantly ironing out these wrinkles and keeping an ear to the ground for any echos of discontent. It is significant that only two disciplinary boards have been convened in the past seven months in handling nearly 1,500 nonnaval cases from all walks of life. Upon the recommendations of medical officers daily liberty and periods of leave are granted. Moving pictures and vaudeville are furnished by the Morale Division and various organizations give parties and dances under the direction of the Red Cross hostess.

The Red Cross distributes clothes, shoes, and toilet articles when requests signed by medical officers are presented. The Knights of Columbus distribute cigarettes and toilet articles weekly, and frequent concerts are given by the naval station band. A well-stocked library and several recreation rooms add to the diversion of ward life.

REPORT OF THE ACTIVITIES OF THE MEDICAL DIVISION OF THE UNITED STATES NAVAL HOSPITAL, SAN DIEGO, CALIF.[1]

By W. D. Owens, Lieutenant Commander, Medical Corps, United States Navy.

The activities of the medical division during the year have been directed to the detailed study of each case admitted and of series of cases of the same disease. This study has been conducted in order that the value of the latest methods of diagnosis and treatment might be determined with the view of establishing a routine for the general management of medical cases. The diseases which have been especially studied include thyrotoxicosis, neurosyphilis, acute and chronic nephritis, diabetes mellitus, amebic dysentery, cholangitis, the pneumonias, malarial fever, Vincent's angina, and acute and chronic rheumatism.

In each instance observations have been directed along special fields of interest, such as basal metabolism estimations, functional kidney tests, blood chemistry and Allen's treatment for diabetes, intubation and visualization with the duodenal tube, and the location and elimination of foci of infection. Spinal punctures, performed in some 95 of our cases have thrown light upon the frequency of neurosyphilis and the diagnostic value of this procedure. Several cases of atypical, ataxic gastric crisis, neurasthenia and epilepsy in which the blood Wassermann was negative have been determined to be syphilitic by means of the examination of the spinal fluid. Blood

[1] From the Annual Sanitary Report of the U. S. Naval Hospital, San Diego, Calif.

Wassermann reactions have been determined in all medical cases admitted.

Nine cases of thyrotoxicosis have been studied. In this series of cases we determined that, with the exception of basal metabolism estimations, the various other diagnostic tests, including the Goetz and Bram tests, are of little or no value and in some cases do actual harm. Basal metabolism findings, however, are of real value, particularly in the differentiation of cases of thyrotoxicosis from "effort syndrome cases." As the result of our studies we have abandoned the other diagnostic tests and confine our efforts to basal metabolism observations. We have learned to accept readings over +10 or +15 as evidence of a hyperthyroid condition. Of the various medical treatments for exophthalmic goiter we have had most success with hydrobromide of quinine. In our hands X-ray exposures have been of doubtful value. Our plan has been to withhold surgery until all medical efforts have failed. In one case, however, on which a partial thyrodectomy was performed, the results have been satisfactory, but only for a limited time.

In nephritis we have made certain observations with the functional kidney tests, and have studied the " Fisher treatment." We have not been able to obtain the excellent results claimed by Fisher and have abandoned its use in our nephritic cases.

Of particular interest has been our work with the Einhorn tube. Intubation and visualization of the duodenum has an important field of interest. More than 100 intubations have been done, and our observations show that it is an excellent adjunct in the treatment of acute cholangitis, and that its use shortens the course of the disease. It also has considerable value in the treatment of cases of atony of the gall-bladder, and is useful in differentiating between duodenal and gastric ulcers. Visualization with the X-ray of the tube passed into the jejunum, affords an excellent method of determining pericystic adhesions and assists in the differentiation of cholelithiasis, chronic appendicitis, gastric and duodenal ulcer.

With amebic dysentery gratifying results have been obtained by the administration of ipecac by means of the Einhorn tube. The following method of administering ipecac by the duodenal tube has been adopted in our most recent cases: The patient is put to bed under the usual restrictions. An Einhorn duodenal tube is passed on a fasting stomach early in the morning. When the tube is well into the duodenum, 1 ounce of syrup of ipecac, containing 40 grains of the drug to the ounce, is passed through the tube by gravity. This is washed out by a pint of warm water and the tube withdrawn. This treatment is given every morning for 10 days and the course is considered complete. The patients usually take the tube very readily after the first or second time and retain the drug well until the system becomes saturated. Then a slight nausea may be complained of, but will subside if the dose is reduced. This has been tried on two patients here with excellent results. One case had symptoms for two and one-half years in spite of the usual treatments. The first examination showed the stool loaded with amebæ. After the fourth treatment with the tube the stools were reported negative. After the seventh treatment the stools were normal in number and consistency. The case has been watched, and after five months has shown no signs of recurrence. Eight dysentery cases have been treated during the past eight months and of this number six have been Veterans' Bureau patients who contracted the disease in France.

A number of cases of malarial fever have been observed in order to estimate the therapeutic value, if any, of a combined treatment consisting of neosalvarsan administered in conjunction with Oschner's quinine treatment, but the results have not been encouraging. Salvarsan seems to have no place in the treatment of malarial fever. Likewise in the case of Vincent's angina, our studies have been directed to a determinataion of the best method of employing salvarsan in this disease and its therapeutic and prophylactic value. Undoubtedly salvarsan suspended in glycerin and applied locally is the treatment of choice in this disease.

In the pneumonias we have established the value of the early administration of digitalis, the advantages of proctoclysis to furnish an increased water intake and as a very satisfactory means of administering sodium bicarbonate in order to diminish the possibilities of acidosis. In pneumonia we administer from 2,000 to 2,500 cubic centimeters of liquid by mouth and by proctoclysis, and are convinced that this liberal quantity of fluid slows the heart action and makes the patient more restful. It is no uncommon occurrence to see our cases quietly sleeping during proctoclysis. We have been impressed with the value of daily blood-pressure estimations, and have established the custom of performing venesection when the systolic blood pressure is above 150 or 160, and especially in those cases in which the pulse pressure is increased and there are evidences of impending circulatory failure. The vast majority of pneumonias which occur at this hospital are of the broncho-pneumonic form. A study of the clinical manifestations of these cases discloses certain clinical features not usually observed in this form of pneumonia. A high temperature terminating by a sudden fall to normal, is not uncommon, and has occurred in fully one-half of our cases. A leucocyte count from 16,000 to 20,000 occurs more often than the low count, and in typing our cases pneumococcus type II has been encountered. There have been 12 cases of pneumonia treated with no deaths.

In the treatment of diabetes mellitus, the Allen technic has been found most satisfactory. A patient now under treatment when admitted gave 5 per cent sugar estimations, and under Allen's treatment has been sugar free for two months.

An endeavor has been made to develop cooperation and interest in our work amongst the other departments of the hospital in order to encourage the group study of medical cases. In no other condition has the group study been so instructive and so highly developed as in the study of foci of infection. Every department in the hospital has rendered excellent service in assisting us to detect and eliminate foci of infection occurring in our patients. In practically every medical case we have had the teeth, nose, sinuses, and tonsils examined to determine the presence of foci of infection; and less frequently studies of the prostate, the bladder, the intestines, the appendix, and the gall-bladder have been made. Some of the results following removal of definite sources of infection have been remarkable, and there is no doubt that this factor, when intelligently and honestly studied, has an important place in the management of medical cases, and especially so in thyrotoxicosis, nephritis, cardiac, and rheumatic conditions. As a result of the study of acute and chronic rheumatic cases the following conclusions have been reached:

(*a*) Acute rheumatic fever—in the majority of cases—is due to infection of the tonsils. A few cases have shown numerous apical abscesses.

(*b*) Apical abscesses occur in the majority of cases of chronic arthritis, myositis, muscular rheumatism. Heart involvement, usually uncomplicated mitral lesions, developed in 60 per cent of our cases.

The importance of a complete history in a medical case is so well recognized that the medical officers of this hospital have adopted a plan of procedure which has been found highly satisfactory. In conjunction with certain permanent additions to the clinical chart hereafter to be indicated, the routine employed is as follows: The medical officer taking the history records the complaint, the family history, previous history, the present illness, and the physical findings. In lung cases the picture is more clearly defined by using symbols to record the physical findings on a skeleton diagram. Standardized symbols taken from Norris and Lander's Diseases of the Chest are employed for this purpose. Finally, the medical officer, as a result of the medical history, physical examination, and the laboratory findings, determines certain "impressions"—and from a study of these "impressions" the diagnosis is accomplished.

In order to utilize the advantages to be derived from recording at definite intervals the blood pressure, basal metabolism, the weight, intake of fluids, and the urinary output, additional permanent notations have been made on the clinical chart, and curves indicating these factors are recorded. These records have been found particularly useful in such conditions as thyrotoxicosis, nephritis, cardiac infections, and the pneumonias. When indicated, as in thyrotoxicosis, weekly basal metabolism readings are recorded, and on the same day the blood pressure and weight are added. Such a set of observations, when completed, is of great value in the study of exophthalmic goiter.

We have been particularly interested in the value of frequent blood-pressure readings. The blood pressure of every patient who is admitted to the medical section is determined and in acute cases additional readings are made every week as long as there are any indications. Probably the greatest value of frequent blood-pressure readings occurs in the treatment of pneumonia. Daily estimations are recorded and, as already mentioned, when under certain conditions the systolic pressure is above 160, venesection is indicated.

Two other routine entries are made in every case paper; these are notes of tropical service and service in France. Knowledge of tropical service in the Navy is important, while with the Veterans' Bureau patients, on account of the frequency of amebic infections, the information that a particular patient served on the Argonne front is of considerable value, as amebic infection occurred frequently in that sector.

NOTES AND COMMENTS.

Form K Dental has been revised to the form of a simple statistical report, thus obviating the necessity for sending to the bureau each month the names of patients receiving dental attention.

In order that permanent records of dental treatments may be provided for, it is directed that the dental appointment books, furnished by the supply depots, be used for recording in ink the names, rates, and operations or treatments received by patients under the date of each appointment. These appointment books or records are to be retained as part of the permanent records of the ship or station, and are to be forwarded to the bureau when the ship or station is placed out of commission.

In order to facilitate a search for the treatments rendered an individual, it is directed that an index of the dental patients' names be kept on the last pages of the dental appointment book, entered under the first letter of the surname and followed by the numbers of the pages on which the appointments, operations, and treatments for that patient have been recorded.

The form as revised should not take much time to prepare at the end of each month if a systematic record is kept of each operation, number of dental charts made, etc. It is believed that the following method will prove of value in obtaining correct records with a minimum expenditure of energy and time:

Cut the new Form K in the center from top to bottom; this provides two papers, each containing the operations, etc., which it is desired to record. Paste a sheet of letter-size paper sufficiently over the right edge of each piece, leaving the "operations," "number of persons," etc., uncovered. Then with a rule continue the lines under each operation to the right edge of the sheet, which has been pasted on. Immediately upon the completion of the work upon a patient after each appointment, make a mark after the corresponding operation—thus a totaling of the marks after a given operation will give the number performed during the month.

The British Medical Journal of January 28, 1922, informs its readers that a gallery has been set apart at the Wellcome Historical Medical Museum to illustrate the history of chemistry, from the most primitive use of still and furnace to the exact and elaborate methods of the present day. It has been arranged in such a manner as not merely to interest or even instruct the casual visitor but to inspire the student, and to furnish, so far as this can be done by pictures, manuscripts, and models, a graphic outline of the progress of chemistry through the ages, not forgetting the cloud of magic and superstition out of which it emerged. On the pillars and frieze the student is reminded of the epochs into which the history of chemistry may be divided, the names of its pioneers, and the symbolism which has been employed by ancients and moderns. At one end of the gallery there is placarded the definition of chemistry which appears in Johnson's dictionary, and at the other the definition which appears in Murray's. The objects in the collection include examples of ancient glass apparatus employed by the alchemists; these include matrasses, cucurbits, alembics, and the like. A model of the alchemist's hearth, with its pewter and stoneware, has been installed, as well as the "aludel" of the sixteenth century, used for subliming sulphur or mercury, and, in curiously shaped bottles, specimens of the elements and their symbols as they were known at this period. A most interesting section illustrates the history of perfumes and aromatic substances. The curator has gathered together many specimens of the little containers in which, from Roman times onward, mixtures of substances of powerful odor have been carried in the hope of warding off plague and other infections. In another cabinet there is a collection of the chemical substances known in ancient times, together with specimens of alkaloids, with the names of those who isolated them, and the date of their introduction so far as these can be ascertained. Other articles, in original or replica, have an interest on account of a particular individual; these include appliances used by Dalton and Faraday in their demonstrations, the pneumatic trough used by Priestley for collecting gases, a porcelain retort which belonged to Joseph Black, the discoverer of carbonic acid, old books on chemistry which had been in the possession of the Boyle family, and documents in the handwriting of Caventou, one of the discoverers of quinine, and Labaraque, whose name is associated with the manufacture of sodium carbonate. On the walls of the gallery are carefully chosen pictures, in oil and water-color, representing personalities and episodes of interest to chemists. Such primary figures are depicted as the Greek Hermes, the Arabian Rhazes, and the German Paracelsus, who insisted that the function of chemistry was not to make gold artificially, but to prepare medicines and substances useful to the arts. The various alchemical processes used in the search for the "philosopher's stone" are depicted on long scrolls by a fifteenth century draftsman, and there are many paintings of the Dutch and Italian schools, whose artists appreciated the pictorial value of the alchemist in his laboratory, lighted by lurid flames and heaped up with strange accessories, though their rendering may not always have been quite faithful. One interesting portrait is that of Mayow, the father of pneumatic chemistry, who was originally a physician; the visitor is reminded in the same way of Lavoisier, and of Scheele, to whom we owe glycerin and prussic acid; of Dalton, Humphry Davy, and Liebig, and many others. The gallery is dominated by the statue of Joseph Priestley, the discoverer of oxygen and nitric and nitrous oxide.

Public drinking fountains of the "bubble" variety in which the spurt of water is less than 2 inches have been banned in Cleveland by Health Commissioner H. C. Rockwood. Fountains with insufficient pressure to force the water 2 inches or more are a serious health menace and assist in spreading communicable disease.

The Royal Air Medical Service Rules to improve respiratory and circulatory efficiency are formulated by Wing Commander Martin Flack, Royal Air Force Medical Service, in the Milroy lectures recently delivered before the Royal College of Physicians of London, on "Respiratory efficiency in relation to health and disease." This system of 10 exercises he has elaborated for the purpose of producing circulatory and respiratory fitness, the work being based on physiological principles and observations made in the training of fliers. In the performance of these exercises Commander Flack lays stress on the great importance of the contraction of the diaphragm at the initiation of inspiration, protruding the "pit" of the abdomen together with a movement of the lower ribs, full inspiration being obtained by a wave-like movement spreading from the lower ribs to the upper part of the chest, and on no account should the upper part of the chest be expanded first. Expiration is accomplished by the contraction of the muscles of the abdomen and of the lower part of the chest. The exercises are here given:

1. In bed. (*a*) Lying flat, inhale to the fullest extent, at the same time raising the hands above the head in a natural "stretching" motion. (*b*) Exhale to the utmost extent, using the abdominal muscles forcibly to press out as much air as possible from the lungs, at the same time carrying the arms to the sides. Repeat five times.

2. Using the weight of the bed clothes turned down to the hips as a means of keeping the legs down, raise the body from the hips and bend forward as much as possible, at the same time breathing out forcibly to the fullest extent, then slowly return to the lying posture, inhaling deeply meanwhile. Repeat five times.

3. (*a*) Using the bed clothes as before, from the lying position raise the trunk, with the hands by the sides, through an angle of 45°, then twist round

the trunk upon the hips, keeping the legs flat and endeavor to make the forehead touch the bed, meanwhile exhaling forcibly as far as possible. (*b*) By a reverse movement assume the lying position, inhaling deeply meanwhile. Repeat five times to right and left sides.

4. (*a*) From the lying position, flat on the bed, with the hands clasped behind the head, raise the legs from the hips, carrying them as far over the head as possible meanwhile. (*b*) Lower legs slowly to the fullest extent, meanwhile exhaling deeply and forcibly. Repeat five times.

(5) Out of bed. (*a*) By a "stretching" movement raise the arms slowly and strongly forward and upward, then lower them sideways until they are in line with the shoulders, which are well thrown back, meanwhile inhaling to the fullest extent. Brace up the muscles of the abdomen and all the accessory muscles of inspiration. (*b*) Keeping the body as upright as possible, carry the arms forward until they overlap and hold sides of trunk; expire meanwhile to the utmost extent, working specially the lower chest and abdominal muscles. When in the position of full expiration brace up all muscles of lower chest and abdominal wall. Repeat five times.

6. (*a*) With the feet about 18 inches apart (or other comfortable distance, which may be gradually decreased as proficiency is attained) carry the arms forward, upward and backward, inhaling meanwhile to the fullest extent. (*b*) Bend trunk forward and full downward, carrying the arms between the legs to touch the ground with the fingers as far as possible behind the feet, meanwhile exhaling to the fullest extent. Repeat five times.

7. With the feet about 18 inches apart (this distance may be decreased as proficiency is attained) and arms raised sideways and in line with the shoulders, bend the trunk to the left (right) until the left (right) hand touches the ground, keeping legs straight, meanwhile breathing naturally or holding the breath. Repeat five times to each side.

8. (*a*) With the feet as above, carry the arms forward, upward, and backward, inhaling meanwhile to the fullest extent. (*b*) Turn and at the same time bend the trunk to the left (right), and touch the ground on the outside of the left (right) fast, expiring meanwhile to the fullest extent. (*c*) Stretch trunk upward to upright position, inhaling meanwhile to full extent. Repeat five times to each side.

9. Inhale as fully as possible, then exhale sharply to the fullest extent, and, with the chest and abdominal muscles, alternately forcibly contracting and relaxing. Repeat two or three times.

10. Stationary running; shadow boxing; shadow skipping; rhythmic balancing exercises; jumping or any other form of exercise preferred by the subject until out of breath.

These exercises take about 10 minutes to perform and should be followed by a tepid or cold bath and a brisk rub down. They are particularly useful for those engaged in sedentary occupations and will enable them to engage in open-air exertions without undue fatigue. They are to be especially recommended as requiring no special apparatus.—(The Nation's Health, February, 1922.)

We learn from the British Medical Journal of January 28, 1922, that Dr. James Waterston, in a short monograph on "The Louse as a Menace to Man," issued by the Natural History Department of the British Museum, gives a straightforward account of the life histories of the three forms of lice which prey on man and describes methods for their destruction. He insists that the essential factor in the spread of lice is a person who is already infested by the parasites, and, as a rule, transference to a clean person is effected by contact of a more of less direct kind. Contact has long been recognized as the determining condition of disseminataion in the case of the crab louse, but it is no less true of head and body lice, in regard to whose spread many misconceptions are prevalent among the lay population. The importance of close association between clean and infested persons in spreading these pests was abundantly demonstrated in the late war, when men were crowded for long periods in dugouts and billets or herded together in prison camps. The normal activity of both head and body lice is found to be greater than was commonly supposed, and this is responsible for their spread; but in certain circumstances—temperature being the decisive condition—lice will leave their host without the stimulus afforded by contact with the fresh victim. Broadly speaking, says Doctor Waterston, body lice tend to leave a host whose temperature rises above or falls below the normal; they are stirred to activity by violent exercise on the part of their host, and in cases of fever will be found moving on the upper blankets. Similarly after the host's death lice appear, sometimes in enormous numbers, while the body is cooling and migrate to surrounding bodies. Typhus fever, relapsing fever, and trench fever are, of course, well known to be spread by lice, while *Bacillus pestis* has also been found in lice feeding on plague patients. There is no evidence, however, that lice are of importance in spreading this disease, although, in Doctor Waterston's opinion, there is reason to believe that they might on occasion do so. In regard to the destruction of lice, he recommends, for lice on the body, smearing the skin thickly with undiluted paraffin emulsion, followed by a hot bath and clean clothing. In cleansing the head he recommends paraffin oil (preferably) or its emulsion, rubbed in thoroughly, the head being afterwards swathed in a tightly wrapped towel for an hour. Mr. A. Bacot found wood-tar oils effective. Mr. Burt Hamilton recently, however, pointed out in our columns that the one essential to safety in any mixture that is to be prescribed for home use is noninflammability, owing to the ingrained carelessness of the class for which such treatment is usually required. He considered paraffin effective for institutional use, but refused to prescribe so dangerous a method for home use. The question of a suitable mixture for this purpose, which should be cheap, noninflammable, and harmless to the skin and hair, is one which merits further study.

Referring to tests for color blindness in seamen, an editorial writer in the British Medical Journal of January 28, 1922, states that until comparatively recently candidates for certificates as mates and masters in the mercantile marine, and men working on the railways, were examined for color blindness by means of pigments of different colors. In the sea service Holmgren's wools were employed, in the railway service the men were asked to distinguish between the colors of dots on a white card. The dot test was employed until quite recently upon the Great Western Railway, and may even now be in use. The Northwestern and other railways have for some years given up pigment tests and used an efficient lantern. The Board of Trade not only prescribed Holmgren's wool test for the examination of officers in the marine, but they also laid down the rule that candidates were not to be asked to name colors, but were to match skeins of wool with three standard, so-called confusion colors. Doctor Edridge-Green and others pointed out that these methods of testing were open to grave objection, in that many who were able to match the colors were in reality dangerously defective in color perception, while others who failed were not color blind at all, or at any rate not dangerously so. Doctor Edridge-Green also drew attention to the fact that by none of these tests were men eliminated for whom the red end of the spectrum was shortened. Such men—and there is no doubt that they exist—are unable to perceive a red light of low intensity which is plain to a normal individual. In other words, in a fog at sea they may fail to appreciate a red light which is obvious to the normal sighted. It is only necessary to allude to the fight, long and fierce, waged by Edridge-Green and his supporters with the Board of Trade. Step by step, in face of bitter opposition from officials, from physicists, and from some physiologists and ophthalmologists who might have been expected to know better, ground was gained, although the Board of Trade were supported by the Royal Society, till eventually a committee was formed to examine the whole question. As a result of its report, a lantern was used in the examination side by side with the now obsolete wools. The battle was all but won. The final victory coincided with the appointment of Doctor Edridge-Green as adviser to the Board of Trade on color vision and eyesight. Doctor Edridge-Green has just issued his report, which lies before us. It is agreed that anyone who can distinguish between red, green, and white lights at a distance of a mile has sufficiently good color perception for navigation. Edridge-Green states that 25 per cent of men have diminished color perception, and that 5 per cent will fail to differentiate red, green, and white lights, in a properly constructed lantern, or the actual lights themselves, at a distance of 1 mile. We gather that, in the opinion of Edridge-Green, men who fail with the lantern are to be held dangerous at sea, and those who pass the lantern test are safe, and this no matter what degree of abnormality in color perception they may show with other tests. He says definitely that the possession of a sense of yellow is a sure indication of safe color vision. There are many who will not agree with that portion of the report which deals with the Edridge-Green theory of color blindness. In the main it may be true, but there are some anomalous cases which the theory fails to explain. As regards the tests we are on surer ground. The men have to name colors shown in a ship's sidelights or from shore lights. It is not part of their duties to match wools. Common sense demands that if the men have to distinguish lantern colors they shall be examined with a lantern. This will in future be done. The Board of Trade will come into line with the Royal Navy and the more enlightened railway companies, and will test its candidates for the work they have to do, and as far as possible under conditions similar to those which obtain at sea.

In the Journal of the Royal Naval Medical Service for January, 1922, Surg. Commander G. R. McCowen writes on "Immediate surgery with the siege guns in France." In the first portion of the paper the writer describes the difficulties under which the surgeon at the front works, and he gives a brief outline of the composition, distribution, and work of the artillery with which he served, and comments on the conditions under which officers and men lived.

As the batteries were stationary, the medical organization was very much more simple when compared to a mobile army unit, such as the infantry or field artillery. Fortunately, only 6 miles behind the most advanced batteries, was the Belgian hospital at La Panne which was magnificently equipped and organized. This hospital could be reached in 20 minutes by motor ambulance and it acted as an advanced dressing station, casualty clearing station, and base hospital all combined in one, caring for the wounded of the batteries until such time as they were fit to be evacuated farther back.

All preparations to meet casualties were based on the principle that, in advanced units, surgical intervention should be reduced to the minimum and should be restricted to dealing solely with complications likely to prove fatal and to protecting wounds from contamination. Therefore, as a routine, only such operations as were absolutely necessary were performed. Operations for hemorrhage which threatened life and those for removal of hopelessly smashed limbs were the only ones done. Exactness of surgical technic gave way to speed in order that the cases might be gotten away to the hospital as soon as possible.

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The medical personnel of the siege guns consisted of 3 medical officers and 17 Hospital Corps men. Their distribution was as follows: Two medical officers were stationed with the foremost section, i. e., the senior medical officer, who lived with the group commander and his staff in a dugout central for the foremost batteries, and another medical officer who lived in one of the battery positions. Each was responsible for an equal number of batteries as far as sickness and hygiene were concerned. The third medical officer was responsible for the casualties, sickness, and hygiene in the rear section.

Each battery had one Hospital Corps man with it, with the exception of the antiaircraft batteries, which, because of their isolation, had two. The Hospital Corps men were taught to be proficient in the following four things: (1) The first-aid treatment of wounds; (2) the control of hemorrhage and treatment of fractures; (3) the treatment of shock; (4) the transportation of wounded.

Each battery had its own supply of medical stores, and the Hospital Corps man on duty with the battery was responsible for replenishing it. Surplus supplies were kept in the foremost batteries with the senior medical officer, and at the rear with the medical officer responsible for that section. "The following were the stores kept in water-tight boxes in each gun position, allowing 25 men to each, of which probably not more than 15 would be in action in the gunpit at the time, the rest being in dugouts close by. Thus two gunpits being close to one another constituting the battery, enabled double this amount of stores to be available, and always one lot was close by should the other be destroyed by gunfire.

Absorbent wool	pounds	3
Gauze, aseptic	tins	8
Oils for burns	ounces	10
First field dressings		10
Bandages (various)		40
Antigas ampules	boxes	10
Iodine tincture	ounces	6
Safety pins		20
Splints, leg (2 Thomas's and 2 back with foot piece)		4
Tourniquets		6
Extra supply of blankets.		
Cyanide gauze	yards	12
Lint (white)	pound	1
Picric acid dressings		5
Shell dressings		20
Bandages (triangular)		6
Hydrarg. perchlor. (solution pellets 8.75 gr.)		20
Scissors	pair	1
Splints, arm (2 Thomas's and 2 Bowlby's)		4
Stretchers		3
Tow for splints	pounds	5

Besides the above there were also the following utensils: One bowl, one basin, soap, and buckets of water. These stores were found to be ample and to contain everything required, even should the maximum number of casualties take place at one time, as they did on a few occasions, when an 11-inch shell in each case came in through the embrasure of one of the batteries and either killed or wounded every one inside.

Each medical officer, in addition to the above, had his own haversack, which he carried about with him, the contents varying according to his taste. From experience the following stores were found useful and adequate and a comfortable amount to carry:

Absorbent cotton-wool	pound	$\frac{1}{2}$
Antigas ampules	boxes	2
Bandages, 3-inch		10
Bandages, triangular		2
Carbolic acid, pure	ounce	1
Cyanide gauze	yards	6
First field dressings		3
Iodine ampules		10
Pocket case of instruments.		
Picric acid dressings		1
Scissors	pair	1
Spirits, methylated (for occasionally flushing out hypodermic syringe)	ounces	4
Safety pins		25
Shell dressings		3
Hypodermic syringes (1 Wildey's and 1 Down metal glass)		2
Injection, hypodermic morphia in Wildey's bottle, $\frac{1}{6}$ gr. in each 5 minims	ounce	1
Sterilized sutures with needles:—		
Horsehair	tubes	5
Silk	do	5
Catgut	do	5
Tourniquets		3
Pituitary extract, $\frac{1}{2}$ cubic centimeter capsules		10
A book of tallies for wounded.		

"In addition to the gun position and medical officers' stores, each ambulance carrying four stretchers had a cabinet specially made for it containing sufficient stores, instruments, anæsthetics, etc., to perform a major operation, should one be required, but this was found unnecessary and from a practical point impossible in any advanced position near the line. Besides the impracticability of performing any elaborate surgery, it was found impossible to get ambulances up to advanced positions during the shelling, and only during a lull were they able to approach near the positions, and then only to collect the wounded with the minimum amount of delay and convey them to the hospital six miles in the rear."

Communication was by means of telephones, ground wires being laid to exchanges, so that all batteries were able to communicate with each other. Each medical officer was supplied with a motorcycle which greatly facilitated his rounds. Two Sunbeam ambulances and one light Ford ambulance served the unit. The Ford car was used to evacuate cases from certain advanced batteries where the heavier Sunbeam would run the risk of stalling in the sand.

The immediate treatment of casualties encountered is considered by the writer under the following headings: (A) General treatment, (B) Local treatment with reference to special wounds.

The majority of the casualties were caused by fragments of "high explosive shells" which in the case of large shells were apt to tear off a limb or crush it to pulp. The mere explosive force of the gases of a large shell exercise great power of destruction and a few men were severely injured by the expansion of the gases alone. The wounds caused by high-explosive shell fragments are infinitely various, so that it is not possible to describe a characteristic shell wound of a type. All shell fragments tear away parts of the clothing and carry them into the depths of the wound. The large fragments tear large masses of skin and muscle away from the limbs and trunk, so that the whole of the calf or the front of the thigh, or the gluteal or deltoid regions may be destroyed, and the tissues from which they have been avulsed are themselves so crushed and lacerated that all the vessels are pulped and extensive areas die. In the neighboring tissues there is widespread contusion and extravasation of blood, and, as a result of these injuries, the exposed muscle often loses all its natural characteristic appearance and looks like a mass of mud, and as it is quite dead, it may be cut away without causing pain or bleeding.

The condition of the wounded man himself is greatly influenced by the time that elapses before assistance arrives, by the amount of blood lost, by exposure to cold and wet, by want of food and drink, and by exhaustion from lack of sleep. Most of the wounded were found with some degree of shock.

Three factors in the general treatment of wounds which have to be combated in their early stages, and which react on one another in a marked degree are shock, hemorrhage, and sepsis.

Shock was generally due to the combined action of several causes, among which the most common were hemorrhage; exposure to cold, wet, and hunger, and fatigue; pain and anxiety; the presence of multiple injuries, particularly those complicated by compound fracture of the femur. Next to the actual injury, unavoidable early handling and transport of the patient were found to be potent factors in producing shock. It was soon learned that the good work of an advanced unit rests on attention to the various causes of shock rather than on the performance of surgical operations.

The methods employed by the medical officers with the siege guns, were the protection of the injured man against cold by the liberal use of blankets, both under him and over him, the avoidance of exposure by unnecessary removal of clothing, the administration of morphia in large doses, the quenching of thirst by hot drinks, and finally by gentle handling.

The following method of folding blankets in order that the maximum advantage may be obtained from them was used by practically all army units in France and is worthy of remembrance. "Two blankets are laid on the stretcher, each with a double fold corresponding with the width of the stretcher. The breadth of the blanket is used, as it is sufficient to reach from the foot to the pillow of the stretcher. No part of the blanket is placed under the pillow, as here its objective would be wasted. If they are not found long enough to reach well down to the foot of the stretcher they need not be made to exactly coincide, but the upper one may be placed slightly higher on the stretcher than the lower one. When not in use, the free portions of the two blankets may be rolled up and laid on the stretcher. When required, the free portions are opened out, the patient is lifted onto the two double folds, and the free portion of each blanket wrapped around him. The ends of the blanket at the foot of the stretcher are tucked in underneath the feet. He has thus four thicknesses of blanket beneath him and two on top. In rainy weather a mackintosh sheet is added to protect him from further wet. If a third blanket is available, it may be folded along its length and placed over him, the lower end being tucked well in beneath the feet and the two corners brought round and secured above the legs by a safety pin. This third blanket is, of course, applied to the patient before the free portions of the two blankets are wrapped round him. He has now four thicknesses of blankets above him as well as below. By this procedure the maximum benefit is obtained by using blankets in this manner, and also when thus adjusted they do not work out of position as often happens when other methods are employed."

With the siege batteries on the Flanders coast, where casualties were generally caused by high explosive shells of large caliber lacerating the tissues and pulping the vessels, severe hemorrhage was not common; still one had always to be prepared for it. "The majority of external hemorrhages can be controlled by firm pressure with a pad over the bleeding point, at least until a field ambulance or hospital is reached, where it can be thoroughly dealt with. Such a pad can be made from a first field dressing, or, if necessary, two field dressings, one on top of the other. The unnecessary use of tourniquets should be avoided, as limbs may be lost by the indiscriminate use of them. The application of a tourniquet to any case of hemorrhage must always be regarded as a purely temporary means. Every patient on whom a tourniquet has been placed should have the fact clearly indicated on the tally, and be evacuated as promptly as possible. With regard to tourniquets, the use of the round rubber one is strongly advocated in place of the web tape with buckle, as it is more easily applied and more effective. If circumstances permit, severe hemorrhage should always be tried to be controlled by seeking for the bleeding vessel and ligaturing it, and, if necessary, enlarging the wound to do so. If this is impossible, due to circumstances, or delay entailed, or lack of surgical facilities, and if packing fails in such a case and a tourniquet is out of the question—such as in a wound of the neck—the wound may, if possible, be closed by sutures embracing the skin, fascia, and muscle, and so converting the case into one of diffuse traumatic aneurysm, in the hope that the pressure will prevent further loss of blood.

"Any wound of a limb in which bleeding has had to be specially controlled should be splinted, as sudden movement or jarring will often restart bleeding that has only been temporarily checked.

"A type of wound which, though possibly it may not appear to be severe, is likely to give rise to serious results, is one in which there is a slow, continuous oozing that is at no time sufficiently rapid to be regarded as severe hemorrhage, but which in a long run may cause more loss to a patient than a brisker hemorrhage that has received prompt treatment. Such a case may not be in danger of death from bleeding, but he will start his fight against sepsis severely handicapped, for hemorrhage, shock, and sepsis go hand in hand."

The sepsis most to be feared was gas gangrene, but fortunately it was not common with the siege batteries, due to their location in the sand dunes of Flanders, and to the fact that evacuation was very quickly accomplished and the man reached the operating table at La Panne within an hour of being hit. At this hospital every wounded man was given a prophylactic dose of 1,500 units of antitetanic serum as soon as he was admitted.

With the siege guns, iodine was used for cleaning the surrounding skin and outside of wounds, but with the infantry a 3 per cent solution of picric acid in alcohol was used and, it was claimed, with better results. In the majority of the cases the only dressing was the application of a very large "shell-wound dressing."

All fractures were immediately immobilized in splints before removal of the patient. The earlier a limb is immobilized the better; shock is diminished and the patient stands a better chance for his life.

For fractures of the humerus, the small Thomas's arm splint. Jones's extension humerus splint, and the Depage modified humerus splint were the most popular.

Fractures of the femur were the most important of all. Early in the war the mortality from this injury was 90 per cent, but with the use of Thomas's splint it was reduced to about 15 per cent. These splints were supplied to advanced posts and were applied without removing either trousers or boots.

If no Thomas's or Liston's splint was available the following improvised means of temporary fixation in a case of fractured femur was found useful: "A puttee or bandage was passed under the perineum and round the handle of the stretcher opposite the injured side at the head of the patient, pulled tight and tied. Another bandage was then passed by means of a clove-hitch around the ankle of the injured leg, extension applied, and the bandage tied to the handle at the foot of the stretcher on the same side as the injured thigh. A couple of splints were then fixed to the broken thigh by bandages or tapes. Finally, the toe of the boot of the injured side was connected by a bandage or puttee to each handle at the foot of the stretcher. This kept the foot stationary and prevented rocking from side to side. An additional bandage was generally put around the hips and stretcher to keep the pelvis firm against the latter."

The British Medical Journal of January 21, 1922, comments editorially on the sources of vitamines. Though the chemical nature of vitamines is still unknown, recent researches have thrown light on the conditions under which they are formed. It has generally been assumed that plants can synthesize vitamines, but doubt has been cast upon this by various workers. Bottomley stated in 1916 that certain plants obtained these accessory food substances from the growth of certain organisms in the soil. Recently Williams and other workers have gone further and have claimed that vitamines, and especially the water-soluble vitamine B, are necessary for the growth of yeast and other microorganisms. These statements made it very difficult to conceive where and how the vitamine supply of the world was produced. Fortunately recent work has cleared up this question. Nelson, Fulmer, and Cessna (Journal of Biological Chemistry, 77, xiv, 1921), grew yeast for a year on a medium composed of inorganic salts and cane sugar; they made subcultures every other day, and calculated that the final solution only contained a minute portion of the original constitutents of the medium or yeast. The yeast thus grown on a synthetic diet was found to contain a normal amount of vitamine B. Harden and Zilwa (Biochem. Journ., 438, xv, 1921), also showed that yeast grown on a pure synthetic diet contained almost as much vitamine B as yeast grown under normal conditions.

These experiments seem fully to establish the contention that yeast can grow freely without any supply of vitamines, and that it can synthesize vitamine B from a diet of inorganic salts and sugar. Yeast does not synthesize the fat-soluble vitamine A, but the origin of this vitamine appears to have been demonstrated by recent experiments of Coward and Drummond. (Biochem. Journ., 530, xv, 1921.) These observers showed that dried seeds contained little vitamine A, and that this amount was not increased by germination, but that as soon as the seeds formed green leaves a considerable amount of vitamine A appeared. Experiments made with Tradescantia shoots grown on Sach's solution also showed that green plants could synthesize vitamine A from inorganic salts. The production of vitamine A was shown to be dependent upon the presence of chlorophyll in plants, for etiolated seedlings contained no vitamine A, nor did white leaves from the interior of cabbages. In green seaweeds, containing chlorophyll, vitamine A was present, but red seaweeds contained none. Mushrooms were found to be almost completely deficient in vitamine A. It appears, therefore, that the presence of chlorophyll is essential for the synthesis of vitamine A, and that chlorophyll-containing plants can synthesize vitamine A when fed on a pure synthetic diet.

The chemical nature of vitamine A is still unknown. Coward and Drummond found that it could be extracted by fat solvents from green leaves and that it appeared in that fraction of the fat which is resistant to saponification. Vitamine A was at one time believed to be one of the yellow plant pigments. These plant carotinoids are the source of the lipochromes which produce the yellow color of animal fat, and, as a general rule, those animal fats which contain most lipochrome also contain most vitamine A. Various workers have shown, however, that this association is not constant and that the association between lipochromes and vitamine A is probably accidental.

These researches give a fairly clear picture of the vitamine exchange in living organisms. Vitamine B is synthesized by all forms of plant life, whilst vitamine A is only synthesized by plants containing chlorophyll. Fishes and whales obtain the rich supply of vitamine A present in their oil either directly or indirectly from the chlorophyll-containing algae or from the chlorophyll-containing organisms which passively float in water. Land animals derive their vitamine A supply from the green vegetables.

The source of the vitamine A in milk has been shown very clearly by Drummond, Coward, and Watson. (Biochem. Journ., 540, xv, 1921.) They measured the vitamine content of the milk of a herd of cows from April to July, 1921. The animals were stall fed until the end of April, and in April their milk contained little vitamine A; after the cows had been a week at grass their milk yielded a high content of vitamine A, which persisted during May and June. The drought last year spoiled the pasture, however, so that in July the cows had to be fed on cake, and the vitamine A content of the milk at once dropped. A quantitative study of the vitamine A content of butter showed that during the process of butter making a certain amount of vitamine A disappeared, but that butter could be stored in tins for many months without any marked diminution in vitamine content. The conclusion was drawn that the vitamine A content of butter was much more dependent upon the season at which the butter was made than upon the length of time for which it has been stored. This conclusion is obviously of great practical importance. The cow can only secrete in its milk the vitamines which it receives in its food, and the milk or butter of a cow fed on a vitamine-poor diet will contain very little vitamine. Our knowledge of the importance of vitamines has emphasized the necessity for obtaining fresh milk in which the vitamines have not been destroyed, but now it appears that it is equally important to obtain milk from a cow receiving a vitamine-rich diet. Drummond and his fellow workers have examined also the vitamine A content of the body fats of animals, and in this case also they found that the fat of a stall-fed animal often contained very little vitamine A; whilst on the other hand, the fat in tinned beef obtained from grass-fed animals was often rich in vitamines after many months' storage. These conclusions as regards the vitamine content of tinned foods apply only to fats which have been stored under good conditions, and are probably true only for the case of vitamine A, which is more stable than either vitamine B or C.

It is, of course, a matter of extreme difficulty to preserve vitamine C; the only substances in which this vitamine is preserved for any length of time are the fruit juices, and even from them the vitamine slowly disappears. Harden and Robison (Biochem. Journ., 521, xv, 1921) found that when dried orange juice was stored in a desiccator for 15 months it lost 50 per cent of its vitamine C content, and dried orange juice kept under ordinary conditions lost 85 per cent of its activity. The supply of vitamine A and vitamine C therefore appear to present two separate problems. In the normal adult there is really no problem, for an adequate quantity of green vegetables in the diet provides a full supply of all three vitamines. In the case of bottle-fed babies, however, the supply of vitamine A appears to depend chiefly upon the diet on which the cows supplying the milk are fed, while the supply of vitamine C is determined chiefly by the treatment which the milk undergoes during its passage from the dairy to the infant. The conclusions of Coward and Drummond certainly suggest that during the winter it is desirable to add cod-liver oil, or some other rich source of vitamine A, to the food of infants on a milk diet.

The British Medical Journal of January 14, 1922, makes the following comment on Molière:

" Jean Baptiste Poquelin, who when he became author and dramatist assumed the nom de théâtre 'Molière,' was born in Paris on January 5, 1622—at least, his baptismal certificate bears that date. His father, who was upholsterer to Louis XIII, came of a prosperous bourgeois family of Beauvais, and there was once a tradition that some remote forbear was Scottish. Of medical practice in his day Molière was a bitter critic. He first satirized physicians in his farcical comedy Le Médecin malgré lui, and returned to the attack in L'Amour Médecin. His last comedy was Le Malade Imaginaire, in which he himself played the part of the sick man when it was produced for the first time on February 10, 1673. During its preparation and rehearsal he had been suffering from cough and haemoptysis, and before the third representation, on February 17, he was so ill that he was advised not to act. He did act, however, but during the performance a violent paroxysm of coughing came on and he was carried away dying from the theater to his house. Fielding's version of Le Médecine malgré lui, bearing the title of 'The Mock Doctor,' was first produced in 1732. In a later play, M. de Pourceaugnac, Molière gibed at the physicians, and there can be little doubt that he suffered much at their hands during his long illness. The physicians and apothecaries of the day could not forgive Molière his bludgeon blows; but in exposing humbug and formalism he was a true friend of medicine, and medicine will join with the other arts in celebrating the tercentenary of the great French dramatist."

The United States naval hospital at Olongapo, P. I., was placed out of commission on February 15, 1922.

There are comparatively few people in or out of the medical profession, who know how enchanting a writer was the late Dr. William Osler, that great Canadian diagnostician and teacher whose brilliant and many-sided career came to an end just a few hours before the close of the year 1919. Why is not Doctor Osler more widely read to-day? Why are not those writings of his, covering a great range of subjects beside those pertaining to medicine and medical history, better known to the general public?

There are several reasons. The chief of these is that his fame as a physician and scientist completely overshadows his fame in any other direction, and as a result the general reading public shies away from his books. It is well nigh incomprehensible to the public that a great scientist can write anything that is not of the dry-as-dust category. The public has a deep and abiding abhorrence of anything too deep, and does not like to take chances on the product of a man with the reputation of a profound thinker. He is never given the credit of versatility and moods. The taint of superhigh-browism is on him and he remains a sealed book to all and sundry outside the inner circle. Doctor Osler made the mistake (?) of becoming too renowned in his line of work. He was quoted too much and discussed too much in print—perhaps, during his life, more than any other physician the world has known. The fact that he was a physician, and a great one, was burned into the public mind on divers occasions, especially after the odd circumstance at Baltimore which brought into being the verb "to Oslerize." It killed his chances, for this generation, of becoming a best seller even in that neglected department of literature in which he excels. It associated him, for the time being at least, in the mind of the average man as one of those intellectual giants whose processes are unintelligible to the common run of men. He has failed of popularity as a writer for the same reason that an intellectual drama fails while a girl-and-music show next door succeeds. He requires too much involuntary concentration.

Men, alas, are slow in finding the treasures that lie close about them. Perhaps by the time the Osler centenary is celebrated things will have changed. The human mind and intellectual appreciation will have progressed to the point where fame in one direction will not hamper fame in another. Or perhaps Doctor Osler's fame as a physician will by that time have become so dimmed, outside his profession, that the public will think of him first and last as a writer. That sort of thing has happened frequently. If it happens in the case of Doctor Osler it will be an approbation of his work that is justly deserved.

Doctor Osler's writings are many and varied. His bibliography, covering a period of 49 years, comprises no less than 730 titles, including his collected essays and addresses, according to Dr. Harvey Cushing, his biographer. "His charm as a writer," says Doctor Cushing, "had much to do with his great success as a teacher. * * * His Textbook of Medicine (200,000 copies) was translated into French, German, Spanish, Chinese, and other languages. * * * It remains the most used and most useful book in medicine to-day."

Doctor Osler was extremely fond of literature and of literary allusion. He was an omniverous reader, and, having a retentive memory, his mind was stored with quotations and incidents. It was a quotation that brought about the famous 60-year deadline story that made him the talk of two continents. In his farewell address at Baltimore, where he had been connected for 16 years with Johns Hopkins University, he quoted from The Fixed Period, one of Anthony Trollope's rarer novels, in which the theory is advanced that the greatest work of man is done before he reaches 40 and that it would benefit society in general if chloroform were administered to all on their reaching 60. This is how he happened to be misquoted as to chloroforming all men over 60. In quoting Trollope he jested, trusting to his hearers, as well he could, confidently enough to understand that he knew as well as they did that the utility of man has no such limitation. He was himself 55 years old at the time and his remaining 15 years were years of great activity and his greatest influence.—(New York Medical Journal, February 1, 1922.)

Possibly the days of the "master" and "disciples" in medicine are passing or have passed, and with wider dissemination of specialist teaching the world over the delights of a continental *Wunderjahr* will be less frequently sought; but no one who has sojourned in the ancient becastled town by the Neckar will forget Erb and Nissl, or admit that stay at homes can ever sense the fascination of contact with master minds of foreign schools, under foreign skies, in days when receptivity is at its maximum and when the chosen career is at its opening. For this reason, if for no other, the death last month of the veteran neurologist of Heidelberg, Wilhelm Erb, can not be allowed to pass unnoticed, though a new generation of neurologists has arisen to whom he must be little more than a name. It is true that in Erb's birth palsy and in the Erb variety of myopathy we have a means of perpetuating his memory, but these serve but feebly to indicate the prominent part he played over many laborious years in the development of scientific neurology and in that movement which has led to its commanding position in medical studies to-day. The student now entering on his curriculum finds in nearly every hospital a neurological department, or at least one teacher of medicine who devotes himself largely to neurology; and he can have little or no idea of the epoch when the voice of the pioneer was as of one crying in the wilderness. It was in 1865, as assistant to Friedreich, that Erb began his career in neurology, and succeeding years saw him establishing, by exact clinical observation and equally important classification, the foundation of scientific neurology in Germany; myotonia, myasthenia, muscular dystrophy, intermittent claudication, the syphilitic etiology of tabes dorsalis and of certain paraplegias, were all differentiated and elaborated and erected on sure foundations, and this before modern methods of investigation came into vogue. Erb was, after Duchenne of Boulogne, one of the first to employ electricity for purposes of diagnosis and treatment; his

" Elektrotherapie " appeared in 1875, and his diagrams of the motor points have since then reappeared in textbooks time without number, until, indeed, one may suppose they are one of the few things which will never be better done. From a note in the Münchener medizinische Wochenschrift we learn that no fewer than 237 publications stand to the credit of Professor Erb, that he had in the course of his life's work no less than 61 assistants, and that it was said of them, "Untersuchen können die Erbschen Schüler alle." From such data we may better understand what Erb's school meant to neurology, what stimulus to research, what inspiration and enthusiasm; we may compare it, indeed, in respect of scientific and clinical attainment, to that of Charcot at the Salpêtrière.—(The Lancet, January 7, 1922.)

It was formerly taught that yellow fever was endemic in West Africa, but the recent commission of the Rockefeller Foundation which traveled through West Africa from Senegal to the Congo had great difficulty in finding there any account of recent epidemics, such as have occurred in the Southern United States and in South America. The commission—of which General Gorgas was president till he died, when his place was taken by General Noble who had worked with him at Panama—had the advantage of the cooperation of Dr. Juan Guiteras, of Havana, whose life's work has been with yellow fever. At the present time yellow fever is found chiefly in South American ports where temperature is higher than in West Africa, where there are more mosquitoes, and where there are many white people. Negroes and their children have a marked immunity to yellow fever, and it is only where, amongst the blacks, there are many susceptible white people that a considerable epidemic can arise; and only in a place which is a great center of trade and visited by many strangers can repeated epidemics occur. Like several other communicable diseases, yellow fever rather quickly infects those susceptible and is brought soon to an end by the raised resistance of the community, unless fresh nonimmunes are continually coming into the area. The cleaning up of the American endemic areas with the destruction of mosquitoes, and the disappearance of the sailing ships which carried infected stegomyia from port to port are the chief agencies which have led to the disease dying out in West Africa. Prof. W. H. Hofmann, of Havana, is of opinion that the best proof that yellow fever is not longer endemic in West Africa is that no outbreaks occurred there during the war, though so many susceptible white men were sent to the region. He mentions that Doctor Guiteras, with his large experience, does not support Noguchi in claiming *Leptospira icteroides* to be the cause of the fever. Noguchi has, however, recently claimed that the injection of killed cultures has definitely protected thousands of susceptible persons in Central and South America, while the immune horse serum, if used before the fourth day, has a curative action.—(The Lancet, January 7, 1922.)

Before the war the bacteriologist always obtained his stains from Germany. That country was supreme in the field of aniline dyes. While other countries were wasting their coal tar Germany was converting this valuable and unsightly material into all sorts of drugs and into dyes of all the shades of the rainbow. One German, moreover, realizing the laboratory uses of the dyes, took it upon himself to purify and standardize those dyes which the bacteriologist and biologist particularly needed. It was a very small business compared to the textile dye industry, but the whole world was his market and his business flourished.

When the war broke out and the stock of these standardized and reliable German stains already in the country gradually became exhausted, the bacteriologist had a hard time finding what he needed for this important work. The American dye business was born to meet the emergency; but the dyes made in America were particularly textile dyes and ordinarily were not suited to the work of the bacteriologist. Finally, one or two men in the business tried adapting their dyes to biological purposes, and very shortly afterwards several other companies started to do the same thing so many in fact that none of them made a satisfactory profit and their products differed so much that no two samples of the same stain could be counted on to give the same result.

The first attempt to standardize these stains was made by the Society of American Bacteriologists. With the assistance of certain dealers in biological stains they have been working on the matter for about a year and find that American manufacturers have already met the bacteriologist's needs in an admirable way. A little standardization is all that is now needed. The work that has to be done in this way by the bacteriological society appeared so important that the National Research Council of Washington, D. C., offered to take it over so as to put it on a broader basis and place facilities at the disposal of the worker which were not available to the bacteriological society alone. Under this new arrangement the work has been organized on a broad basis, with the cooperation of the Department of Agriculture and several of the large national scientific socities besides the Society of Bacteriologists. The hope of the committee in charge of this work is not only to standardize the stains and to secure American products as good as Germany can produce, but to secure the production of biological stains in this country decidedly better than those available before the war.

NURSE CORPS.

WHAT IS PROFESSIONAL ETHICS?

One of the questions frequently asked the applicant for appointment in the Naval Nursing Service is "What is meant by professional ethics?" From the answers received, which convey such varied meanings, it would seem that the word "ethics" is losing some of its fullness. A protesting patient recently exclaimed "What is this 'professional ethics' which hampers my choice of physician and nurse and which further hampers me if I desire to change my physician or nurse?"

The general definition of ethics is probably summed up in the statement that we mean those rules which govern actions relating to the duty and discipline demanded by the profession or vocation with which we are identified. Since the inception of a nurse body there have been certain principles which are the ethics of our calling. In teaching the meaning of professional ethics, we become aware of confusion in the minds of those who have preceded us produced by a more or less successful training in social ethics. The term should not be confined to social or professional customs which have been established by the consensus of opinion. The history of our profession, or vocation, points significantly to the influence exerted by religious bodies. This is especially true of the nurse standards in Germany and England from which countries we received the incentive to establish our training schools. The history of the evolution of the hospital shows the recognition of the necessity of religious teaching to develop moral standards.

Here we find the ethical principle of authority with the responsive obedience among those who took unto themselves the care of the sick. Religion formed the background and gave to us the rule that though a cure could not be effected, the patient could be given care and comfort in dying. Without the religious background and the voluntary service of the religious sisters trained from childhood by the church in self-denial, we of the present day have our background in teaching in the homes and the training of schools and colleges.

It may be safely affirmed that the resulting development of our training attains a success in proportion to the strength and soundness of the foundation. "Ethics," therefore, if so well understood, as to be an intrinsic part of the nurse, is not learned from a definition, but from an absorption of the idea that discipline is necessary to develop thoughts and actions in relation to others. The result is respect for teachers, thoughtfulness toward associates, and, in the struggle for mastery in any line of endeavor, mental development, and formation of character.

When this home background is lacking the understanding of ethics is so slowly absorbed that the professional knowledge is obtained before the spiritual nature has developed, and the practical preparation is accomplished while the qualities of heart and mind are absent or unawakened.

Some vocations demand a greater accountability than others. In the profession of nursing the existence and development of the ethical principle is a fundamental necessity. The conception of the ethics of nursing, therefore, is the development to the point of unconscious possession of the characteristics which every nurse should possess, to spend and be spent for others: Truthfulness, not the studied correctness, but involuntary truthfulness; obedience in the meaning of "dutifulness;" respect for those in authority, one of the first lessons taught by Christ; gentleness in speech and manner; control of tongue, abstaining from destructive criticism. "Thoughts unexpressed may sometimes fall back dead, but God himself can't kill them when they're said." When these characteristics have been acquired there will follow self-respect, dignity, observation, judgment, and tact. Where these characteristics have been implanted in the home life the correct conception of professional ethics is innate. The defect in the foundation can only be fortified by efforts well directed on the part of those in authority; and conscious rebuilding without resentment or animosity, on the part of those who have chosen the profession of nursing for their field of work. The inculcation and the willing conception of right principles will innoculate our profession with the knowledge that ethics and ethical standards rest in a rooted feeling that to realize our greatest ideal we must toil and work for the development of our lives in relation to others. Nothing perfect is given to us; each day we must take up the struggle and live the highest that is given us to live; working, not despairing: not rebellious, but having a mind open to every new and worthy experience.

The following citations were inadvertently omitted from the list of those receiving honors or distinctions published in the January issue of the Bulletin:

" Certificate of citation for exceptionally meritorious and conspicuous service at Navy Base Hospital No. 1, bestowed upon Miss Frances Van Ingen, chief nurse, United States Navy.

"The Elizabeth medal of Belgium presented by the Queen of the Belgians on the U. S. S. *George Washington* to Miss Sophia V. Kiel, chief nurse, United States Navy, in appreciation of her work and also of the work of the American nurses during the war."

Recently the Bureau of Medicine and Surgery has been presented with an historic flag which was used when the hospital of base No. 1 was commissioned in Brest. The flag hung in the office of the chief nurse of the unit, Miss Frances Van Ingen, of New York, who was also the chief nurse of the hospital, and has been presented to the bureau. When Brest was in gala array on the occasion of the armistice this flag was used in the decorations.

When one opens the door of the office of the superintendent of the Navy Nurse Corps this flag is the first object which meets the eye. Just beside this flag, which shows marks of service, hangs the beautiful banner of the Navy Nurse Corps, which was presented by the Sixth Division, and which has been used in various official parades where the Nurse Corps was represented.

After viewing the flag and the banner, the eye travels around the wall, resting on the various groups of members of the Navy Nurse Corps on duty at many of the hospitals in the United States. He is a rare visitor who fails to notice and make favorable comment on these photographs showing the nurses in their uniform of the Navy Nurse Corps.

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BOOK NOTICES.

Publishers submitting books for review are requested to address them as follows:

The Editor,
U. S. Naval Medical Bulletin,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

Books received for review will be returned in the absence of directions to the contrary.

REVIEWER.

Lieut. Commander W. M. KERR, Medical Corps, United States Navy.

"A little music, a choice picture or two, and a shelf of good books mark a real home, for they distinguish those who appreciate the finer things in life from those who don't."

MEDICAL SERVICE IN MODERN WAR, by *Lieut. Cols. P. S. Bond and C. F. Martin, Medical Corps, U. S. Army.* George Banta Publishing Company, Menasha, Wis., 1920.

This is an admirably written pamphlet of 76 pages delineating the functions and tactical employment of Army Medical Department formations and units in a modern campaign.

The surgeon with the combatant forces in modern warfare must be more than a surgical operator. He must be well versed in administration. He must be forceful and able to organize and direct. Above all, he must be a tactician with the ability to foresee coming events. With this in view, the authors have described, in a general way, the functions of the medical department of an army in the field; the medical equipment of divisions, corps, and army; the evacuation and treatment of sick and wounded, and medical service in open warfare.

When the United States entered the World War, the Army adopted an organization which was a compromise between American ideas and those of our Allies. This organization proved to be satisfactory, although it was by no means perfect. This treatise is based upon it, but since the war a number of changes have been agreed upon which appear to tend toward greater simplicity. These the authors make clear to their readers.

In an appendix will be found some excellent diagrams which illustrate the more important tactical functions with which all officers should be familiar.

The Surgeon General of the Army, in a short preface to this work, says: "All officers will find in its perusal a well-arranged and coordinated exposition of standard doctrine, which is the resultant of the extensive experience of the Medical Department of the United States Army in the World War."

Naval medical officers who are taking the Correspondence Course for Medical Officers now being conducted by the Marine Corps Schools, Quantico, Va., will find this pamphlet a valuable addition to their working library. (W. M. K.)

SOUTH AMERICA FROM A SURGEON'S POINT OF VIEW, by *Franklin H. Martin, M. D., F. A. C. S.* Fleming H. Revell Co., New York, 1922.

This is a delightful collection of notes gathered during two visits to South America during 1920 and 1921 in behalf of the American College of Surgeons, the first visit being made in company with Dr. William J. Mayo, then president of the college, and the second in company with Dr. Thomas J. Watkins of Chicago. The itinerary of the first journey included Jamaica, Panama, Peru, Chile, Argentina, and Uruguay; the second journey covered the same ground with the addition of Brazil. This book really is a report to the American College of Surgeons; in it are included some observations of Dr. Francis P. Corrigan who, at the time of the second journey, was making a survey of the medical conditions of Bolivia and Ecuador, together with some extracts from papers written by Dr. Martin's traveling companions.

The visits to South America were made with the object of securing the affiliation of the surgeons of South America with the American College of Surgeons. Dr. Martin tells in a readable manner of the party's reception and of the hospitality afforded them by the Governments of the various countries and by the members of the medical profession in each city visited.

The conditions encountered made a profound impression on the visitors who regard the surgeons of South America in their hospitals and operating rooms as equals of any representative group of operators in the world.

The book contains descriptions of the medical schools and the hospitals visited, especially in the cities of Lima, Santiago, Buenos Aires, Montevideo, Sao Paulo, and Rio de Janeiro, as well as much interesting information concerning the social and professional conditions in South America.

It is copiously illustrated with portraits of eminent surgeons and photographs of interesting buildings and scenery.

The medical man of North America who contemplates a visit to the regions south of Panama will find this little volume of great assistance. (W. M. K.)

ABDOMINAL PAIN, by *Prof. Norbert Ortner, chief of the second medical clinic at the University of Vienna.* Translated into English from the second and latest edition by William A. Brams, M. D., formerly Lieutenant Commander, Medical Corps, United States Navy. Rebman Co., New York. 1922.

Medical men whose good fortune it was to study in Vienna in the days before the war have many pleasant recollections of Professor Ortner, and many of them will welcome an American edition of his book on Abdominal Pain, a work which is the product of many years of personal experience and observation.

In a short preface which Professor Ortner wrote for the American edition, he remarks that he hopes the book will be well received, and that it will be of help in reestablishing friendly relations between members of the medical profession of English-speaking countries and of his own. One can assure him that the American medical profession at least is willing to meet him more than half way in this reconciliation, although we fear that it will be some years before the clinics of Vienna attain the popularity they formerly enjoyed.

The work is a concise and competent discussion of abdominal pain in all its phases. In abdominal disease one is not often called upon to make a diagnosis on the consideration of the pain alone. There soon develop other symptoms which are of assistance, but the pain often points out the direction one must follow in the objective examination in order to arrive at the proper diagnosis. As the author remarks: "It is one of the early symptoms and serves as a guide through the maze of possibilities, and, therefore, it seems justifiable * * * to consider the pain as the starting point in the differential diagnosis."

This is not a book to pick up in an idle moment, but one to be read carefully, if one is to extract all the meat it contains. The author considers abdominal pain in the various localities in which it occurs. Hence we find first a discussion of diffuse abdominal pain; then a section on localized abdominal pain. This is followed by considerations of epigastralgia or stomach cramps, pain in the right hypochondrium, pain in the right ileocecal region, acute pain in the left iliac region, pains in the lumbar region, flanks and lateral parts of the abdomen, pain in the left hypochondrium, bilateral hypochondrial pain, pain in the region of the navel and pain in the hypogastric region. In an appendix various other phases of abdominal pain are treated fully.

Each of these topics is elaborated extensively until every variety of abdominal pain together with associated symptoms have been presented to the reader in a systematic manner. Nothing has been left out, and the careful reader gains not only a comprehensive knowledge of the meaning of abdominal pain, but considerable knowledge of the diagnosis of abdominal disease in general.

The book is written in the heavy style characteristic of the German school of scientists, but in spite of this handicap it should prove to be a useful volume to one concerned with abdominal disease. (W. M. K.)

DISEASES OF THE SKIN AND ERUPTIVE FEVERS, by *Jay Frank Schamberg, A. M., M. D., professor of dermatology and syphilis, Graduate School of Medicine, University of Pennsylvania.* Fourth Edition. W. B. Saunders Co., Philadelphia, 1921.

An admirable book which has been revised and amplified in order to bring it abreast of the recent advances in dermatology. Whoever attempts to treat skin diseases should be skilled in the diagnosis not only of the ordinary dermatoses, but of the rashes of the various eruptive fevers. These two classes of affections frequently resemble each other to such a degree as to present great difficulty in differentiation as is exemplified by the striking manner in which syphilis may simulate smallpox.

The differentiation of various skin lesions requires skill which is usually acquired only through years of experience with many patients. Unfortunately most of us do not have an opportunity to develop the diagnostic acumen so often noted in the skin specialist to whom we have referred our puzzling cases and we grope about in the mazes of what seems to us an intricate subject. Should one wish to acquire a good working knowledge of dermatology, or merely to obtain light on an obscure case, Schamberg has written just the book to aid him. Each skin disease is presented in a brief and practical manner, special attention being devoted to symptomatology, diagnosis and treatment.

The exanthemata are dealt with in a separate portion of the book and, because of the importance attached to their diagnosis, they are given greater space than is usually accorded them in textbooks.

The text is supplemented with excellent photographic illustrations, which add greatly to the value of the book from the view point of the general practitioner. (W. M. K.)

PNEUMONIA, by *Frederick T. Lord, M. D.* Harvard Health Talks, No. 9, Harvard University Press, Cambridge, Mass., 1922.

The Harvard University Press has issued from time to time valuable little books which form a series known as the Harvard Health Talks. This series aims to provide in easily accessible form modern and authoritative information on medical subjects of general importance. So far these talks have been on the care of children, preservatives and other chemicals in food, the care of the skin, the care of the sick room, the care of the teeth, adenoids and tonsils, an adequate diet, and the avoidance of injection.

The last of the series to appear is a little book on pneumonia, the text of which was originally delivered as a popular Sunday afternoon lecture at the Harvard Medical School. The book sets forth in nontechnical terms our present knowledge of pneumonia, and contains valuable suggestions for the prevention and treatment of this disease. (W. M. K.)

THE AMERICANIZATION OF EDWARD BOK. THE AUTOBIOGRAPHY OF A DUTCH BOY FIFTY YEARS AFTER. Charles Scribner's Sons, New York, 1921.

"Sir, the biographical part of literature is what I like most," said Dr. Samuel Johnson; and many of us agree with him, especially when the biography is so full of human interest as is the Americanization of Edward Bok.

Here a strong, honest, upright man has written a book out of his own rich personal experience, relating in simple and convincing language what he has accomplished, giving, as it were, an account of his stewardship and of the intellect with which he was endowed. He has written the story of a little Dutch boy "unceremoniously set down in America" in 1870, unable to make himself understood or even to know what people were saying, but who "by some curious decree of fate" was destined, as editor of the Ladies Home Journal, to write for 30 years to the largest body of readers ever addressed by an American editor.

He lived a busy life in his adopted country. At an early age a hobby—that of collecting autograph letters—resulted in his acquaintance with many of the notable men of the early eighties. Although he possessed enterprise and energy, the continuous good fortune which followed him resulted from the friendships he had made and the men with whom his life had come in close contact at its most formative period.

At the age of 21 he became associated with the Scribner publishing house, where he received a training in magazine management which fitted him for his life work. Of course he met obstacles—every successful man does—but obstacles to him "soon became merely difficulties to be overcome, and he trusted to his instinct to show him the best way to overcome them. He soon learned that the hardest kind of work was back of every success; that nothing in the world of business just happened, but that everything was brought about, and only in one way—by willingness of spirit and a determination to carry through. He soon exploded for himself the misleading and comfortable theory of luck; the only lucky people, he found, were those who worked hard. To them luck came in the shape of what they earned. There were exceptions here and there, as there are to every rule, but the majority of these he soon found were more in the seeming than in the reality. Generally speaking a man got in this world about what he worked for."

In 1889 Edward Bok became the editor of the Ladies' Home Journal and he was eminently successful, for he possessed the faculty of rightly gauging the psychology of his public. He gave his readers the subjects they asked for, but always "on a slightly higher plane; and each year he raised the standard a notch," and each year the circulation of the magazine increased.

No one can doubt the great influence which the Ladies' Home Journal has had on American life, for many of us have noted the changes for the better which have been brought about by its endeavor. One of the first we remember was the alteration in the character of the American small house. The houses of the early nineties were for the most part wretchedly planned, so Bok devoted his attention to better American architecture, gardening, and interior decoration, with special application to the small house.

For 25 years he pursued the plans adopted and in time his dream of better homes came true.

"Bok had begun with the exterior of the small American house and made an impression upon it; he had brought the love of flowers into the hearts of thousands of small householders who had never thought they could have an artistic garden within a small area; he had changed the lines of furniture and he had put better art on the walls of these homes.

"It was a peculiar satisfaction to Bok that Theodore Roosevelt once summed up this piece of work in these words: 'Bok is the only man I ever heard of who changed for the better the architecture of an entire nation, and did it so quickly and yet so effectively that we didn't know it was begun before it was finished. That was a mighty big job for one man to have done.'"

Bok next turned his attention to certain civic questions—the improvement in the decorations of the Pullman parlor car; the elimination of billboard advertising and of untidy spots in prominent portions of various municipalities; the improvement of rural schools; and the education of women in civic matters, with equal success.

The Ladies' Home Journal, under Bok's direction, was the first of America's magazines to refuse to accept advertisements of patent medicines. The magazine attacked the patent-medicine evil from all sides. It aroused the public by showing the actual contents of some of their pet medicines, or the absolute worthlessness of them, and was instrumental in securing legislation which abated this traffic.

Then Bok took up the question of venereal disease and he had a lonely fight for a while. But it was a question that had to be faced, and he faced it with a will. There was much opposition from his readers at first, which only proved to Bok that he was right. With a series of well-selected articles he presented his case so ably that soon women began to realize that the Ladies' Home Journal was working for their best interests and for those of their children. In the end he accomplished what he had set out to do. "He had taken the question of natural life and stripped it of its false mystery in the minds of hundreds of thousands of young people; had started their inquiring minds; had shown parents the way; had made a forbidden topic a debatable subject, discussed in open gatherings, by the press, an increasing number of books, and in schools and colleges."

He next attacked and abolished the public drinking cup; instituted the movement for a "safe and sane" Fourth of July, and for "better babies."

These are only some of Edward Bok's achievements. His story is fascinating to the very end. It is full of lessons and encouragement for all who are striving to make the world a better place in which to live. Perhaps he was influenced by a sentiment that was voiced by his Dutch grandmother on sending her sons out into the world: "Make you the world a bit more beautiful and better because you have been in it." At any rate Bok believed: "No man has a right to leave the world no better than he found it. He must add something to it; either he must make its people better and happier or he must make the face of the world fairer to look at, and the one really means the other." (W. M. K.)

QUERIES.

Medical officers are invited to submit queries and to present their problems to the BULLETIN, *which, being in a position to draw on varied and extensive sources of information such as are not available elsewhere, will use every means of securing authoritative opinion.*

All queries will be answered by mail; and the replies, if of sufficient general interest, will also be published in this column.

TO THE EDITOR: I was much interested in reading the discussion of the toxic effects of picric acid as commonly employed in the treatment of burns which appeared in the January number of the BULLETIN in reply to Ambrine's request. Personally, I am confident that, in spite of all theoretical considerations to the contrary, picric acid is not good to use in burns. I am inclosing a series of communications from different sources regarding the treatment of burns, and from them you will see the point of view of men who are probably treating more emergency burns than anyone in the country. I have no doubt that you could get a great deal more data by writing to a large number of industrial plants, but believe this will show quite definitely that picric acid is considered as somewhat obsolete.

AMBUSTIO.

The treatment of burns is an important subject and one worthy of consideration by the naval medical officer, as the Annual Report of the Surgeon General of the Navy for the fiscal year 1921 shows 736 original admissions to the sick list during the year for this class of injury.

The use of a 1 per cent solution of picric acid is quite routinely employed in the treatment of burns throughout the Navy, but the use of this preparation is open to certain objections and, as Ambustio's letter indicates, is not universally popular.

It may be that picric acid, by suspending skin respiration and exudation in the areas on which it is applied, or by doing something to a skin area already elaborating a toxic substance as a result of the burn, or by further irritating a nervous area already irritated to the point of inducing shock, may produce definite injury, but such actions seem never to have been demonstrated, and before we can learn much that is definite concerning such speculative effects, it will be necessary to learn more about the toxicology of burns, which as yet is very obscure.

Abstracts of the correspondence referred to in Ambustio's letter are given in order that medical officers may be familiar with treatment advocated by the surgeons of several large industrial establishments. It will be noted that these men do not speak against picric acid, but they do not recommend its use.

Armour & Co., Chicago, Ill.: V. S. Cheney, M. D.—"We do not use the picric-acid treatment on any of our burn cases.

"We have had considerable experience with the paraffin treatment, and it has given very good satisfaction in extensive burns of the legs and arms due to scalding water. We have also tried the open-air treatment, and in my opinion the result has not been as satisfactory with that method as it has with the paraffin treatment. In a great many cases with the open-air treatment we have had exuberant granulations, with very pronounced scars, resulting in contractures; this, however, was in very extensive burns. I believe that the open-air treatment is suitable for superficial burns and those not covering a very large area. I believe that the paraffin method is preferable in burns of the third degree and involving most of an extremity."

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.: L. Noland, M. D.—"We have conducted rather extensive experiments for a number of years, using a number of different treatments; but for the past four years we have used the so-called 'open treatment' only, and are satisfied that we are getting very much better results than we ever did with any other type of treatment.

"As soon as cases of burn are received in the hospital they are placed on a sterile bed under a bed tent, with electric bulbs inside in sufficient quantity to insure warmth.

"When the burned surface begins to dry and crust over, compresses freely moistened with normal saline solution are applied each morning for two or three hours, followed by the easy removal of crusts and necrotic tissue with forceps. If there is a tendency to spreading infection, moist hot dressings of one-half of 1 per cent carbolic acid are used for periods of from 12 to 24 hours, but otherwise the open treatment with exposure to light is constant.

"We are convinced that this treatment is giving us far better results than we have ever secured any other way, with a minimum of pain and scar."

Bethlehem Steel Co., Bethlehem, Pa.: Loyal A. Shoudy, M. D.—"Before talking about the direct treatment of burns I should like to call your attention to the care of the patient generally. I find that the burn of itself is not the part which causes the trouble, but the "toxemia" produced. I am not sure that it is a toxemia, but that is the nearest I have been able to come to it. Because of this, in all cases of extensive burns, the general care of the patient must be considered.

"For the so-called minor burns, by this I mean those which do not confine to the hospital or bed, but those which come from the shops and can be cared for as ambulatory cases, we cleanse with benzine, dry, and then apply dressing of ointment of the following:

	Parts.
Bismuth subnitrate	6
Paraffin	14
Petrolatum	80

"The paraffin in this is sufficient to hold the ointment above the melting point of the body heat, and I believe this is the main point in all the paraffin dressings. In some cases we find it easier to heat the ointment and apply it directly to the burn; but in most cases we spread it on lint or gauze.

"This you will find gives a flexible dressing and enables a man to return to work in the case of hand or finger burns. It is our experience that the burns from the hot-metal departments—splashes, and mostly of the feet—are the ones hardest to 'get well,' partly due to the fact that they are mostly third-degree burns, and also that they are in the dependent position. These we cleanse, dry, remove all 'cooked' skin, then apply a wet dressing of chinosol and cover with a dressing of the ointment. Latter used to keep the wet dressing from sticking and to keep it moist. If extensive we use the paraffin gauze for a protection. If extensive and 'deep' we use the wet dressing of chinosol and keep moist and elevated.

"Support and protection are helps in all cases of burns. If wet dressings are used, use paraffin gauze, which prevents sticking. The so-called bad cases must, from the start, be treated generally as well as locally and don't forget that if the man is or has been a user of alcohol that it should be supplied now.

"These men we cleanse if not in a condition of shock. If in shock, a hypo of morphine sulphate is given and the patient is kept warm until recovery. If able to cleanse do so; blisters we open under sterile conditions, but do not cut away the skin. Cleanse, dry, and apply the ointment described. *Keep clean daily* with warm saline, chinosol, and a little green soap. Then keep well covered with the ointment. In the 'deep' cases use the wet dressing of chinosol or saline.

"In general measures we have found that the use of the Murphy saline drip is good measure for the help of elimination. We give water freely and try in every way to keep the spirit of the man 'up.'

"We believe in fresh air and keep the body warm.

"We have almost reached the state where we believe that the so-called 'general measures' are of as much value as the particular treatment used.

"Dakin's solution is good, but sometimes the men complain of the continued stinging.

"In burns of the skin around the eyes we use zinc oxide, with paraffin, as we have learned that it gives better results; why I do not know.

"As to picric acid we have not used it for the past six years.

"Chinosol I learned from Doctor Murphy's clinic as a general antiseptic."

Carnegie Steel Co., Clairton, Pa.: A. W. Colcord, M. D.—In 1910 Doctor Colcord said at a meeting of the Pennsylvania Railway Surgeons' Association: "For the past 10 years I have been using an ointment known as Burn Ointment, old formula, and composed of: Carbolic acid, thymol, menthol, camphor, of each 5 gains; ichthyol, balsam of Peru, of each 10 grains; zinc oxide; starch, of each $1\frac{1}{2}$ drams; petrolatum to make 1 ounce. Mix well.

"It occurred to me that carbolic acid had some good properties in the treatment of burns. It is germicidal, a deodorizer, and a local anesthetic, but it is irritating and poisonous. For some years I experimented to find a combination which would retain the three good qualities and remove the two bad ones. I believe this mixture has accomplished the result. These four crystalline substances—carbolic acid, thymol, menthol, and camphor—rubbed together produce a new product, which has neither the physical, chemical, or therapeutic properties of either drug taken alone. It is a clear sirupy liquid. You may put your tongue into it and experience only a slight burning. Painted on the unbroken skin, it produces no redness, pain or gangrene, only a cooling effect followed by a slight local anesthetic. The balsam of Peru and ichthyol, advocated by Doctor Estes, are valuable aids in stimulating granulation and epidermis formation. The oxide of zinc and starch incorporated in a petrolatum base make of it a protective dressing of about the right consistency. After treating over 2,000 burns with this ointment, I am convinced that it has the following advantages:

"1. It is an efficient germicide and not only renders the surrounding skin sterile, but also keeps the discharges and burned surface free from germs and, therefore, free from pus. The only pus cases we get are:

"(a) Those who take off their own dressings and so infect the burn.

"(b) Those who come after several hours or days with burns already infected.

"(c) Burns near the mouth, nose, or hair, or near the buttocks in babies.

"(d) Possibly some bad sloughing burns of the third degree, but these are treated as soon as a slough begins to form with continuous wet dressing of Ochsner's fluid, which prevents bad odor or pus.

"2. It is a powerful local anesthetic and soon stops pain, especially in burns of the first or second degree. A badly burned baby, screaming with pain, will often go to sleep from the relief afforded before the bandages are all on.

"3. It is a deodorizer. Our burns have no bad odor except badly sloughing third degree ones, and the odor is best controlled by the wet dressing.

"4. It is nonpoisonous. I have never seen a case where I thought absorption of the drugs produced any unpleasant symptoms.

"5. It is with some exceptions, to be mentioned later, nonirritant.

"6. It is easily and quickly applied and convenient to carry in the grip.

"7. With this, dressings do not stick as they do with picric acid and many other applications. Men with slight burns can, with this dressing, work in comfort.

"8. It is especially adapted to mill and office practice, where we do not have the perfect cleanliness of the hospital and where the open-air (Sneve) dry method or the continuous bath is impracticable. It is the only method I have found that will keep a burn clean in the dirty homes of some of the foreigners working in the steel mills.

"9. The recovery is much more rapid by this method, because (1) the edema and inflammation of the skin soon subside, (2) there is no pus, (3) granulation and epidermis formation are stimulated.

"10. There is less scarring, because less destruction of tissue.

"Some years ago I treated 30 cases with picric acid, and there was a general demand from these patients that we return to the ointment.

"Let us suppose we are called to treat a severe burn of the second degree. We find the patient suffering agonizing pain, with oncoming shock and a chill. We at once administer a hypodermic of one-fourth to one-half grain of morphia, one-fortieth to one-twentieth grain of strychnia, and one one-hundredth to one-fiftieth grain of atropin to stop his pain and apprehension and combat the shock. We then see that the room is warm—80° to 85°—clear it of unnecessary furniture and bystanders and order hot-water bottles or hot bricks gotten ready. The bed should also be prepared. If we have a nurse or assistant at hand we can order her to prepare the necessary things for a hypodermoclysis or a Murphy drip.

"We must bear in mind that in every bad burn three things are more important than the local treatment.

"1. Stop pain.

"2. Combat shock.

"3. Provide for dilution and elimination of the toxins, which at once are thrown into the blood.

"Having gotten thus far with our work, we can proceed to do the local dressing. The clothing should be carefully cut away—never pulled off or dragged over the burned area. We must remember that a burn is, at first, sterile and we must try to keep it so. Unless we believe that it has become infected through dirty handling, dirty clothing dragged over it, or a dirty blanket laid on it, it is best not to wash the burn. Estes washes the surrounding skin with 5 per cent carbolic solution, protecting the burn with pledgets of wet gauze. With our burn ointment we have not found this necessary.

"Pieces of gauze of convenient size are now spread thickly with the ointment and applied somewhat beyond the burned areas. Over this cotton and over all a bandage is placed. The patient is now put to bed, and if shock continues the normal salt solution is repeated every eight hours, giving plenty of water to drink. Nourishment for the first three days should be liquid on account of the intense congestion of the alimentary tract; then we may gradually feed according to conditions.

"There should be the usual care of the bowels, skin, kidneys, etc., not forgetting, in our zeal over the local treatment, that we have on our hands a sick man with blood loaded with toxins, with meninges, lungs, stomach, kidneys, and other organs congested.

"We re-dress our burns daily, gently wiping away the discharges of serum and broken-down cells, which is poisonous and irritating, with dry gauze or cotton. Blisters are opened and pieces of loose skin removed with sterile scissors or forceps, but all skin is left in place as long as possible to protect the underlying, new-forming skin.

"Every dressing should be made with aseptic care, clean hands, clean gauze, and clean instruments.

"As the old epidermis is shed we have a red, raw, irritable surface, and we must reduce our ointment to one-half or even one-fourth strength.[1] In an occasional case even this is too irritating, and we change to oxide of zinc ointment, or, better, to strips of gutta-percha tissue wet in normal salt solution. When the islands of epidermis have coalesced, we can change to aristol or any dusting powder.

"Of course, the greater number of burns are not so extensive, have no shock, and come to the office for daily dressing.

"In burns of the third degree the initial stage of shock, pain, and toxemia is treated as in extensive burns of the second degree, and the ointment applied. As soon as the slough begins to form, if there is much odor, it is well to change to a continuous wet dressing; we prefer Ochsner's fluid (or Dakin's solution) with gauze,

[1] In a personal communication Doctor Colcord states: "We now use on practically all burns an ointment: Burn Ointment—old formula, one-sixth; 5 per cent boric acid in white vaseline, five-sixths."

cotton, and bandage. The patient or nurse is given a bottle of the fluid, which is poured on every three hours without removing the bandage. The burn is re-dressed daily, and sloughing masses are removed when ready. We often see new epidermis forming along the edges before the slough has all come away from the deeper parts. The sloughing area is rapidly filled with red granulations, and if kept clean, the epidermis from the edges starts to cover it. During this period we usually apply the ointment daily, one-half strength, using silver nitrate if granulations are too high at the edges. Where ulcers, following deep burns, are sluggish with a poor blood supply at the base, balsam of Peru or bovinine is used daily.

"When the area is large in a third-degree burn, skin should be grafted as soon as the slough is well away and the hole is filled with granulations. To wait until the granulating mass is old and high, we not only invite failure of the grafts to take, but we have a mass of scar tissue formed which will eventually contract, with resulting deformity.

"Murphy says: 'In late grafting where a heavy mass of connective tissue forms beneath granulations, I advise that this be dissected out, down to the normal fascia, muscle, bone, or other tissue beneath, before placing the graft.'

"We use mainly Reverdin or Thiersch grafts, covering with gutta-percha tissue strips and wet gauze dressing of normal salt or borax solution.

"Young, of Glasgow, following the method of Wolf, Krause, and Matas, has obtained some excellent results by grafting the whole skin with the subcutaneous fat removed. He claims much more permanent results than with the other methods, greater elasticity and better appearances.

"Much of the ugly scarring and deformity resulting from third-degree burns is due to the neglect of skin grafting. It is often done too late or poorly done, and in many cases not done at all.

"Reverdin grafting can be performed without an anesthetic and at the home of the patient. No apparatus is needed but some gutta-percha tissue, a pair of sharp scissors, mouse-toothed forceps, and some sterile salt solution. The wound surface and surrounding skin must be clean, the granulations firm and healthy, and there must be no bleeding. If near a joint, apply a splint to insure perfect rest, keep the parts constantly wet with normal salt solution. Leave the strips of gutta-percha tissue in place three days, then change to clean strips. Put on grafts, one-half inch apart, in rows, both ways, so that the strips may be crossed like basket work.

"First-degree burns are dressed once or twice with the ointment and discharged cured. Those of the face are covered with sterile

103390—22——11

vaseline or zinc-oxide ointment, or the Burn Ointment, and are left without bandages. They rapidly dry and heal without further attention.

"Burns of the eye are dressed with Lippincott's Ointment: Bichloride of mercury, 1 grain; ammonium chloride, 1 grain; sterile vaseline, 5 ounces.

"This can be put in the eye where the burn is on the eyeball or under the surface of the lid, and gauge and bandage applied. These burns also do well with a wet dressing of boric acid solution. When the cornea is burned, atropin is used."

In a recent communication Doctor Colcord said: "In my address before the Pennsylvania Railway Surgeons' Association, I reported the treatment of 1,000 burns with no clinical infection. I can now add 9,000 more to the list. Nurses, assistants, and patients have always been enthusiastic about the results of this ointment. As you will note, I am now using it much weaker than at first.

"Am just finishing the treatment of a very deep third-degree electric (6,600 volt) burn, destroying skin, facia, and a portion of muscles of ball of thumb. Slough was 2 by 3 inches and three-fourths inch deep. Ointment used first four days. Then a constant wet dressing of 10 per cent Dakin, mopping slough daily with pure Dakin solution. Skin of hand was protected with the Burn Ointment. Swelling of hand was slight and soon subsided. There was the usual amount of discharge from a rapidly dissolving slough but no signs at any time of clinical infection about the burned area. As soon as slough was complete I returned to the Burn Ointment and the cavity rapidly filled with healthy granulations covering in from the edges with epithelium. I had told the patient that skin grafting would be needed, but the new skin came so rapidly that I did not use it. Throughout his treatment he has been free from pain and has worked in comfort. There has been no perceptible odor. I cite this case as typical of our treatment and its results.

"I treated 200 cases with paraffin and got good results, but not nearly so good as with the ointment. The paraffin does not prevent infection, does not deodorize, does not provide for the carrying away of the discharges, does not tend to sterilize the surrounding skin, but on the other hand keeps the wound discharges in close contact, permitting them to become infected by the pus germs ever present in oil glands, sweat glands, and hair follicles, and so carrying infection to the burn. In about 25 per cent of cases I got pustules or furuncles around the burn. Yet paraffin has great advantages and has been an advance over the antiquated methods in vogue before the war or those used to-day by many otherwise good surgeons."

From a communication recently received by the editor, the following is quoted:

"1. For burns, either erythematous or vesicular, in which the epidermis is not broken, I use picric acid.

"2. (*a*) For second or third degree burns in which the epidermis is removed, I use the open-air treatment, with some means for maintaining desiccation of the surface.

"(*b*) If, however, infection supervenes and the crusts are interfering with drainage, I saturate the individual with citric acid internally, and keep the parts wet with citrated solutions until the infection is overcome. I then revert to the dry treatment (2 *a*) or the pus dressing (3).

"3. The tissues in the neighborhood of a burn always show, as you know, signs of damage from the heat, a condition similar to that produced by therapeutic thermo-coagulation, so that a prolonged period following the injury is occupied in repair of damage before definite healing processes start.

"When the healing process is well under way, as shown by healthy granulations and advance epithelium, I use my old pus dressing—a sheet of rubber dam covering the whole granulated area. The theory of this dressing is: (1) It protects the granulations and tender epidermis from mechanical injury, (2) conserves all the exudate, which, in clean wounds, consists of nutritive and reparative material, and (3) by the conservation of this exudate, the young, 'naked' cells and capillaries are bathed in fluid which is not only nutritive but ideally adapted in chemical constitution, being far superior to any salt solution that we can concoct.

"I speak at length of the theory of the 'pus dressing,' since the rationale of paraffin dressings is, I believe, identical. Consequently, I regard the healing period as the indication for paraffin, if it is to be used at all."

The Bulletin would welcome the ideas of individual medical officers on the subject of the treatment of burns in order that it may present to its readers treatments which have been found to be efficient.

THE DIVISION OF PREVENTIVE MEDICINE.

Lieutenant Commander R. F. JONES, Medical Corps, United States Navy, in charge.

Notes on Preventive Medicine for Medical Officers, United States Navy.

INSTRUCTIONS TO MEDICAL OFFICERS.

THE VENEREAL DISEASE PROBLEM.

By PAUL RICHMOND, Jr., Lieutenant, Medical Corps, United States Navy.

The problem of combating the venereal diseases has not been solved either for the Navy or for civilian communities. Comprehensive and well-defined plans are being carried out to reduce the harmful effects of other communicable diseases but considerable difference of opinion exists as to the best method of procedure in directing activities aimed at minimizing the incidence of the venereal diseases. During the World War the liberal contributions of patriotic citizens and popular enthusiasm made it practical to carry out more extensive measures than had previously been possible. Resulting therefrom there was a widespread suppression of the old type of "restricted district" which has changed the outward aspect of commercialized prostitution. Another factor influencing the problem has been the advent of prohibition. It is, therefore, difficult to compare present conditions with pre-war standards.

From 1910 until the beginning of the war there had been a gradual reduction in the annual admission rates for venereal disease in the naval service. By some, this diminution has been attributed to the more general use of medical prophylactic treatment, whereas other medical officers claim that improved conditions in seaport cities as well as more extensive instruction and warning of the men were the determining factors. This was true especially in those cities where restricted districts and other resorts of commercialized prostitution were closed.

During the two years of the war the rates suddenly fell to not much more than half the pre-war rates. Undoubtedly this was due to many influences; the causes tabulated below are listed in what is believed to be the order of their importance:

1. Enlisted men of a higher type than in time of peace.
2. Improved social status of enlisted men.

3. Suppression of all forms of prostitution in the vicinity of naval establishments and in seaport cities in the United States.
4. Prohibition of alcoholic beverages for men in uniform.
5. Military activities occupying a greater portion of the men's time than normally.
6. Improved facilities for recreation and amusement.
7. More intensive instruction as to the nature and dangers of the venereal diseases.
8. Patriotism, with a desire to avoid sickness during war.

Since the war the rates have again reached almost to the 1916 level and are about where they would have been if the pre-war rate of decline had continued uninterruptedly. Inasmuch as the low war rates were not destined to be lasting in spite of a continuance of as many activities aimed at reduction as was possible, the questions have been repeatedly asked: "What should be done in the future and what permanent policy should the Bureau of Medicine and Surgery adopt in regard to these diseases?" and "Should the propaganda against venereal disease be abandoned or should new lines of activities be sought?" Before undertaking to answer such questions an analysis of the possibilities of present methods will be attempted.

Inasmuch as the type of the men enlisting in the naval service in times of peace is more dependent on conditions of industrial employment and wages in civil communities than on service inducements, it remains only for officers on recruiting duty to select the best men who present themselves for enlistment. Since this policy has always been carried out, it may be presumed that the best types of men available have been and will in the future be obtained, so that efforts from within the service can not be expected to make any particular improvement in this factor.

Suppression of prostitution can not be undertaken by the naval service. However, such organizations as the Interdepartmental Social Hygiene Board, the American Social Hygiene Association, and many local agencies are active in this field and have gone far toward eliminating open prostitution in the United States. Women's political clubs are especially interested in this matter and are able to exert so much influence on mayors of cities, city and State boards of health, and police officials that few cities will again tolerate open prostitution. As a result of these activities, prostitution in the United States is rapidly assuming a clandestine form and, as active suppression continues, women of this character will be more and more difficult for men in the naval service to find. This has already been reported to be an important factor in reducing exposures in San Diego, Calif., where strenuous measures were employed to suppress prostitution. On the other hand, medical officers of ships report that the exposure rate increases markedly when liberty is given in European or South American ports where prostitution is unrestricted. The active suppression of prostitution by municipal police authorities promises more in the way of reducing the incidence of venereal disease in the naval service than any other available measures. The venereal rate for military forces in the United States should gradually improve as the practice of prostitution becomes more precarious. While many men will continue to find prostitutes in every large city, solicitation by the women will cease to be a considerable factor. However, many men, especially those recently enlisted and those whose sexual habits are irregular, will often be disappointed in their search. Medical officers may occasionally render assistance to the local authorities by reporting foci of infection. The commanding officer by bringing pressure to bear on those in political power can aid in improving conditions. But, in the main, the Navy can not take an active part in solving this phase of the problem.

Nation-wide prohibition by reducing the amount of drinking is thought to have reduced the number of exposures to venereal disease. Many men are restrained while sober, but when intoxicated tend to seek out and associate with prostitutes. Medical officers on ships visiting foreign ports almost invariably mention drunkenness as a factor in increasing the number of venereal infections. Men under the influence of alcohol are notably careless concerning exposure and prophylactic treatment.

The facilities for amusement, recreation, and athletics are recognized as of great importance in reducing exposure to venereal disease. Inasmuch as the Morale Division of the Bureau of Navigation has funds with which to aid ships and stations, there is no reason why every ship and station should not have adequate amusements, etc., for its complement, when the officers take an active interest. Medical officers, in general, encourage athletics and other recreations among the men, as such activities have a beneficial effect on the body and thus diminishes all forms of physical disability. Although indirect this is one of the best methods of reducing the incidence of the venereal diseases especially since the war, when the men have more spare time and less engrossing duties. Its preventive value is believed to be in direct proportion to the character of the men, however, for some types of individuals will not be restrained to any appreciable extent.

In the matter of instructing the men as to the nature of venereal disease and warning them as to the dangers of such diseases, the medical officer has definite obligations and should have a broad view of the problem in order that he may not be discouraged if his efforts are often apparently futile. It is important that those phases most likely to have a lasting beneficial effect, however small, be emphasized, but fallacies which lead to opinions which can not be defended and are contrary to the policies of the Navy Department must be avoided. The first consideration of educational measures aimed at the prevention of venereal disease is the prevention of promiscuous sexual relations. The number of cases of venereal disease will bear a definite ratio to the number of exposures, i. e., after all other factors have reached the best possible efficiency. From a study of the Forms A from all ships and stations for a period of a year and a half, it appears that many medical officers give this phase of the problem little or no consideration, but concentrate their efforts on instructing the men how to use prophylaxis. Those having tried to reduce the number of exposures by instructing and warning the men of the dangers of venereal disease are divided as to whether any reduction has resulted. A few report that "much good was accomplished," others state that "it is believed that the pamphlets, posters, and lecturers do good." A great many more medical officers state that "the men continue to expose themselves in spite of intensive instruction as to the nature and danger of the venereal diseases, both by lectures and the distribution of the literature provided."

Although the actual restraining power of such propaganda can not be measured, some men are known to be influenced thereby. Whether such instruction will be of any avail is believed to be entirely due to the individual man's moral viewpoint. The group of men who believe that promiscuous sexual relations is morally wrong in the same way that theft, lying, and other forms of dishonesty are considered wrong can, it is believed, be dissuaded, in great part, from what they consider lapses of morality. The number of exposures for this class can thus be greatly reduced. However, similar propaganda is of no avail for that group who regard promiscuous sexual intercourse as a matter for individual choice, in the same way that the use of alcohol is usually considered, and who do not attach any moral stigma to those practicing such irregular sexual relations. The exposure rate may, nevertheless, be reduced in this class by cautioning the men to avoid intercourse with prostitutes, who are practically all diseased.

Opinions on this subject are usually fixed before men enter the service; consequently the influences of later environment and teachings to change the viewpoint are of no avail, except in the occasional instance. The lack of success experienced by medical officers who have given the propaganda a thorough trial is attributed mainly to the relatively small number of men in the first group, as well as to the fact that such instruction may have been given at a time when opportunities for sexual relations were especially numerous and attractive. For instance, this seemed to be true on the U. S. S. *Utah* in Mediterranean waters where the monthly exposure rate exceeded the number of the complement. Certain variations in exposure rates must be due to other factors also. For example, in case of the U. S. S. *Kittery* and the U. S. S. *Gulfport*, which regularly visit practically the same West Indian ports, each medical officer states on Forms A that he instructs and warns the men of the dangers of venereal disease. For the last quarter of 1921 the U. S. S. *Gulfport*, with an average complement of 92, reported 2,746 exposures, whereas the U. S. S. *Kittery*, with an average complement of 121, reported only 191 exposures for the same period.

Such variations in the exposure rates, where other factors appear to be the same, can possibly be attributed to the example set by certain men among the crew who, by their conversation and conduct, more than neutralize any beneficial effect produced by educational measures. Such environmental influences induce many men to seek sexual gratification much more frequently than they would otherwise be inclined to do. This may also be a factor on large ships and shore stations among any particular group of associated men. The writer had occasion to observe such an example among a group of Hospital Corps men, following the arrival of a pharmacist's mate whose sexual habits were unusually irregular. Although transfer of this man to other duty did not immediately reduce the rate of exposure to average, a much more salubrious character of conversation immediately prevailed among the corps men. Unfortunately, recruits get most of their information or misinformation from conversation with other enlisted men "between decks." For this reason is it to be wondered that an occasional talk by the medical officer, however forceful, can not displace the effect of the continual reiteration of fallacious statements? Fear of disease is rapidly dissipated when an "old timer" tells of his "career" and appears none the worse. As these conditions can not easily be changed, those carrying out educational measures will have to be contented with scant evidence of improved rates for venereal disease. Recently a case of syphilophobia was reported to the Navy Department. From this it can be seen that our appeal to the fear of disease may do harm in some instances.

Instruction as to the value and use of the new form of medical prophylactic treatment must continue to form a part of the educational program. The percentage of infections following any form of prophylactic treatment in a large group of cases is a good index of the relative value of such measures. Tabulation from Forms A of over 36,000 treatments given within one hour after exposure indicate that 2 per cent of infections may be considered the average rate of disease following early treatments by the methods applied during 1921. It is expected that the use of the prophylactic packet will reduce the ratio for all exposures to this minimum.

Present methods are deemed both justifiable and adequate. New departures are not to be looked for, nor should existing measures be despaired of. The venereal diseases result from human conduct which follows age-long customs. As social conditions generally improve the venereal diseases must diminish. In southeastern Europe a social collapse has produced the inevitable increase of these infections. Inasmuch as the sexual impulse depends on a primitive instinct it can not be expected that promiscuous sexual relations will diminish faster than other forms of antisocial conduct.

ABSTRACTS FROM THE ANNUAL SANITARY REPORT, FLEET SURGEON, UNITED STATES ATLANTIC FLEET, FOR THE YEAR 1921.

A review of the health statistics of the fleet for the year 1921 shows that, as far as sickness and injuries are concerned, the return to peace-time conditions has been practically fulfilled. By this it is meant that the admission rates per 1,000 for diseases and injuries now approximate those rates that were in existence prior to the entry of the service into the World War. The returns available for examination indicate that there is improvement in nearly all classes of diseases and injury. In fact, it can be stated with more optimism than for many years that the health of the fleet during the year 1921 has been excellent.

The admission rate for the entire Navy for the previous year was 676 per 1,000. For the 5-year period immediately preceding the war the mean rate was 464 per 1,000. Therefore, the annual rate of 398 per 1,000 for the year 1921 may be considered as reflecting very satisfactory health conditions in the fleet.

Communicable diseases.—About 22 per cent of the total admissions to the sick list belong to those ailments classified as communicable. The kind and number of each of the communicable diseases that occurred in the fleet during the latter half year are as follows:

Diseases and Number of Admissions.

Tonsillitis	665	Measles	13
Influenza	79	Tuberculosis (all)	11
Cellulitis	71	Mumps	8
Abscess (all)	39	Rheumatism (all)	6
Pneumonia (all)	25	Scarlet fever	4
German measles	22	Erysipelas	2
Fever, unknown cause	21	Diphtheria	1
Furunculosis	18	Dysentery	1
Malaria	17		
Chickenpox	16	Total	1,019

There were 665 admissions for tonsillitis, which amounts to about two-thirds of the total number of admissions for these communicable diseases. Next in importance to tonsillitis is that group made up of those diseases caused by the pus-forming organisms; that is, cellulitis, abscess, and furunculosis. Tonsillitis and the latter group have a total of 803 admissions, or about 80 per cent of the entire number of admissions for the diseases of this class. It is singular that malaria, measles, mumps, chickenpox, and other similar diseases have such low admission rates. Unfortunately, the two diseases most menacing to life, pneumonia and tuberculosis, are represented by a considerable number of admissions.

The above table shows that tonsillitis and diseases of the pus-forming organisms are the principal contributors to this class of communicable diseases and that if it were possible to control these contagions a relatively large amount of sickness would be avoided. An explanation as to the reason for the predominance of these two diseases can not readily be offered. It is probable that a predominance of tonsillitis and diseases of the pus-forming organisms is due to some defect in ship sanitation. Unfortunately, no definite statement to this effect can be made. But whenever the admission rate for one or both of these diseases is unusually high, experience indicates that the condition of the sculleries, drinking fountains, and other similar sanitary factors should be carefully examined with the view of finding the probable cause of the increased incidence.

Smallpox and typhoid fever.—During the latter half of the year there was no admission for smallpox or typhoid fever. Two isolated cases of modified smallpox occurred in the first half of the year. These two cases were handled with a minimum of inconvenience to the fleet. It is believed that the Atlantic Fleet is now fully protected against typhoid fever and smallpox. If either of these diseases appear, it is quite certain to be in a mild or modified form. Therefore, it is improbable that the health of any persons in the fleet will be jeopardized by their contracting smallpox or typhoid fever, or that the movement of the fleet, or any ship of the fleet, will be restricted on account of the appearance of either of these diseases.

Fatalities.—A total of 29 deaths occurred among the personnel of the fleet during the year. Of these, 8 were due to natural causes and 21 to external violence. Of those due to disease, 3 were caused by pneumonia, 3 by inflammatory brain affections, and 1 each was due to acute peritonitis and dilatation of the stomach.

The following is a summary of the 21 fatal accidents:

Drowning	9
Fell overboard (one unwitnessed)	3
Swimming (one unwitnessed)	3
Capsizing of canoe (unwitnessed)	1
Suicide (unwitnessed)	1
Fell overboard on watch (unwitnessed)	1
Airplane accidents	3
Crash	2
Caught by revolving propeller	1
Street accidents	2
Trolley car	1
Fell down street stairs	1
Coaling, drawn into winch	1
Engine room, bursting steam pipe	1
Asphyxiation, working in confined space (unwitnessed)	1
Drug poisoning, drug addict	1
Homicide, unwitnessed	1
Fall on board, unwitnessed	1
Jumped in front of train, suicide	1
	21

It is seen from the above that drowning as a cause of death leads all other causes. It is natural to expect that the hazard of drowning is greatest in a seagoing occupation. Consequently, there are many recognized precautions that are constantly being enforced. But in spite of all these, drowning accidents occur. Accidents resulting from swimming and men falling overboard account for the greatest number of drownings and these are difficult to guard against. Of course, no man should be permitted to enter a swimming pool when no other person is present, and the breaking of this rule seems to have accounted for one death. Each year a number of deaths occur among swimming parties. The unnoticed disappearance of a member of such a party is a frequent occurrence. To prevent this a plan has been suggested by which the members of a swimming party pair off before going into the water, each one of a pair to be responsible for the safety of the other. Under such a plan the occurrence of an unnoticed disappearance of a man would seem quite improbable.

The fleet regulations require that care be taken for the safety of the lives of the personnel, in particular, when new activities are being carried on, and, also when conducting activities known to be hazardous. Furthermore, there is an order that when an accident resulting in a fatality occurs a copy of the board of inquest or investigation, as the case may be, shall be furnished the commander in chief. These reports are carefully considered to ascertain if blame or responsibility for injury to personnel can be attached to any person or persons, and also to determine if it is possible to institute any safeguarding or precautionary measures against the recurrence of the same or a similar accident.

Venereal diseases.—According to incomplete statistics collected within the fleet during the past year it appears that the venereal situation for 1921 will be relatively good. Calculations for the last half of 1921 give an annual rate of 102 per 1,000. The rate for the entire Navy for the previous year was 126 per 1,000, and for the year before that 111 per 1,000. The last half of the present year does not include the period during which the fleet is at Guantanamo, when a comparatively small number of infections occurs. It does not seem improbable that when a complete calculation is made the venereal admission rate of the Atlantic Fleet for 1921 will be found to compare favorably with the low rates of the war-time years.

The last annual report of the Surgeon General of the Navy notes that "in general * * * the rates for the venereal diseases were lower for shore stations than for the entire Navy." It appears that the reverse is true for the Atlantic Fleet for 1921.[1] The rate of 102 per 1,000 is small for a force afloat. It would be worth while in the interest of further prevention to determine, if possible, the reason for this reduced venereal rate. This year medical prophylaxis and educational propaganda were carried out with about the same amount of zeal as during previous years. The presence of a less changing personnel might be assigned as a cause for fewer communicable diseases, but this condition would appear to be practically without effect to reduce the number of venereal diseases. It is probable that the favorable results of 1921 followed some definite cause or causes.

In attempting to analyze the venereal situation it should be taken into consideration that the enlisted personnel nowadays, in consequence of various propaganda that have been forced upon it, is better informed concerning venereal matters than formerly. Also, vice conditions on shore have changed. In the past the sailor was often exploited by commercialized vice, which is seldom the case any more. When the present-day sailor encounters vice on shore it is probable that he has sought it instead of the vice having sought him. In other words, the sophistication concerning venereal matters which

[1] Provisional statistics in the Bureau of Medicine and Surgery do not bear out this statement. The admission rate for venereal diseases for 1921 for shore stations was 71 per 1,000 per annum.

the enlisted man now possesses has resulted more in his avoiding the consequences of his moral transgressions than it has in bolstering up his better inclinations.

The administering of prophylactic treatments on board ship has many objectionable features. Among them, and not the least of them, is the attending publicity, which tends to dull the moral sensibility of the applicant for treatment. The fact that the taking of medical prophylaxis is considered a requirement after an illicit exposure has resulted in a great many untrue statements being made to the attendant in charge, and, consequently, considerable erroneous data are now entered in the prophylactic records. Many men are providing themselves with their own methods of prevention. If the method fails, or if the individual believes it to have failed, he takes a treatment on board ship, thereby having his name recorded and giving any number that happens to come into his mind as the number of hours after exposure. It is probable that this practice, more than anything else, causes the high percentages of failures and, without doubt, the erroneous percentages that are now being obtained on Form A.

A summary of the Forms A from the fleet for six months, representing an average complement of 23,414, is as follows:

Hour.	Number of treatments.	Diseases.	Per cent.
1	3,952	66	1.6
2	4,403	110	2.4
3	2,851	106	3.7
4	2,151	87	4.0
5	1,411	61	4.3
6	1,253	64	5.1
6 to 12	2,073	126	6.0
Over 12	837	68	8.1
	18,931	688	3.6

It is seen in the above table that the percentages of failures for each hour after exposure are unusually high. The inference is that medical prophylaxis in the fleet has been particularly unsuccessful. It seems inconsistent to have among the same personnel a high rate of infection following prophylaxis and at the same time the low rate of admission of 102 per 1,000 per annum previously noted. This phenomenon may be explained by the suggestion already advanced; that is, that the enlisted man, through greater knowledge of the subject, is seeking in his own way to avoid venereal disease. Some men are avoiding disease by comparative or absolute continence, while others resort to various mechanical or medicinal means of prevention. The result is that the ship's prophylaxis is used to cover up errors or neglect, thereby causing a considerable distortion of the compiled results. On the other hand, there is a better appreciation on the part of the crews at large of the dangers of illicit intercourse. This is associated with a more intelligent effort to avoid or prevent infection, which is apparently the cause of the low rate per 1,000.

HEALTH CONDITIONS OF THE NAVY.

The annual admission rate for all causes, entire Navy, for the five-week period ending June 10 was 488 per 1,000 per annum, as compared with a rate of 506 per 1,000 per annum for the previous four-week period ending May 6. The progressive average rate for the entire Navy on June 10 was 624 per 1,000 per annum, which is considerably lower than it has been at any time during the year or, in fact, at a similar time for the past four years.

There has been a gradual decline in the annual admission rate for diseases only since about the 1st of March; the admission rate for the five-week period ending June 10 was 422 per 1,000 per annum.

The morbidity rate for accidents and injuries for the week ending June 10 was higher than it has been at any time during the past two years, the rate being 92 per 1,000 per annum. The average rate for accidents and injuries for the five-week period ending June 10 was 66 per 1,000 per annum.

The morbidity rate for communicable diseases continues to be very low. The following table shows the rates for certain communicable diseases for May, 1922, as compared with the average rate for this month for the previous four years:

Annual admission rates per 1,000 for certain communicable diseases, current month of May, 1922, in comparison with the mean annual admission rates, month of May, for the four-year period 1918–1921, inclusive.

	March, 1918–1921.	March, 1922.
Cerebrospinal fever	0.32	0
Diphtheria	3.29	.20
German measles	.99	2.44
Influenza	53.41	12.60
Malaria	5.98	12.89
Measles	5.79	2.83
Mumps	15.76	1.27
Pneumonia	3.05	2.83
Scarlet fever	2.40	.20
Smallpox	.13	0
Tuberculosis	3.45	4.20
Typhoid fever	.03	0

It will be noted that the morbidity rates for German measles, malaria, and tuberculosis are higher than usual. German measles has been reported from several battleships of the fleet; this, no doubt, accounts for the high rate for this disease. Malaria has not only been prevalent among marines stationed on foreign shore service, but also at Quantico, where there were 31 cases admitted during the past month.

The morbidity rate for the venereal diseases has continued to decline during the past five-week period, the progressive average now being 108 per 1,000 per annum as compared with 112 per 1,000 per annum for the four-week period ending May 6.

The mortality rate for the entire Navy is not only much lower than for a previous five-year norm, but is also lower than for the year 1921; the progressive average rate for 1922 now being 1.83 per 1,000 per annum, as compared with 3.20 per 1,000 per annum for 1921 and the five-year norm rate of 5.40 per 1,000 per annum.

Health conditions at training stations have been excellent, few cases of communicable diseases having been reported.

DIPHTHERIA IMMUNIZATION IN ADULTS.

By J. P. LEAKE, Surgeon, U. S. Public Health Service, in charge of biologic products, Hygienic Laboratory.

Questions are frequently asked as to the advisability of immunizing adults against diphtheria by the use of toxin-antitoxin mixture, a procedure which gives promise of definite reduction in diphtheria mortality among children.

The case in regard to adults is very different from the use of the preventive in the younger age groups. For one thing, diphtheria is not the serious problem which it is in children. Among males in the registration area of the United States for 1919, the last year for which the mortality statistics are available, 60 per cent of the deaths from diphtheria and croup were before the age of 5, 88 per cent before the age of 10, 94 per cent before the age of 15, while only 5 per cent occurred in the age group 15 to 44. In the ages 2 to 9, which are those chiefly concerned for diphtheria prophylaxis, 13 per cent of all deaths were due to diphtheria, a proportion of 1 death out of every 8, while at the ages of 15 to 29, 1 in every 300, and at the ages of 15 to 44, only 1 in every 600 was caused by diphtheria. The diphtheria death rate per 100,000 below the age of 15 was 45, only 2 at 15 to 29 years, and 1 per 100,000 at 30 to 44 years.

The year 1919, for which the figures are given above, was not a year of exceptionally low diphtheria incidence in the registration area, and it is not to be expected that in the future the deaths in the Navy, for example, will frequently exceed the high point of 14 per 100,000 reached for the year 1920. For the six years before the World War the death rate was continuously below 2.

There is no considerable evidence as to the permanency of diphtheria immunization in adults, but it is reasonable to suppose that persons who have reached adult years without being able to maintain the degree of immunity which is usual at that time may not only be difficult to immunize, requiring more injections than do children, but also be uncertain in their hold on the immunity thus produced, losing it more rapidly than normal individuals.

The presence of a larger proportion of pseudoreactions to the Schick test in adults than in children corresponds to the observed fact that the injections of broth cause less discomfort in children than in older persons.

For all these reasons—the slighter need, the more uncertain value, and the greater trouble to the persons receiving the treatment—the testing and immunizing of adults against diphtheria is on a different footing from the same procedure in the case of children, and is to be advised as a routine for adults, at present, only in the case of individuals who are likely to suffer a considerable and prolonged exposure to diphtheria.

FRESH-WATER FISH AS CONSUMERS OF MOSQUITOES.

The following was abstracted from an article entitled, "Notes on the use of fresh-water fish as consumers of mosquito larvæ in containers used in the home," by N. E. Connor, published in the American Journal of Public Health, March, 1922:

With the exception of metal tanks, for which no satisfactory fish has yet been discovered, fish can be employed as larvæ destroyers in all classes of reasonably large water-storing receptacles. The four factors needed to insure their effectiveness are—

1. That the fish be in a sound condition when placed in the container.
2. That the water in the container receive sufficient air to support fish life.
3. That the container be protected from the sun.
4. That there be placed at the bottom of the container, against the side, a cave-like arrangement beneath or behind which the fish can rest or can hide when frightened. A condensed milk can, a curved piece of earthenware, or an elevated stone device made by resting a flat stone on two other stones will suffice.

As a general rule, all fresh-water fish that can adapt themselves to the confines of containers will consume mosquito larvæ. Species of top minnow, carp, pike, mullet, and perch, and also shrimp and small turtles, have been used with excellent results. Unfortunately, some species of fish which consume great quantities of mosquito larvæ are unable to adjust themselves to the narrow limits of the average container. Larva-eating fish may be roughly divided into "top feeders" and "bottom feeders." Top-feeding fish are most effective where there is plenty of sunlight. They seem unable to locate larvæ in dark containers. The bottom-feeding fish have, however, given the best results. One fish is enough for a cistern, barrel, or well.

PROMOTION OF BETTER HEALTH IN THE NAVY.

Dr. F. G. Barr, medical director, National Cash Register Co., Dayton, Ohio, in an article appearing in the National Safety News, June, 1922, states that—

"The selling of health must begin in the medical department, for so long as the doctors, nurses, dentists, and clerks do not act as salesmen and saleswomen meager results must be expected.

"The medical force at the National Cash Register factory at Dayton consists of three doctors, two dentists, three nurses, two treatment-room men (physiotherapy), one masseuse, and three clerks. To insure success in the work among the employees, we believe that every member of the staff should have the following qualifications:

"1. A vision of the value of preventive medicine.

"2. Adaptability. Patients ranging from the foundryman or trucker to the president of the company must receive medical care which will lead them to have confidence in the medical department. The president and other executives must not feel that it is merely a department for the laborers, nor must the trucker or foundryman feel that the department is only interested in the executives and "white-collar men."

"3. Interest in the employees' troubles, no matter how trivial they may seem from the medical viewpoint. A curt, ill-considered answer to one of these trifling questions is often enough to make the employee a confirmed "knocker" so far as the medical department is concerned.

"4. The ability to sell health as a factor in production.

"5. Honesty. There is no place in industry for the physician or nurse who merely asks the patient a few questions, looks at his tongue, fills in a report, and sends him back to work. A doctor should be discharged upon the second offense of this kind, for thoroughness is one of the first essentials of success in industrial hygiene.

"6. The medical department employee must have his heart in the work."

Inasmuch as the Navy, in many ways, is very similar to a large industrial organization, it seems that the qualifications which have been laid down by Doctor Barr for the staff of an industrial concern, might be applicable to the personnel of the Medical Department of the Navy. In this connection it will be of interest to know that the average time lost by the employee of the National Cash Register Co. was 11.5 hours per year, whereas the average time lost by all industrial workers in the United States on account of sickness is variously estimated from six to nine days per year per employee. In other words, a saving of more than 75 per cent has been accomplished as a result of Doctor Barr's most excellent work with the National Cash Register Co., which, no doubt, is largely due to the efficiency of his organization.

ABSTRACTS FROM THE ANNUAL SANITARY REPORT, DESTROYER SQUADRONS, U. S. ATLANTIC FLEET, FOR THE YEAR 1921.

The most interesting feature of epidemiological interest has been the venereal situation and the influence thereon of our two bases. For example, in February, 1921, representing the middle of the stay of the destroyer squadron at Charleston, it was reported in "Notes on Preventive Medicine" that the mean rate for venereal disease from destroyers, Atlantic Fleet, was 225 per 1,000 per annum, whereas in August, 1921, representing the middle of the stay at Newport, R. I., the mean rate was 103 per 1,000 per annum. That this is not merely fortuitous is confirmed by the increased rates reported in November and December, when vessels were again at Charleston, S. C.

In the United States Public Health Reports for December 16, 1921, it is noted that the physicians of the State of South Carolina reported 11,826 cases of venereal diseases, including 5,719 gonorrhea and 5,508 syphilis, between July 1, 1919, and June 30, 1920. The Rhode Island physicians reported 1,224 total cases, of which 485 were gonorrhea and 732 syphilis. If the reported syphilis were used as an index, it would appear that South Carolina, with two and one-half times the population of Rhode Island, was reporting about three times as much syphilis per capita.

In the "Report of the Percentage in the Second Million of Drafted Men Found Infected with Venereal Disease" (war statistics), South Carolina stood fourth, with 13.1 per cent, and Rhode Island was thirty-fifth, with 2.8 per cent. The average for the whole United States was 5.7 per cent.

We expect, then, to record a higher morbidity rate for venereal diseases when the destroyer squadrons are in Charleston than is recorded at Newport. This is borne out by the actual returns.

The situation in Charleston and its adverse effect on the personnel is commented upon in several of the Annual Sanitary Reports for 1921 submitted by the medical officers attached to this force.

Charleston, on the other hand, recognizing the desirability of having this force make this port a permanent base, has begun a clean-up compaign. The first step was taken during the summer before the destroyers returned. The white vice district was closed. The local follow-up efforts have not been as energetic nor as effective as the first steps. Prostitution is still rampant. Real improvement of vice conditions probably will be slow in becoming manifest. This is an inherent defect in our present political conscience. The clean-up idea is merely dormant now and may at some future date eventually carry its point. Economic pressure has been the factor most useful in getting results. All local effort has been entirely on the initiative of the residents themselves, but the Navy has cooperated fully in every measure tending to improve conditions.

The former practice of maintaining a first-aid and prophylactic station on the Government landings at Charleston and at Newport has been continued.

ABSTRACTS FROM THE ANNUAL SANITARY REPORT, U. S. S. "PENNSYLVANIA," FOR THE YEAR 1921.

During March, 1921, while anchored in Guantanamo Bay, Cuba, an epidemic of acute bronchitis occurred aboard this vessel. There were approximately 100 cases. In order to cope with the epidemic about 50 per cent of the cases were transferred to the hospital ship *Relief* for treatment. The cause of the epidemic was undoubtedly due to infection with Pfeiffer bacillus. The infection was either airborne or carried through the agency of mess gear. The symptomatology common to all of the cases was a nonproductive cough, mild fever, tightness and constricted sensation of chest, headache, and moderate prostration. There were seven battleships at Guantanamo during the period of this epidemic, but five of them had no cases. A similar epidemic occurred at this time on the U. S. S. *North Dakota*.

Acute follicular tonsillitis has been prevalent during the year. This disease has not appeared in epidemic form, but has been endemic, there being always one or two cases of tonsillitis reported on the morning report of sick. The cause of this disease is believed to be due in large part to nonsterilization of the mess gear. The condition of the decks—worn-out linoleum with residual water beneath—has probably been a contributing factor at times when repair was delayed. The etiology of these cases has been carefully studied, and certain ones have been found to closely follow exposure to wet and cold weather. Defects in the ventilating system may also contribute to the etiology of this disease.

Throat infections by Vincent's organism were common while this vessel was on the Atlantic coast, but since a change of station occurred in September, 1921, to the Pacific coast, Vincent's angina has rarely occurred.

The influenza cases occurring during the latter part of 1921 have been characterized by marked selective action for the nervous system. The symptoms were mild fever, with cough or pulmonary symptoms; mild rhinitis; severe neuralgias, usually of head, face, or neck; and prostration disproportional to the mildness of the other symptoms. Recovery from attacks has been comparatively rapid.

The absence of certain diseases which were present in 1920 is noted with satisfaction. There has been no case of cerebrospinal fever, typhoid fever, or lobar pneumonia. Three cases of encephalitis lethargica occurred during January, 1921. Two of these cases terminated fatally on board the U. S. S. *Relief*.

Several cases of subtertian malarial fever occurred among members of the marine expeditionary force, which was aboard this ship while at Panama in August, 1921. These cases attracted interest, as it was definitely found that the infection did not occur in the Tropics. The cases occurred too soon after arrival at the Isthmus of Panama to permit of the belief that the infection had been acquired there. As these men had been stationed at Quantico, Va., prior to embarkation, and as they had never lived in the Tropics previously, it is assumed that they were infected while serving at Quantico.

Preventive measures against epidemic diseases have been carried out aboard ship in routine manner. The sanitary drinking cups are burned out with a gasoline torch daily. Linoleum decks have been washed down with cresol solution each morning. Air-bedding orders have been made to include officers' bedding. Divisional officers and crew have been instructed by medical officers regarding venereal diseases and the prophylaxis and hygiene relating thereto. Instructions regarding typhoid prophylaxis and vaccination against smallpox have been carried out scrupulously and energetically. The principles of venereal prophylaxis have been rigidly enforced. Disciplinary measures for failure to take venereal prophylaxis have been very rarely used.

Ventilation.—There has been no change made in the structural details of the ship's ventilating system since certain recommendations were made in the sanitary report from this vessel for the year 1920. The deficiencies of the supply system reported upon at that time are in no way improved and are found to be worse on the third deck and in the storerooms below.

Late in 1921 the main air ducts leading forward and aft from the forward air-intake vents were examined and the following conditions found: The walls of the ducts were entirely covered with impacted black soot to a thickness of 2 to 3 inches. In other words, the lumen of the main air ducts was reduced from 2 to 3 inches at the place of their largest circumference and their air-carrying capacity was proportionately reduced and choked by the accumulation of dirt and soot on their walls.

The insanitary aspect of this condition is most obvious. So much soot is blown through the terminal louvers that it becomes necessary in many compartments to filter the air through gauze veils tied over the louvers. While this plan acts to keep out dust and dirt, it also reacts to diminish the air supply.

The presence of dirt at each end of a ventilating system indicates that the entire system is air choked and in consequence is incapable of functioning to full capacity. It is natural that the smaller ducts should be most affected by this condition, and consequently it is in the storerooms that the air supply is most deficient. The dangers from insufficiently ventilated storerooms have recently been made the subject of a special bulletin sent out by the Bureau of Medicine and Surgery.

Venereal diseases.—Preventive measures against venereal infections have been carried out through the agency of warning posters, venereal prophylaxis, and instruction to the divisional officers and crew by the medical officers. On such occasions emphasis has been placed on instructions that continency is the sure preventive against venereal diseases.

Venereal prophylaxis has been given as a matter of routine to those men who admit having risked infection. The system employed has been efficacious and has undoubtedly served to prevent many cases of disease. During the period of February 1 to 4, while at Callao, Peru, venereal prophylactic treatment was given to 737 men. Diseases resulting from these exposures were confined to 11 cases of gonococcus infection of urethra and two cases of chancroid. During the period from February 16, 1921, to February 22, 1921, while at Balboa, Canal Zone, 472 prophylactic treatments were given, with no venereal diseases resulting from these exposures.

Conditions on the Pacific coast are found to be less favorable for the effectiveness of venereal prophylaxis, and the admission rate has been high during the time that the ship has been based at San Pedro, Calif.

ABSTRACTS FROM THE ANNUAL SANITARY REPORT, UNITED STATES SUBMARINE BASE, NAVAL OPERATING BASE, HAMPTON ROADS, VA., FOR THE YEAR 1921.

Living conditions on a submarine are apparently far from healthful. In ventilating a submarine during surface runs there are many fluctuations in the atmospheric conditions within the boat, the rapid changes of air causing drafts of cold air to enter a warmed space; on the other hand, during submerged runs or runs in heavy weather, when hatches are closed, there is complete stagnation of air in an overcrowded space. The older type submarine is poorly heated and when lying in cool water the temperature within the boat is always cold and damp. The air is saturated with water, and as a result the bedding and spare clothing become soggy, cold, and damp. Facilities for bathing are much curtailed. Men are living closely crowded together and have no opportunity for exercise other than what their duties in this small space provide. It would seem that living under conditions of this kind would be conducive to the development of respiratory and rheumatic affections of various kinds, but experience in this division of submarines shows that men serving on submarines are not more subject to such diseases than men doing duty at the Hampton Roads Base. Most of the men are young, only a few of the chief petty officers being in the neighborhood of middle age. This is undoubtedly another example of how young men, kept in good physical condition, may be made to stand adverse conditions and is no argument whatever for minimizing the disadvantages and discomforts of such living conditions.

ABSTRACTS FROM THE ANNUAL SANITARY REPORT, U. S. S. "MONOCACY," FOR THE YEAR 1921.

The incidence of venereal disease for the year was very high, there being admitted to the sick list 13 cases of gonococcus infection of the urethra, 13 cases of chancroid, and 3 cases of syphilis. Thirteen of these 29 cases occurred during the month of June. It is believed that the entire crew appreciates the seriousness of the venereal diseases, for they have been given frequent individual instruction as to consequences of such diseases. A prophylactic station has always been accessible, and the men have been instructed in the proper method of taking prophylaxis. After having been in the upper part of the Yangtze River for the entire winter, the *Monocacy* returned to Shanghai in June, where liberty was given freely to the men. The 13 cases of venereal disease for that month does not prove that the men had failed to receive the proper instructions and warnings against the dangers of venereal disease, but rather that they had disregarded them. Shanghai is overrun with houses of prostitution; the number of Chinese, Japanese, Russian, and European prostitutes is very high and no attempt is made to cleanse the city of this terrible vice. The "houses" usually frequented by sailors are along the water fronts, in localities where filth and disease are prominent and where the men have free and easy access to an unlimited quantity of intoxicating liquors. The latter, I believe, is in a large measure responsible for the high incidence of venereal disease on the Asiatic Station. Many men have told me that when they went ashore they were determined to abstain from illicit intercourse, but that after having consumed "liquor" they did not realize what they were doing. Under the influence of intoxicating liquors they would thus become easy victims of this large army of prostitutes.

In the smaller ports up the Yangtze River there are fewer prostitutes and no all-night liberty is granted, and, as a result, there is a lower incidence of venereal disease. All these facts will explain why the venereal report for June was so very high. I believe that the number of cases of venereal disease would be greatly diminished if the Navy Department would return to its former custom of allowing the men to furnish themselves with prophylactic tubes such as the Royal Navy issues to their sailors. Certainly such a custom could not do any harm, for as long as houses of prostitution are tolerated and whisky is easily obtained men will respond to their sexual desires. The Yangtze River ports lack recreation centers and clubs; there is no mental diversion for the men when they go ashore, and there is nothing with which they can advantageously occupy themselves. I am not attempting to uphold the men or offer any apologies for their misconduct; I am merely stating facts—facts of which all medical officers on this station are fully cognizant.

INSTRUCTIONS TO MEDICAL OFFICERS.

Circular letter.

Serial No. 186–1922. WJCA: ESK 129733 (53).

WASHINGTON, D. C.,
16 May, 1922.

To: All naval hospitals.

Subject: Occupational therapy for Veterans' Bureau patients in United States naval hospitals; quarterly reports concerning.

Reference: (*a*) Bureau's circular letter, Serial No. 185–1922 of 6 May, 1922, No. 129733 (43).

1. On May 1, 1922, the Bureau of Medicine and Surgery, Navy Department, assumed entire charge of all personnel, equipment, and material used in connection with occupational therapy and physiotherapy for Veterans' Bureau patients in United States naval hospitals.

2. In the future no reports or other information will be furnished by the occupational therapy personnel. These employees are employed by the Navy Department and have no further connection with the Veterans' Bureau. All reports, etc., must be forwarded by, and information furnished by, the commanding officers of the various hospitals.

3. On June 30, 1922, and at the end of each quarter thereafter, commanding officers will forward to the Bureau of Medicine and Surgery reports concerning occupational therapy for Veterans' Bureau patients in the form and order indicated below and containing the following information:

(*a*) Name, rate under civil service, date of appointment, and salary of each employee connected with occupational therapy for Veterans' Bureau patients.

(*b*) List of courses taught Veterans' Bureau patients giving names of instructors or teachers in each course.

(*c*) Hours spent by instructors in connection with occupational therapy.

(*d*) Hours actually occupied in teaching and manner in which time is spent when not actually teaching.

(*e*) Number of Veterans' Bureau patients availing themselves of courses in occupational therapy, giving number of patients and hours devoted to each subject.

(*f*) Detailed report of duties performed by educational director.

(*g*) Report of duties performed by clerks and stenographers.

NOTE.—In making reports, time spent by Veterans' Bureau patients in study outside classroom shall not be counted in with time actually under instruction. A separate report of time devoted to study can, if practicable, be made.

E. R. STITT.

Circular letter.

Serial No. 187–1922. HWS: MFD 130402 (53).

WASHINGTON, D. C.,
May 17, 1922.

To: All medical officers.

Subject: Consultation service in roentgenologic interpretation.

Reference: Manual for the Medical Department, section 3221.

1. The general adoption of celluloid films in roentgenology has made practicable an extension of the service rendered by the U. S. Naval Medical School for many years in the examination of pathological specimens.

2. Any medical officer desiring to consult with a roentgenologist regarding the appearances in an X-ray film can obtain an opinion by forwarding the film or films in question addressed to the Commanding Officer, U. S. Naval Medical School, Washington, D. C., accompanied by a brief abstract of the clinical history of the case, and the following data written on each film: (*a*) Name and rate of patient; (*b*) name of hospital, and (*c*) "right" or "left."

3. In cases of injury to a joint, and always in any affection of the knee, a corresponding plate of the unaffected side should be inclosed. X rays of fractures should be taken in two directions, as nearly perpendicular to each other as possible. In chest cases, take stereograms if available apparatus permits making them.

4. In order to comply with postal regulations, celluloid films are to be mailed in a metal container, sealed, and labeled "Inflammable."

5. Medical officers desiring photomicrographs of tissues, blood, or bacterial preparations or photographs of gross specimens for use as illustrations are reminded that the school is prepared to undertake such work on request.

E. R. Stitt.

Circular letter.
Serial No. 188–1922.

WJCA: ESK 129733 (52).
Washington, D. C.,
19 May, 1922.

To: All naval hospitals.

Subject: Re Transportation for Veterans' Bureau patients upon discharge from U. S. naval hospitals.

References: (*a*) Telegram from District Manager, U. S. Veterans' Bureau, Atlanta, Ga., to Commanding Officer, U. S. Naval Hospital, Pensacola, April 17, 1922.

(*b*) Letter from Commanding Officer, U. S. Naval Hospital, Pensacola, to District Manager, U. S. Veterans' Bureau, Atlanta, Ga., April 29, 1922.

(*c*) Letter from Director, U. S. Veterans' Bureau, MCG: ecr: 10 Hospital Section to the Surgeon General of the Navy, May 13, 1922.

1. For your information and guidance the contents of the above references are hereby quoted:

(*a*) "Bertrans Edwards C eleven fifteen five three naught issue transportation to Cincinnati Ohio."

(*b*) "The above-named man was this date discharged from further treatment at this hospital and has been furnished twenty-one meal and lodging requests in lieu of transportation to Cincinnati, Ohio, which was authorized by your telegram reference above."

The following statement was signed by the man concerned: "I hereby waive transportation to Cincinnati, Ohio, and accept in lieu thereof meal and lodging requests mentioned above."

(*c*) "There are inclosed herewith copies of a telegram from the district manager of the fifth district, Atlanta, Ga., to the Commanding Officer, Naval Hospital, Pensacola, Fla., and a letter from the commanding officer. It will be noted that the commanding officer, presumably upon the request of the claimant, issued in lieu of the transportation to Cincinnati, authorized by the district manager's telegram, 21 meal and 5 lodging requests. The commanding officer, as noted above, presumably did this upon the request of the claimant.

"It will be noted that the claimant waived his transportation to Cincinnati and accepted in lieu thereof the meals and lodging request noted. This, of course, is contrary to the practices of the Veterans' Bureau, as it is felt that the transportation to the claimant's home is a privilege based on humanitarian consideration and is not a vested right which the claimant may demand in cash or other valuable consideration.

"It is therefore requested that you instruct the commanding officers of the different naval hospitals caring for Veterans' Bureau claimants that transportation requests are to be issued only for legitimate and actual intended travel and can not be exchanged either for cash or for other valuable consideration."

E. R. STITT.

Circular letter.
Serial No. 189–1922.

WJCA: ESK 132687–0(54).
WASHINGTON, D. C.,
22 May, 1922.

To: All naval hospitals.

Subject: Occupational therapy for Veterans' Bureau patients in United States naval hospitals.—Red Cross personnel.

Reference: (*a*) Bureau of Medicine and Surgery circular letter Serial No. 184–1922–WRJ–THC 132687–0(51) of May 2, 1922.

1. In order to simplify administrative control and reduce overhead expenses in connection with occupational therapy in naval hospitals, the Bureau of Medicine and Surgery has adopted the following policy in this connection:

2. Commanding officers will arrange the instruction of Veterans' Bureau patients in such a manner that all work in connection with the former term of occupational therapy (i. e., beadwork, basketwork, and any other branch which may have been included under the old terminology of occupational therapy) will be designated (assigned) to Red Cross personnel, and all other work such as that formerly included under the term of prevocational training (i. e., stenography, typewriting, English, reading, writing, bookkeeping, commercial subjects, agriculture, etc.) will be designated to civilians employed for that purpose.

3. In this way all naval and Veterans' Bureau patients will receive their instruction in branches included under the occupational therapy (old term) (par. 2) from the Red Cross personnel, and Veterans' Bureau patients *only* shall receive training and instruction in branches formerly included under prevocational (old term) (par. 2) from the civilian personnel supplied by this bureau for this particular work. It is not the intention of the bureau to furnish prevocational training to naval personnel.

4. Red Cross personnel will request all necessary material and equipment necessary in connection with occupational therapy (old term) for Veterans' Bureau patients from the commanding officers of the naval hospitals, who will furnish the material and equipment in accordance with reference (*a*); that necessary for naval personnel will be obtained in the same manner as is now practiced by the Red Cross.

5. All articles made by Veterans' Bureau patients will be held pending legislation regarding their disposal, and information concerning this will be supplied in a subsequent circular letter.

E. R. STITT.

Circular letter. WJCA: ESK 129733(52).
Serial No. 190–1922.

WASHINGTON, D. C.,
22 May, 1922.

To: All naval hospitals.
Subject: The handling of records for patients of the United States Veterans' Bureau in United States naval hospitals.
Reference: Letter from the Director United States Veterans' Bureau to the Surgeon General of the Navy, ML/EG: 6 of May 13, 1922.

1. For your information there is quoted herewith the contents of the above reference:

"In order to facilitate the handling of records for patients of the United States Veterans' Bureau, it is desirable to extend to other Government institutions certain procedure now followed in United States veterans' and United States marine hospitals. You are therefore respectfully requested to issue orders to all United States Navy hospitals treating patients of the United States Veterans' Bureau as follows:

"THE ASSIGNMENT OF REGISTER NUMBERS.

"*a.* Every patient of the United States Veterans' Bureau should receive a register number upon admission to the hospital. This number should be retained by the patient until his discharge, and it should appear on all records of the patient during the period of hospitalization, particularly admission and disposition cards, Form 1971–F.

"*b.* The register numbers for United States Veterans' Bureau patients should be assigned consecutively from one distinct series for each hospital.

"*c.* Only one number should be assigned to each patient during one continuous hospitalization.

"*d.* A new register number should be assigned upon readmission of the patient to the hospital.

"*e.* The series of register numbers for United States Veterans' Bureau patients should start with 1 and be carried on indefinitely until further advised.

"In order to start this system of register numbers all patients of the United States Veterans' Bureau remaining in the hospital on June 1, 1922, will be numbered from 1 up. The first new patient admitted on June 1, 1922, will be assigned the next highest number. For instance, if on June 1 there are 88 patients in the hospital, numbers 1 to 88 will be assigned to these patients. Number 89 will be assigned to the first new patient.

"A list of patients in the hospital on June 1, 1922, giving name, register number, date of admission, and diagnosis, should be sent in to the Director United States Veterans' Bureau, Washington, D. C., attention Medical Statistics Section.

"TRANSMISSION OF REPORT CARDS, FORM 1971–F.

"Two copies of report cards, Form 1971–F, will be executed upon admission and discharge of each patient in addition to copy retained at the hospital. One of the copies will be forwarded to the manager of the district where the hospital is located and one *direct* to the United States Veterans' Bureau, Washington, D. C. Cards to the Director United States Veterans' Bureau, will be forwarded as follows:

"*a*. A manila envelope of special size (6 by 8½ inches), a supply of which may be obtained by requisition, should always be used.

"*b*. All envelopes bearing the name of the forwarding station should be numbered consecutively, beginning with 1 and marked thus, Cards 1971-F, package No. —.

"*c*. All envelopes are to be addressed to

The Director,
Attention Medical Statistics Section,
United States Veterans' Bureau,
Washington, D. C.

"Cards should never be allowed to accumulate any length of time, but should be forwarded as soon as possible after admission or discharge of patients.

"It is requested that two copies of above orders to hospitals be supplied to the Director United States Veterans' Bureau, attention Medical Statistics Section."

E. R. STITT.

Circular letter.
Serial No. 191-1922.

HBS: DRG 132609-0(54).
WASHINGTON, D. C.,
25 May, 1922.

To: All medical officers.
Subject: Surveys on Medical Department property.

1. The attention of all medical officers is called to the necessity for greater care in the preservation of Medical Department property.

2. Surveys are daily reaching the bureau which show many costly items received within the past year or two with recommendation from the board of survey that they be destroyed as of no value, deterioration due to "use," etc. In many instances the date of receipt is given as "unknown," original cost "unknown," or the word "missing" is used with the statement "no responsibility." Again, pocket cases, surgical instruments, or other cases are recommended for return to supply depot, and upon arrival at the depot it is found that they have been looted of their contents and only the bare cases returned.

3. The new supply table of the Medical Department, 1922, provides instruments and spare parts for cabinets, cases, and pouches; therefore, when a few of their contents are deteriorated or broken only the actual instruments so affected should be surveyed and requisitions submitted to supply the missing parts. Medical officers and Hospital Corpsmen should carefully study the new supply table of the Medical Department.

4. Upon receipt of nonexpendable medical supplies property cards must at once be prepared showing date of receipt, cost of each item, and number and fiscal year of requisition. The bureau will then be able to determine when such property is surveyed if reasonable service has been obtained therefrom. Surgical instruments should, with reasonable care, last for a number of years, and platinum needles, which are so frequently surveyed in quantities and are expensive, should last indefinitely.

5. It is impracticable to enumerate in detail the many expensive items surveyed which appear to have rendered but little service, but if the same care is given by medical officers and Hospital Corpsmen to Government property that is used with respect to their personal property the bureau will be relieved of considerable embarrassment from needless expenditures, which is essential in these days of economy.

6. The Secretary of the Navy, in a recent letter to all bureaus, directed that disciplinary action be taken against persons guilty of neglectful responsibility in the care of Government property. Property surveys will therefore receive special attention in future.

E. R. STITT.

Circular letter.
Serial No. 192–1922.

HBS : DRG 132679(54).

WASHINGTON, D. C.,
24 May, 1922.

To: Medical officers on shore stations in the United States.

1. This bureau's reply to an inquiry made by Commanding Officer, Naval Medical Supply Depot, Brooklyn, New York, is published for information of officers concerned:

"To: Commanding Officer, Naval Medical Supply Depot, Brooklyn, New York.

"Subject: Complement of shore stations relative to quantities of medical department supplies to be furnished.

"References: (*a*) Letter, Commanding Officer, NMSD., Brooklyn, M–2–2–ESB : KG of 12 April, 1922.
(*b*) U. S. Navy Regulations, 1920, Article 1185 (1)–(7)–(9).
(*c*) U. S. Navy Regulations, Article 1575–1580."

1. Replying to question contained in reference (*a*), "Are expenditures authorized under Medical Department of the Navy appropriations for double the number of civilian attachés to the number of Navy personnel attached to a station." It has been decided that on shore stations in the United States where the treatment of families of officers and enlisted men and first-aid treatment for civil employees, as provided in reference (*b*), is required, medical and surgical supplies shall be requ sitioned for on the basis of active Navy and Marine Corps complement allowance.

2. Medical supplies over the complement allowance will be furnished such stations in such quantities as may be necessary for the treatment of families of officers and enlisted men, and first-aid treatment of civil employees, as provided in reference (*b*), but the additional supplies required for this purpose must be made the subject of a special letter to the Bureau to accompany the requisition in each instance.

3. The unlimited expenditure of Medical Department supplies for treatment of civilians, not authorized by reference (*b*), is not approved, and the medical officers of shore stations concerned will be so informed.

E. R. STITT.

Circular letter.
Serial No. 193–1922.

WJCA : ESK 132687–0(61).

WASHINGTON, D. C.,
5 June, 1922.

To: All naval hospitals.

Subject: Care of Veterans' Bureau patients in U. S. naval hospitals.

Reference: Letter from Director, U. S. Veterans' Bureau, to Surgeon General, U. S. Navy, dated May 29, 1922.

1. Arrangements have been made whereby, during the fiscal year 1923, the Bureau of Medicine and Surgery, Navy Department, will designate and maintain the following number of beds in the respective naval hospitals mentioned below for the use of U. S. Veterans' Bureau patients:

Chelsea, Mass	500
Great Lakes, Ill	650
League Island, Pa	125
Newport, R. I	50
New York, N. Y	400
Norfolk, Va	100
Pensacola, Fla	25
Portsmouth, N. H	50
Washington, D. C	250
	2,150

2. Should the necessity arise the Veterans' Bureau has been authorized to utilize from time to time a certain limited number of beds at the following naval hospitals:

U. S. Naval Hospital, Mare Island, Calif.
U. S. Naval Hospital, San Diego, Calif.
U. S. Naval Hospital, Honolulu, Hawaii.
U. S. Naval Hospital, Manila (Canacao, P. I.).

It is not thought that the utilization of hospital facilities in these hospitals will be of a sufficiently continuous or extensive nature to warrant any increase of personnel to care for Veterans' Bureau patients.

3. Commanding officers of naval hospitals other than those referred to in paragraphs 1 and 2 are directed to admit Veterans' Bureau patients in emergencies and to notify the Bureau of Medicine and Surgery of all such admissions.

E. R. Stitt.

Circular letter.
Serial No. 194–1922.

HBS-DRG 125884(61).

Washington, D. C.,
7 June, 1922.

To: All medical officers.

Subject: Alcohol, X-ray supplies, laboratory supplies, and surgical instruments, requisitions for.

References: (*a*) Bureau medicine and surgery circular letter, No. 172–1922; dated 28 March, 1922.
(*b*) Supply table of the Medical Department, U. S. Navy, 1922.

I. ALCOHOL.

1. Alcohol for use by the Medical Department of the Navy will in future be obtained on Form B or Form 4 requisitions from nearest naval medical supply depot; quantities required will correspond with complement allowance prescribed on page 9, supply table of the Medical Department, 1922. This product is furnished in 500 cc. bottles exclusively is a cologne spirits, and suitable for internal administration. Naval hospitals are authorized to procure additional alcohol needed for nonmedical use from supply officers on stub requisitions, chargeable to allotments granted by this bureau for the purpose.

II. X-RAY SUPPLIES.

2. Estimates for laboratory and X-ray supplies submitted to the bureau, in accordance with instructions contained in reference (*a*) indicate that these instructions were in many instances misinterpreted, and numerous items were included in the estimates for laboratory supplies which are listed in the supply

table of the Medical Department, 1922. The following additional instructions relative to proper procedure for obtaining such supplies are therefore issued:

(*a*) X-ray dental films and duplitized films will be furnished by Naval Medical Supply Depot, Brooklyn, N. Y., on letter request direct to that depot. These requests will not exceed estimates submitted to the bureau in compliance with reference (*a*). Upon receipt of such request by the commanding officer Naval Medical Supply Depot, Brooklyn, the contractor will be directed to forward films direct to the activity requiring them. The expenditure will be covered by emergency issue slip in the same manner as are biologicals at present. Upon receipt of the films by the activity concerned the responsible officer will immediately accomplish the emergency issue slip and return to the supply depot. This is important, as authority for payment for the films is contingent upon the receipt of these receipted slips. The films supplied will be freshly prepared and will bear a date of expiration of period of usefulness. It is contemplated that requests will be promptly filled, which will obviate the necessity for carrying a large stock of films on hand and insure fresh supplies when needed. Sufficient films for three months' supply only should be required at one time.

(*b*) X-ray chemicals (nonsupply table) will be obtained on Form 4 requisition from Naval Medical Supply Depot, Brooklyn, direct. within the estimates submitted to the bureau. These products will be supplied in the following standard size packages:

Barium sulphate for X-ray diagnosis, 1-pound carton or can.
Sodium sulphite in 5-pound bottles.
Chrome alum in 1-pound bottles.
Sodium hyposulphite in 25-pound kegs.
X-ray powders in size sufficient to make one gallon of developing fluid.
Potassium ferricyanide in 1-pound bottles.
Other chemicals required are Form B items.

(*c*) Requisitions for dental film mounts, X-ray photographic papers, film-filing jackets, lantern slides and accessories, film hangers, developing trays, gloves, X-ray aprons, X-ray and kidney compressor bags, will be made on requisition Form 4, and forwarded direct to Naval Medical Supply Depot, Brooklyn, if within the estimates submitted to the bureau.

(*d*) Requisitions for X-ray Coolidge tubes will be made on requisition Form 4, submitted direct to the Naval Medical Supply Depot, Brooklyn, if within the estimates submitted to the bureau. In preparing requisition for Coolidge X-ray tube, radiator type, 10 milliampere capacity, specify the make of machine with which tube is to be used.

(*e*) Requisitions for cassettes and intensifying screens will be made on requisition Form 4 direct to Naval Medical Supply Depot, Brooklyn, if within the estimates submitted to the bureau. Requisition for cassettes must specify dimensions of cassette required, especially the thickness, and the make of machine with which it is to be used. In preparing requisition for intensifying screens, specify the size of cassette with which they are to be used and whether the standard, thin, or both standard and thin, are required. These two items will not be carried by supply depot, but will be purchased upon receipt of requisition giving specifications.

(*f*) Requisitions for any other X-ray material required in emergency will be submitted to the bureau for approval together with explanatory letter.

III. LABORATORY SUPPLIES.

3. Requisitions for laboratory supplies will be submitted in accordance with instructions in the supply table of the Medical Department, 1922, and will specify items listed in Parts I and III thereof wherever possible. Special

attention is called to contents of cabinet, laboratory, Navy standard, which together with Form B chemicals, includes practically all apparatus and reagents required for usual laboratory examinations in accordance with modern methods. It will not be necessary to requisition for reagents of any other size containers than those specified in the supply table, nor to require a multiplicity of sizes of items such as test tubes, flasks, bottles, pipettes, etc.

(*a*) Requisitions for laboratory supplies listed in Part III of the supply table will be prepared on requisition Form 4 and forwarded direct to naval medical supply depots.

(*b*) Requisitions for items not listed in Part III of the supply table will be made on separate requisition Form 4 and forwarded direct to the Naval Medical Supply Depot, Brooklyn, N. Y., if within the estimates submitted to the bureau.

(*c*) Requisitions for laboratory supplies other than specified above will be made on requisition Form 4 and submitted to the bureau for approval, together with explanatory letter.

IV. SURGICAL INSTRUMENTS.

4. All requisitions for surgical instruments other than those listed in Part III of the supply table will be made on requisition Form 4 and submitted to the bureau for approval together with explanatory letter.

E. R. STITT.

M-S. #132679(43).
41822CO-SD.

U. S. NAVAL MEDICAL SUPPLY DEPOT,
SANDS AND PEARL STREET,
Brooklyn, N. Y., April 18, 1922.

To: All medical and dental officers.
Subject: Typographical errors in supply table, Form B and Form B–Dental.

1. The above-mentioned forms contain errors which should be corrected on each copy, as follows:

SUPPLY TABLE.

Page 5, 4th line, change "Shick" to "Schick."

Page 16, column B, strike out "Less than 75 men" and insert "75 to 150 men."

Page 21, strike out "Case, diagnostic, electric (recruiting)."

Page 27, items "Corks, bottle, Nos. 3, 4, 5 6, 7 (16) . . . dozen 10 10 20 30 40 50 60 70 100" out of alphabetical order. Indicate by arrow that this item should follow item "Cork presser." (This change necessary to conform with Form B.

Page 36, item "Illuminator, bracket, electric," strike out "110 volts" and insert reference number "(40)."

Page 36, item "Illuminator, bracket, electric, lamp for," strike out "110 volts" and insert reference number "(40)."

Page 40, item "Syringe, conductive anaesthesia, etc.," change "88" to "87."

Page 42, item "Atomizer, hand, etc.," change allowance "3" in coulmn "Standard equipment," to "0."

Page 44, items "Argentum colloidale," change reference number "(24)" to "(42)."

Pages 46 and 47, insert reference number "(42)" after the following items: "Apron, operating," "Gown, operating," "Towel, hand," "Toweling, crash," "Book blank, small quarto," "Envelope, official size," "Eraser, rubber," "Inkstand," "Pad, memorandum," "Paper clip," "Paper fastener," "Pencil, lead," "Penholder," "Pen, steel," "Rubber band," and "Rule."

Page 60 item "Gauge steel (Handerson)" change to read "(Henderson)."

Page 88, item "Water heater, electric," strike out the line "Water heater . . . number 1."

INDEX.

Page 90, "Bistoury, straight," strike out "84."

Page 91, "Bone surette," strike out "69."

Page 91, "Bucket, agate," change "29" to "30."

Page 92, "Card confusion colors" change "87" to "88."

Page 92, "Case diagnostic electric (recruiting)" strike out "21."

Page 93, "Combination syringe," strike out "77."

Page 93, "Corkscrew" insert page "27."

Page 93, "Cotton, absorbent," stroke out "65," "66," "86," and "87."

Page 93, insert after "Cotton, absorbent," "Cotton, absorbent, compressed . . . pages 65, 66, 86, 87."

Page 93, "Curette, bone," strike out "69."

Page 94, "Diagnostic case, electric (recruiting)," strike out "21."

Page 95, "Diagnostic tags" change to "Diagnosis tags."

Page 97, "Hagedorn needles" change "24" to "23."

Page 99, after "Laryngeal mirror, handle," insert page numbers "58" and "72."

Page 99, strike out "Matches, waterproof . . . 65."

Page 99, strike out "Methyl violet . . . 81."

Page 100, "Morphine sulphate hypo. tablet," insert page number "65."

Page 100, "Needle, suture, Hagedorn," change page "24" to "23."

Page 103, "Reamer, root," insert page number "39."

Page 103, "Repair tools, bridge," change "49" to "51."

Page 105, "Suture, needle, Hagedorn," change "24" to "23."

Page 107, "Urethroscope," insert page "63."

FORM B.

Page 13, strike out "Case, diagnostic electric (recruiting) (19) . . . number."

FORM B—DENTAL.

Page 3, Item "Illuminator, bracket, electric," strike out "110 volts" and insert reference number "(40)."

Page 3, item "Illuminator, bracket, electric, lamp for," strike out "110 volts" and insert reference number "(40)."

Page 11, the following items are not in alphabetical order according to the supply table: "Caryophylli, oleum," "Collodium flexile," and "Hydrargyrum."

Pages 13 and 14, insert reference number "(42)" after items: "Apron, operating," "Gown, operating," "Towel, hand," "Toweling, crash, (38)," "Book, blank, small quarto," "Envelope, official size," "Eraser, rubber," "Inkstand," "Pad, memorandum," "Paper clip," "Paper fastener," "Pencil, lead," "Penholder," "Pen, steel," "Rubber band," and "Ruler."

VITAL STATISTICS.

In the future the "Monthly Health Index," which will be published on the fifteenth of each month, will contain statistical data for individual ships and shore stations. The statistics appearing in this bulletin are summaries compiled from those published in the "Monthly Health Index."

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

TABLE No. 1.—*Monthly report of morbidity in United States Navy and Marine Corps for the month of May, 1922.*

	Entire Navy.	Forces afloat.	Atlantic Fleet.	Pacific Fleet.	Shore stations.	Atlantic stations in United States.[1]	Pacific stations in United States.	Marine Corps.
Average complement	[2] 122,870	[2] 82,122	[2] 32,652	[2] 29,760	[2] 40,748	[2] 22,958	[2] 6,104	21,612
All causes:								
Number of admissions	4,929	2,529	988	984	2,400	1,318	215	1,238
Annual rate per 1,000	481.37	369.54	363.10	396.78	706.78	688.91	422.67	687.39
Disease only:								
Number of admissions	4,257	2,179	867	870	2,078	....	....	1,075
Annual rate per 1,000	415.74	318.40	318.63	350.80	611.95	....	....	596.88
Injuries and poisons:								
Number of admissions	672	350	131	124	322	....	....	163
Annual rate per 1,000	65.63	51.14	48.14	50.00	94.83	....	....	90.50
Communicable disease exclusive of venereal disease:								
Number of admissions	1,061	575	....	....	386	57	19	297
Annual rate per 1,000	103.62	169.33	....	....	143.12	29.79	37.35	164.91
Venereal disease:								
Number of admissions	1,088	677	365	212	411	170	38	263
Annual rate per 1,000	106.25	98.92	134.14	85.48	121.04	88.86	74.70	146.03

[1] Does not include 9th naval district.
[2] Includes Navy and Marine Corps personnel.

NOTE.—Asiatic and unassigned ships not reported.

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the five-week period, April 29 to June 3, 1922, inclusive.*

	Forces afloat, Navy and Marines (complement), 82,122.		Forces ashore, Navy and Marines (complement), 40,748.		Total (complement), 122,870.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases	2,179	318.40	2,078	611.95	4,257	415.74
Injuries	350	51.14	322	94.83	672	65.63
Total admissions	2,529	369.54	2,400	706.78	4,929	481.37
Class III.						
Appendicitis, acute	43	6.28	34	10.01	77	7.52
Autointoxication, intestinal	7	1.02	11	3.24	18	1.76
Cholangitis, acute	25	3.65	17	5.01	42	4.10
Cholectystitis, acute	0	....	2	.59	2	.20
Colitis, acute	1	.15	0	....	1	.10
Constipation	10	1.46	23	6.77	33	3.22
Enteritis, acute	19	2.78	13	3.83	32	3.13
Gastritis, acute catarrhal	1	.15	8	2.36	9	.88
Gastroenteritis	19	2.78	41	12.07	60	5.86
Hemorrhoids	39	5.70	30	8.83	69	6.74
Pharyngitis, acute	11	1.61	16	4.71	27	2.64
Ulcers	3	.44	4	1.18	7	.68
Total admissions	178	26.01	199	58.60	377	36.82
Class VII.						
Varicocele	11	1.61	15	4.42	26	2.54
Class VIII.						
Chicken pox	1	.15	2	.59	3	.29
Diphtheria	0	....	2	.59	2	.20
German measles	21	3.07	4	1.18	25	2.44
Influenza	75	10.96	54	15.90	129	12.60
Measles	23	3.36	6	1.77	29	2.83
Mumps	11	1.61	2	.59	13	1.27
Pneumonia, broncho	2	.29	10	2.94	12	1.17
Pneumonia, lobar	8	1.17	9	2.65	17	1.66
Scarlet fever	2	.29	0	....	2	.20
Whooping cough	0	....	1	.29	1	.10
Total admissions	143	20.90	90	26.50	233	22.75
Class IX.						
Dysentery entamebic	0		1	.29	1	.10
Class X.						
Dengue	5	.73	12	3.53	17	1.66
Filariasis	0	....	2	.59	2	.20
Malaria	13	1.90	119	35.04	132	12.89
Total admissions	18	2.63	133	39.17	151	14.75
Class XI.						
Tuberculosis (all forms)	9	1.32	34	10.01	43	4.20
Class XII.						
Chancroid	141	20.60	98	28.86	239	23.34
Gonococcus infections	478	69.85	223	65.67	701	68.46
Syphilis	58	8.47	90	26.50	148	14.45
Total admissions	677	98.92	411	121.04	1,088	106.25
Class XVIII.						
Bronchitis, acute	130	19.00	95	27.98	225	21.97
Laryngitis, acute	1	.15	6	1.77	7	.68
Pleurisy, acute fibrinous	9	1.32	7	2.06	16	1.56
Rhinitis, acute	18	2.63	18	5.30	36	3.52
Tonsilitis, acute follicular	249	36.38	119	35.04	368	35.94
Total admissions	407	36.38	245	72.15	652	63.67
Class XX.						
Hernia (all forms)	29	4.24	26	7.66	55	5.37

TABLE No. 3.—*Summary of annual admission rates for venereal disease reported from ships for April and from various shore stations for the five-week period, April 29 to June 3, 1922, inclusive.*

	Annual rate per 1,000, April.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All ships	0	102.70	902.25	0	126.01	831.02
Battleship and cruiser force:						
Atlantic Fleet	10.38	98.68	326.84	16.62	103.49	321.25
Pacific Fleet	22.26	77.21	106.09	68.61	98.82	142.01
Asiatic Fleet	....	....	....	112.50	212.07	393.19
Destroyer force:						
Atlantic Fleet	0	118.54	902.25	0	147.12	697.39
Pacific Fleet	0	79.84	631.57	0	96.33	476.19
Asiatic Fleet	0	78.68	106.66	0	280.38	831.02
Miscellaneous:						
Atlantic Fleet	0	105.12	666.66	0	123.57	463.15
Pacific Fleet	0	85.26	448.59	0	73.96	258.06
Asiatic Fleet	0	321.95	698.41	0	340.34	814.81
Unassigned, including ships on special duty.	0	194.28	700.00	0	163.27	491.80

	Annual rate per 1,000, Apr. 29-June 3, 1922.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All naval districts in the United States	0	76.26	287.74	0	89.07	253.24
First naval district	13.92	11.80	14.47	12.45	21.30	32.30
Third naval district	0	72.00	119.81	4.33	65.04	127.48
Fourth naval district	0	91.43	89.16	0	188.04	225.24
Fifth naval district	0	107.52	216.06	17.96	145.25	253.24
Sixth naval district	35.93	73.71	287.74	50.99	54.01	171.42
Seventh naval district	0	0	0	29.81	29.81	29.81
Eighth naval district	0	85.80	87.81	0	129.91	87.81
Ninth naval district	24.12	24.12	24.12	66.14	66.14	66.14
Eleventh naval district	41.60	53.15	51.61	13.69	31.78	48.37
Twelfth naval district	61.57	122.87	167.60	60.61	111.11	139.21
Thirteenth naval district	0	0	0	17.14	37.84	88.88

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASE.

	Per cent, April.		Per cent since Jan. 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All ships	66.05	10.88	65.80	11.42
Battleship and cruiser force:				
Atlantic Fleet	64.70	16.47	68.49	12.87
Pacific Fleet	91.13	1.26	82.52	9.70
Asiatic Fleet	....	....	61.11	16.66
Destroyer force:				
Atlantic Fleet	52.17	14.78	60.95	8.83
Pacific Fleet	81.35	6.77	77.00	7.31
Asiatic Fleet	100.00	0	45.65	14.13
Miscellaneous:				
Atlantic Fleet	44.73	10.52	59.94	13.16
Pacific Fleet	78.72	6.38	81.25	7.38
Asiatic Fleet	72.72	0	51.29	18.53
Unassigned, including ships on special duty	61.76	17.64	59.24	13.02

TABLE No. 3.—*Summary of annual admission rates for venereal disease reported from ships for April and from various shore stations for the five-week period, April 29 to June 3, 1922, inclusive*—Continued.

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASE—Continued.

	Per cent, Apr. 29–June 3, 1922.		Per cent since Jan. 1, 1922.	
All naval districts in the United States	72.59	15.00	67.87	16.96
First naval district	0	0	66.66	20.83
Third naval district	72.22	16.66	65.16	24.71
Fourth naval district	90.47	9.53	80.68	4.82
Fifth naval district	65.71	16.19	62.45	15.77
Sixth naval district	85.71	14.28	78.00	16.00
Seventh naval district	0	0	100.00	0
Eighth naval district	42.85	57.15	65.38	30.76
Ninth naval district	100.00	0	68.12	15.62
Eleventh naval district	100.00	0	80.76	11.53
Twelfth naval district	83.33	13.33	65.62	25.78
Thirteenth naval district	0	0	84.61	15.37

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates 1,000, entire Navy, for the five-week period, April 29 to June 3, 1922, inclusive.*

	Navy (complement), 101,258.		Marine Corps (complement), 21,612.		Total (complement), 122,870.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases of blood	1	0.12	0	....	1	0.10
Diseases of circulatory system	33	3.91	6	3.33	39	3.81
Diseases of digestive system	477	56.52	147	81.62	624	60.94
Diseases of ductless glands and spleen	1	.12	1	.56	2	.20
Diseases of ear	93	11.02	16	8.88	109	10.64
Diseases of eye and adnexa	71	8.41	16	8.88	87	8.50
Diseases of genito-urinary system (nonvenereal)	163	19.32	40	22.21	203	19.82
Communicable diseases transmissible by oral and nasal discharges	228	27.02	26	14.44	254	24.81
Communicable diseases transmissible by intestinal discharges	0	....	1	.56	1	.10
Communicable diseases transmissible by insects and other arthropods	40	4.74	124	68.85	164	16.02
Tuberculosis (all forms)	39	4.62	7	3.89	46	4.49
Venereal diseases	926	109.73	263	146.03	1,189	116.12
Other diseases of infective type	234	27.73	99	54.97	333	32.52
Diseases of lymphatic system	62	7.35	17	9.44	79	7.72
Diseases of mind	15	1.78	4	2.22	19	1.86
Diseases of motor system	76	9.01	38	21.10	114	11.13
Diseases of nervous system	29	3.44	14	7.77	43	4.20
Diseases of respiratory system	793	93.97	139	77.18	932	91.02
Diseases of skin, hair, and nails	89	10.55	41	22.76	130	12.70
Hernia	50	5.93	11	6.11	61	5.96
Miscellaneous diseases and conditions	62	7.35	24	13.33	86	8.40
Parasites (fungi and certain animal parasites)	105	12.44	40	22.21	145	14.16
Tumors	9	1.07	1	.56	10	.98
Diseases of women	1	.12	0	....	1	.10
Injuries	560	66.36	141	78.29	701	68.46
Poisons	19	2.25	22	12.22	41	4.00
Total	4,176	494.86	1,238	687.39	5,414	528.73

TABLE No. 5—*Deaths reported, entire Navy, for the five-week period, April 29 to June 3, 1922, inclusive.*

Causes.	Navy (complement), 101,258.	Marine Corps (complement), 21,612.	Total (complement), 122,870.
Meningitis, cerebrospinal	1	0	1
Pneumonia, lobar	1	0	1
Tuberculosis, chronic, pulmonary	1	0	1
Tuberculosis, other forms	1	0	1
Dermatitis exfoliative, general	0	1	1
Cholecystitis	1	0	1
Enterocolitis	0	1	1
Poliomyelitis, chronic, anterior	1	0	1
Syphilis	2	1	3
Other diseases	5	2	7
Drowning	3	0	3
Other accidents and injuries	5	1	6
Poisons	2	1	3
Total	23	7	30
Annual admission rates per 1,000, all causes	2.73	3.88	2.93
Annual admission rates per 1,000, disease only	1.54	2.77	1.76

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VOL. XVII NO. 2

UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

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NAVY DEPARTMENT
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COMMANDER H. W. SMITH, MEDICAL CORPS, U. S. NAVY
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LIEUTENANT COMMANDER W. M. KERR, MEDICAL CORPS, U. S. NAVY

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(MONTHLY)

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1922

NAVY DEPARTMENT.
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
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TABLE OF CONTENTS.

PREFACE.

The United States Naval Medical Bulletin was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, abstracts of current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. Stitt,
Surgeon General United States Navy.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

NATIVE SANITARY INSPECTOR HOLDING TWO OF THE LARGER VARIETY OF THE EDIBLE FISH SOLD IN ST. THOMAS. LEFT, LUTIANUS GRISEUS (LINNÆUS), SNAPPER; RIGHT, LACHNOLAIMUS MAXIMUS (WALBAUM), HOG-FISH.

U. S. NAVAL MEDICAL BULLETIN

VOL. XVII. AUGUST, 1922. No. 2.

SPECIAL ARTICLES.

FISH POISONING IN THE VIRGIN ISLANDS.

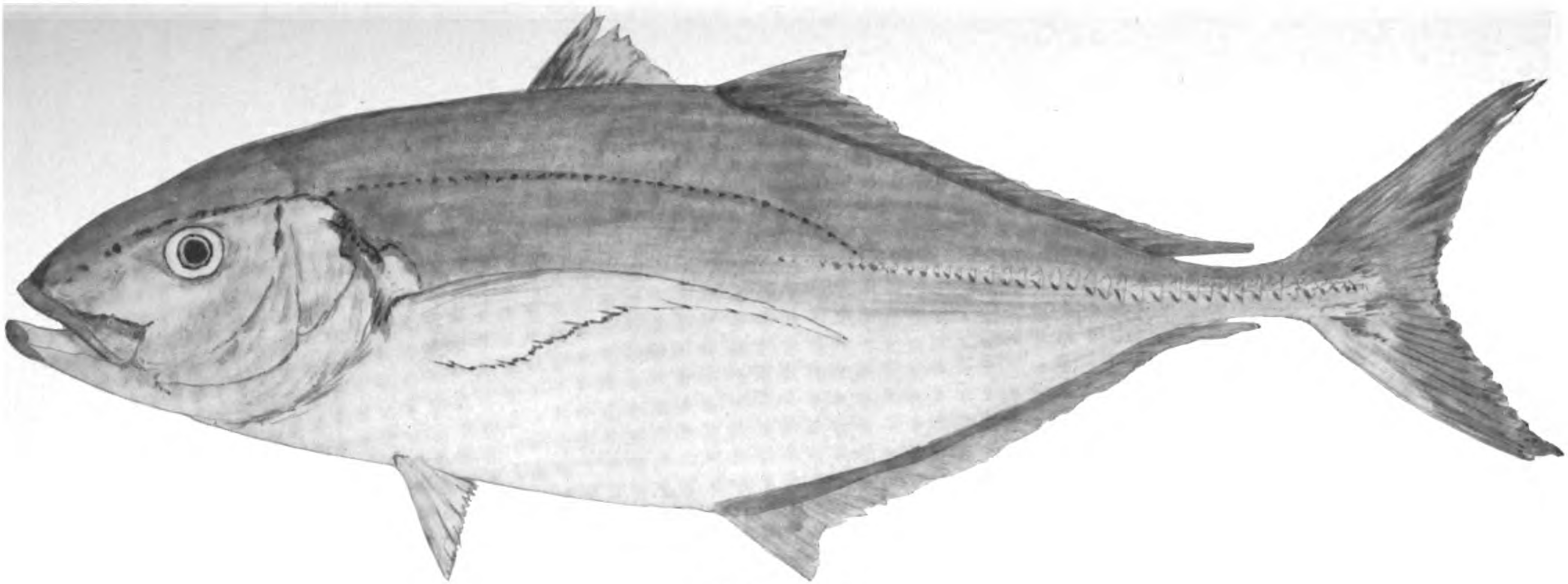
By F. D. WALKER, Lieutenant, Medical Corps, United States Navy.

The records of the sanitation office, St. Thomas, Virgin Islands of the United States, show that each year there have been cases of fish poisoning. During the months of August and September, 1918, 34 cases occurred, due to the fish known as "carang" which had been caught in deep sea fish pots. The greater portion of carang caught are seine fish, caught near the surface of the sea and considered good food, in contrast to the "yellow jack" variety of carang which is generally considered poisonous and never used for food. On October 14, 1919, 11 cases were reported due also to the carang. There were no deaths, and the predominating symptoms were gastrointestinal. In 1920 there were only two cases of fish poisoning, one each in the months of July and August, both from eating carang latus (locally called horse-eyed "jack" or "yellow jack"). This fish is seldom eaten in the summer months, because the natives have learned to fear it. However, poverty or indifference often leads to its being used and poisoning generally follows. In this year, fish poisoning was made a reportable disease. Although only two cases were reported, inquiry brings out the fact that many mild cases occurred that did not require medical attention.

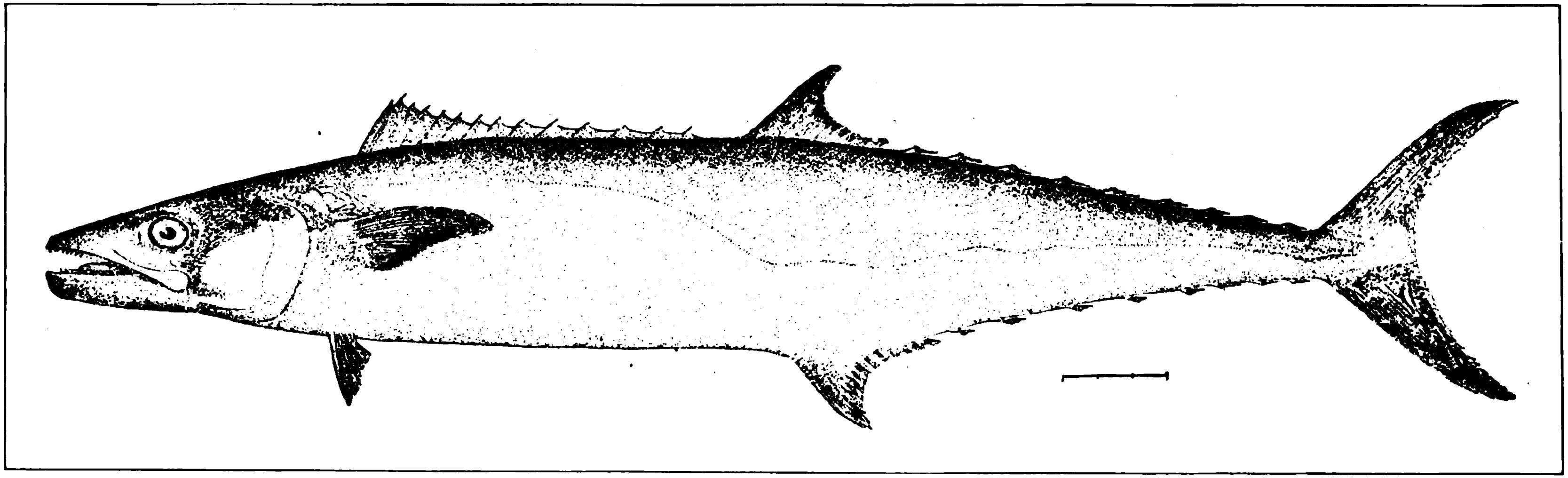
The first case for 1921 was reported in February, and was due to an "amber jack" carang. From March until June, there were no more cases. June and July show one case each due to amber jack. August had no cases. September showed 14—6 carang, 7 king-fish (*scomberomorus cavalla*), 1 barracuda. In October there were 10 cases, 8 from carang and 2 from barracuda. In November there was one case from carang. In one of the cases of barracuda poisoning, the fish weighed about 3 pounds, and was handled in the following way: The patient caught it in the early morning; it was out of the water for about four hours, when he cleaned it, split it up by long knife cuts and packed it in salt over night. The next day he cooked it and ate at least a pound. No other person ate any. The other case of barracuda poisoning resulted after a similar treatment of the meat. Both these patients caught the fish and handled it themselves; both were aware that there was some danger of poisoning, and the salting process was to avoid the effects. Both men had been poisoned some years ago from eating this fish without salting. They declared that the fish weighed about 3 pounds. A small barracuda is not considered dangerous and large ones are never eaten. In the history given the sanitary inspector, the patient said that about three hours after eating the fish he had "reeling in the head, and an hour later diarrhea set in, which kept him from sleeping at night"; he states that "the bones throughout his body became very weary and as well he had an itching of the skin very bothersome." The itching and weakness lasted two weeks and his convalescence was slow in view of his mild illness.

In 1918, 1919, and 1920 all cases reported were carang poisoning, more especially the fish called "horse-eyed jack," "cavalla," or "yellow jack" (*carang latus*), and these were all taken in deep-sea pots. However, in 1921, out of the 28 cases reported, 18 were carang, 7 king fish, and 3 barracuda. The cases of carang poisoning occurred in eight different groups; one group of 6 cases all in one family; one of 5 in one family; one of 2, and the others singly. Groups of five, two, and one occurred on the same date—October 9, 1921. The group of six occurred on September 19, 1921. All of these fish were caught in deep-sea pots. On investigation it was learned that many families which had eaten carang had mild illness among the members for which they had had no medical attention and therefore were not reported. The after-effects were weakness and itching that lasted sometimes for three weeks in some degree. Our inference from this investigation was that a day or two of illness in a family group that had eaten carang, at a time when other cases were being reported, especially when the illness consisted of gastro-intestinal symptoms, syncope, and weakness with subsequent itching, was enough to make a diagnosis of poisoning from fish. It is safe to presume that with 18 cases of carang poisoning reported there must have occurred for the season about 50. No cases were reported among any American people or local whites. These people eat fish less frequently, and their cooks are very careful to get the best fish. On the other hand, in the fishing villages of Honduras and in the locality known as Cha-Cha town, populated by French people whose chief article of food is fish, and where every marketable variety of fish is eaten, including carang and small barracuda, no cases of fish poisoning have been reported.

In connection with carang poisoning in 1920, the following warning was published in the daily papers of St. Thomas by Lieut. E.



CARANX LATUS.



SCOMBEROMORUS CAVALLA (CUVIER). CERO, KING-FISH.

Peterson, Medical Corps, U. S. Army, then chief sanitation officer for St. Thomas-St. John:

WARNING AGAINST POISONOUS FISH.

CARANGS CAUGHT IN FISH POTS APT TO CAUSE FISH POISONING.

September 22, 1918, an epidemic of fish poisoning occurred in St. Thomas.

Investigation of the cases revealed the fact that all the victims had partaken of carang, caught in a deep-sea fish pot. In all, 34 cases of fish poisoning occurred.

October 14, 1919, practically the identical occurrence was repeated.

Nine carangs were caught in a deep-sea fish pot, and of the 11 people who ate this fish, all were taken sick with fish poisoning.

It may be stated that the carangs caught on above occasions were identical in appearance with the ordinary seine carang, a distinct species as compared with the well-known poisonous yellow-jack carang.

The underlying factors, causing fish poisoning, are, in the majority of cases, obscure. In some fishes a well-defined toxin has been isolated, whereas in others no positive findings have been ascertained.

With regard to the carang, the consensus of opinion on the subject seems to be that this fish at certain times is very prone to spoliation with the formation of poisonous substances, probably in connection with their spawning periods.

Due to the above facts that fish poisoning has been caused two years in succession by eating carang caught in deep-sea fish pots, around the same time of the year, it is likely that carangs, caught in this manner, between the months of August and November, inclusive, are poisonous.

Hence a warning is hereby given against eating carangs caught in fish pots during the above period.

E. PETERSON,
Chief Sanitation Officer.

The Carangidæ, or the Pompanos, are pictured and described in "Naval Hygiene," Gatewood, and mention is made of the fact that the carang latus seems to be poisonous only at certain seasons and under certain conditions. In the waters about St. Thomas it is a dangerous fish always during the hot months of summer, especially when caught in deep-sea pots, and is always dangerous when the fish is large. No deaths have ever been reported, and it never has seemed necessary to forbid the eating of the fish, since so many people depend upon it for a cheap food. The naval personnel of this station rarely ever get carang as food. The principal thing for visiting ships to remember when in the waters of the Virgin Islands is that it is a safe policy to reject all fish of the carang variety, commonly called by the natives "jack," "yellow jack," "amber jack," and "horse-eyed cavalli." Some species may not be harmful, but many other better food fish abound that can be accepted with little or no risk. Whether or not the poison is in the fish or is due to rapid decomposition can not be settled because of the manner in which they are handled.

In spite of the fact that in 1921 the kingfish (*Scomberomorus regalis*, *cavalla*) was responsible for a number of severe sicknesses, it is considered the finest food fish in these waters. When caught around these islands these fish weigh about 12 pounds; some heavier but few less than 8 pounds.

All cases of poisoning reported occurred in the month of September. There were four separate poisonings, one involving three in a family and one two. The fish in each case was caught in deep water early in the morning, probably about 5.30, and cooked in the late afternoon about 4.30. The symptoms as given were loose stools, vomiting, "bad feelings," griping, prostration. The writer saw these cases and can testify to the "bad feelings" and prostrations, which were all out of proportion to the quick recovery, the patients being able to get about the next day. However, the prostration continued in part for two weeks or more and some of the patients were troubled for days with severe itching. Authorities call this fish a mackerel, akin to the Spanish mackerel (*Scomberomorus maculatus*), a smaller fish abundant here, and considered a toothsome and entirely safe fish. The National Geographic Magazine, January, 1922, says: "The kingfish sometimes attains the weight of 100 pounds, is an excellent food fish, and is, next to the Spanish mackerel, the principal export fish from the Florida coast."

The month of September when this fish is thought poisonous is a very hot month, and no doubt the poisonings that occur are true food and not fish poisonings. The manner in which fish is handled by the fishermen of St. Thomas, while the best possible for the average month, is a bit faulty for the hot season. They go out about 4 a. m., get their catch and return about 9 a. m. The fish are brought in without any cleaning or cooling. The sale occurs on the wharf or in close proximity to it and by 11 a. m. all have been sold. As a rule, the natives carry their fish home personally and cook it at once. The high price of ice or cooling systems, and the impracticability of making the fishermen, who are very poor, provide "live-well" boats, makes it possible only to endeavor to lessen the length of time between the catching and cooking of the fish.

In St. Thomas it is very important that nothing shall be done to increase the price of food, unless it can be shown that an advantage in health is gained thereby. It is thought better to have an abundance of cheap food, and trust to the general warning issued by the health department, and more especially to the native ability to know "good fish," than to attempt more regulations and restrictions. A king-fish caught, cleaned thoroughly, and well cooked within two hours, is probably not poisonous in any season.

The fisherfolk of the American Virgin Islands in general consider the barracuda (*Sphyraena barracuda*) caught in these waters as an unsafe food. Some will eat a small fish, about 3 pounds, others will not eat any. Here again the facts seem to favor a food rather than a fish poisoning. The natives who eat barracuda are usually those who fish for their families and do not sell. They have on many occasions eaten the fish without harm. In the cases reported here, the fisherman had attempted to cure the fish by the local method which consists of thoroughly cleaning it, making long, deep cuts in its flesh, and then packing the whole in coarse salt. The fish is allowed to stay 12 hours, then cooked and eaten. Two fishermen who so prepared the fish said that once they were poisoned by "uncured" barracuda and that they had since often eaten small fish "uncured" and fish of over 3 pounds "cured" by their method and had experienced no ill effects. The efficacy of salt to prevent poisoning from barracuda has been under discussion for many years. As early as 1829, Currier and Valenciennes quote a French naturalist, M. Plée, who lived in the West Indies, as saying that the inhabitants of St. Croix never ate the fish until it had been in salt for 24 hours. A French physician in 1823 reported a case of poisoning in Martinique, the fish having been so cured.

The symptoms complained of in our cases came on three hours after eating a good portion of the fish and were extreme dizziness and diarrhea, followed later by "aching" bones and extreme itching. Prostration was marked for three days, and in one case the writer saw the patient still incapacitated for work after three weeks. T. L. E. Clarke, medical officer in the British Virgin Islands, in 1918, reported that in his experience barracuda of a good size from certain fishing grounds were always poisonous, and that the poison was not due to any decomposition from poor handling. However, many other specimens of edible fish from these same fishing grounds proved poisonous. The different theories regarding the poisonous qualities of this fish are interesting, but none is based on experiment. The idea that the fish eat the fruit of the very poisonous manchaneel tree can not be proven. About St. Thomas there are plenty of these trees overhanging the water, but to connect them with the barracuda seems trivial. Very little fruit gets in the water; fish food for the barracuda is very plentiful, and this fish shows no particular desire for this highly irritating berry. The theory that the fish feeds on copper banks and thereby attains poisonous qualities is also firmly believed here. There are few copper-bottomed wrecks in this vicinity now, and no copper banks near the fishing grounds.

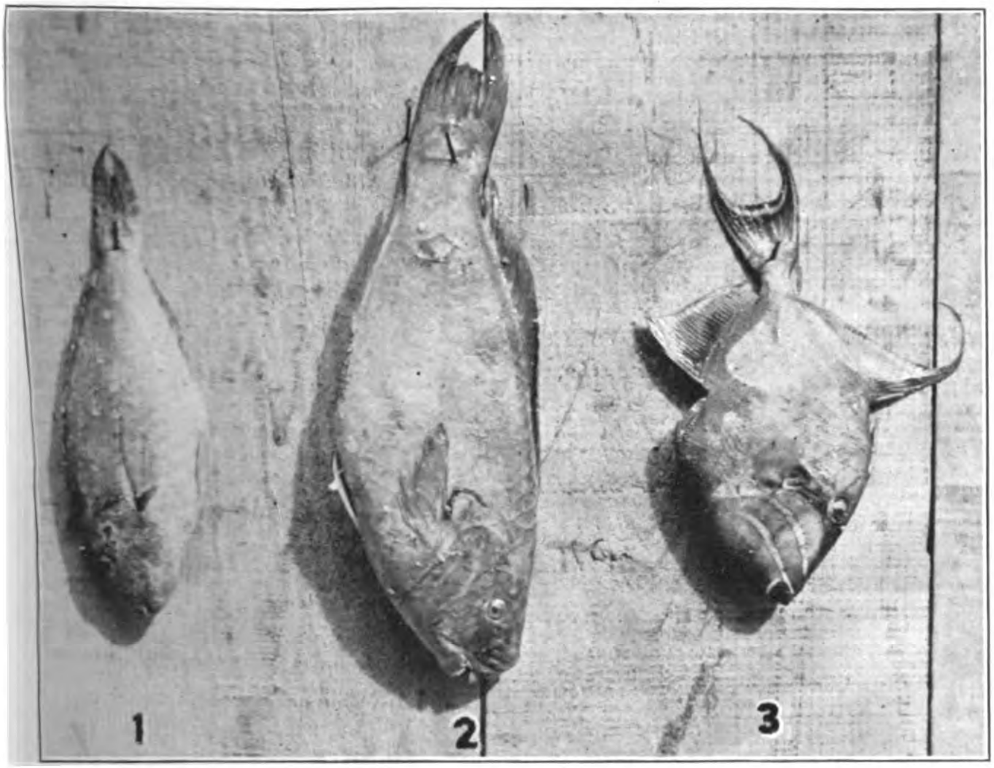
The idea that during the summer months this fish eats a poisonous moss is well established in the native mind, but has never been proven. One thing, however, is constant, and that is the symptomatology. As proof of this constancy can be quoted a French author in 1829 and a native St. Thomas sanitation inspector in

1921. The older observer says: "The signs of poisoning by the becune (barracuda) are a general trembling, nausea, vomiting, sharp pains, particularly in the arms and hands." The inspector, quoting the patient, says, "Three hours after eating the fish, he took in with a reeling in the head, and an hour after diarrhea set in, which kept him from sleeping at nights. His bones throughout his entire body became somewhat weary as well, and he had an itching all over his skin."

In 1675 an observer states: "The fish that are here are many of them poysonous, bringing a great pain in their joints who eat them, which continues for some short time, and at last, with two or three days' itching, the pain is rubbed off." The inspector reports: "The fish was caught and corned for about three weeks before it was cooked and eaten, and about two hours after eating they took in with the reeling in their heads, vomiting, and bowels." The fish weighed about 18 pounds. The writer saw the patients to whom the inspector referred; one was incapacitated for a month and suffered for days from extreme itching.

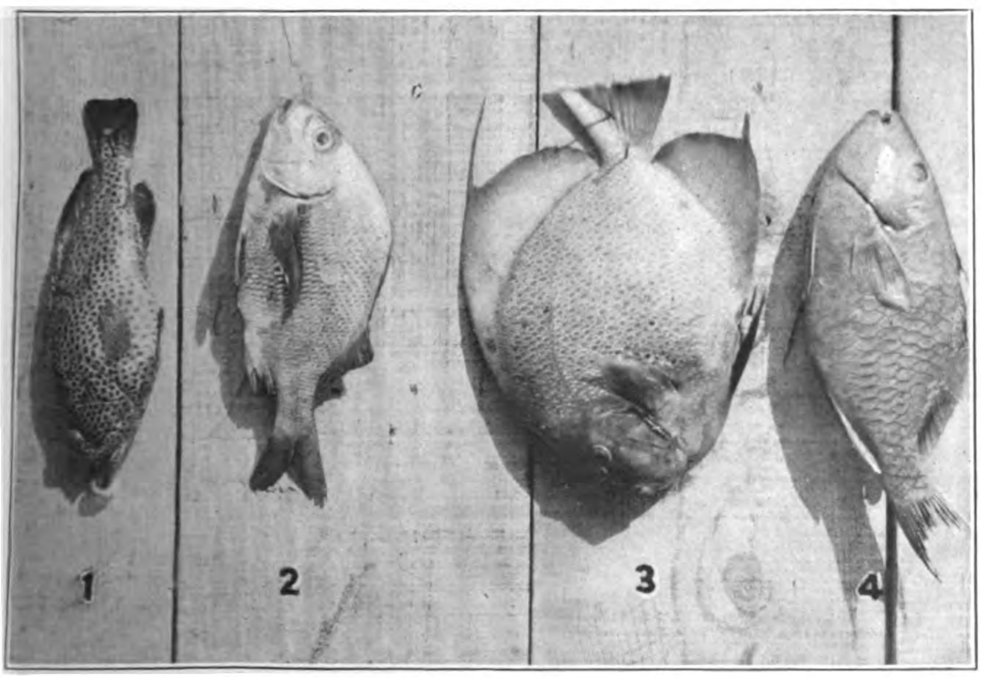
In the 28 cases reported in St. Thomas in 1921 and treated at the municipal hospital, reliable data were available. The most striking thing in the histories is the fact that regardless of whether the fish was barracuda, king-fish, or carang, the symptoms were all alike, namely, that of acute food poisoning. Vomiting and diarrhea were always present, as was prostration in some degree. Many other symptoms were noted in addition, such as violent gastric pains, muscular weakness, slow, feeble pulse, flushing of the skin with extreme itching. The symptoms were so uniform that in family groups often only one case was described in detail, the others being so similar. Few of the patients had any after effects, and these only showed lessened capacity for daily tasks and some uncomfortable itching of the skin.

One of the most common food fishes eaten in St. Thomas is the *Balistes vetula* Linnaeus, locally called "old wife." Gatewood says, in "Naval Hygiene," that the family Balistidæ or trigger fish, of which he says *Balistes vetula* is a suitable example, should not be used as food, as the flesh in some localities is said to cause very marked toxic symptoms. W. R. Dunlop, writing in the West Indian Bulletin, 1917, upholds this view and quotes other observers, including Evermann and Marsh, who say "shore fishes of the tropical seas of rather large size are carnivorous or partly herbivorous; they are rarely used as food, many of them being reputed as poisonous." In another issue of this periodical Clarke states that this fish is readily purchased in the British Virgin Islands and is undoubtedly wholesome for food. He has, however, seen two cases of poisoning from this fish that he could not attribute to ptomaine formation between



SOME EDIBLE FISH FROM ST. THOMAS.

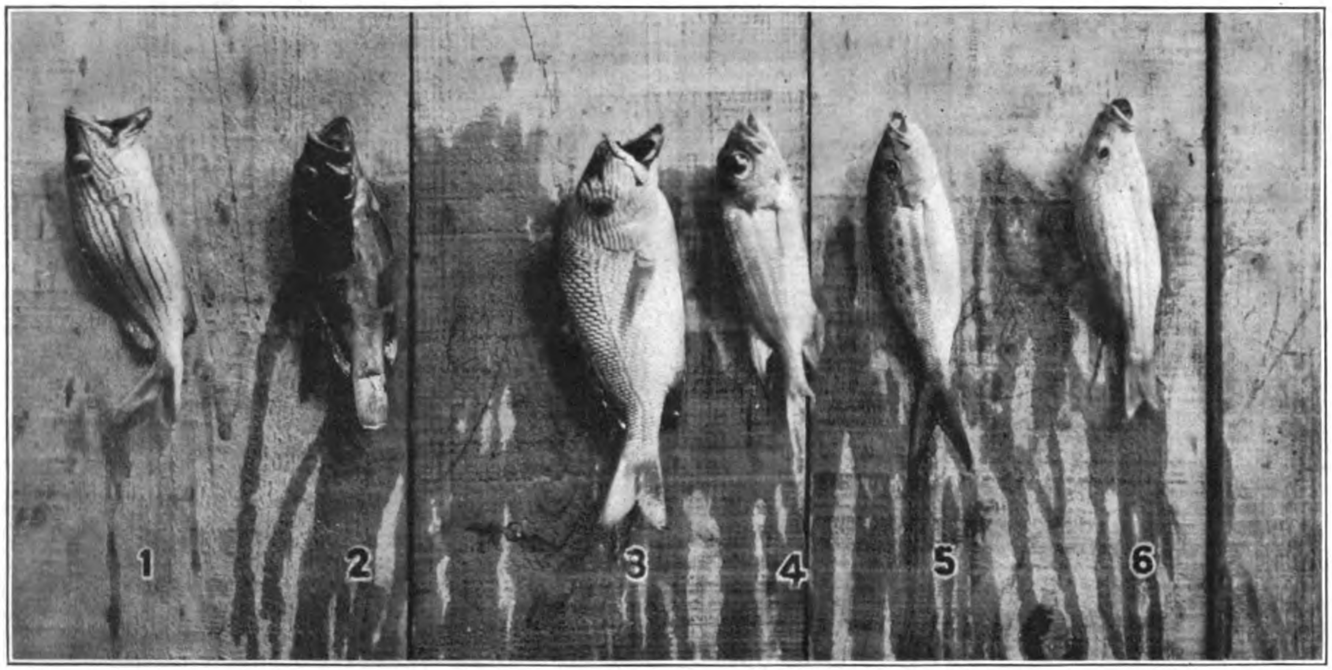
1. Sparisoma chrysopterum (Bloch and Schneider). Brown goutu.
2. Scarus cœruleus (Bloch). Blue goutu.
3. Balistes vetula (Linnæus). Old wife.



EDIBLE FISH OF ST. THOMAS.

1. Epinephalus odsensionis (Osbeck). Hind-fish.
2. Anisotremus surinamensis (Bloch). Paugy-fish.
3. Pomacanthus arcuatus (Linnæus). Flat-fish.
4. Sparisoma abildgaardi (Bloch). Speck-tail gutu.

198—1



A GROUP OF THE SMALLER EDIBLE FISH SOLD IN THE MARKETS OF ST. THOMAS.

1. Bathystoma rimator (Jordan and Swain). Whip-fish.
2. Bodianus fulvus (Linnæus). Butter-fish.
3. Hæmulon plumieri (Lacépède). Grunt-fish.
4. Holocentrus ascensiones (Osbeck). Wenchman.
5. Ocyurus chrysurus (Bloch). Yellow-tail.
6. Brachygenys chrysargyreus (Günther). Bay Redman.

198–2

capture and preparation. The "old wife" as sold in St. Thomas is a small fish weighing only a few pounds. Like a well-known patent medicine it is "unlike any other" and anyone who sees a picture of it can readily pick it out of any group of fishes. It is pictured well in "Naval Hygiene, Gatewood." Tradition has it in St. Thomas that this fish is sometimes poisonous, but since 1918 no case has been reported. A very large number is eaten in all seasons, and one of the most common sights in the streets is the line of housewives going home from the wharf carrying a small string of fish with the inevitable "old wife." The dried skin is supposed to have some virtue as a scrub brush, and native women use it on the floor in preference to a more modern brush.

Many other fish are used as food here and have no stigma of poisoning attached to them. The red snapper is highly prized; fish of this type are locally called rock fish. The National Geographic Magazine for January, 1922, shows a plate of a similar fish called mutton fish. The groupers and grunts are palatable and safe fish, as are also the fish called locally the "Goutu," a blue fish of about 4 pounds weight with a flat nose like a dolphin.

No difficulty is ever experienced in keeping the people from eating such well-known poisonous fish as the Puffers (*Spheroides spengleri*) and similar ones equally dangerous. No cases have ever been noted by the writer of poisoning from the toxic effects of handling the fish. The conclusions drawn from the cases observed point to the fact that at certain seasons some usually good market fish are harmful, either due to inherent poison from whatever cause, or from bacterial products produced by poor handling. The absence of mortality in these cases lightens our responsibility and permits us to allow the most liberal use of all fish that a Virgin Islander sees fit to eat. Visitors, especially in the months of August, September, and October, will profit best by listening to the advice of local fish savants, even though they can not prove the point at issue.

Dr. H. F. Taylor, assistant, United States Bureau of Fisheries, has published certain notes concerning poisonous fishes and a selected bibliography of references to literature on the subject which will be found exceedingly valuable.

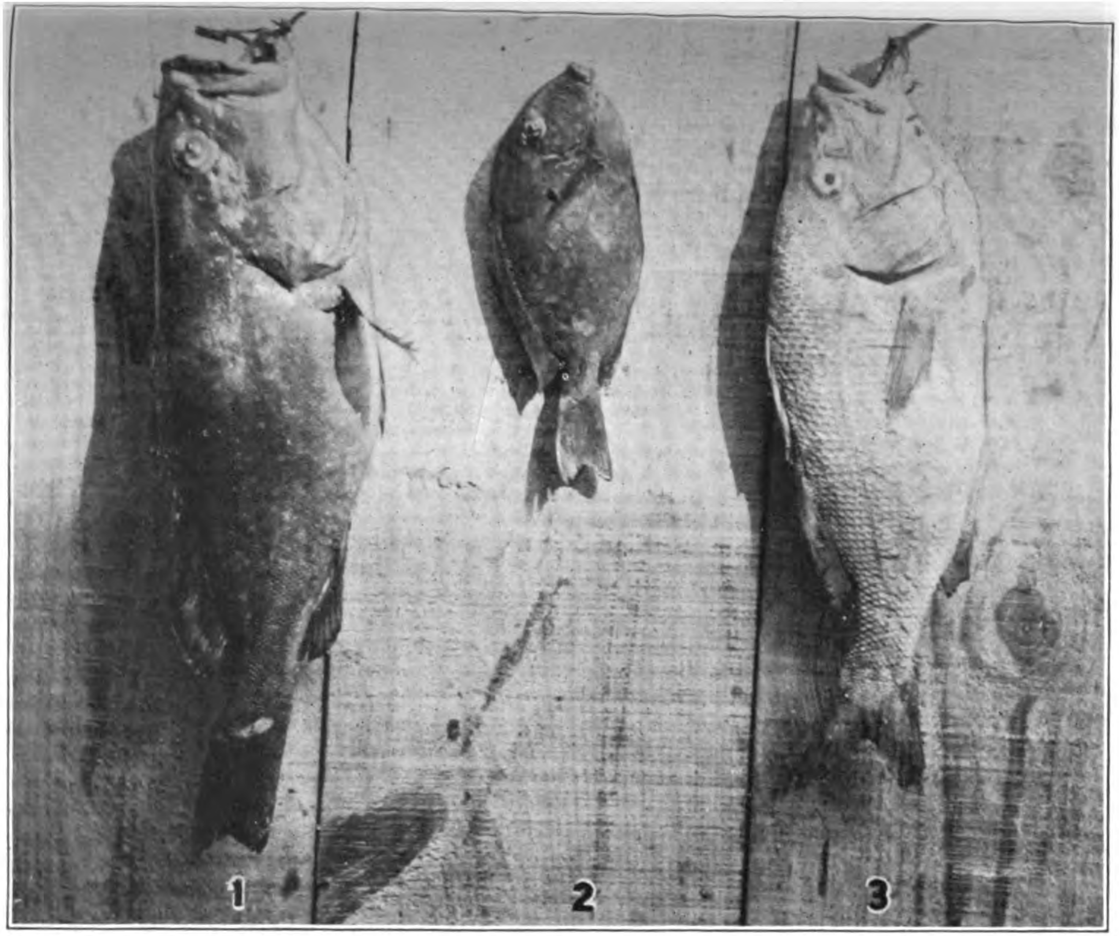
He states that it appears to be true that poisonous fishes are much commoner in tropical than in temperate waters, and that fishes that are harmless and a regular article of diet in the latter may be regularly or frequently poisonous in the former; that certain species are constantly and always poisonous, and that others only occasionally cause sickness. The members of the family Tetradontidæ (puffers, swell toads) are looked upon generally as poisonous in tropical waters, while several others are said to be occasionally poisonous. In the book by Gatewood there is a list with illustrations, mentioning the toxic characteristics of many fishes.

The causes of poisoning by fishes are diverse (no account is taken here of venomous fishes that inflict with their teeth or spines poisonous wounds). It appears that some people exhibit idiosyncrasies in this respect; in such cases there appears to be an inability to digest fish, due, it is said, to a deficiency of hydrochloric acid in the gastric juice; violent digestive disorders, such as acute indigestion, may follow a meal composed of fish. In other cases, the oil in the fish is an obstacle to digestion.

Some fishes, not themselves poisonous, may transmit poisons through their food to persons eating them. This is alleged to be true in the West Indies where fishes eat the manchineel fruits. Other foods, sometimes poisonous to man, but apparently harmless to fishes, include molluscs, zoophytes, corals, medusae, holothurians, and protozoans. Fishes that live in putrid detritus may undoubtedly convey some poison to man. This case is unlikely, however, in open sea water. The deliberate use of poisons to capture fish, such as fish berries (*Cocculus indicus*), may cause poisoning in this class, though it is not known that persons have been actually poisoned from this illegal method of capture.

The most important cause of poisoning by fish relates to cases where the meat of the fish is in itself poisonous. There are two important subdivisions of this general class; first, inherently poisonous; second, and flesh which acquires poisonous quality after death of the fish. In the former subdivisions certain fishes (Tetradons) undoubtedly belong. The poisons are called "leucomaines" or animal alkaloids that are normal and physiological in the fish, and represent no derangement. The poisons seem to be concentrated in the genital organs, viscera, and surrounding tissues, especially during the breeding seasons. They are violent piosons causing death in a short time. They are also distributed to a lesser degree in the flesh of the fish. It is possible that other chemical poisons, possibly cynates, exist in other fishes, especially the liver, of certain selachians.

The other subdivision of this class of poisons relates to poisonous quality developed after death of the fish, and the opinion is general, though not unanimous, that the poisoning by the barracuda is of such a nature. It appears almost certain that poisoning by Carangidae is of this kind. Fish flesh may spoil very readily, especially in tropical climates, and when slightly spoiled contains the so-called "ptomaines," or substances of a putrescent origin. The degree of poisonous quality may vary from mild to very great virulency. A close examination of the methods of handling may reveal that the fish are not properly chilled, or are otherwise improperly handled, so that opportunity arises for this decomposition to occur. In tropi-



EDIBLE FISH SOLD IN THE MARKETS AT ST. THOMAS.

1. Epinephalus morio (Cuvier and Valenciennes). Grouper.
2. Teuthis hepatus (Linnæus). Doctor-fish.
3. Hæmulon album (Cuvier and Valenciennes). Margot.

cal waters every effort should be made to ice the fish immediately upon capture and keep them at ice temperature at all times, and also to shorten the time between capture and consumption as much as possible.

The markets should be rigidly supervised so that their fish are never exposed to warmth at any time. One method that has been used to prevent "ptomaine" poisoning consists of dropping the freshly caught fish into boiling water, thus cooking it. It will then keep under moderate precautions until eaten, better than raw fish.

Poisoning by fish is called in the West Indies "Ciguatera"; in the Philippine Islands the name for the puffer "botete" has become the general name for poisoning by fish. Poisoning by inherent fish poisons is called "ichthyotoxism."

During the frequent mortalities of fishes in the West Indies, many fishes are found afloat, recently dead, and apparently good. Cases are known where such fishes have been eaten. Needless to say, this practice is extremely dangerous, for there is no means of knowing how long the fish have been dead, and the looks of a dead fish afford no necessary indication of its chemical constitution. Perhaps such dead fish may be taken intentionally or unintentionally. Every effort should be made to prevent their being taken at all.

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CHEMICAL ANALYSIS OF THE BLOOD.

By C. W. O. BUNKER, Lieutenant Commander, Medical Corps, United States Navy.

The chemical analysis of the blood has attained a clinical simplicity and significance that demands recognition. It provides points of value in diagnosis, prognosis, and treatment, and is especially useful in nephritis, diabetes, acidosis, comatose conditions, gout, and in questions of kidney function and treatment, especially dietetic.

Few diseases have been as yet studied thoroughly in this respect, but our fund of knowledge is receiving constant additions. The field of tropical medicine is practically untouched, and it is quite possible that an investigation along this line might there yield facts of interest and value. Some naval medical officers have access to such material, and the time is ripe for the endeavor.

Numerous articles relative to this subject have appeared in medical literature during the past few years. Most, however, have been in journals to which the average naval medical officer does not have access. So it is the intent of this brief summary to emphasize the clinical advantages to be obtained by examinations along this line, and to touch in a general manner upon the significance of findings. I have considered acidosis in a previous article, and will endeavor to do the same for kidney function later. No exhaustive consideration will be attempted, nor will matters of technique be considered. For those who desire such elaboration or details, I would suggest two books—"Practical Chemical Analysis of Blood," by V. C. Myers (C. V. Mosby Co., St. Louis, 1921), and "Practical Bacteriology, Blood Work, and Parasitology," by E. R. Stitt (P. Blakiston's Son & Co., Philadelphia). The former considers the question of significance very satisfactorily, and the two works supplement one another very nicely as regards methods. Current literature must be consulted for advances.

One must not anticipate the solution of all his difficulties when the sample of blood is sent to the laboratory. Very few matters are entirely settled there. Abnormal findings relate to the patient, but not necessarily to the disease under consideration. The malarial parasite found in the blood smear establishes malaria, but does not eliminate other concurrent disease, perhaps rheumatic fever. Similarly, a marked nitrogen retention in the blood would be strongly suggestive of uremia in a case of coma, but would not exclude cerebral concussion as the cause. It is for the clinician in charge of the patient to consider the blood chemistry report just as he does that of examination of urine, feces, cerebrospinal fluid, etc., and to determine its possible significance in view of the other evidence present. And it is also well to bear in mind that nephritis is a common complication, especially in chronic conditions, and will itself affect the blood picture.

The peculiar advantage of examination of the chemical constituents of the blood lies in the fact that we thus pass behind the barrier of the kidneys. Findings in urine are always dependent upon the renal function. The kidneys normally excrete but traces of certain substances, e. g., cholesterin, fats, proteins, sugar, etc. Others, such as urea, uric acid, creatinine, chlorides, etc., are concentrated in the urine from the blood with varying facility. The kidney is said to have a certain *threshold value* for certain substances, i. e., they must be present in the blood stream in a certain concentration before they can be excreted in the urine either at all or in abnormal amounts. Thus, for sugar, there normally must be more than 160 to 180 milligrams per 100 mils of blood before glycuresis occurs; no chlorides are excreted unless the blood plasma

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contains 562 milligrams chlorides per 100 mils. Kidney function may be impaired, a situation in which there is not necessarily any parallelism between the effect upon the excretion of different substances. The function for chlorides, for instance, is independent of that for urea. Such an impaired function could cause our being led widely astray by urine examination alone. It is not unusual for diabetes mellitus with a blood sugar of treble the normal to show no glycuresis; there is upon record a patient who had 1,100 milligrames sugar per 100 mils blood and only 0.5 per cent sugar in the urine.

The net result, then, of our blood chemistry is a more intimate picture of metabolism. We can study substances that are not available in the urine. Early metabolic changes are detected, as well as the first disturbances of renal function. Abnormal concentrations of constituents may arise on the one hand from overproduction, defective assimilation, or retention, or, on the other hand, from decreased production or depletion as the result of excessive excretion or assimilation. Consequently, the findings in the urine are naturally complementary to those in the blood, and their joint consideration quickly settles the bearing of kidney function on the latter. Alone the urine is a very unsafe index of conditions beyond the genitourinary tract.

Our chemical examination is directed toward many substances, which are conveniently grouped as nitrogenous and nonnitrogenous. Enzymes are also studied, especially diastase. The following list includes the constituents most frequently under consideration, as well as normal values for adults. These are expressed in the usual terminology of milligrams per 100 mils of whole blood unless otherwise noted. Values elsewhere in this article will also follow the same system. Normally, total solids are 19–23 per cent, and total nitrogen is 2.7–3.5 per cent (0.6–1.1 per cent in plasma).

Nitrogenous:	
Proteins—	
Hemoglobin	14 per cent by weight.
Serum albumin	4.5 per cent.
Paraglobulin	3 per cent.
Fibrinogen	0.4 per cent.
Nonproteins—	
Urea	20–30 milligrams per 100 mils of whole blood (10–15 for urea nitrogen).
Uric acid	2–3 milligrams per 100 mils of whole blood.
Creatinine	1–2 milligrams per 100 mils of whole blood.
Creatine	3–5 milligrams per 100 mils of whole blood.
Amino acids	6–8 milligrams per 100 mils of whole blood (constituent nitrogen only).
Ammonia	about 0.1 milligram per 100 mils of whole blood.
Bile pigments.	

Nonnitrogenous:

Sugar	90–120 milligrams per 100 mils of whole blood.
Chlorides	450–500 milligrams per 100 mils of whole blood (570–620 for plasma).
Bicarbonate	53–77 vol. per cent CO_2 (plasma).
Oxygen	18. 5 vol. per cent (oxygen capacity).
Carbon dioxide	about 40 mm. tension in arterial blood.
Fat	about 600 (Bloor's fat method).
Cholesterin	170–250 milligrams per 100 mils of whole blood (Bloor's method).
Lecithin (Bloor's "lecithin")	30 milligrams per 100 mils of whole blood (22 for plasma).
Acetone bodies	0–4 milligrams per 100 mils of whole blood.
Calcium	5. 3–6. 8 milligrams per 100 mils of whole blood (7. 2–12. 1 for serum or plasma).
Magnesium	2. 3–4 milligrams per 100 mils of whole blood (1. 6–3. 5 for serum).
Potassium	153–240 milligrams per 100 mils of whole blood (18–21 for serum).
Sodium	170–225 milligrams per 100 mils of whole blood.
Phosphorus (total, as H_3PO_4)	about 120 milligrams per 100 mils of whole blood (35–40 for plasma).
Phosphorus (of inorganic phosphates)	1–3. 5 (serum).
Sulphur (of sulphates)	0. 5–1 milligrams per 100 mils of whole blood.

This rather lengthy list, however, is of more theoretical than practical interest at present. Clinically, we desire only that which helps us in our problems. The routine examination, then, confines itself usually to nonprotein nitrogen, urea nitrogen, uric acid, creatinine, sugar, and chlorides of whole blood, and plasma bicarbonate. There might be added cholesterin and oxygen capacity, the latter being a measure of the hemoglobin. Two technicians can complete about six such routine examinations in an ordinary working day. And I wish to reiterate that the technique is not complicated, usually being quite simple and within the capacity of an intelligent hospital corpsman. Moreover, the new test case has been equipped with these methods in view.

Phosphorus and calcium are receiving considerable attention in connection with pediatrics. As time progresses others on the list may assume definite clinical importance and be generally useful, providing a simple technique for estimation is available. Whole blood, plasma, corpuscles, and serum have each been studied, as the list would indicate. And I might mention that volume relations are being scrutinized—the effects of increased or decreased blood volume upon concentrations of constituents, as well as the relation of such concentrations to variation in corpuscle volume relative to the plasma. In fact, the antipyretic effect of such drugs as sodium salicylate, aspirin, antipyrin, quinine, etc., is considered to be the result of the mobilization of sugar in the blood and the consequent general blood dilution.

I have found that the meaning of "nonprotein nitrogen" is not clear to some. It simply signifies, as the name would indicate, all nitrogen except that from the proteins. The nitrogen of the blood is in the proteins (serum albumin, hemoglobin, corpuscles, etc.) and also as a nonprotein portion. The list above shows that the nonprotein nitrogen would then be the nitrogen from the urea, uric acid, creatinine, creatine, amino acids, etc. It amounts to 25 to 30 milligrams per 100 mils of whole blood, while the total nitrogen is about 3,000. The nonprotein nitrogen is at present especially important clinically, and our chemical examination uses it, precipitating and discarding the protein portion. It is well to bear in mind that urea is largely exogenous in origin, and subject to considerable variation as the result of food. Uric acid comes about equally from exogenous and endogenous sources; a high concentration in the blood is usually due to decreased elimination. Creatinine is almost entirely endogenous. For the nonprotein nitrogen 30 to 35 milligrams per 100 mils of whole blood is considered a slight, 35 to 50 a considerable, and 50 to 100 a great increase, and uremia may be expected with values as high as the last. With advanced retention the urea nitrogen may be 75 per cent of the nonprotein nitrogen.

The following table (amplified from Myers) is a concise summary of normal findings and those encountered in various clinical conditions. In general, the blank spaces indicate normal findings, although in a few they may mean no data. The diagnostic significance is evident. Some of the results are based upon the analysis of many cases, others upon but few. The values are in the terms already noted above, except those for diastatic activity (recorded in Winslow's empirical units) and acidosis (expressed in terms of plasma carbondioxide combining power—volumes per cent carbon dioxide—following Van Slyke). "Inc." and "Dec." signified increased and decreased, respectively.

RESULTS OF CHEMICAL EXAMINATION OF BLOOD.

Condition.	Non-protein nitrogen.	Urea nitrogen.	Uric acid.	Creatinine.	Sugar.	Cholesterin.	Chlorides.	Diastase.	Plasma CO_2.
Normal	25–30	10–15	2–3	1–2	90–120	167–255	450–500	8–64	53–77
Exercise, short and violent					Inc.				
Exercise, long and fatiguing			Inc.						
Tropics					Inc.				
Aviation					Inc.				
Furunculosis					Inc.				
Diabetes mellitus, mild					150–300				
Diabetes mellitus, severe		20	4–10	2–4	300–1200	200–800	400	Inc.	10–50
Pancreatic disease					Inc.			Inc.	
Arteriosclerosis			Inc.		Inc.	Inc.			
Kidney, passive congestion of							Inc.		
Nephritis, acute		40–100	5–15	2–6	120–180		450–600		20–45
Nephritis, interstitial, early		15–25	5–12	2–3.5	120–150		450–600		
Nephritis, interstitial, terminal	100–350	60–300	5–27	5–28	120–240	to 300	360–600	Inc.	12–40
Nephritis, parenchymatous (nephrosis)		20–50	2–5	2–4	120–200	Inc.	500–610		
Nephritis, chronic, diffuse, severe		to 230	to 10	to 16	to 250				
Kidney, polycystic, double		to 75	to 5	to 8	to 200				
Uremia	90–350	70–300							
Prostatic obstruction	Inc.	12–40	3–9	1.5–3.5	110–160				
Gout			4–10						
Hyperthyroidism		Inc.			Inc.				
Hypoendocrine conditions		Dec.			60–90		Dec.	Dec.	
Pregnancy		Dec.				to 500			
Hyperemesis gravidarum			to 5						
Eclampsia	25–45	10–25	4–8						43–58
Cholelithiasis						130–300			
Acute yellow atrophy of liver						to 87			
Intestinal obstruction, acute	75–170	45–120	Inc.	Inc.					
Fever, acute		Inc.	Inc.	to 4		Dec.	Dec.		
Pneumonia, severe and late		to 53	to 18	to 3.5	to 180	Inc.	Dec.		Dec.
Anemia, pernicious	to 108	to 75	to 10	to 3.1	to 300	to 60	to 600		Dec.
Leukemia			Inc.						
Leukemia, myelogenous	to 110	to 20	to 7.6						
Malignancy, late	Inc.	Inc.	Inc.	Inc.		Dec.	Inc.		Dec.
Dementia precox, catatonic		6–10	Dec.		Inc.				
Shock	Inc.	Inc.		Inc.	Inc.				Dec.
Edema							Inc.		
$HgCl_2$ poisoning	to 370	to 300	to 15	to 33	120–200	to 350			
Plumbism	Inc.	Inc.	Inc.						
Alcoholism						Inc.			
Ether anesthesia					Inc.				Dec.
Digitalis							Dec.		
Salicylates, antipyrin, quinine					Inc.				
Adrenalin					Inc.				

The table gives definite values, but it is worth while for the person analyzing a report to endeavor to determine how much any variation from normal is due to such factors as food, increased metabolism, defective assimilation, retention by a kidney whose function is impaired, etc.

Nephritis produces blood changes essentially by reason of the usual inability to properly excrete the waste products of metabolism. Acidosis, edema, or uremia are the clinical evidences of such retention. *Interstitial nephritis* is characterized by the retention of nitrogen, the first changes being noted in the uric acid. Urea and non-protein nitrogen increase later. The significance of albumin in traces and occasional casts in urine has been more definitely established by examination for increase of uric acid in the blood—an increase arguing for an organic lesion. On a high purine diet there will be an accumulation of uric acid, a result that does not occur in normal persons. Inasmuch as the urea furnishes such a large portion of the nonprotein nitrogen and varies so markedly by reason of diet, a high nitrogen value affords definite information only if the intake is known. The nonprotein nitrogen has, however, always a negative value. Associated cardiac decompensation will further increase the blood urea. Values of over 4 for creatinine do not occur without great impairment of renal function, and findings of more than 5 have practically uniformly foretold a fatal termination in less than six months, except in acute nephritis and mild bichloride-of-mercury poisoning. The creatinine is also the best guide to the status of renal function in terminal cases.

Parenchymatous nephritis shows relatively little nitrogen retention, but does evidence a decided tendency toward chloride retention. Low urea values, due to superpermeability of the kidney, are found occasionally with chronic diffuse nephritis and in hypersensitive cardio-vascular disease.

The imminence of *uremia* may be judged by the extent of the nitrogen retention. We have an aid in the differentiation of the uremia of nephritis accompanied by a flagging heart from the passive congestion of cardiac decompensation, especially as to which is the secondary condition, and thus therapeutic indications relative to mooted questions of treatment, such as hot packs, morphine, renal stimulants, etc.

Unsuspected cases of nephritis showing only gastric symptoms subjectively have been detected by blood chemistry.

Essential hypertonia, with its normal blood chemistry, is differentiated from *arteriosclerosis* with its frequent nitrogen retention. It is of interest to note that experimental administration of cholesterin has caused histologic changes in the aorta.

The important questions of acidosis and kidney function, as already stated, will not be considered in this paper, although the former is an integral part of blood chemistry and the latter is an important factor in determining the blood picture. Their discussion requires considerable space, and it is probably preferable to consider them separately, while bearing in mind their relation to the chemistry of the blood. The *surgeon* is especially concerned with them if he desires the best results and uneventful convalescence. The *pediatrician* should always bear acidosis in mind.

The blood may indicate a prediabetic state, and place the practitioner upon his guard. Nephritis may be present with *diabetes mellitus*, and usually is when the latter is severe, so one must be prepared for the blood picture of the former. The blood sugar and plasma CO_2 are usually considered the only safe guides in the treatment of diabetes mellitus, and no extended medical or surgical interference should ever be attempted without their estimation. Glycosuria is a poor guide, especially in advanced cases, as is readily inferred from the remarks relative to renal function in the early part of the paper. A persistently low blood sugar is extremely favorable. A high threshold for sugar in a mild case on diet usually indicates some complication, such as arterial hypertension. A rising or persistently high threshold for sugar despite diet is serious. Blood fats are considered by some to be a better index of the patient's condition than the blood sugar, but their estimation is by no means simple. The cholesterin determination is not difficult, and this compound is said to parallel and be an index of the fats.

Some diagnostic significance is attached to the *sugar tolerance test.* There is some variation in methods for its application, and the following may be considered as good as any. After an overnight fast, ingest 100 grams glucose dissolved in 300 mils black coffee. Collect blood samples just before feeding and at 45 and 120 minutes after same, and determine the blood sugar in each sample. If the blood sugar has not by then returned to about normal, one may test further samples taken at hourly intervals. The urine may also be collected and tested for sugar.

Under such conditions a normal person will show no glycuresis, and his blood sugar will be at its maximum (about 150) after 45 minutes, and approximately normal at the end of 120 minutes. The usual abnormal variation consists in increased height, or, especially, duration of curve before reaching normal, as much as six hours being not unusual. Until the significance of the test is more fully established, it will probably be better to interpret such an abnormal curve as indicating an impaired sugar tolerance and its degree. Practically equivalent results are obtained in such diverse conditions as diabetes mellitus, nephritis, hyperendocrine (thyroid and hypophyseal) conditions, tuberculosis, epithelioma, pregnancy, fatigue, etc.

There is a condition but recently recognized in which there is a normal blood sugar, a persistent glycuresis of usually less than 1 per cent and independent of carbohydrate intake, occasionally polyuria, but with no other symptoms of diabetes mellitus. It is known as *renal diabetes*, is apparently harmless, probably not uncommon, and may comprise most of those "diabetics" who can disregard diet with impunity.

Furunculosis often shows an increased blood sugar, and diabetic restriction of sugar may be of much aid in its treatment.

In *comatose conditions*, nitrogen retention will select the uremic and hyperglycemia the diabetic cases. But *acute nephritis* should always be borne in mind, as it may have a pronounced acidosis but no nitrogen retention.

The frequent hyperglycemia of *hyperthyroidism* is useful in differentiating the irritable heart.

The solitary increase of blood uric acid (probably the result of retention) in gout aids in the differential diagnosis from simple *rheumatic fevers* and other *arthritides*, any uric acid retention in them being usually accompanied by retention of other nitrogenous elements. It is especially useful in the diagnosis of gouty arthritis without tophi. Of course this increase of uric acid alone is also characteristic of early interstitial nephritis, but, with the latter, a general nitrogen retention usually supervenes and there is commonly albuminuria and cylinduria. The amount of uric acid in the blood bears no relation to the severity or the chronicity of gout. A purine-free diet tends to lower the uric acid. This can be accomplished more effectively, however, by drugs, such as tolysin (neocincophen) or cincophen (Acidum phenylcinchoninicum). These increase the excretion of uric acid, and will also reduce increased blood urea or chlorides. They act as renal stimulants, and this excretory action is rapidly secured (that for tolysin reaches its maximum in about one day) and gradually lost. They apparently are not toxic, and are analgesic, the latter effect being gradually lost.

Ten grams of sodium chloride by mouth in a glass of water is said to decrease blood chlorides if the gastric secretions are normal. If the secretory disturbances are marked, an increase in blood chlorides may be expected.

Pregnancy is accompanied by low values for blood urea, and cholesterin is said to increase beginning with the fourth month and progressing to term. An increase in blood uric acid is definitely associated with the toxemias of pregnancy, and should place the obstetrician upon his guard.

Diet is concerned particularly with retention, especially of nitrogen and chlorides, and defective assimilation, especially of sugar. The blood examination definitely settles such questions, and it should precede and then guide dietetic treatment. The efficacy of treatment will, in general, be shown by the degree of approach to normal blood findings. As a general rule, it is preferable to determine the chlorides of whole blood rather than of plasma. Plasma, if used, should quickly be separated from the corpuscles.

It is appropriate to mention here the ferment, *diastase*. This is an amylolytic enzyme whose activity is considered to be normally under the inhibitory control of the internal secretion of the pancreas, and whose function is concerned with the production of the blood sugar from the glycogen of the body. It is found in the body fluids and excretions. An impaired kidney function may cause its retention in the blood, and thus be the etiological factor in the hyperglycemia of such cases. Its diagnostic significance is still debatable, but very high values, especially in the blood and with no evidence of impaired kidney function, should be considered confirmatory of impaired pancreatic function.

For a complete examination one should secure at least 10 mils of blood, and it is best taken 3½ hours after a meal, preferably before breakfast. The values obtained from the sample taken after the shorter interval are probably satisfactory for clinical purposes. Truer values require the longer interval. Hammett found no practical difference between samples secured after fasts of 14 or 3½ hours. The sugar was variable, while the nonprotein nitrogen, urea, and uric acid were slightly lower after the longer interval. Plasma sugar concentration is not affected by ingestion of water. A rich carbohydrate meal causes a slight increase of sugar that may last for several hours. A protein meal causes a temporary increase of nonprotein nitrogen and amino-acid nitrogen. Fifty grams of protein, eaten by a normal person, produces an increase in urea nitrogen for 8 or more hours, the blood sugar being unaffected. With severe diabetes mellitus or nephritis the increase in urea nitrogen is more marked and sugar is increased, although the latter effect may be overlooked in the presence of a marked hyperglycemia.

The values for many of the blood constituents will decrease the longer the sample stands. Twenty hours at room temperature does not change the nitrogenous substances, and the sugar only slightly. The sugar then deteriorates rapidly, especially when the sample is agitated. The other ingredients show but little change for two or three days, especially if preserved as blood filtrate and in the refrigerator.

THE WEIL-FELIX REACTION.

By J. H. Chambers, Lieutenant, Medical Corps, United States Navy.

The Weil-Felix reaction has gradually come into general use within the past few years as a laboratory diagnostic measure in typhus fever. It is an agglutination reaction, employing the patient's serum and a member of the Proteus group of microorganisms. The particular organism employed is known as X19, and was isolated by Weil from the urine of a patient suffering from typhus fever. From experimental evidence it is not believed that the Proteus organism has any causative relation to the disease, nor is it apparently a secondary invader in the ordinary sense. It is, however, very often present in the urine of typhus patients, particularly in the later stages of the infection. The strain used in the test has the usual characteristics of members of the Proteus group that ferment glucose and saccharose, but do not ferment lactose, maltose, or mannite. Another organism having cultural characteristics similar to those of X19 is known as X2 and is frequently used along with X19 as a confirmatory test. It has recently become apparent that X19 gives uniform and consistent results and is now commonly used alone.

Sufficient work has been done in typhus centers to demonstrate conclusively that a positive reaction occurs only in serum obtained from typhus patients and not from other diseases. Napier (1) reports results on a number of cases of typhus, including 40 with mild attacks, and all of these gave a positive reaction. The highest titer was 1:20,000 on the eighth day, the lowest 1:200 on the eighth day, rising to 1:10,000 on the sixteenth day. The average titer of the 40 cases was 1:2,600, and was present on the seventh to the thirtieth day. Eleven cases clinically doubtful at the onset gave positive Weil-Felix reactions. The highest titer in this group was 1:20,000; the lowest 1:50 on the fifth day, rising to 1:800 on the seventh day. Two groups of control cases were used, one of 50 refugees with no record of treatment in the hospital, and the other of 24 patients suffering from febrile conditions incompatible with a diagnosis of typhus. Of the first control group, one gave a titer of 1:100, four 1:50. Of the second group, two gave a titer of 1:100, eight 1:50. In the latter group, if cases of typhoid were excluded, none gave a titer of 1:100, and only five of 1:50. He concludes that eight per cent of normals give a titer of 1:50, and 25 per cent of febrile conditions, other than typhus or typhoid, give a titer of 1:50. Hence a positive Weil-Felix reaction must show a titer greater than 1:50. Of his 59 cases, only 12 failed to give a titer above 1:1,600, and none below 1:640. Of the 77 control cases, none gave a titer above 1:400, and only one that high. In Fairley's report (2) of cases in Egypt, 63 of 65 showed a positive reaction. Of the 120 cases other than typhus, none were positive in dilution of 1:20. Felix and Weil (3) reported positive reactions in 125 of their 126 cases. Of 632 patients not having typhus, including typhoid, meningitis, and relapsing fever, 12 per cent gave agglutination as high as 1:25, with the agglutination incomplete or delayed. Sacquépée and Delavergne (4) report the Weil-Felix reaction constantly positive in typhus fever and negative in 14 cases other than typhus. Montefusco (5) reports reaction positive with a titer of 1:800 in all but one of 100 cases, and constantly negative in a large number of acute diseases other than typhus, except one case of smallpox. Compton (6) reports 47 tests on 14 cases in Syria, with all but one case positive. Numerous other writers have reported series of positive results in typhus, and negative results in other diseases. Kraus and de la Barrera (7) reported positive results in all cases of typhus fever, with two positive reactions in other diseases. One of the latter was a case of typhoid (Widal, 1:4,000, agglutination X19 1:10,000) who had lived in Russia till a few years previously, and the other, a case of measles, with a history of previous residence in an endemic focus of typhus, whose serum gave a titer of 1:200. The authors termed these "anamestic reactions."

The exact technique of the test varies with the individual. Results obtained by using live or killed suspensions seemed to be equally satisfactory: and inasmuch as killed suspensions are more convenient, they were used in the majority of tests reported below. Cultures of X2 and X19 were obtained through the courtesy of Dr. G. W. McCoy and Miss I. A. Bengtson, of the Hygienic Laboratory of the United States Public Health Service. Twenty-four hour agar cultures were washed into normal salt solution containing 0.3 per cent formalin and kept in the refrigerator for four days, by which time all organisms were killed. This suspension was standardized to make a 0.1 per cent suspension of each strain. One cubic centimeter of this suspension was added to an equal amount of diluted serum, each serum being tested against both organisms and each series of tests having the usual control of salt solution. Living cultures in broth were used in 20 tests and living organisms in salt solution in 25. The results differed in no way from those obtained with killed organisms.

Sera for these tests were obtained from patients in the naval hospital, Washington, D. C., on whom complement fixation tests for syphilis were being done. About 14 per cent of these gave a positive complement fixation reaction and the remainder included a wide variety of diagnoses. The serum, which was kept in the refrigerator, was always used within 24 hours after withdrawal. Four dilutions, ranging from 1:16 to 1:128, were used for both organisms. After thorough shaking the tubes were placed in an incubator at 37° C. and readings made at the end of three hours. A final reading was made on the following morning, and in no instance was there any change in the reaction. Of 370 sera examined, only one showed an agglutination in any dilution. In this case agglutination was present in a dilution of 1:128. In another test on fresh serum of the same patient agglutination was complete up to 1:160, whereas it was present but incomplete at 1:320 with X2 and X19. This is in accord with results obtained elsewhere. Much of the work hitherto reported has been done on individuals coming from or residing in districts where typhus is endemic and epidemic, whereas the majority of the patients seen here had never been exposed to typhus, and this may well explain the greater frequency of agglutinations in the low dilutions reported elsewhere. The one patient showing agglutination was a native of Denmark, had been in the merchant marine for eight years, and in the United States Navy for a number of years, so might very well show a mild form of the happily termed "anamnestic reaction" of Kraus and de la Barrera (7).

This additional evidence is added to the already lengthy series of tests showing a negative reaction with diseases other than typhus. All the patients examined here had received vaccine as prophylaxis against typhoid and paratyphoid within the past five years, the majority within three years and a few cases very recently. The immunity thus acquired did not seem to influence the Weil-Felix reaction in any way. As the titer of typhus serum is not very high prior to the fifth or sixth day, and a diagnosis on clinical findings alone is then often quite definite, the test is not needed in such cases. However, in the large group of atypical or doubtful cases, it is of much practical value, particularly in the diagnosis of the early cases of an epidemic. Here, it is in the first cases that the diagnosis is most often missed till late and it is then that the most effective preventive measures may be instituted.

Conclusions.—(1) The reaction is negative in diseases other than typhus; (2) it is not influenced by serum showing positive complement fixation test; (3) it is not influenced by typhoid prophylaxis.

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AVIATION MEDICINE IN THE UNITED STATES NAVY.

By J. F. Neuberger, Lieutenant, Medical Corps, United States Navy.

THE FLIGHT SURGEON.

The British, French, and Italians, all stated early in the war that it was fortunate that the air forces of the United States were profiting by the mistakes of the allied flying forces, and in recognizing at the beginning the fact that the medical problem of aviation is a very special problem and can not possibly be conducted except by medical officers specially trained for this sort of work (1). The British were the first to recognize the advantage of medical officers specially trained for aviation. During the first year of the war, 2 per cent of air casualties were caused by the Germans, 8 per cent were due to defective planes, and 90 per cent were due to physical defects of pilots. As soon as they had established an independent air medical service and specialized in the care of the flier, statistics changed immediately and in the next year the 90 per cent was reduced to 20 per cent and in the following year to 12 per cent.

When the United States entered the war, it was decided to follow in the footsteps of our Allies and medical officers with special qualifications for aviation duty were selected. At that time we knew very little about the medical problems of aviation, and in order to properly investigate these problems the United States Army established a research laboratory in Mineola, Long Island, N. Y. The laboratory was subdivided into seven professional departments, and each department studied the problems of aviation that concerned its own particular field. These departments were physiology, cardiovascular, ophthalmology, otology, psychology, psychiatry, and physics. This laboratory has produced wonderful results in this connection and the highest praise is due to the officers connected with it. A most important phase of their researches was the study of the effect of low oxygen on the circulation, respiration, mental reaction, and the eye. One of the early ingenious devices developed at the laboratory was a low-pressure tank with which it was possible to simulate air conditions from sea level up to approximately 36,000 feet. Later a rebreathing machine was developed. With this apparatus the subject breathes the same air over and over again with the impurities eliminated. The oxygen, of course, is constantly diminished, and the result is similar to that in the tank, for it was soon found that the important factor in altitude is the decrease in oxygen, the decrease of atmospheric pressure and temperature being of secondary consideration.

The primary duties of the medical officer assigned to aviation duty can be described under the headings:

1. The selection of the flier.
2. The maintenance of the fitness of the flier.

The most important factor in the selection of the flier is the physical examination. One can not be too careful in this examination and should always carry the old rule in mind—"when in doubt, reject." This rule might work an injustice on an individual, but it will ultimately benefit the service as a whole and it certanly will save the lives of many men.

The maintenance of the fitness of the flier is of equal importance to the physical examination. The aviator is subject to certain conditions, which have a tendency to produce mental fatigue, which, if not discovered in time, will cause the aviator to deteriorate and make him useless for further service. This condition of mental fatigue is commonly spoken of as "staleness." It is in reality a functional degeneration of his mental and nervous system. After prolonged flying without a rest the aviator begins to do unusual things. He makes a bad landing. Perhaps he has a crash, or he hesitates to go into the air. He may completely lose his nerve. The aviation medical officer should watch the flying in order to see how pilots are withstanding the effects of flying, to take steps to combat at an early stage the onset of flying stress and to prevent undue fatigue.

The term "Flight surgeon" is used in the United States Army to designate medical officers assigned to aviation activities. While this term is not used officially in the Navy, it simplifies matters to employ it in this article, as referring to medical officers of the United States Navy assigned to aviation duty. The flight surgeon in the United States Army officially receives training and instruction in actual flying in aircraft, which is not the case in the Navy. The Navy Department, however, has never voiced any objections to a medical officer taking flight, or instruction in actual flying, providing he can find an instructor at a station willing to give him flight instructions. The writer has found that all pilots realize the importance of the services of a medical officer on aviation stations and appreciate the fact that he is looking after their health and safety. They are always more than willing to assist him in any way possible.

The question should a medical officer of the United States Navy officially receive flight training? has been often discussed. The Army surgeons claim that in order to understand the medical problems of aviation, one must be a qualified flier. From the writer's personal experience, he has come to the conclusion that training in actual flying of aircraft is not essential, although it might be desirable, and that a medical officer, not a qualified pilot, can perform his duties just as well as though he had received actual training. It is, however, essential that he fly with the pilots as often as time and circumstances permit, in order to obtain first-hand knowledge as to the work the pilots have to perform, to experience the different air conditions, to notice any changes in the human body in the air at high altitudes and in general, to have the same experience as a qualified pilot. It is believed that this experience can be obtained just as well by accompanying the flier as by oneself piloting the plane. The writer has taken numerous flights under all sorts of conditions and at the end of each flight he has found, on discussing different occurrences, that everyone had practically the same sensations, ideas, and opinions about all that happened while in the air. It is, of course, obvious that some men have keener powers of observation than others and notice things which others do not. The writer personally is not in favor of making a doctor a "flier." He can not be expert in both. If the medical officer is a qualified aviator, it is necessary for him to spend a good deal of his time in the air in order to keep in practice and he develops the same peculiarities, attitude and symptoms as other pilots. He can no longer observe them in any one else, as practically all the symptoms of "staleness" are objective, and his usefulness as a flight surgeon is therefore at an end. He is just as likely to develop symptoms of staleness as any other flier without realizing it, for many pilots showing objective signs of this condition, yet unaware of it, protest most vigorously if the medical officer recommends a temporary "grounding," stating that they are perfectly all right and capable of flying, despite the fact that they show signs of complete mental and nervous exhaustion. It is honestly believed that more can be accomplished and greater progress will be made in aviation medicine if the medical officer assigned to aviation duty is not a qualified aviator provided he takes sufficient interest in aviation, becomes engrossed in air problems, sees and experiences them himself in the air, either as an observer or passenger.

"A medical officer assigned to aviation duty must have a thorough knowledge of internal medicine, including physiology and psychology, and he must be able to make thorough eye and ear examinations. It is believed that every flight surgeon should have special training in eye, ear, nose, and throat work." A medical officer assigned to aviation duty should be selected with as much care as the pilot. With deep and interested self-devotion to his work, he must be unselfish, approachable, gentlemanly, at the same time possessing firmness, and must have all other qualities expected of a medical officer, and, above all, he must not be afraid to fly. He must be "a good mixer," and must obtain the implicit confidence of all pilots and should spend as much time as possible in informal association with them. He should make it a practice to be at the flight office as often as practicable and whenever the pilots "take the air." Half of the fliers are usually watching the others, and one can obtain a lot of valuable information from their remarks and general conversation. The flight surgeon should be a young man, about the same age or a little older than the fliers. He must work in close cooperation with the instructors in order to gain as much information as possible about the student flier. He must be on the station whenever there are machines in the air, be it day or night, for when his services are required they are certainly very badly needed.

The flight surgeon must keep in touch with the flier's physical condition and become acquainted with all affairs pertaining to him. He should spend as much time on the flying field as is possible, watching for defects in flying, such as bad take-offs, bad landings, uncertainties of action, and he should make it a point of seeing each flier every day, either on the fields, at mess, or in the quarters.

At the United States naval air station on Rockaway Beach the commanding officer issued an order for all officers to have the midday meal at the bachelor officers' mess. This order at first brought forth a storm of protest, especially from the married officers who had quarters on the station or in the vicinity, as they preferred to have lunch with their families. However, they soon saw the benefit of the order and adjusted themselves to it. This order brought the officers together at least once a day and gave them an opportunity to know each other better and to discuss the different events of the day; they obtained different viewpoints and oftentimes better understanding of a happening whether it was a successful maneuver or a fatal crash. The writer knows from personal experience that arguments and scientific discussions during this meal hour resulted in many improvements, increased knowledge, better understanding, and the greater efficiency of all the flying personnel. It is considered an excellent procedure and recommended for all naval air stations.

One of the most important duties of the flight surgeon is the repeated physical and mental examination of the aviator to determine his continued fitness for flying. Its accomplishment is not an easy task, as it inconveniences the pilot. The average pilot dislikes frequent physical examinations, because he is afraid that something may be found which would ultimately disqualify him physically from flying. It is quite hard for him to realize that this examination is carried on for his benefit and personal safety. The frequency of these examinations depends upon circumstances and the amount of flying carried on. It is believed, however, that this examination should be made at least once a month and an entry of the result should be made in the health record. In making this examination the possibility of staleness should always be borne in mind.

The flight surgeon should always keep in intimate touch with the flight commander and the instructors, especially on stations used for training purposes. He should act in an advisory capacity to the flight commander, and by mutual cooperation many men may be discovered who are for some reason not flying at their best.

It is the flight surgeon's duty to see that all of the flying personnel have sufficient, proper, and suitable exercise. He should impress upon the fliers that they should regard themselves much in the light of athletes, and that they must bear in mind the rules for the training of athletes, such as temperance in all things, good hours and plenty of sleep, good food and comfortable quarters, and the right kind of recreation. It is believed that comfortable quarters for the aviator are just as necessary as a comfortable flying suit, as flying is accompanied by great mental and physical fatigue, and the aviator should have a comfortable and pleasant place to rest after his work is done.

The flight surgeon should organize the medical department of the air station so that all accidents may be handled quickly and efficiently. He should investigate every crash, to determine whether it was due to a physical or mental defect of the pilot. If the defect is of a temporary nature, grounding should be recommended, but if the defect is permanent, the pilot should be disqualified for further flying. When in doubt the pilot should be kept under observation until his status is definitely determined.

The flight surgeon must appreciate his work. There is no duty for the Navy medical officer of to-day in which there is more chance and opportunity for progressive research than that of the flight surgeon. It is a known fact that marked reduction in fatalities has occurred where efficient flight surgeons have been placed. While we can not reduce the incidence of accidents due to mechanical or structural defects, we certainly can reduce those due to the men themselves. A recent publication (2) of the United States Army Air Service on the subject of aviation states: "The value of the flight surgeon has been abundantly proved in the training schools of the United States and France; but the signing of the armistice prevented the full realization of the hope that flight surgeons would be placed where they are of the greatest value—at every aerodrome and balloon station at the front.

"It can readily be seen that a skillful flight surgeon would have been very valuable at the aerodrome where Guynemer had his headquarters. That marvelous flier had shown increasing nervousness and physical unfitness for some time. In his delightful book, Mr. Driggs says: 'A new Guynemer revealed himself to his friends and comrades. He became nervous, sick, and irritable. His comrades, unable to control their captain, telephoned to Paris, informing their old commanding officer, Brocard, that Guynemer was sick and in no condition to fly, and imploring him to come back to the aerodrome to take their captain away for a much-needed rest. He arrived about half an hour after Guynemer had left on his last flight.' "

"Rickenbacker says: 'It is plainly imperative that one keeps one's self always fit and clear minded. It is a matter of life and death to every air fighter—this quick-thinking, unburdened mind.' His words in speaking of the fatal accident of Lieutenant Kurtz are very illuminating: 'I had noticed before starting that Lieutenant Kurtz appeared nervous, but did not give the matter any great consideration. The explanation was given by a brother officer who had come with Lieutenant Kurtz to the squadron. Before starting on his last flight Lieutenant Kurtz had confided to him that he was subject to fainting spells when exposed to high altitudes, and the only thing he was afraid of was that he might be seized with such a fit while in the air. Alas, his fear had been only too well founded. But what a pity it was he had not confided in me, his flight commander.'

"After a flight of over 15,000 feet, Lieutenant Kurtz was making a turn over an adjoining field, when his Nieuport dropped into a vrille, crashed, and caught fire. Experience has shown over and over again that a flier will confide in his flight surgeon when he will be silent with his commanding officer."

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THE FUNCTIONS AND ORGANIZATION OF MEDICAL CORPS UNITS SERVING WITH THE MARINE CORPS IN THE FIELD.[1]

By S. N. RAYNOR, Major, United States Marine Corps.

ORGANIZATION OF THE DIVISION STAFF.

In the preceding article we discussed in brief and general terms the organization of a brigade. Because the brigade, except when serving alone, is not an administrative unit, and, because the regimental medical officers function directly under the division surgeon (when the brigade forms a part of a division) and should, therefore, have at least a working knowledge of the duties and functions of the latter in order that they may intelligently cooperate with him, it is believed that the next logical step is a description of the organi-

[1] There has been established at the field officers' school, Marine Corps schools, Marine Barracks, Quantico, Va., a correspondence course for medical officers which offers many advantages to medical officers of the Navy, particularly those serving with the Marine Corps in the field.

The duties required of medical officers on board naval vessels and at shore stations in the United States are totally different from those required when serving with the Marine Corps in the field, where, during active operations, aid stations, dressing stations, field and base hospitals must be established, and problems of evacuation must be solved.

The staff problems connected with a military force in the field are complicated ones—much more so than those presented on board ship, and require a high degree of initiative on the part of all staff officers and in whom must be centered a great deal of responsibility. The senior medical officer of any military organization is a technical advisor to his commanding officer, and upon him rests the responsibility for the coordination of all the medical units assigned to the command, their disposition to most effectively serve the combatant troops, and the procurement and issue of medical supplies in adequate quantities.

To perform these duties most efficiently requires a more or less intimate knowledge of the organization of the combatant units; their tactical dispositions under varying conditions; familiarity with the organization of the Medical Corps units best calculated to meet the demands made upon them; and a knowledge of topography and tactics.

In time of peace the only means available to the average officer for acquiring this knowledge lies in the solution of map problems. The general purpose of medico-military map problems is to invite attention to the varying conditions and factors which might zation and functions of the division general staff, and an outline of the administrative and technical services.

A division consists of approximately 20,000 officers and men. Manifestly, it would be impossible for one man to control such a great number of individuals. For this reason we find these individuals organized into a great number of subordinate groups, each having its own commander and varying in size from the squad of seven men under a corporal to the brigade, which is the largest subordinate unit in the division. It is by means of this organization that the commander, by dealing with a very few men, is enabled to exercise his authority over each individual in his command.

This organization, by means of which a commander controls and directs the movements of his troops, is called the chain of command. The number of subordinates with which one man can deal effectively varies from five to nine, and it is upon this principle that military organization is largely based.

Let us assume that a division has been directed by some higher authority to march from X and attack the enemy at Y. The first task of the division commander would be to draw up a plan for the movement. But before a plan can be formulated the commander must obtain as much information of the enemy as possible. The size of the enemy's force, its composition, disposition, condition, morale, probable intentions, etc., will all have a material influence on his plan. So also will it be influenced by the routes available and the nature of the terrain. In addition to the foregoing, he must study the question of supply in relation to the movement. He must determine and decide how much food and ammunition will be required, the kind and quantity of clothing and equipment to be carried, and innumerable other things that affect the fighting efficiency of the command.

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influence the management of the Medical Corps units serving with troops in the field. The correctness of the solutions rendered is of relatively small importance. Such solutions merely apply to individual concrete cases; but the solution of a sufficient number of problems demonstrates broad general principles upon which the efficient solution of such problems or the handling of actual situations liable to be encountered in the field must depend. The practical value of map problems lies in the stimulation of thought along lines ordinarily relatively unfamiliar.

Medical officers of the Navy are urged to take advantage of this opportunity. Further information regarding the course may be obtained from Maj. S. N. Raynor, Marine Corps Schools, Quantico, Va.

Officers enrolling for the course would be required to provide themselves with the following maps, which may be purchased from the book department, General Service Schools, Fort Leavenworth, Kans., or which will be supplied free by the Bureau of Medicine and Surgery, upon request, to medical officers enrolling for this course:

General map, Gettysburg-Antietam ($0.10).

Gettysburg-Antietam, 3-inch map, 12 quadrangles, either mounted together on muslin ($3) or mounted singly ($0.25) each, or single unmounted sheets ($0.05 each), at their option.

Geological Survey map of Gettysburg and vicinity, 1 : 62,500, 6 sheets, mounted together on muslin ($1.50).

Having gathered together all the information obtainable, the commander is then ready to draw up his plan, and after having done so to communicate it in the form of orders to his subordinates.

These questions all relate to strategy and tactics, and naturally group themselves under the head of *planning*, *directing*, and *coordinating*.

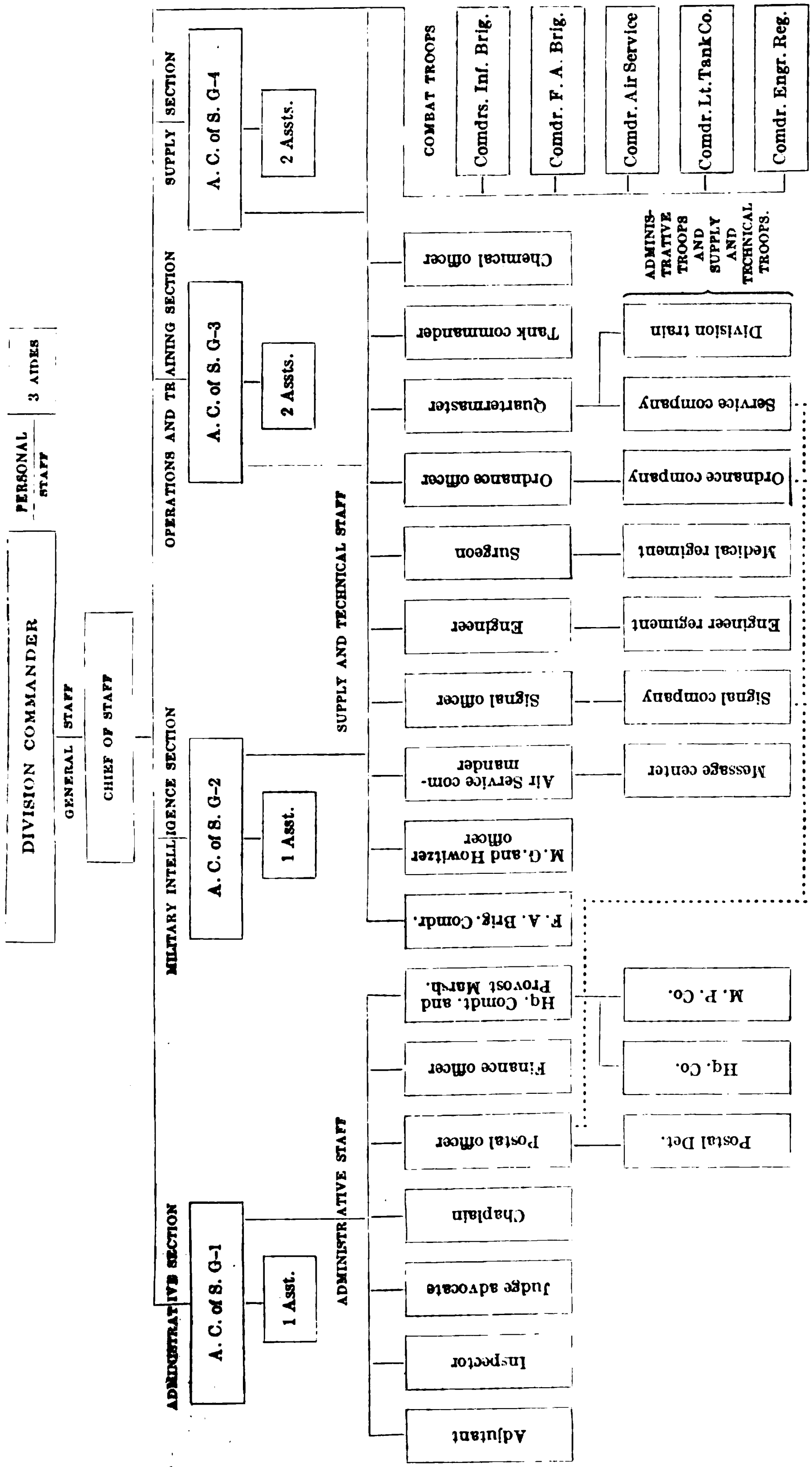
In addition to his tactical and strategical functions, there are others of a more technical and administrative nature for which he is held responsible. Having decided that he will need so much ammunition, food, clothing, equipage, etc., he must also take the necessary measures to procure it. Such questions as the kinds and proportions of the artillery ammunition to be carried must be decided. If the operation involves crossing a river where the bridges have been destroyed or are inadequate, he must determine and decide the kind and quantity of bridge material to be carried. Questions of signal communication, hospitalization and evacuation of men and animals, disposition of prisoners of war, traffic control, kinds and quantities of various materials for the construction of command posts, shelters, etc., must also be decided. These functions are all closely related, and are therefore placed in a group by themselves—a *technical* and *administrative group*.

There are still other functions which group themselves into a purely *administrative group*. These functions, such as the assignment of officers and men to subordinate units, records of personnel, awards of merit, infractions of discipline, and many others of a like and routine matter, while they do not directly affect the tactical handling of the division, do affect its morale, its discipline, and its personnel, for all of which the commander is held directly responsible by his superiors in command.

It is quite obvious that it would be beyond the powers of any one man to perform more than a very small proportion of the functions enumerated. He would become so involved in the mass of details as to preclude any possibility of his exercising his higher functions of command, viz., the study and consideration of questions affecting the tactical and strategical handling of his division, and upon which depends the success of his command as a combat unit.

Evidently, if the division commander is to successfully carry out the tasks assigned his division, he must have competent and trustworthy assistants who are specialists in the various tasks assigned them. These assistants constitute the staff. While the duties of these staff officers pertain to the functions of command, they do not, as such, exercise command. Where orders are issued they are issued in the name of the commander, who alone is responsible for them and to whom falls the lot and right of making a decision. The staff

BASIC ORGANIZATION OF A DIVISION STAFF.



NOTE.—Dotted line indicates disciplinary and administrative control. Used exceptionally as combat troops.

is charged (1) with gathering and furnishing the commander with the information upon which he bases his decisions; (2) with working out the details necessary to complete the decisions and enable the subordinates to carry them out; and (3) to see that the tasks assigned are carried out in accordance with the ideas of the commander.

We have seen that the functions of the division commander are divided into three groups: First, that pertaining to command and called the *planning, directing, and coordinating group;* second, that pertaining to the technical arms and services, and called the *technical and administrative group;* and third, those pertaining to routine functions, and called the *administrative group.*

This division of the functions forms the basis of staff organization. Officers assigned to the first group constitute the *general staff;* those assigned to the second group the *technical and administrative staff;* and those to the third group, the *administrative staff.*

We will now consider those three groups separately and in more or less detail in order that we may see the relationship that exists between them and the commander, with the troops, and between themselves.

THE GENERAL STAFF.

The general staff is the connecting link between the general and his command. It relieves him of the mass of detail and leaves him free to devote his attention to the higher functions of command; it furnishes him with the information necessary to reach a clear and correct decision; works out tentative plans and the details thereof; and gives expression to his decisions in the form of orders and instructions, and insures their execution.

By referring back we will see that this group naturally divides itself into four sections—one having to do with information of the enemy; another with questions of supply as affecting strategy and tactics; another with administrative questions; and still another section which having received all the information required from the first two sections, and the commander having drawn up a tentative plan, works out the details of this plan and, when a decision has been reached, communicates that decision to the subordinate commanders in the form of an order.

From this division of duties has evolved the four sections into which the general staff of the division is divided: To the second section or G–2 appertains intelligence of the enemy; to the fourth section or G–4, questions of supply; to the third section or G–3, the preparation of plans of operation and their promulgation in the form of field orders so that they may be intelligently executed; and to the first section or G–1, personnel and routine matters. In Armies and higher headquarters, the G–3 section is again divided into a G–3 section and a G–5 section, the former being confined to operations and the latter responsible for questions of training.

The volume of work required from each of these sections is such as to require considerable personnel, varying with the size of the command. The work of this personnel in each section is coordinated and controlled by the chief of that section. Each chief of a section is officially designated as assistant chief of staff G–1, G–2, G–3, or G–4, depending upon the section to which assigned.

In order that all parts of the staff may function smoothly and that all questions of differences of opinion may be settled, and that all may be coordinated into an efficient team, the four sections of the staff are placed under the command of the chief of staff, who is the mouthpiece of the division commander and the officer through whom he communicates his decisions and wishes, and through whom he receives the information and tentative plans upon which he bases his decisions.

It is not the purpose of this article to go into a detailed description of the organization, functions, and operations of the four sections of the general staff. Only a very general outline of their functions sufficient for a clear conception of the staff organization as an entity will be given.

As a concrete example let us go back to the division which was ordered to march from X and attack the enemy at Y. The operations or G–3 section is the group which will plan and work out the details for the movements of the division. The commander may, through his chief of staff, submit to this section a general outline of how he wishes the movement to be carried out, or, he may simply transmit to it the instructions he had received from higher authority and direct it to draw up tentative plans for his approval. The chief of this section, before he can draw up any plan, must get in touch with the chief of the intelligence section (G–2) in order that he may familiarize himself with any new information concerning the enemy, for, as already stated, the strength and disposition of the enemy will, very naturally affect the formation of the division for the movement. If the enemy is near, the formation must be such as to facilitate early and rapid deployment. This might best be accomplished by an advance in several columns over parallel roads. On the other hand, the presence of a hostile force on one flank would necessitate a flank guard. The strength and composition of the advance guard would also be influenced by the strength and disposition of the enemy. It is evident, therefore, that there must be the closest cooperation between the G–2 and G–3 sections.

The same sort of relationship must also exist between G–3 and the supply (G–4) section. This latter section works out and plans the operations of the services. If there is not the most complete coordination between these two sections, confusion and the most serious consequences are likely to result. Ammunition and food supplies, without which an army is helpless, may fail at a critical moment. For example, G-3, in drawing up his plans for the attack, may wish to use smoke or gas on certain sections of the enemy's position, or he may desire to put over a long and heavy bombardment. He should first ascertain from G-4 if this ammunition is procurable, for otherwise he may find out, when it is too late, that his plans were faulty because the ammunition he desired was not obtainable.

Likewise, G-4 must obtain from G-3 the latter's plans in order that the field and administrative orders will not conflict with one another. If the division is to be deployed for action G-4 must know the relative position of the various organizations before he can determine and designate the distributing points for rations and the distributing stations for ammunition, as well as the numerous other details that go to make up the administrative order, and which are dependent on the field order. (NOTE.—The administrative order will be discussed in a subsequent article.)

THE TECHNICAL AND ADMINISTRATIVE STAFF.

It has been previously stated that the administrative (G-4) section of the general staff directs and controls the operations of the technical and administrative staff. Before we go into the details of this latter group, let us examine for a moment the reason for this group of the staff. As a matter of principle every staff should be reduced to the minimum consistent with efficiency.

What are the functions of the technical and administrative staff? Day after day the 20,000 men of our division must be fed, which means that rations must be procured and delivered. Furthermore, they must be properly and adequately clothed and equipped at all times. During combat they must have a plentiful supply of ammunition, which must be procured and distributed. Every day a large number of men are taken sick and require medical attention. During combat many become casualties through wounds or gas. Arms and equipment are constantly being lost, destroyed, or worn out, and must be replaced. Animals, like men, become casualties, and some must receive medical attention, while others must be evacuated and replaced. Constant communication must be maintained within the division and with headquarters, and this requires the supply and installation of signal equipment, such as telephones, switchboards, wire, radio apparatus, flags, panels, pyrotechnics, etc. When marches are undertaken the road may be in need of repair or bridges may require strengthening or have to be replaced. To distribute the supplies we must have both horse and motor transportation, and this transportation must be so regulated as not to cause congestion on the roads or interference with the troops, otherwise the supplies may fail to reach their destination in time to be of any value.

It is quite evident that no one man could perform all of these multifarious duties. Moreover, many are of a technical nature and require technical knowledge and skill which no one man could expect to master. This, then, is the reason for the technical and administrative staff; the officers who compose it being specialists in the branches they direct. These officers are the technical advisers of the general and his general staff, and while they ordinarily function under the direction and control of the G-4 section, nevertheless, at times and for some purposes they may function under the direction of some of the other sections of the general staff.

Within a division the staff officers forming the technical and administrative staff, and functioning, as a general rule, under the G-4 section of the general staff, are as follows:

Field Artillery brigade commander.
Machine gun and howitzer officer.
Air service commander.
Signal officer.
Engineer officer.
The surgeon.
Ordnance officer.
Quartermaster.
Tank commander.
Chemical officer.

With the exception of the duties of the surgeon, it is not believed necessary to go into details regarding the functions of these staff officers. The functions of the division surgeon will be the subject of the next article.

THE ADMINISTRATIVE STAFF.

If, as has already been shown, it is beyond the powers of one individual to perform all the duties pertaining to the administrative and technical staff, it is equally impossible for any one individual to dispose of the innumerable details of routine administration which fall within the province of the administrative staff. These functions divide themselves naturally into certain classes which are clearly defined and pertain to the routine administration of the division, its correspondence, records, statistics, finances, questions of personnel, and others of a like nature. There are other functions which concern inspections, questions of morale, discipline, military justice, and spiritual welfare.

These duties, which constitute the functions of the administrative staff, are divided among the following staff officers:

The adjutant.
The inspector.
The judge advocate.
The chaplain.
The postal officer.
The finance officer.
The headquarters commandant and provost marshal.

In the channel of staff control and coordination these officers operate under the G–1 section of the general staff.

RELATION BETWEEN HIGHER AND LOWER STAFFS.

In the foregoing discussion the staff organization of a division has been taken as a model. The staffs of all organizations are, however, organized on the same general principles. Although in principle each staff functions under the authority and in the name of its commander, it will be found that in matters of a purely routine nature the higher and lower staffs deal more or less directly with each other. However, it should always be remembered that a staff officer, as such, can not exercise command except in his own office and over his own assistants.

Before closing it seems to be advisable to define and illustrate the words *coordination*, *supervision*, and *control*, which are continually being used in reference to the general staff.

Webster's Dictionary defines *coordination* as "The act of regulating and combining so as to produce harmonious results." Let us apply this definition to an example and assume for this purpose that the division which was to march from X to Y reaches the vicinity of the latter place late in the afternoon, and that the commander decides to bivouac for the night and attack the enemy's position early the next morning. There are many questions of supply and administration which will conflict and produce confusion at this critical time unless there is some one in authority to make harmonious adjustments of these conflicting claims of the administrative and technical staff in the light of their bearing on the plan of the commander and which can not be known to them.

There is the quartermaster who is responsible for feeding the troops; the ordnance officer who must see that all small-arms ammunition needed for the battle on the following day reaches the troops in sufficient quantity and on time; the surgeon must make plans for the evacuation of the wounded and that necessitates the establishment of collecting stations, field hospitals, ambulance routes, etc.; and the engineer and signal officers who must get supplies to the front. Each of these officers is, quite naturally, interested only in his own particular task. If some one does not pass upon and regulate their conflicting claims, the evening before the battle will find the road leading to the front blocked with traffic and, instead of all the supplies reaching their respective destination that night, traffic jams will probably prevent any of them from reaching their destinations.

In addition to the foregoing, the quartermaster has selected a point where he wishes to establish a ration distributing point, but it appears that the ordnance officer has selected that same point for establishing his ammunition distributing station; or that the surgeon wishes to establish a collecting station there; or that the engineer officer would like to use that spot as a dump for engineer material. Not one of these officers is in a position to decide as to who shall have priority because not one of them is familiar with the general plans for the attack, and, even though they did know, each one would naturally decide in favor of his own service. There must be some one, other than these technical staff officers, to make harmonious adjustment of these conflicting claims, so that no *one* particular class of supplies will reach its destination but that *all* of them will reach their destinations on time and without confusion. The officer best qualified to coordinate the activities of these officers of the administrative and technical staff, and to produce a harmonious and smooth working machine, is one who can view all of the functions from the viewpoint of the commander—in other words, a member of the general staff, and in the case in question, the assistant chief of staff G-4.

Control is defined as "To restrain, rule, govern, manage, guide." The assistant chief of staff G-4, having coordinated the conflicting claims of the technical and admisistrative staff, and having decided on such other matters of a supply and administrative nature as required direction and adjustment, governs, manages, or guides the operations of these services by the issuance of administrative orders and instructions to the command in the name of the division commander.

The mere issuance of orders is not sufficient, as we are all well aware. There must be a follow-up to see that the instructions and orders of the commander are carried out in accordance with his plans and wishes. This overseeing, inspection, superintendence, etc., constitutes the general staff *supervision*.

The accompanying chart shows graphically the organization of the general staff of a division.

NOTE.—The subject matter of this article has been compiled from War Department publications and pamphlets used in the courses of instruction at the General Service Schools, Fort Leavenworth, Kans., and the Marine Corps Schools, Quantico, Va. From its nature much of it has been copied verbatim. By quoting or modifying the text of those publications and pamphlets where, for the purposes of this article, such modification seemed desirable, the writer has endeavored to present a clear and understandable picture of the general staff of a division, but disclaims any credit for originality except in the method of presentation.

GAS WARFARE. EFFECTS OF POISONOUS GASES—EARLY AND LATE.[1]

By Maj. W. R. Galwey, O. B. E., M. C., Royal Army Medical Corps.

Since the advent of chemical warfare a very large number of substances have been examined with a view to determining their suitability from the points of view of production in quantity, use in shells, bombs, or projectors, and the physiological effects on human beings and other animals exposed to them.

A detailed list of these substances would serve no useful purpose, and it will suffice to show how they may be grouped into the following classes according to their physiological effects and to mention one or two of the more important substances in each group.

(1) Lachrymators.

(2) Sensory irritants of the eyes, nose, and upper respiratory passages.

(3) Vesicants.

(4) Asphyxiants or acute lung irritants.

(5) Direct poisons of the nervous system.

(6) Gases which act by interference with the respiratory property of the blood.

	Compound.	Formula.	Boiling point °C.	Characteristics.
Group (1) Lachrymators.	Benzyl bromide...	$C_6H_5CH_2Br$.......	198	Colorless liquid with pungent smell.
	Xylyl bromide....	$C_6H_4CH_3CH_2Br$...	185	
	Brom. acetone....	$CH_2BrCOCH_3$.....	137	Pale yellow liquid with pungent smell.

(2) Sensory irritants of the eyes, nose, and upper respiratory passages. Examples: Di-phenyl. chlor. arsine $(C_6H_5)_2$; AsCl melting point 43° C.; boiling point 333° C.; faintly odorous, yellowish oil or as a solid; ethyl-di-chlor. arsine, $C_2H_5AsCl_2$, boiling point 156° C., faint ethereal smell.

(3) Vesicants. Examples: Di-chlor. ethyl sulphide (mustard gas) $S\begin{smallmatrix}\diagup CH_2CH_2Cl \\ \diagdown CH_2CH_2Cl\end{smallmatrix}$ boiling point, 217° C.; a pale yellowish oil, odor of garlic or mustard.

(4) Asphyxiants or acute lung irritants. Examples: Chlorine Cl_2, boiling point 33° C., greenish-yellow gas, smell of bleaching

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[1] Reprinted from the Jour. Royal Army Med. Corps, London, February, 1922.

lime; phosgene (carbonyl-chloride) $COCl_2$, boiling point 8° C.; colorless gas, smells of musty hay, tobacco gives a characteristic taste after phosgene has been inhaled.

(5) Direct poisons of the nervous system. Example: Hydrocyanic acid HCN, boiling point 26.5° C., melting point 13.8° C.; colorless mobile liquid with smell of bitter almonds.

(6) Gases which act by interference with the respiratory properties of the blood. Example: Carbon-monoxide; colorless, odorless gas, lighter than air.

This classification is to some extent artificial, for in certain instances the groups merge into each other, e. g., some lachrymators are asphyxiant in high concentrations and the asphyxiants cause lachrymation. Again, the arsine compounds besides being sternulators cause lesions in the lungs and possibly in the central nervous system.

ASPHYXIANTS.

Confined to the upper air passages these substances may reflexly inhibit breathing and may produce anesthesia of the mucous membrane with loss of taste and smell.

If they reach the larynx in quantity, they may cause immediate suffocation through spasm of the glottis.

In the pulmonary air passages they may cause intense bronchial spasm, also necrosis and stripping of the mucous membrane leading to mechanical blocking of the air passages. If they reach the air cells in large quantities, they may penetrate the epithelium and the capillary walls and directly affect the blood, and so lead to those changes which bring about a blocking of the pulmonary circulation.

Immediate death has occurred in laboratory animals exposed to high concentrations of phosgene. When this happens, intense venous and capillary congestion and subdural hemorrhages in the brain are found. The lungs show practically no edema. The blood vessels in the lungs are much congested and inundated with a brownish granular material. The blood in the systematic circulation is normal to spectroscopic examinations. Death is thus accompanied by and probably due to an immediate pulmonary vascular stasis resulting in acute asphyxia.

Cats exposed to chlorine 1.700 died in less than 15 minutes, the blood being almost black, arterial pressure falling rapidly and there being no asphyxial rise, and practically no lung edema.

Pulmonary changes appear to be a necessary stage in all the pathological effects of the irritant gases. With doses of such a strength as to cause death in two hours, damage of the lung seems a necessary factor.

In smaller quantities than those giving rise to effects just described, the asphyxiants may injure in various degrees the bronchial mucous membrane and the epithelium of the air sacs and capillary walls, without actually penetrating into the capillary vessels, the lesions giving rise to intense pulmonary edema.

Finally, a secondary bacterial infection may lead to pneumonia and infective inflammation of the respiratory passages.

The condition brought about after the injury to the capillaries and air cells is one of want of oxygen, and to this most of the serious symptoms and the sequelae of asphyxiant gas poisoning are due. In fact, there is no good evidence that with moderate concentrations of gas, any system of the body other than the respiratory is primarily damaged. So far as the evidence goes at present, the lesions found in the other organs are a consequence of the interference with the respiratory exchange of oxygen.

Of the typical asphyxiants chlorine affects the upper air passages and bronchial tree primarily; while the action of phosgene is chiefly on the cells of the lung alveoli. Chlorpicrin is intermediate between the two.

Experimenting with dogs, Underhill found that chlorine has a very strong irritative action, an animal gassed therewith becoming excited and in evident distress. With chlorpicrin the character of the reactions is very similar but less pronounced. With phosgene, on the other hand, the animals appeared to be in no immediate distress.

To some extent this difference of reaction can be explained. When the substance is introduced in the atomized condition, if the spray is coarse it may be entirely held up in the upper respiratory passages. A fine spray, on the other hand, may reach the alveoli. If the substance is very soluble, as ammonia, the moisture of the surfaces of the air passages would largely entrap it. Possibly also a substance may be comparatively innocuous to the more resistant epithelium of the air passages, and only effective on the more delicate lining of the alveoli. Or again, the vapor may have an affinity for some tissues while it is relatively indifferent to others, as in the case of mustard gas, which attacks the epithelium of the air passages, but not that of alveoli.

In acute deaths from asphyxiant gas poisoning, i. e., those occurring in about 24 hours, the most striking changes are found in the lungs. The following are the gross lesions found in human beings:

On opening the thorax the lungs are voluminous, and hardly collapse at all. Distended lymphatics and small subpleural hemorrhages are visible on the surface. Rarely the hemorrhagic areas coalesce with stripping of the pleura.

Air from damaged lungs is visible as chains of bubbles below the visceral pleura along the interlobular fissures, and occasionally penetrating into the tissues of the mediastinum and into the subcutaneous tissues.

The whole external surface of the lung shows deep purple areas of collapse or consolidation slightly depressed below the surface, alternating with irregular areas of acute emphysema of a light grayish color. Emphysematous patches are more numerous along the margins and diaphragmatic surface of the lung where bullæ are sometimes found.

In the pleural cavities are found serous fluid in varying quantities and some traces of blood.

The lungs, on removal, weigh several times their normal weight. They feel wet, and on section drip frothy fluid and blood. The irregular patches of collapse and emphysema extend throughout the lung substance. Occasionally definite infarcts are found.

The fluid collected from the lungs of animals dying with acute pulmonary edema is clear straw-colored, and occasionally contains a few red blood corpuscles. Underhill found that its chloride content is essentially the same as that of a simultaneous sample of blood plasma. This shows that there is complete permeability of the pulmonary capillaries for salts. The edema fluid and blood plasma are in equilibrium as regards their salt content.

The trachea and bronchial tubes are largely filled with thin, yellowish, highly albuminous fluid, which sometimes escapes as a froth from the mouth and nostrils after death.

The degree of inflammatory change in the mucous membrane is variable. In severe cases the lining of larynx, trachea, and bronchi is of a deep purple color, swollen and edematous. The epiglottis is affected to a less extent than the trachea and the edema of the larynx is not sufficient to endanger life.

The mucous membrane of the pharynx is generally dry, glossy, and somewhat congested.

Sometimes only the lower trachea and bronchi are affected, and occasionally (as in cases of pure phosgene poisoning) they are normal save for frothy fluid.

It is stated that a false membrane was rarely found in cases which survived to reach a medical unit.

If death is delayed to the second or third day the aeration of the lung tissue is better; and if the patient survives till the fourth day areas of broncho-pneumonia and pleurisy may be found.

In examining lungs from animals killed at various periods after gassing one is struck by the very small amount of sound lung tissue with which the animal appears to be able to carry on.

On examination of the circulatory system engorgement of the large veins is found. The right heart is generally but not invariably distended, and sometimes petechial hemorrhages are found in the endocardium. Sometimes there is an increase in the pericardial fluid. The blood clots rapidly and its concentration is above normal.

Abdominal organs.—There may be petechial hemorrhages and slight ulceration in the stomach. Large hemorrhages in the stomach cavity have been described.

There is a general engorgement of viscera; enlargement and nutmeg appearance of the liver and enlargement and congestion of the kidneys are found; but frequently in experimental animals no abnormal appearances are observed.

Central nervous system.—In early deaths as a general rule only engorgement of vessels, both meningeal and cerebral, is found; but when death follows after two or three days of cyanosis and unconsciousness due to want of oxygen, tiny petechial hemorrhages are seen surrounding vessels throughout the whole of the white matter. Similar hemorrhages have been found in the brain in deaths which were ascribed to shell shock, but as Sir F. Mott has pointed out, such deaths may in reality have been due to poisoning by the carbon-monoxide generated by the shell explosion.

The punctiform hemorrhages occurring in the white matter are primarily due to the anatomical conditions of the vessels in the cerebrum, where they are terminal, each small artery having a separate capillary system, as is also the case with the emerging veins. A tendency to stasis may be brought about in these separate vascular systems by the failure of the heart as a force pump, also by respiratory conditions which lead to right heart dilation and interference with return of blood from the skull. In those gas cases where the hemoglobin has been converted into pigment the hemorrhage may arise from occlusion of the arteries.

Observations on animals have enabled observers to give a fairly clear account of the sequence of events which lead up to the postmortem appearances described above. .Professor Shaw Dunne made extensive observations at Porton on goats gassed with phosgene, and the following account of the changes in the lungs is abstracted from his paper:

By the end of half an hour after gassing on inspection of the lungs red areolae are observable in the centers of alveoli. Fluid accumulates in the interlobular planes, which are seen as fissures and under the pleura.

On miscroscopic examination alveolar edema is found. Masses of light granular material are seen most commonly in the openings of the infundibular cavities toward the centers of the lobules. This light edema is found all over the lungs. At this stage desquamated pulmonary epithelial cells and red-blood corpuscles can be seen in the edema in small numbers.

The interlobular planes of connective tissue show marked edema, the fibers forming them widely separated by granular material representing fluid.

The lymphatic vessels in these planes are distended as are those in the bronchial and arterial walls.

In the central lobules there is blocking of the capillary vessels in the alveolar walls by minute thrombi. This phenomenon may be seen as early as half an hour after gassing, but is usually well advanced by two or three hours. In the earliest recognizable stage the damaged vessels appear collapsed and contain few red-blood corpuscles but many leucocytes. The process is confined to the rows of alveoli nearest to the infundibular openings. On the fringe of this area the capillaries are much engrossed with blood in contrast with those situated more peripherally. The latter are almost empty as in a section of normal lung.

The engorged state of the capillaries points to stasis of blood in them during life.

At quite an early stage the musculature of the bronchiolar termination and infundibula is affected. The fibers are swollen and tend to lose their striation.

In some cases these muscles are in a condition of spasm so that groups of alveoli are distended with air which can not escape. This condition has been found to persist as late as 12 hours after gassing. As it affects the airways to both edematous and nonedematous areas it tends to prevent loss of function in the former being compensated by the latter and so increases the lack of oxygen of the animal.

At this stage the superficial layer of ciliated cells of the bronchi also show evidence of damage.

During the initial period of three to four hours the amount of fluid which remains in the air spaces is very small, though a great excess must escape from the capillaries which have undergone a less severe lesion than those which are actually thrombosed. The edema in the interlobular planes indicates this and also shows how rapidly an abnormal exudate can be got rid of from the alveoli.

After this initial stage naked-eye examination shows extension and intensification of the edema with progressive diminution of the normal post-morten collapse of the lungs. The reddening in the center of lobules extends to whole lobules and deepens in tone. The surface of the lung is mottled in varying shades of red, as some lobules are more affected than others. Later large areas become entirely filled with fluid to the exclusion of air.

By the end of 48 hours the condition of light profuse and universal edema is no longer seen. In the majority of the animals observed there are greater or less tracts of solid lung, contrasting with areas in which edema is slight or absent and aeration well established.

Histological examination shows a further development of the changes observed in the early stage. The alveolar edema is more abundant and more generally distributed. The solid residue of the edema is denser in consistence. It may appear as a reticulum like fibrin or a homogeneous masslike colloid. Every alveolus in a lobule and also the infundibular cavities and terminal bronchioles may be full of it. Even where there is a vacant space representing air this may be situated centrally so that it is away from the capillaries and alveolar walls. If edema persists for more than 24 hours the alveolar walls may show thickening and many of their epithelial cells may be desquamated and lie in the edema residue. There may be a few polymorphonuclear leucocytes in the exudate.

There is evidence of loss of tone in the elastic fibres in the alveolar walls.

The smaller bronchi and bronchioles show loss of superficial ciliated cells, but rarely is the whole epithelial coat destroyed.

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In places bronchioles are partially blocked. Those which lead to solid lobules become filled by albuminous material, mucus and epithelial débris.

Capillary thrombosis undergoes very little extension after the initial period, and persists practically unchanged for 36 to 48 hours. It is always accompanied by much engorgement of the neighboring capillaries. The fluid in the alveoli diminishes the lumina of the capillaries since it subjects their walls to greater pressure than would the normal content of air.

Up to 48 hours after gassing, then, the outstanding feature is progressive diminution of aerating surface by fluid accumulating in the alveolar spaces. As the distribution of the edema is not uniform, a greater or less extent of lung may remain relatively free and may suffice to keep the arterial blood sufficiently aerated till the edema subsides.

There is experimental evidence to show that though the circulation in the capillaries is much impeded by intense edema the total blood flow is fairly well maintained, therefore a greater proportion than usual must pass through the less edematous portions where some degree of oxygenation can be effected.

The accumulation of fluid seen in the interstitial planes and under the visceral pleura and the exudation in the pleural cavity shows how the fluid escaping from the alveolar capillaries is being continuously drained off. The amount remaining in the alveoli shows how far supply is in excess of disposal.

As a rule in animals gassed with phosgene, death during the first 48 hours is associated with an extreme degree of pulmonary edema, and as a result of fluid in these spaces the greater part of the respiratory area is out of action. Death is thus due to diminution of the supply of oxygen to the blood, and this conclusion is confirmed by blood gas analysis.

In animals dying in first 24 hours the edema, though universally distributed, is not so intense. Death in these cases may be due to oxygen lack combined with shock or lower resistance.

In animals dying on third day it is found that the pulmonary lesions are on the decline; the alveoli could take in air if the necessary respiratory effort were forthcoming. In such cases it is possible that the earlier lack of oxygen has brought about failure of the heart and respiratory center.

It is usual for animals to die within the first two to three days after gassing with phosgene; deaths at a later period are frequently due to secondary infection. In animals which have survived till the third or fourth day and have then been killed for purposes of examination there is evidence of the decline of edema. The only visible edema is on the ventral aspects of the lungs, but the affected portions are almost entirely solid. The lesions may be scattered or occupy large areas. The main body of the lungs appears fully aerated. The aerated portions collapse less completely than normal.

The contrast between the solid areas and expanded areas is extreme. It is probably due to the edema in the greater portion of the lungs being insufficient to interfere seriously with aeration, so that expansion and contraction is not checked. The movement of the lung tissue and compression of air will aid drainage of fluid through the lymphatics. On the other hand, in solid lobules no such help is given and air may not even enter choked bronchioles.

In the worst cases amongst goats which recovered, Dunn found solid edema in one-third to half of each lung and edema in some degree in the remaining portions.

By the fourth day there is definite evidence of the absorption of edema. The lungs are less bulky and there is obvious shrinkage of the solid areas. The dorsal parts of the lungs are fully aerated. The margins of the solid and aerated areas are not sharply differentiated; there is an intermediate zone where reexpansion is proceeding slowly. By the fifth day scattered lobules in the solid areas are aerated.

By the eighth day only small areas remain unexpanded.

In animals surviving to the fifth and sixth week the lung has resumed its normal appearance.

Microscopic examination shows how reparation is brought about. The more lasting the edema in a lobule the greater is the amount of histological change developed. The maximum alteration is in the area of thrombosed capillaries. The alveolar walls here become thickened, partly owing to edematous swelling of their connective tissue elements, partly to increase in the number of their cells. The thrombi are disposed of by phagocytic action, and the capillary network is ultimately completely reformed. The thin pulmonary epithelium is replaced by closely set cubical cells like those in the terminal bronchioles. The reparative changes are therefore of a subacute inflammatory character. The albuminous material shrinks and is attacked by phagocytes from the pulmonary epithelium. In the more peripheral portions of the lobule outside the thrombosed area there is slight thickening of the alveolar epithelium which later disappears.

The signs and symptoms of asphyxiant gas poisoning.—All the gases which act as lung irritants cause practically the same type of symptoms, though the time of onset and the concentration necessary to cause symptoms of the same severity differ with particular gases. The picture also varies slightly according to whether the gas affects primarily the respiratory passages of the alveoli of the lung.

Exposure to an atmosphere containing one of these gases causes immediate sensory irritation accompanied by smarting and watering of the eyes. The irritation of the respiratory passages causes catching of the breath, coughing, and a sensation of tightness in the chest.

The intensity and duration of those early symptoms depend upon the concentration.

Even a very mild dose of phosgene may cause a feeling of lassitude and general discomfort for some hours. As a rule nausea, vomiting, and retching are prominent features in the early stages.

Inhalation of phosgene causes a very characteristic change in the taste of tobacco.

The onset of edema of the lungs is signaled by deep cyanosis or leaden-colored facies, the cough and frothy expectoration, the distress and restlessness, the quickened respiration and rapid pulse which are characteristic of a serious case of gas poisoning. These signs are usually well established by the time a patient is admitted to a field ambulance or casualty clearing station. In the case of phosgene poisoning there is, however, sometimes, considerable delay and a man apparently only slightly gassed may carry on his duty for several hours and then become seriously ill.

Headache, pain behind the sternum and in the epigastrium are associated with these signs and symptoms in the majority of patients. As the case develops, want of oxygen becomes more serious and dominates the clinical picture.

The serious cases may be divided into two groups:

(1) Those which show definite signs of venous engorgement, i. e., congested and deeply cyanosed face, blue lips and tongue, visible distension of the superficial veins of the face and neck, increased breathing which is often deeper than normal. Cough may be present and accompanied by abundant thin frothy fluid. The pulse is full, of good tension, and beats about 100 per minute.

(2) In the second group the deep cyanosis is replaced by an ashen pallor, the lips being pale and of the color of lead. The patients are collapsed, respiration is rapid and shallow, the pulse is rapid, weak and running up to 130 to 140 per minute. There is often little cough or expectoration.

This latter group predominates in phosgene poisoning. Of these serious cases in both groups, some exhibit extreme restlessness and anxiety; others a semicoma and muttering delirium. Consciousness may be maintained to the end.

Sometimes a case in the first group will gradually assume the characteristics of the second group.

Four-fifths of the deaths occur in the first 24 hours and very few after the third day. This has also been observed in animals gassed for experimental purposes.

A case apparently slight during the first 24 hours may rapidly go downhill and die on the second day; but, generally speaking, for the less severe cases the danger is passed on the second day.

Bacterial infection may lead to the characteristic signs and symptoms of broncho-pneumonia developing on or after the fourth day, and this complication may rapidly kill the patient. Deaths from this cause are not so common as might be expected.

As a rule by the end of a week a patient is convalescent. During convalescence there is often a temporary bradycardia.

Complete recovery may take a considerable time, and a certain percentage of patients develop symptoms which are very troublesome and intractable to treatment. These cases fall into three main groups:

(1) Cardiac.

(2) Spasmodic dyspneic.

(3) Combined cardiac and dyspneic.

(1) *Cardiac.*—These patients exhibit the characteristic signs and symptoms of the effort syndrone or irritable heart, i. e., precordial pain, dyspnea, exhaustion, and persistent tachycardia after exercise. The patient may look "done" after walking half a mile in 10 minutes and may be quite incapable of going upstairs quickly.

(2) The characteristic symptom of the second group is spasmodic attacks of dyspnea at night. They may occur every night or at intervals of a week. During an attack the patient sits up in bed, his breathing is rapid and shallow, but not difficult, resembling the dyspnea of uremia rather than that of asthma. Slight cyanosis may be present. The attack may last up to 30 minutes and several may occur during the same night. The pulse may be slow and full or rapid and thready. Such a patient on exercise suffers from intense headache and giddiness. The pulse rate after exercise may fall rapidly, unlike that of the cardiac group. In these patients the blood usually shows a hemoglobin percentage over 100.

(3) A third group combines the symptoms of the first two.

All these groups suffer from pain in the head, pain in the abdomen, usually worse after food, and pain in the chest.

The above description gives a fairly typical picture of the course of a case of gas poisoning; there remain, however, a few observations made either clinically or by laboratory examination of gassed animals which are of importance.

(1) *Respiratory system.*—The percussion note may remain resonant all over the chest, notwithstanding the presence of marked pulmonary edema. The breath sounds are weakened, especially behind. Fine rales and rhonchi are heard. Considering the extreme danger to the lungs the physical signs give little indication of the seriousness of the case.

(2) *Circulatory system.*—In the early stages the pulse may be so rapid as to be uncountable. This may be due to shock or to an early developing condition of oxygen want. Another early sign

in some cases is acute dilatation of the right heart. This may be only temporary, disappearing during convalescence.

The second cardiac sound is accentuated; this is connected with raised tension in the pulmonary artery.

In experimental animals blood pressure falls early and the fall is permanent. The initial fall may be preceded by a temporary rise, and this occurs before there are distinct signs of lung edema or as asphyxial state of the blood. This fall may be due to the development of an early want of oxygen reacting on the spinal and medullary centers, or to dilatation of the pulmonary vessels leading to stasis of blood in the lungs and its withdrawal from the systemic circulation.

(3) *Changes in the blood.*—Concentration of the blood is a marked feature of cases of gas poisoning. This is brought about primarily by the production of pulmonary edema, but is contributed to by shock which leads to stagnation of the blood in the capillaries, and by partial asphyxiation of muscular and other tissues which brings about increased local production of lymph.

The curve of the concentration of the blood follows closely that of the percentage of hemoglobin as measured by a hemoglobinometer, and Hb. values up to 140 per cent have been obtained. This means that the concentration of red blood corpuscles is really 40 per cent greater than normal, and therefore the potential oxygen-carrying capacity is increased; but on the other hand analysis of the blood gases shows that the actual oxygen content is seriously diminished, and that the increase of corpuscles does not compensate for this loss.

It should also be noted that the increase of red blood corpuscles at this stage is relative and not absolute.

Later a true polycythæmia may develop in certain cases which are slow in convalescence; it may be regarded as a compensation for chronic oxygen deficiency.

(4) *Digestive system.*—Acute gastritis occurs in fatal cases, and chronic dyspepsia is one of the commonest sequelæ of gas poisoning.

(5) *Excretory system.*—The kidney are congested, as a rule, in cases which come to the post-mortem table. Albuminuria is found in poisoning with chlorpicrin.

In goats dying as the result of gassing with this substance and with phosgene, a condition of acute necrosis of the kidney was found. This change is probably due to a circulatory deficiency and not to the direct effect of the gases themselves.

Gases which interfere with the respiratory functions of the blood—Carbon monoxide.—This gas, though not used directly for offensive purposes, was a cause of casualties, being generated when camouflets in mines were blown, when high-explosive shells burst in a confined space, and from the discharge of machine guns in insufficiently ventilated pill boxes; from charcoal braziers in dugouts, and from the exhaust gases of motor engines in tanks.

Carbon monoxide combines with the hemoglobin in the blood as does oxygen, but has about 240 times the affinity for hemoglobin that oxygen has. When blood is exposed to an atmosphere containing CO and O_2, the hemoglobin divides itself between the gases in proportion to their relative partial pressures.

The gas acts as a poison simply through its exclusion of oxygen from the red-blood corpuscles so that want of oxygen develops—the degree of want of oxygen depending upon the amount of CO hemoglobin present and upon the fact that when part of the hemoglobin is combined with CO the dissociation of oxygen in the tissues is slower than normal.

The symptoms of the poisoning depend upon the degree of saturation of the blood with the gas, and vary from giddiness and headache to loss of consciousness, respiratory and cardiac failure and death.

The treatment is pure oxygen at once. This is given not for the purpose that oxygen is given in asphyxiant gas poisoning, but to drive the CO out of combination with the hemoglobin, since the amount which the hemoglobin combines with depends upon the partial pressure of CO and of O_2 in the blood. Care should be taken that the patient does not rebreathe his own expirations. As soon, then, as the CO has been driven out the O_2 may be stopped, though, on account of the damage already caused by the lack of oxygen, the patient may not recover consciousness at once or, indeed, may not recover at all.

All are, no doubt, familiar with the cherry-red color which the blood develops in the presence of CO.

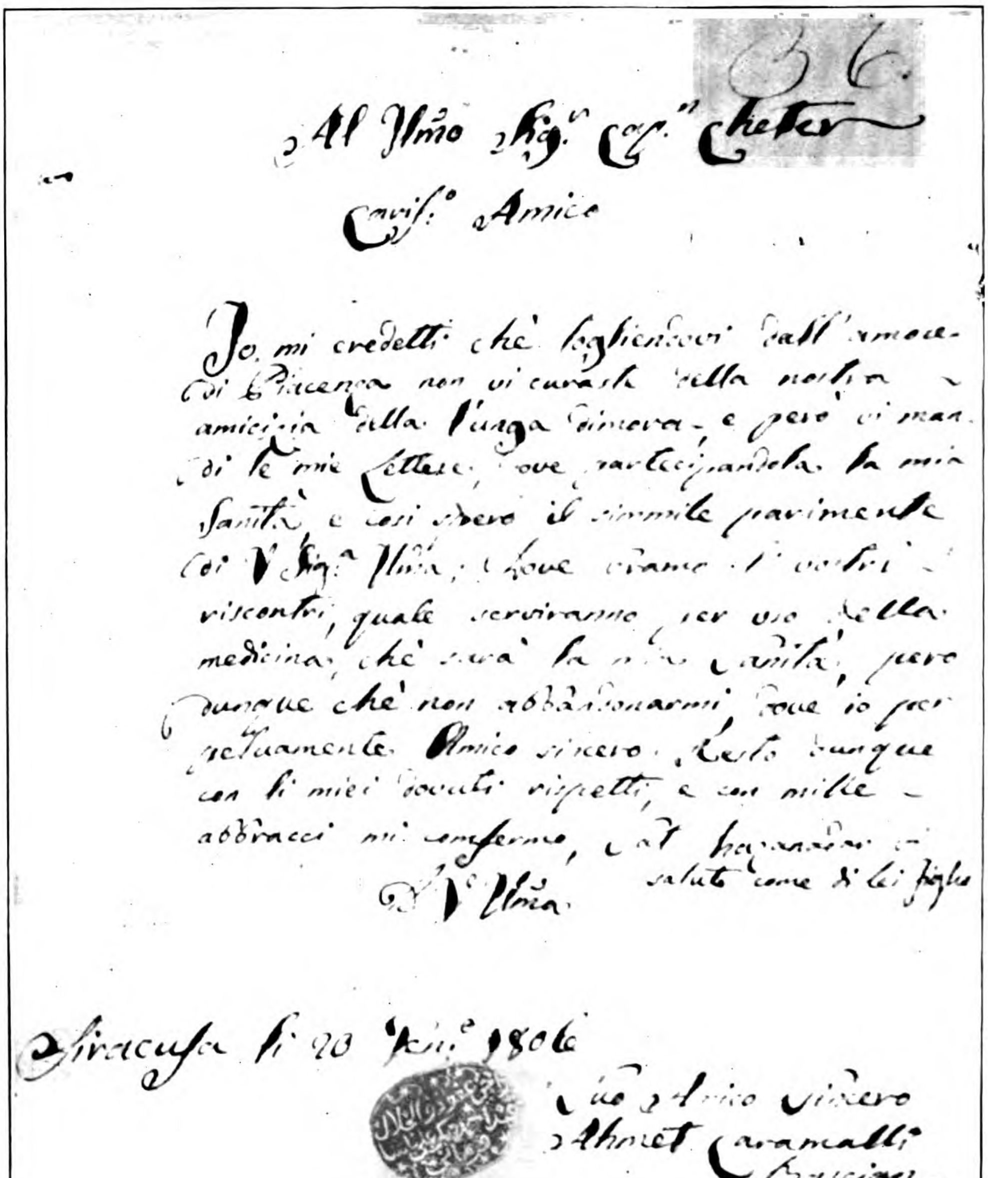
The box respirator does not protect against CO poisoning and in entering mines, etc., when it is present, it is necessary to wear an oxygen-breathing apparatus.

Direct poisons of the nervous system.—Hydrocyanic acid is a direct tissue poison, but the nervous system is peculiarly susceptible to its action.

Concentration of the gas is of more importance than duration on exposure, i. e., it has practically no cumulative effect. When a certain concentration is attained the action is very rapid, but if the concentration is low it may be borne for a considerable time without ill effects.

Symptoms follow each other in rapid succession—giddiness, confusion, headache, indistinct sight, palpitation, and pain in the chest and over the heart, labored breathing, unconsciousness, convulsions, failure of respiration, and, finally, of the heart. In large doses death is almost immediate.

The respiratory center is rapidly paralyzed—immediate treatment, therefore, is necessary. The patient must be brought into fresh air, and if the respiration is stopped or gasping and weak Schafer's method of artificial respiration must be resorted to immediately. This is the essential in treatment, and although other well-known methods of resuscitation may be applied time should not be wasted on them before artificial respiration is commenced.



36.

Al Illmo Sig.r Con.l Cheter

Cariss.o Amico

Io mi credetti chè togliendovi dall'incom-
di Piacenza non vi curaste della nostra
amicizia della lunga dimora, e però vi man-
di le mie Lettere, ove partecipandola la mia
Sanità e così spero il simile parimente
di V. Sig.a Illma, dove erano li vostri
riscontri, quale serviranno per uso della
medicina, chè sarà la mia sanità, però
dunque chè non abbandonarmi, dove io per-
petuamente Amico sincero. Resto dunque
con li miei dovuti rispetti, e con mille
abbracci mi confermo, e al [illegible] saluto come di lei figlio

Di V.S. Illma

Siracusa li 20 Ien.o 1806

Suo Amico sincero
Ahmet Caramalli
Bascian

LETTER WRITTEN BY HAMET CARAMALLI.

HISTORICAL.

JONATHAN COWDERY, SURGEON IN THE UNITED STATES NAVY, 1767–1852.

PART II.

By Capt. F. L. PLEADWELL, Medical Corps, United States Navy, and Lieut. Commander W. M. KERR, Medical Corps, United States Navy.

In 1806 there was printed and sold by Belcher & Armstrong at No. 70 State Street in Boston a small book with the title "American Captives in Tripoli or Dr. Jonathan Cowdery's Journal in Miniature." Evidently Doctor Cowdery contemplated a more extensive account of his experiences, for it is stated in the preface of this book: "He kept a regular journal from the time of his capture to the day of his release, in which he noted, as minutely as circumstances would admit, everything novel or remarkable and he has in contemplation to publish a volume to be entitled 'American Captives in Tripoli,' containing the particulars of the capture of the Philadelphia frigate; general description of Tripoli with its adjacent country, its curiosities, etc., and a sketch of the customs and manners of its inhabitants; to which will be added the journal at full length kept during his captivity, and an appendix containing the treaties and general relations between the United States and the Barbary Powers."

As far as we know, this contemplated book was never published, but the following extracts from Doctor Cowdery's "Journal in Miniature" will tell the story of an interesting and romantic episode in American history. It is printed just as it was written over a hundred years ago, with the quaint phraseology, spelling, and punctuation in vogue at that time:

The particulars of the unfortunate capture of the *Philadelphia* frigate, by the Tripolitans, have already been before the publick. She run on a bank abreast of the harbour of *Tripoli*, on the 31st of October, 1803, at 11, A. M. and kept up a brisk cannonade, with the gun boats of that regency, until 4 P. M.; when, failing in their efforts to get her off, they surrendered to superiour force. The *Philadelphia* mounted 44 guns, and had 350 men; she was afterwards got off by the Tripolitans, and moored in their harbour; but was destroyed by Capt. Stephen Decatur, jun. in a schooner, with three boats, a part of our Mediterranean squadron, who boarded and burnt her up the night of the 18th of Feb. 1804, four months after her capture. On the capture of the *Philadelphia*, the Tripolitans demanded *one million six hundred and ninety thousand dollars*, for the release of our captured brethren! they, however, have been very glad to take 60,000 dollars for their release, and to enter into new bonds for future good behaviour! This much promised, we now proceed to Dr. Cowdery's Journal; which he commences immediately after his capture.

After the flag of the *Philadelphia* was struck, (says the Doctor), and the officers and crew were waiting the pleasure of their new masters, the Tripolitan chiefs collected their favourites, and, with drawn sabres, fell to cutting and slashing their own men, who were stripping the Americans and plundering the ship. They cut off the hands of some and it is believed several were killed. After this battle amongst themselves, was a little over, we were ordered in the boats to be carried on shore. One of their officers, whom I had taken by the hand, and who promised me his friendship, came to me, took me by the arm, and told me I must go. I asked him to let my boy go with me, which he refused. I then took hold of my small trunk, which contained my best clothes; he gave me to understand that I could not take it, but should have every thing taken care of and restored to me. He took hold of my hand and hurried me over the side of ship, while his other hand was employed in rifling my pockets, from which he took about ten dollars. I had concealed some gold in my clothes, which he did not find. I then went down into one of their boats, from whence I was to pass into the next, which was almost full of our officers and men. I made all haste to get into it for I observed that the Turks in the boat where I then was, were stripping my messmate, Dr. Harwood, and the carpenter, Mr. Godby; but I was soon stopped by three of the ruffians, who stood over me with drawn sabres and cocked pistols, and wrested my surtout from under my arm. Whilst they were picking its pockets, and quarrelling with each other for the booty, I sprung for the next boat, which was waiting for me.

In my way, I met a little fellow, who seized me, and attempted to take off my coat; but I hurled him into the bottom of the boat, and jumped into the one which was waiting amongst my fellow officers, where I thought the Turks more civil. They then set off for the town, compelling our men to row the boat, and standing with drawn sabres over our heads. When we had got near the shore, they ordered our men to stop rowing. Two of them came to me and gave me a severe blow on the side of the head. They then searched me, and took a case of surgeon's instruments from my pocket. They took my pocket book, but finding it contained nothing but papers, they returned it. One took my silver pencil, and another the handkerchief from my neck. They then began upon Mr. Knight, sailing master, Mr. Osborne, lieutenant of marines, and all the officers in the boat, plundered their pockets and took the handkerchiefs from their necks. They then landed us at the foot of the Bashaw's palace, where we were received by a guard, who conducted us into the palace before the Bashaw. He viewed us with the utmost satisfaction, and had us conducted into an apartment where we found the captain and several officers, who arrived in another boat just before us. Here was a table set in the European style. The servants appeared to be Maltese and Neapolitan slaves. Here we supped, after which it was announced that another boat had arrived with our officers and men, who were before the Bashaw. Capt. Bainbridge requested me to go and look for Dr. Harwood, whom it was feared was killed. I found him with the carpenter before the Bashaw, stripped of everything but their shirts and trousers. They afterwards informed us, that they were stripped in the boat where I lost my surtout; and when they got within a few rods of the shore, they were thrown into the sea, and left either to drown or swim ashore. The Bashaw's servant gave them dry clothes, and we were all again conducted before the Bashaw,[1] and formed into a half circle. He was seated on his little throne, which was decorated in the Turkish order, and made a handsome appearance. He is a good looking man, aged about 35. He counted us, viewed us with a smile, and appeared highly pleased with us. We were then conducted by the minister of exteriour relations and a guard, to the house formerly occupied by the American consul—a very good house, with a large court, and roomy enough for our convenience. We were seated here about nine o'clock in the evening. Capt. Bainbridge got permission from the Bashaw to send for the Danish consul, who paid us a visit and offered every assistance in his power. We slept upon mats and blankets spread upon the floor, which was composed of tiles.

November 1.—This morning the Danish consul, Mr. Nissen, paid us another visit. Capt. Bainbridge engaged him to furnish us with provisions and such other necessaries as we might want. Our dwelling was furnished in a plain style, and we were supplied with fresh provisions that were tolerably good. We were allowed to go to the front door, and to walk on the terrace or top of the house, which commanded a handsome prospect of the harbour, the sea, the town, the palace, and the adjoining country. Here we could see our ship on the rocks, full of Turks, and surrounded by their boats, and a constant stream of boats going to, and bringing off, the plunder of the ship. We could see these robbers running about town, with our uniform coats and other clothing on. The minister of exteriour relations promised to be friendly, and collect as much of our clothing and effects as he could, and return them to us.

Nov. 3.—The Bashaw sent for the carpenter to go on board the ship; he went and found six feet water in the hold. The carpenter's crew and fifty men were ordered and carried on board to work at night. A gale of wind and heavy sea hove the ship off the rocks, and the carpenter returned.

Nov. 4.—In the morning lieutenants Hunt and Osborne, and myself, were at the Danish consul's observatory, on the top of his house, upon a plain with and adjoining ours, which together made a large and handsome walk. We were looking at the ship with Mr. Nissen's glass, when our dragoman came and informed us that the Bashaw had ordered us not to walk upon the terrace any more. We immediately returned to our house.

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[1] The reigning Bashaw (Pasha) of Tripoli at this time was Yusuf Caramalli, who, about the year 1792, had usurped the throne by deposing his elder brother Hamet (or Ahmet) Caramalli. Yusuf had already done away with his elder brother Hassan, and Hamet after a wandering life had taken refuge among the mamelukes of Egypt. From this latter situation he was rescued early in 1805, and, with his followers, joined the expedition under Gen. William Eaton, formerly United States consul to Tunis. This expedition was undertaken for the purpose of bringing pressure to bear on the de facto Bashaw, Yusuf, securing recognition of our rights, and reinstating Hamet. A further reference will be made to this picturesque exploit, in which the city of Derne was carried by storm, an event commemorated in Whittier's poem Derne.

The letter which is reproduced in this article is written by Ahmet Caramalli in more or less incorrect Italian and apparently contains Arabic terms. The following is a rough translation of its contents:

To the Very Honorable Captain Cheter,

My very dear Friend: I believed that being far distant from the pleasant surroundings of Piacenza you would no longer bear in mind our friendship of long duration. Nevertheless I send you my letters wherein I acquaint you of my good health, hoping that yours is the same. What has become of your notes used in medical work, which will be my salvation (*Sanità*). I hope, therefore, that you will not abandon me as I have always been your sincere friend. I remain, therefore, with a thousand greetings, and saluting you as a son,

Your sincere friend,

Ahmet Caramalli
Bascian (?)

Siracusa, December 20, 1806.

Nov. 5.—Our new masters came and closed up the passage which led to the top of the house; and a guard was set at the front door to prevent our going into the street. The minister sent his chief secretary with a parole of honour, written in French, which we all signed.

Nov. 6.—We found that we were not allowed to go out, notwithstanding our signing the parole of honour. The minister of exteriour relations sent us word that he had got eight of our trunks, which we might have for twelve hundred dollars. We did not take them, nor thank him for his hospitality. We purchased new blankets, sent to us by the Danish consul. The English consul, Mr. McDonald, paid us a visit and offered us every assistance in his power.

Nov. 8.—The Jews purchased some of our clothing and offered it to us at an enormous price; but we purchased little of it. The Bashaw sent for Captain Bainbridge and told him that John Wilson had informed him that Captain Bainbridge, before hauling down the colours, threw overboard nineteen boxes of dollars and a large bag of gold. Captain Bainbridge assured him that it was false, and gave him his word of honor, that there was no money thrown over to his knowledge; but that the money in question was left at Malta. In the evening, the Bashaw not being satisfied, sent for the captain's servant, and ordered him to be flogged if he did not tell the truth concerning the money. The boy denied having any knowledge of it. After repeating the threat several times, and the boy insisting that he knew nothing about the money, he was acquitted. Wilson had turned traitor, and given the enemy all the assistance in his power. He now acts as overseer over our men.

Nov. 9.—Our captain established a credit with the Danish consul who supplied us with necessary provision, and with cloth for mattresses. A guard was posted at our door, to prevent our going out into the street, or purchasing any books or clothing.

Nov. 10.—Several Turks came and informed Captain Bainbridge that the Bashaw had been told that Captain Rodgers who commanded the U. S. frigate *John Adams*, treated the Tripolitan prisoners taken last summer, very badly, and they feared that we would suffer for it.

We have plenty of pomegranates, dates, and oranges. The Danish consul visits us every day.

Nov. 13.—The minister of exteriour relations sent his dragoman to Captain Bainbridge and informed him, that if he would send an immediate order to Commodore Preble, to deliver up the Tripolitan prisoners captured by Captain Rodgers last summer, amounting to about eighty in number, we might remain where we were, but if he did not comply, we should fare worse. Captain Bainbridge replied, that he could not command Commodore Preble, and therefore could not comply with his request. At 9, in the evening, a Tripolitan officer came armed with two pistols and a sabre, and said, *To night nothing; to-morrow the castle.* We accordingly prepared for the castle.

Nov. 14.—Breakfasted early to be ready for our new habitation. At 9, A. M., a guard came and ordered us to the castle. We formed agreeable to rank, and marched to the castle. We were huddled into the most gloomy cell, among our men, where there was hardly room for us to stand. Here we spent the day without food, and were scoffed at by our foes until night, when, to our happy surprise, we were conducted back to our old place of abode. The minister of exterior relations sent for Captain Bainbridge, and affected great surprise at our going to the castle, saying that he knew nothing of the measure, which we all knew to be false. He told Captain Bainbridge that we should remain where we were until he heard from his people, the prisoners, in the hands of the Americans.

Nov. 17.—Visited our sick, who were quartered in a small house without a floor, near the palace, and about half a mile from our lodgings. (As this was Doctor Cowdery's daily practice, we shall omit the repetition of it.) The Danish consul supplied the sick with fresh provisions, by the request of Captain Bainbridge.

Nov. 20.—The minister permitted us to purchase our clothes. We got but a few, and at a high rate. One of our men, by the name of Thomas Prince, turned Turk, and was admitted into the palace.

Nov. 21.—After visiting our sick, I was permitted to go with our dragoman about the town to purchase medicine; we found but a few articles. A man of 116 years of age came to me to cure him of deafness.

Nov. *24.*—The Bashaw refused to furnish necessary clothing for the sick, or anything for them to eat, but sour filthy bread. Captain Bainbridge contracted with the Danish consul to supply the sick with beef and vegetables for soup every day.

Nov. 27.—Our men complained of their hard usage, in being compelled to lie on the cold damp ground, to eat bad bread, to work hard, and to be bastinadoed by their drivers.

Nov. 30.—One of our men in a fit of despair attempted to kill himself; but was prevented by the Turks, when in the act of cutting his throat. The wound did not prove mortal. I was permitted by the minister to call on the Spanish physician for medicine for Dr. Ridgley, who was then sick.

December 5.—The Bashaw sent for me to prescribe for himself and two officers of his body guard, and ordered me to get such medicine as was necessary of the minister, who had a medicine chest.

Dec. 6.—Visited the sick at the palace, and found them all better. I was received and treated very politely. The minister sent for me to cure him of a blindness in the left eye. I prescribed for him with very little success.

Dec. 7.—Visited the ambassador of Constantinople, who was affected with the intermitting fever. Found my patients at the palace almost well.

* * * * * * *

Dec. 9.—Visited the Turkish ambassador and found him better. He asked many questions about America, and treated me with coffee.

Dec. 10.—Visited the Turkish officer, where I found a captain of one of the grand Seignor's ships of war, who came to Tripoli to carry presents to the Grand Seignor. The Tripolitan captain who took the brig *Philadelphia*, Captain Morris, was also there. He was very inquisitive about our country and our navy.

Dec. 12.—Was called on by the general of Marine to visit his principal secretary. Before I was permitted to give any medicine the Turks, six in number, with *Hamet*, our dragoman, surrounded the sick man, and offered a prayer to Mahomet. The sick man then told me that if I would cure him he would be very thankful, and would speak to the Bashaw in our favour.

Dec. 15.—The Bashaw had a schooner launched, which was built by the Spanish carpenters. She was tolerably handsome, and was calculated to carry six guns. When she was launched, three guns were fired from the batteries, and the consuls all hoisted their colours. At sunset, a firing from the batteries announced the commencement of the Mahometan *Rhamadam*, continuing a lunar month, in which they neither eat, drink nor smoke, while the sun is above the horizon, but feast at night. In walking through the town, to visit my patients, I found the mosque and principal houses illuminated, and the people rejoicing. Passing the Coffee house with our dragoman, *Lysle*, a renegade Scotchman, who was now the Tripolitan admiral, called me in to drink coffee with him and was very polite.

Dec. 16.—Visited the Marine secretary, and found him in a state of great debility. Could not prevail on him to take any medicine, or the least kind of nourishment. He said he would rather die than offend Mahomet by breaking the *Rhamadam;* but he would take whatever I would advise him at night.

Dec. 20.—The market was so poor that we could get nothing for dinner. but a shoulder of poor dromedary.

January 1.—Was called to visit the Bashaw's child, about eleven months old. The Bashaw seemed much affected on my pronouncing the child dangerously ill; and wished me to pay every attention to it, saying that anything he could afford would be at my service.

Jan. 2.—Found the Bashaw's child better, at which he expressed great satisfaction, and offered me a horse and servants to go to his gardens, about two miles from town. I preferred walking, and took our dragoman with me. As I passed out of the gates of the city, I saw a man's head sticking on a pole. On inquiry, I found that it was the head of one of the *Bedouins*, who, about a year before, killed a son in law of the Bashaw, who commanded the army, in collecting the taxes in the back part of his dominion. About a quarter of a mile from the gate, the road passed through a burying ground full of graves. After this I came into a well cultivated country which was laid out in squares of from one to six or eight acres, each surrounded with date trees, interspersed with orange, fig, olive, lemon and other trees. On coming to Admiral Lysle's garden we found him there, and he invited me in. It was very beautiful. He loaded me with its fruits, and offered me access to it whenever I chose, and said I was welcome to anything growing in it. I concluded to postpone going to the Bashaw's garden, until another day.

Jan. 3.—Went to the Bashaw's garden, where I met the minister and the prince, the Bashaw's oldest son. They politely conducted me through the garden, which was ornamented with a great variety of fruit trees, loaded with fruit, particularly with oranges, lemons and limes. John Hilliard died in the evening.

Jan. 4.—William Anderson died.

Jan. 12.—The Bashaw's eldest daughter was married to Selim, the Bashaw's chief *Casteda* or Treasurer. Wilson, who was one of our quartermasters, and lately turned traitor and Turk, received 500 bastinadoes for quarreling with the famous Lysle.

Jan. 14.—The minister of foreign affairs, Sidi Mahomet Dacize, visited our prison. The month's fasting (*Rhamadam*) ended this day at the change of the moon. The Tripolitans fired a salute from our ship which lay moored in the harbour, within sight of our window.

Jan. 15.—The feast called Byram commenced. Every gun in Tripoli was fired in honour of the day. Every Turk put on his best suit, and there was a general rejoicing.

Jan. 16.—Capt. Bainbridge and lieutenant Porter, were invited and accordingly visited the Bashaw, with all the consuls.

Jan 17.—The *Byram* ended this evening. The consuls, the ships in the harbour, and the castle displayed their colours during the three days. The rejoicing was great, but neither elegance nor taste were discoverable.

Jan. 18.—By permission visited the triumphal arch which was built at the time the Romans conquered this country. It is dedicated to Augustus Caesar; is very large, built of fine marble, and is full of engravings and inscriptions in tolerable perfection. It stands near the marinery.

Jan 19.—The Bashaw's agent sent us a present of tea, coffee and sugar, and a lamb, probably to induce us to buy a quantity of old clothes taken from us, for which they asked 600 dollars.

Our diet at this time was two eggs and a piece of bread, with rain water for breakfast and supper; poor beef or camel's flesh, bread, and sometimes boiled cabbage, with rain water for dinner.

February 3.—Was conducted to the castle to visit the Bashaw, whom I found after passing several sentinels, about fifty fierce yelping dogs, and three heavy doors loaded with irons and bolts, which were opened for us by armed mamelukes. Prescribed for the Bashaw's disorder.

Feb. 6.—The Bashaw sent for me to come to his room in the castle. He shook hands with me, received me with much politeness, and requested me to pay every attention to his family as a physician.

Feb. 10.—The Bashaw gave the officers permission to walk out into the town and country, but not to visit the consuls nor the batteries. Our dragoman, Hamet, was ordered to walk with us and direct us where to go. We went out six at a time.

Feb. 16.—Prescribed for the Bashaw's eldest daughter. Her husband offered me many civilities. At 5 o'clock, P. M. were informed that two English merchantmen were standing in for the harbour. They proved, however, to be two vessels under the command of Capt. Decatur. About 11, at night, we were alarmed by a most hideous yelling and screaming from one end of the town to the other, and the firing of a cannon from the castle. On getting up and opening the window which faced the harbour, we saw the frigate Philadelphia in flames.

Feb. 17.—The Turks appeared much disheartened at the loss of their frigate. A strong guard was put at our door, and we were forbid going out. I was forbid visiting our sick. It was reported that an American schooner and three boats set fire to the ship. Two Turks escaped who told this news. They said that eight Turks had charge of the ship, and they supposed the other six were carried off by the Americans. Our dragoman informed us that we were to be removed from our present habitation into the castle.

Feb. 18.—A guard of about twenty Turks was at our door. I asked permission to visit our sick and was refused. A gloomy aspect continued on the faces of the inhabitants at the loss of the frigate.

Feb. 19.—Again asked permission to visit our sick, and was again refused.

Feb. 20.—Permitted to visit the sick.—Found the town full of country militia and our guard doubled.

Feb. 21.—Our prison was kept full of Turks, to guard us. The Bashaw, having got a little over his fright, consented to let us remain where we were.

Feb. 24.—We were forbid sending letters to our friends, without first showing them to the Bashaw or his ministers. The last letters we received, were broken open by the latter, before they were delivered to us.

March 1.—We were conducted to the castle.

March 2.—Found our habitation very dark and smoky, having no light but what came through a grated sky light.

March 3.—Not allowed to visit the sick, and our dragoman was forbid carrying letters to use.

March 4.—Captain Bainbridge received a letter from the ministers, reprimanding him on account of three men who floated ashore a few days after the burning of the frigate. The Turks pretended that they were murdered after they were made prisoners by the Americans.

March 6.—In close confinement. Hamet, our dragoman, was taken from us. The Bashaw suspected him of being too friendly to us.

March 7.—The Tripolitans got the guns from the remains of our frigate, and mounted them on their batteries. In trying them, several of the gun carriages broke down, and one of the guns burst and killed one Turk and wounded four.

March 14.—The Turks seemed much alarmed, and placed a strong guard at our door, for what reason we knew not.

March 16.—The Bashaw sent word that I should have any thing I wanted, free of expense.

March 17.—Ordered not to send our clothes out to wash.

March 24.—I was taken out of prison to visit a mameluke's wife and child. The minister of foreign affairs paid us a visit, and said many clever things.

March 26.—A truce was held between Commodore Preble and the Bashaw.

From *March* the 28th to the 13th of *April*, I was violently afflicted with the dysentery, during which time the Bashaw expressed much anxiety, and offered me every assistance.

April 15.—We felt the Syroc wind, which was very oppressive.

April 24.—John Morrison died, in consequence of a hurt he received a few days before while at work under the directions of his new masters. The Bashaw permitted me, with two of my fellow officers, to go to his garden, conducted by a guard of two Turks, armed with pistols and sabres. This precaution, they pretended, was taken to prevent the wandering Arabs and Moors from robbing us; but it was probably done to prevent our escaping to the squadron, then cruising off the harbour, in sight.

May 11.—Our squadron appeared off the town. The Turks were at their quarters. They had twelve gun boats, armed, manned, and moored out in the harbour.

May 16.—Ten of our officers took a walk to the gardens under escort of a guard. They returned with a variety of flowers and ripe apricots.

May 20.—A party of us, under escort of four Turks, walked to the desert, about four miles from our prison. We ascended a large bank of sand, where we had an extensive view of the country. The deserts have a singular and grand appearance. They extend to Mount Atlas, which we could see at the distance of two day's journey. The sand is in heaps, like snow drifts in our country. There was not a house nor any other object to be seen; nor a thing growing to interrupt the sight; but it appeared like an ocean of sand. On our return we visited several gardens, where we got oranges, lemons, apricots, and a variety of flowers. We were treated with sap of the date tree, which tasted much like mead.

May 29.—A party of us, under escort as before, took a walk into the desert. On our return we dined in the Bashaw's garden, under the shade of orange trees. The dinner was prepared in the Turkish style and we ate with wooden spoons—it was simple and good. We visited several gardens, and were treated with as much respect as could be expected or desired from a foe, who held us as prisoners of war. On returning to town we saw two of our brigs at anchor off the harbour, seeming to defy all the force of Tripoli.

June 4.—We are plentifully supplied with squashes and cucumbers.

The Bashaw's eldest wife, called the queen, was delivered of her ninth child on the 18th of June. She was twenty three years of age. The first child was born when she was in her eleventh year. It is said to be common to marry at ten.

June 27.—Mr. Hodge, our boatswain, Mr. Douglass, the sail-maker, and Mr. Fontaine, the first master's mate, were taken from the prison and set to work by order of the Bashaw.

July 15.—The Bashaw, his wives and guards removed to their country seat at his garden. The season was very warm and our close confinement continued. We purchased figs, watermelons, muskmelons and cucumbers.

July 28.—I was called to visit the Bashaw's eldest son, the Bey of Tripoli (termed the *Prince of Wales of Tripoli*, by the English Consul) at his palace, about three miles from town. I found him in a lofty and airy apartment, lying on a mattrass and surrounded by his attendants. I prescribed for him and was highly entertained in the Turkish style.

July 29.—The Bey was well enough to return to Tripoli. He called at the door of our prison, which was unlocked and the bolts and bars unloosed. I was conducted to him when he expressed great satisfaction at having recovered his health, thanked me for my attention, and promised to alleviate our misfortunes, as far as was in his power. I was then sent back to prison. The Bashaw and Bey spend a day alternately in town, on account of the expected attack by the Americans.

July 31.—I was carried with my trunk, and bed, to the castle, where a room was provided for me, and the Bashaw informed me I must attend the Americans and his family as a physician.

August 3.—The American squadron, under the command of Commodore Preble, consisting of one frigate (the *Constitution*), two brigs, three schooners, and seven gunboats, at about 2 o'clock, P. M. commenced an attack on the batteries and gunboats of Tripoli. I stood on the top of the castle, where I had a fair view of the engagement. Three of the enemy's gunboats were captured by the Americans. Two Turks swam to the shore, and were carried before the Bashaw, who gave them a suit of clothes and a few dollars. They said that many were killed on both sides.

Aug. 5.—The American squadron anchored off Tripoli, I was ordered to dress a wound of a mameluke, who had his hand shattered by the bursting of a blunderbuss. I amputated all his fingers but one, with a dull knife, and dressed them in a bungling manner, in hopes of losing my credit as a surgeon in this part of the country, for I expected to have my hands full of wounded Turks in consequence of the exploits of my brave countryman.

Aug. 9.—At about 12 o'clock the alarm gun of Tripoli was fired. The Tripolitans all took their stations, and went through the Mahometan prayer, by kneeling and kissing the ground several times, with their faces toward the east, all with as much regularity as the exercise in a well-disciplined army. Their military manœuvring was a scene of the utmost confusion. I got permission to go on the top of the castle, where I had a most extensive view of the sea and land, and saw the American squadron approaching the town. At about 1 o'clock the attack commenced, and the battle soon became vigorous, with a tremendous cannonading on both sides. I now beheld the melancholy catastrophe of the explosion of one of our gunboats. I saw the mangled bodies of my countrymen precipitated into the air. For a few moments a general silence took place, when the firing recommenced with unabated vigor. I saw shells explode, and set fire to the town in many places; but the houses being principally built of stone, mud and mortar, the fire did but little damage. The shells and shot, however, battered the town very much, and almost destroyed some of the houses. The firing ceased at 4, P. M. when the ship John Adams joined the squadron. The Bashaw has a bomb-proof room in his castle, where he staid during the action. On hearing of the explosion of our gunboat, he ventured out to take a peep, with the precaution of having a *Marabewt* or priest, to seal a black piece of paper on the top of his head, with a Turkish or Mahometan scrawl, with assurances that it would entirely secure him from all danger; but he soon returned to his cell. The Turks all wear a paper of this kind, sewed up in a little velvet bag, with assurances from the *Marabewt* that it will protect them in the greatest danger. The *Marabewt* gets a sum of money for these blessings. If a Turk gets wounded or killed, it is supposed the blessed paper was too old, or not placed in a proper manner. In the time of action the *Marabewt* gets upon some secure place and cries to Mahomet in the most dismal yells to let them conquer their enemies; and beckons to the vessels to run on shore or be destroyed. Such of our crew as were able, were put to work, and drove about like horses or mules.

Aug. 10.—Lewis Heximer, who lately turned Turk, went by order of the Bashaw, and told Capt. Bainbridge, the particulars of the two late actions. The Bashaw informed me that the late commander of the schooner Vixen, Lieut. Smith, was commodore of the gunboats in the late action, and was killed by a musket shot through his head. Our men complained of being drove and beat about at an unmerciful rate, in consequence of which they petitioned the Bashaw, in the following terms:

"*To his Excellency the Grand Bashaw of Tripoli:* The petition of the whole of the American prisoners, most humbly sheweth:—

"That your humble petitioners, when doing their duty with all their power, as they are commanded, are most cruelly beaten by our wardens, stoned, insulted, and spit upon by the soldiers and others; required to carry burthens impossible for us to sustain, and chased and bruised, until we are, or soon shall be, unable to labour at all.

"From the many acts of justice, kindness, and generosity we have experienced from your Excellency, we cannot suppose that such conduct is authorized by your commands; or that we should be punished for what is out of our power to perform; or for the actions of others, which we have no agency in, and which we cannot prevent.

"Returning your Excellency our sincere and humble thanks for your bounty and privileges heretofore shewn, and relying upon your goodness for protection, we therefore most humbly pray, that your Excellency would interpose your royal authority and grant us a speedy relief. And your petitioners, as in duty bound, will remain your Excellency's most humble, faithful and obedient servants."

On the petition being explained to the Bashaw by Heximer, (or *Hamet Amerikan*, his new name) the Bashaw forbid the Turks striking the prisoners.

Aug. 11.—The Bashaw sent for me, and, agreeably to his orders, I took a seat by his side. He began conversation about my country, and our squadron, which was then in sight, and consisted of eighteen sail. He said that for two dollars he could repair all the damages that the bombardment did to his town; that but one man was hurt by the shells; that what he had been offered for the American prisoners was but fifty dollars per man; that he would make them earn that sum in two months. He asked me what I thought my country would give for me. I told him I did not know. He said he would not take twenty thousand dollars for me; to which I replied, that I might then expect to remain in slavery for life. He patted me on the shoulder and said, I might then content myself to stay with him. I asked to go and see our men, but he refused, saying, that Moors and Arabs would kill me if they could catch me.

Aug. 12.—Our squadron hoisted a flag of truce, sent in a brig and schooner and fired a gun. The Bashaw did not, and swore he would not, answer it; and said he would not treat with commodore Preble. A truce however was afterwards held. Consul O'Brien wished to come on shore, but was refused.

Aug. 13.—Another truce was held, when the Bashaw demanded one million of dollars for our ransom. One hundred and twenty thousand dollars were offered and refused.

Aug. 17.—The Bashaw informed me that fifteen Americans were found drifted ashore at the westward of the town, and that one of them was an officer with an epaulet on the right shoulder. We supposed they were men destroyed by the explosion of the gunboat, in the late engagement. I asked permission to go with two or three of our men and bury them, and the Bashaw told me I might go the next day. Our squadron lay at anchor off the harbour. The inhabitants had chiefly moved out of the town, through fear of another bombardment; and the Bashaw ate, drank and slept in his bomb proof room. Several tribes of the back country inhabitants had lately come and offered their services to the Bashaw,—in all not more than one thousand men. Many of them had muskets without locks, but had a sort of match to put fire to them. They were almost naked, half starved, and without discipline. When they are going to battle or appear before the Bashaw, they run to and fro, shaking their rusty muskets over their heads, all crying *Holouet Buoy* (I am my father's son.) Every tribe has a priest, or what they call *Marabewt*, whose badge is a small green flag, which is carried in his hand or stuck up at his tent. They pretend great skill in prophecy, in which the people put the utmost faith. They prophecy success in battle; and for a small sum of money, ensure any one against wounds or death in fighting a Christian. They often go on eminences, and beckon and sing to the American vessels to run on shore. They prophecied that another American vessel was to go on the rocks, and the Bashaw fully believed it.

Aug. 18.—Was not permitted to bury our dead. Our squadron stood out to sea. At evening the Bashaw went to his country seat and the Bey came in to keep the throne till his father's return. They never both leave the castle at once. When the Bashaw leaves it, the gates are shut till his return, for fear of incursions upon the throne. In the evening, the moon shining very brightly, the prince or Bey ordered out the band of music, which was very ordinary, and made Christians, Turks, Arabs and Guinea Negroes dance before him, according to the mode of their respective countries, at which he seemed highly diverted.

Aug. 19.—Between 9 and 10 o'clock in the evening, Mr. Church, a respectable English gentleman was shot through the head in the street, on his return from visiting his neighbours.

Aug. 24.—In the morning, between 2 o'clock and daylight, two of our small vessels hove about thirty shells, as was supposed for the round fort, but they all fell short of the mark. Such attempts served rather to encourage than to intimidate the Tripolitans; and the Bashaw was in high spirits on the occasion.

Aug. 26.—At about 4 o'clock P. M. the fellow who murdered Mr. Church, was executed near the spot where the crime was committed. It had theretofore been a custom in this country, when a person had committed murder, to fly to a tomb of a *Marabewt* (or priest) where they were protected from justice, and a fee to a *Marabewt* would procure them absolution. This fellow fled to a place of this kind immediately after killing Mr. Church. The English consul, Mr. Langford. on being informed of the murder, addressed the Bashaw, and demanded justice. The Bashaw then found out by a boy, who accompanied the murderer when he committed the crime, the particulars of the affair; and immediately sent a file of men and ordered them to prevent any person carrying food or drink to the murderer. They watched him until night when the Bashaw sent his *Marabewt*, who coaxed him away, brought him to the castle and confined him in irons. The next day the Bashaw called his divan, when it was decided that the prisoner was guilty of wilful murder, and ought to suffer death. It appeared by the evidence and confession of the prisoner, that Mr. Church had lent a sum of money to a Spanish carpenter in this place:—that Mr. Church had pressed him for payment; and that the carpenter's wife hired the Turk to kill Mr. Church for forty dollars. The villain took his watch from his pocket after he had shot him. The boy who accompanied him and carried a lantern was bastinadoed with five hundred blows. The carpenter's wife was ordered to leave Tripoli.

Aug. 27.—Our squadron stood towards the harbour.

Aug. 28.—About 4 o'clock in the morning, I was awoke by a heavy and incessant fire of cannon, and the whistling and rattling of shot all around me. On getting up, I found that our gun-boats were close in, and were firing upon the town and batteries. Every gun in Tripoli that could be brought to bear, was returning the fire. The Tripolitan gun boats were close under the castle for protection. The firing continued until a few minutes after sun-rise, when one of the largest gun boats ventured out, with an intention of boarding the nearest American boat. As soon as she got within pistol shot, the American discharged their piece, loaded with grape, and killed four and wounded two of the enemy, they then put about and retreated. At the same time, commodore Preble bore down and gave the batteries to the westward of the town two broadsides. The squadron then stood out and anchored off the harbour. The damage done to the town was considerable. A large vessel was sunk in the harbour and others damaged. Many men were killed and wounded.

Aug. 29.—The Bashaw sent me to his palace in the country, to see his eldest son the Bey, whom I bled in the foot. He requested me to spend the day and dine with him, which I did. He endeavoured to have the dinner in the Christian style. It was set on a table, and consisted of a large dish of boiled rice and stewed fowls, out of which we both ate, he with a wooden spoon, and I with a silver one, without knife or fork. The prince's servant stood by him, and pulled the fowl in small pieces with his fingers, for the prince to eat. I made use of my fingers and teeth to get mine in pieces. Our dessert was dates and watermelons. Our drink was lagby, or the juice of the date tree, which we drank out of a large gold cup. He shewed me the garden, and took great pains to entertain me.

Aug. 30.—A truce was held, I took a ride upon a mule about eight miles to the westward of the town, in company with my guide, Hamet, a Turkish officer, and several footmen. I there saw a boat, which drifted on shore, with a dead man, and several muskets and swords in it. The man appeared to have been shot through the body with a cannon ball, which had also pierced the bottom of the boat. The Turkish officer collected about twenty Arabs, who hauled the boat upon the beach, dragged the dead man out of it, stripped him entirely naked, and left him on the beach. I tried in vain to hire the Arabs to bury the body; they said it was contrary to their religion to bury a Christian. I asked permission to get him buried by our countrymen, some of my fellow prisoners, but was refused. I found that our men, who were destroyed by the explosion of the gun-boat, on the 9th inst. lay in a state of putrefaction on the beach. They were scattered on the shore for miles, and were torn in pieces by dogs. The Bashaw had frequently promised me that these men should be buried; but refused to let me take some of our men to go and bury them.

September 2.—At about 4 P. M. our squadron commenced another attack on the town in which eight of our gun boats drove sixteen Tripolitan gun boats under the battery on the east side of the harbour; while the Commodore bore down and gave the batteries at the west end of the town, several broadsides. Many of his shot came into the town, and castle. Two bomb-ketches were employed in heaving shells into the town, which did considerable damage to several houses, and entirely destroyed the house of the Spanish carpenter, the Bashaw's naval constructor. I observed the utmost confusion and random-firing among the Tripolitans. It appeared they were almost out of powder. Two of their guns bursted, one of which was an eighteen pounder from the late Philadelphia frigate. The men, women and children ran out of the town in the utmost terror and distraction.

Sept. 3.—Had been to see the prince in the country, and was returning about 10 o'clock in the evening, with the Bashaw and suit, when we saw a most extraordinary light or flash, and heard a heavy report. We all wheeled about, and made for the place we had left; but the Bashaw soon altered his mind, and proceeded to town, while I went to the country palace and staid all night. The explosion was a fire ship sent into the harbour by Commodore Preble, which did but little damage.

Sept. 5.—The Turks found ten dead men near the place where the vessel blew up, on the evening of the 3d instant. The Bashaw and his people had a thanksgiving to Mahomet on the occasion. Their ceremony was prayer in doleful tone, and singing, accompanied with the sound of an instrument made by drawing a skin over a hoop.

Sept. 6.—More men were found, three of which appeared to be officers. By permission, I took our boatswain and a gang of men, and buried these bodies a little east of the wall of the town. All that I saw, who appeared to have been killed by the explosion, amounted to fourteen. The Bashaw's son-in-law told me that six more had been found drifted on the western shore; but I could not ascertain the truth of it.

Sept. 7.—John McDonah died of a consumption, with which he had long been ill.

Sept. 9.—The Bashaw took me with him, and his suit to his country seat where we spent the most of the day. About 5 o'clock P. M. we went to see the great *Marabewt*, or Mahometan priest, in whom the Bashaw had great faith, and thought he could foretell events. It was said by the Turks, that he foretold the stranding and capture of the Philadelphia; that he got offended with the Bashaw and caused and foretold her being burnt. But I had heard nothing of these mysteries until a little previous to this. He now said that the commodore's ship, the Constitution, would never return to America; that she would either be blown up, or run on shore; and that the Bashaw would have success in his warfare with America. It appeared that this great prophet was a sojourner; and that he only came to Tripoli when the Bashaw was in want of a prophet. He was encamped on the sandy desert, at a tomb of an ancient *Marabewt*. The tomb had a house over it, with several rooms, and was encircled with several green trees. It was about two miles back of the gardens. We found this great Marabewt standing on a large mat, which was spread on the sand under the shade of a large mulberry tree. About thirty of his attendants stood back of him, paraded in form of a crescent. I was ordered to pull off my hat; and all approached him from the west; the Bashaw, with some of his most truly attendants in front. When we came near to him we all dismounted. The Bashaw run to him, kneeled before him, and kissed his hand. The mamelukes followed his example. The *Marabewt* then sat down, and was followed by the Bashaw and his suit, forming a circle on the mat. During this time, I stood by my mule, about five rods from the scene, with my hat in hand. I was soon called and ordered by the Bashaw to take off my shoes and feel the Marabewt's pulse. I left my shoes at the edge of the mat, or holy ground, and stepped on. I laid my hat on the edge of the mat in preference to laying it on the sand; but it was immediately taken off. I was then ordered to approach his holiness and kiss his hand. I felt his pulse; but before I had time to prescribe for him, he put his hand against me, and gave me to understand that I must go off the holy ground. Immediately stepped off; put on my shoes, took my hat, and went to my mule. The Bashaw called me back, and asked what I would do for the *Marabewt*. I recommended bleeding; but the *Marabewt*, shook his head and gave me to understand that he wanted nothing of the *kelp* (*the Dog*). I was then told to withdraw, which I did, and took a walk round the tomb, which I found to be very ancient. The Bashaw spent about half an hour with the *Marabewt*, when he kissed his hand; and we all returned to the country. The Bashaw apologised for the impoliteness of the *Marabewt*, and said that they had a foolish antipathy to all but Mohometans.

October 22.—None of our cruisers were to be seen from the top of the castle. The Tripolitan gun boats were disarmed, and the Bashaw's gunners were employed in drawing the charges from the cannon on the battery. Many of the guns now stood in the sand, as they did when Commodore Preble first attacked the town. On being fired two or three times, they recoiled into the sand so deep that they could not be worked, and were abandoned. The Bashaw told me that if he had three frigates, he would blockade America. He said he could do it as easily as a frigate and schooner could blockade Tripoli!

Oct. 26.—A great scarcity of grain. Our crew had no bread for three days. The Bashaw gave orders to all the market people, not to sell grain to anybody but his household. There was no bread to be had for money. A dispute took place between the Bashaw and the renegado Lysle, about the purchasing of some barley. Lysle was considerably intoxicated, and insisted on his right to purchase grain in the market. The Bashaw was highly affronted, and flew at him with all his might, struck him, and ordered his mamelukes to disarm him and put him in prison, which they strove to obey, and carried him off. The Bashaw, however, soon ordered him released, and then ordered his servant, who was supposed to be the cause of the quarrel, bastinadoed with five hundred blows, which was immediately put into execution.

November 9.—The Bashaw had an epileptic fit, and his people thought he was possessed with the devil. They performed many ceremonies to cast him out, which they said succeeded. The Turks said they saw many ghosts the night before; and that a *Marabewt* drove the devil out of the Bashaw.

December 6.—Our men suffer for the want of provisions. The Bashaw does not allow them either victuals or cash.—They get but a small allowance of bread, and that on the credit of their own country. They are beat unmercifully and compelled to work hard every day.

Dec. 7.—I was informed, that, through the influence of many Turks, the Bashaw had given orders to Sarcey, our master, to treat the American prisoners with the utmost cruelty, in order to induce the United States the sooner to make peace. He was impatient for his money.

Dec. 10.—Our men all agreed not to work unless they were fed, and accordingly when the wardens went to the prison and ordered them out, they all refused. The wardens whipped them until they were tired, and then went to inform the Bashaw, who immediately ordered them bread and oil, and they went to work.

Dec. 21.—At evening, the Bey, the eldest son of the Bashaw, was married to his first cousin, eldest daughter of the Bashaw who was driven out of Tripoli by the present Bashaw. The bride was said to be very handsome, and but twelve years old.

Our boatswain, carpenter, sail-maker, and first master's mate, who had the liberty of the town for a few months, were put in close confinement with our other officers, on suspicion of attempting to raise the crew to take the town.

Dec. 25.—The Bashaw's son-in-law, Selim, who had charge of the stores, was detected in selling a quantity of cordage to a Tunisian merchant. The Bashaw ordered him five hundred bastinadoes, but Selim fled to a *Marabewt* for protection, and escaped punishment.

January 24.—Renegade Wilson, who pretended to be a great engineer, was ordered by the Bashaw to fire hot shot at a mark, but succeeded indifferently. The Bashaw, however, was highly pleased, gave Wilson eight dollars, and promised to reward him in proportion to his exertions in his future warfare. Wilson engaged to teach the Turks how to throw bombs, hot shot, and hand grenades; and to alter and improve the fortifications, etc.

Jan. 25.—The Bashaw sent me to visit the wife of Alla Mameluke. She was once a wife or concubine to the Bashaw, who gave her as a wife to his favourite. She was sister to a wife of the Emperor of Morocco, about eighteen and very handsome. She was in child-bed travail, attended by a number of Jewish women. She was delivered of a son, her first child, to the great joy of all the Turks in the castle, male and female. It was proclaimed by a loud yelling, with clapping of hands to and from the mouth, by the women of the castle.

Jan. 28.—The Bashaw was informed by Wilson, the renegade, that our crew were all armed, and about to rise upon the town. Search was made, and the report found to be false. But the Bashaw was much intimidated and an additional guard was placed over us.

February 1.—George Griffiths, one of our crew, having informed the Bashaw that he could build an air furnace, and cast guns, shot, etc., was furnished with a mason and nine of our crew, and set to work, with a promise he should have a hundred dollars for the first shot he should cast. After expending about five hundred dollars in the experiment, Griffiths this day attempted a blast in his furnace; but with all the wood and coal that the Bashaw could furnish, he could not melt the iron, and the furnace cracked in several places. It afterwards appeared that Griffiths had no intention to cast any shot.

Feb. 5.—While a number of our men were at work at the north corner of the castle, a large body of the wall fell, and killed Jacob Dowdesher. The only consolation we received from the Turks, was, that he was *amak deric* and *sansafedah*—that is *D——n his mother, he has got no faith, Romo Kelfi—He is a Christian dog.*

March 1.—An American frigate appeared off the harbour. The Turks were all at their quarters, and were manning their gun boats.

The Bashaw was preparing an armament to go against some of his refractory tribes on the borders of Egypt.

March 4.—Hassan Bey, the Bashaw's chief mameluke, was appointed to command the expedition towards Egypt, on the borders of the dominions of Tripoli. Hassan and his officers were attended by the Bashaw and several stand of colours to a *Marabewt* about three miles from town to receive absolution and assurances of victory in the intended expedition. A great part of our crew, and many Turks and Jews were employed in packing up ammunition, etc., for the camp.

March 5.—Two frigates and a brig, supposed to be American, appeared off the harbour. The people of Tripoli were preparing and moving their effects into the country, expecting a siege by the Americans.

March 12.—Swallows appeared. Apple, peach and plumb trees were in blossom, and peas in market.

March 17.—Walking by the house called the American house, I perceived that it was full of Turks, and a strong guard was at the door. On inquiry, I found that they were the sons and nearest relations of the Bashaw's officers, who had gone in the expedition to the frontiers. The Bashaw kept these people as hostages for the fidelity of his officers, whom it appears, he was afraid to trust, least they might join in the rebellion and come against Tripoli. It was said that his highness had received a letter, stating that the Americans were making great preparations to attack Tripoli. A tent was pitched on the battery of the castle, and orders given to keep watch all night, and every night afterwards. Orders were also given to make every preparation to repel the Americans.

March 18.—The Bashaw sent his son-in-law into the country for troops to protect Tripoli.

March 19.—It was reported and generally believed that the Americans had been to Alexandria in Egypt, where they had got the Ex-Bashaw[2] and four thousand Egyptians, and carried them to Syracuse,[3] where they were to be landed to act in concert with the Americans against Tripoli. I perceived many private councils and long faces amongst the Turks.

March 21.—A frigate and brig appeared off the harbour. The Bashaw told me he suspected commodore Barron was dead, as he had not heard from him for a long time. Not long before, he told me, that he had heard of the death of his brother the Ex-Bashaw. He seemed highly pleased at such news. Several of the sons and dearest friends of his chiefs in the country, were brought into the castle, as hostages for their fidelity to the present Bashaw. Symptoms of dissatisfaction appeared amongst the people.

March 22.—Two negroes were hung at the gate of the city for robbery. The Bashaw's son-in-law who had been sent into the country to collect troops to protect Tripoli, returned without success. The people refused to fight for the Bashaw, because he had made unusual demands for money, and even had stripped their wives of their jewels. For several days it had been reported that ten thousand troops were to muster on the beach near the town; and his highness was to make a speech to encourage them to fight for him against the Americans and his brother. I prepared myself to see these troops; but to my disappointment not one of them appeared.

April 7.—One of our cruisers appeared. A large gunboat was launched, which was built by the redegade West, who was one of our crew, and turned Turk.

April 12.—The Bashaw received an unfavourable letter from his agent at Malta, concerning the armament of the Americans. The Spanish consul presented the Bashaw three hundred stand of arms and a number of pistols, and, it is said, advised him to keep up the war, and force the Americans to pay his demand. It was concluded that the Bashaw's women and children should stay at the castle during the summer. They said that if they must be taken, they would rather fall into the hands of the Americans than the Arabs.

April 13.—The Bashaw declared, that if the Americans drove him to extremities, or attacked his town, he would put every American prisoner to death.

April 19.—The Bashaw interrogated me concerning the force of my country; he asked me how many marines the United States kept in pay. My answer, for good reasons, was, ten thousand! How many troops? he asked.—Eighty thousand, said I, are in readiness to march to defend the country, at any moment; and one million of militia are also ready to fight for the liberty and rights of their countrymen! At this, his highness assumed a very serious look, and I returned to my room.

[2] It has been mentioned that the ex-Bashaw, Hamet Caramelli, after failing to gain any advantages in his brother's forces, had withdrawn from Derne early in 1804, and gone to Egypt.

[3] At this time the United States utilized the harbor of Syracuse as a base from which to operate against Tripoli. A naval hospital had also been established at Syracuse.

April 27.—A very oppressive Syroc wind. Several companies of Arabs had arrived within a few days: about three hundred horse and seven hundred foot.

May 3.—The Bashaw and suit went very early this morning to the great *Marabewt*, of whom some particulars have been before mentioned. He was to continue with the Bashaw during the contention with the Americans. He now assured the Bashaw that the American frigates would be destroyed; and that the gunpowder of the whole squadron would be so damaged, that the Americans would not be able to fire a gun. He agreed to attend the Bashaw, to keep the balls and shells from hurting him. He receives large sums of money from the Bashaw.

May 14.—I received a note from capt. Bainbridge, stating the inconvenience which the officers laboured under by being in close confinement and by breathing unwholesome air. I spoke to the Bashaw on the subject, and humbly solicited that our officers might be removed to the American house. The Bashaw replied, that the war between him and my country at first was about money; but now it was whether him or his brother should be the Bashaw; and that the Americans had bound themselves to his brother in such a manner that it was not in their power to make peace with him. But that his brother and the Americans were determined to take Tripoli and take off his head. He swore by the prophet of Mecca, that if the Americans brought his brother against him, he would burn to death all the American prisoners except me; that my life should be spared, because I saved the life of his child when very sick. He went off in a great passion, and mounted his horse. His mamelukes and guard, to the number of about forty, attended him, and they took a ride to his country palace. They returned about sun set, and the minister of exteriour relations and the Bashaw were in private conference.

May 19.—A spy employed by the Bashaw, arrived from Malta and Syracuse. He brought news that the American squadron sailed for Alexandria in Egypt about twenty days before; that it consisted of 4 frigates, 3 brigs, 3 schrs. 24 gun boats, 6 bomb ketches, and several transports; that they were to take on board the former, or Ex-Bashaw, and to proceed along the coast of Tripoli, and take the principal towns; and then to attack and take the town of Tripoli, and put it in possession of the Ex-Bashaw. The Bashaw and his people seemed much agitated at this news.[4]

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[4] General William Eaton was born in Woodstock, Conn., on the 23d of February, 1764. As a boy he served for a short time in the Continental Army. He graduated from Dartmouth College in 1790, was clerk of the lower house of the Vermont Legislature in 1791–92, and then reentered the Army as a captain, later serving against the Indians in Ohio and Georgia. In 1797 he was appointed consul to Tunis, where he arrived in February, 1799.

While in Tunis he became acquainted with Hamet Caramalli, the rightful pasha of Tripoli, who about the year 1792 had been deposed by his brother Yusuf. When, in 1803, because he refused to comply with the extortionate demands of the bey of Tunis, Eaton was driven from that country, he returned to the United States to urge American intervention for the restoration of Hamet Caramalli to the throne of Tripoli on condition of a permanent peace and no tribute, arguing that this would impress the Barbary States with the power of the United States. On reaching Washington he succeeded in exciting a moderate amount of interest in his project to cooperate with Hamet Caramalli, who in the meanwhile had taken up arms against his brother Yusuf, had been defeated, and had early in 1804 withdrawn to Egypt.

In May, 1804, Eaton was appointed Navy agent and placed under the orders of Commodore Barron. To the latter the Secretary of the Navy wrote, June 6, 1804: "With respect to the ex-pasha of Tripoli, we have no objections to your availing yourself of his cooperation with you against Tripoli. * * * In such an event you will, it is believed. find Mr. Eaton extremely useful to you."

Commodore Barron's squadron sailed for the Mediterranean in June, 1804, arriving at Malta in September, and the following month Eaton was sent in the *Argus* to Egypt.

May 21.—The Bashaw with his attendants rode into the counry. According to custom he took with him on a mule, two boxes, said to contain twenty thousand sequins, (forty thousand dollars). But I did not believe they contained that sum. They were light. I had lifted them both; and they were carried to and from the mule by one slave. Another mule was loaded with the

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At Cairo he learned that Hamet, with a few of his followers, had joined the Mamelukes, who were at war with the Ottoman Government, and was at that time besieged at Minieh, 150 miles or more up the Nile from Cairo. The prospect of getting into communication with him seemed doubtful. Eaton obtained an audience with the Viceroy of Egypt and frankly explained the object of his visit. The Viceroy, delighted at an opportunity of ridding his country of an enemy, promised an amesty for Hamet and his followers and a passport through the Turkish lines. In the course of time Hamet and his followers appeared at an appointed rendezvous.

Eaton's plan had been to embark with Hamet on the *Argus* and to proceed from Alexandria to a point near Derne in Tripoli where they would meet Hamet's troops and capture the city, but it was thought best to go by land, chiefly because it was feared that Hamet's army would evaporate in his absence. He therefore formed his camp some distance to the west of Alexandria. Arrangements were made for the *Argus* to meet the expedition at the Bay of Bomba with supplies and reinforcements.

Eaton entered into a convention with Hamet in which it was provided that the Government of the United States should reestablish him in the possession of his sovereignty of Tripoli and that the expense incurred by the United States was to be repaid by Hamet out of the tribute derived from certain other nations.

Eaton's little army was composed of about a dozen Americans from the *Argus*, including Lieutenant O'Bannon of the marines and Midshipman Peck; 25 cannoniers of various nationalities, with 3 officers; 38 Greeks, with 2 officers; Hamet and his suite of 90 men; a party of Arabian Cavalry under Sheik el Tahib and another chief; a number of footmen and camel drivers, altogether about 400 men, and a caravan of 107 camels and a few asses.

This expedition to Derne is of interest because it was the first American force to operate on foreign soil. The story of the expedition is splendidly told in Gardner W. Allen's "Our Navy and the Barbary Corsairs," from which the following is quoted:

"On March 8, 1805, the march was begun across the Lybian Desert to Derne, a distance of between five and six hundred miles. For the greater part of the way the route lay within sight of the sea. Water was generally obtained from natural basins worn in the rocks by the streams during the wet season, and filled with rain water; but there was often great scarcity of water and suffering for want of it. An advance of 15 miles was made the first day, and then on the following morning the owners and drivers of the camels became mutinous and demanded advance pay. In this they were encouraged by Sheik el Tahib, one of the Arab chiefs, who made trouble during the whole march. This difficulty caused a delay of a day and a half. Hamet was irresolute and seemed to have no influence with the Arabs. At last Eaton, finding argument fruitless, assembled the Christians 'and feinted a countermarch, threatening to abandon the expedition.' This had the effect of checking the mutiny, and the march was resumed. On the 13th a courier from Derne appeared and announced to Hamet that the Province was preparing to support him. This news caused rejoicing and a discharge of firearms, which alarmed the Arabs in the rear, who thought an attack was being made. They thereupon attempted to disarm and massacre the Christians escorting the caravan, but were restrained by one of their more prudent chiefs.

"March 16 and 17, there was a cold rainstorm, and the Arabs again became mutinous. On the 18th, having advanced about 150 miles, Eaton learned that the caravan had been freighted by Hamet for this distance only. The owners finally promised to proceed two days farther, upon being paid. This took nearly all the money Eaton had, and when they had received it, all deserted, part the first night and part the second, setting out on their return to Egypt. Sheik el Tahib and other chiefs now refused to proceed until news should be brought from Bomba that the United States vessels were there, and proposed to send a runner to ascertain the fact. Eaton ordered their rations stopped. These complications consumed three days. The Arabs finally yielded, about half the caravan was induced to return, and the march was resumed.

"March 22, they arrived at a great plain, bordering upon the sea, inhabited by thousands of wild Arabs who had never before seen Christians or tasted bread. They had vast herds of camels, horses, and cattle, and countless sheep and goats. Hamet was here reinforced by 80 mounted warriors, and a caravan of 90 camels was freighted; and later another force of Arabs, including 150 warriors, with their families, joined the expedition.

packages of the Bashaw's clothing. The Bashaw always went thus provided, through fear that he might be served as he served his brother the Ex-Bashaw, who was denied to return to the castle when the present Bashaw usurped the throne. During the absence of the Bashaw, his eldest son, the Bey, had his amusement. He ordered two carpets spread on the south corner of the castle.

On the 26th a courier announced that a large force, sent by Yusuf Pasha, was marching from Tripoli to Derne. This caused another panic, Hamet hesitated and wavered, the camel drivers fled with the caravan, and Sheik el Tahib deserted with part of his tribe and a large number of other Arabs. Hamet begged Eaton to offer inducements for the Sheik to return. This Eaton refused to do and was glad to be rid of him, but he soon came back of his own accord. On the 28th Hamet's slender stock of resolution seemed to have oozed away completely, and he decided to abandon the enterprise and return to Egypt. Eaton kept on with the baggage, and in two hours Hamet followed him. That evening all the Arabs that had joined a few days before deserted, having been discouraged by Shiek el Tahib. An officer was sent back after them and returned with them the following afternoon.

"The next complication was a quarrel between Sheik el Tahib and another Sheik, which ended in the latter's deserting with many others whom it was important to retain on account of their influence with Arabs near Derne. Hamet went back to induce them, if possible, to return. 'From Alexandria to this place,' wrote Eaton, 'we have experienced continual altercations, contentions and delays among the Arabs. They have no sense of patriotism, truth nor honor; and no attachment where they have no prospect of gain, except to their religion, to which they are enthusiasts. Poverty makes them thieves and practice renders them adroit in stealing. The instant the eye of vigilance is turned from an object on which they have fixed a desire, it is no more to be found. Arms, ammunition, and provisions most engage their furtive speculations, but sundry of our people have been robbed of their clothes and other articles. With all their depravity of morals they possess a savage independence of soul, an incorrigible obstinacy to discipline, a sacred adherence to the laws of hospitality and a scrupulous pertinacity to their religious faith and ceremonies.' After an absence of four days, Hamet returned with the Sheiks who had deserted. Meanwhile there had been more trouble with Sheik el Tahib, who demanded an increased ration. He became insolent, and Eaton threatened him with death if he attempted to incite a mutiny. He rode off with two other chiefs, but a few hours later returned very penitent and took an oath to remain faithful thereafter.

"On the evening of April 2, Eaton held a meeting of Hamet and all the Sheiks in his tent, and endeavored to impress upon them the importance of union and perseverance, and they all 'gave pledges of faith and honor.' The force now consisted of between six and seven hundred fighting men, who with camel drivers and camp followers, including women and children, made a total of about 1,200. The next morning the march was resumed, but after advancing only 10 miles the Arabs positively refused to go farther until a caravan had been sent to an oasis five days' journey inland for a supply of dates. Eaton finally agreed to this on condition that they should proceed the next day, being met at Bomba by the detachment sent after the dates. During the few days following there was much suffering for lack of water, but a good supply was found on the 8th.

"On this day, also, occurred the most serious commotion yet experienced. Although there was only a six days' supply of rice and no other food, Hamet insisted upon encamping and sending a courier to Bomba to look for the American ships. Eaton stopped the Arabs' rations. They prevailed upon Hamet to return to Egypt and made a move to seize provisions. Eaton assembled the Christians and formed a line to resist this attempt. After facing each other for an hour the Arabs dispersed. Supposing the tumult tranquilized, Eaton ordered the troops to pass the manual exercise according to his daily practice. In an instant the Arabs took an alarm, remounted and exclaimed, 'The Christians are preparing to fire on us.' The Pasha mounted and put himseelf at their head, apparently impressed with the same apprehension. A body of about 200 advanced in full charge upon our people, who stood their ground motionless. The enemy withdrew at a small distance, singled out the officers, and with deliberate aim cried, 'Fire.' Some of the Pasha's officers exclaimed, 'For God's sake, do not fire. The Christians are our friends.' * * * Eaton advanced toward the Pasha, and cautioned him against giving countenance to a desperate act. At once a column of muskets were aimed at his breast. The Pasha was distracted. A universal clamor drowned Eaton's voice. He waved his hand as a signal for attention. At this critical moment some of the Pasha's officers and sundry Arab chiefs rode between the lines with drawn sabers and repelled the mutineers. Hamet repented of his rashness, ordered the Arabs to disperse, called Eaton his friend and protector, and promised to take up the march if rations were issued. This was done, and the next morning they moved forward.

On one of the carpets, the Bey and his attendants seated themselves, with a band of musick, consisting of two men with tamborines, and one with a sort of drum. Murat, his uncle, and myself were seated on the other carpet. Three large negroes were brought and ordered to perform before the Bey. The musick then struck up and the three negroes commenced the negro dance, with

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"By April 10 there was 'nothing but rice and water for subsistence and that at half rations' for three days. No news from Bomba. Hamet was beginning to entertain the idea that he was being used by the Americans merely 'for the purpose of obtaining a peace with his brother,' a suspicion that proved to be not wholly unreasonable. A mutiny was organized among the cannoneers, of which Eaton was secretly informed; they were to insist on a full ration. The situation seemed critical, and Eaton took O'Bannon into his confidence. Early in the evening, however, before any outbreak took place, a courier arrived from Bomba with news that the ships had been sighted. Confidence was now restored, and nothing more was heard of the mutiny. The last of the rice was issued on the 12th. The next day Hamet had one of his camels killed, and exchanged another for sheep with the Arabs; this gave the troops one full ration. For the next two days they subsisted on roots and herbs. On the afternoon of the 15th they reached Bomba, but found there no trace of a human being and not a drop of water; moreover, not a vessel was in sight. The Arabs now became mutinous and abusive. Eaton took the Christians upon a mountain, where they built fires and kept them burning all night.

"The next morning at 8 o'clock, just as the Arabs were preparing to leave in disgust a sail was sighted, which proved to be the *Argus*, Isaac Hull in command; she had seen the smoke of the fires. Eaton went aboard at noon. He found a letter from the Commodore dated March 22, 1805, informing him that stores and provisions were sent and seven thousand dollars in specie, but that no marines could be spared. The camp was moved around the bay to a cistern of water which had been found, and in the afternoon provisions were sent ashore. Either here or later, at Derne, Midshipman Mann came ashore and rejoined Eaton. April 17, the *Hornet* arrived with abundance of provisions. They remained in camp recuperating until the 23d, when they resumed the march with a sufficient supply of provisions to carry them to Derne, a distance of about 60 miles. The next day another courier arrived, with the news that an army from Tripoli was rapidly approaching Derne and would probably reach the place first. The Arabs were again seized with alarm and became mutinous. Sheik el Tahib, at the head of the cavalry, began a retreat. Hamet, as usual, was irresolute and despondent. After much persuasion and a promise of money, the sheiks were induced to advance, and on the afternoon of the 25th they encamped on a height overlooking Derne.

"The town was reconnoitered, and information was also obtained from a number of shieks who came out in the evening to meet Hamet and assured him that two of the three departments into which the city was divided were loyal to him. The third department, situated along the water front and containing a third of the inhabitants, was devoted to the interest of his brother Yusuf. This department was, however, the strongest in position and in its defense, which consisted of a water battery of eight 9-pounders on the northeast breastworks, and walls of old houses on the southeast, and a 10-inch howitzer on the terrace of the bay's palace; the walls of the houses were also pierced with loopholes for musketry. It was likewise learned that the bey had 800 fighting men, and that the Tripolitan army was near at hand. On the 26th Eaton sent in a flag of truce with a letter to the bey offering terms. His reply was: 'My head or yours.' Smoke signals were made, and in the afternoon the *Nautilus* appeared. The next morning the *Argus* and *Hornet* hove in sight. The *Nautilus* and *Hornet* came close in, and sent a boat ashore with two field pieces. One of these was landed, but owing to the great difficulty and delay of hauling it up the steep and rocky precipice that bordered the bay, the other was left behind, as Eaton was very anxious to attack without any loss of time.

"Eaton at once set about making his dispositions, and the attack was made that day, Apr. 27, 1805. The enemy began by firing on the ships. The *Hornet*, Lieutenant Evans, anchored within a hundred yards of the water battery and opened fire. The *Argus*, Captain Hull, and *Nautilus*, Captain Dent, anchored about half a mile from shore, to the eastward of the *Hornet*, and opened on the town and battery. The breastworks and a ravine at the southeast part of the town was held by a considerable force of the enemy, and opposite this point, on an elevation, were posted the squad of marines, 24 cannoniers with the fieldpiece, and 36 Greeks, all under the immediate command of Lieutenant O'Bannon; also a few Arabs on foot. Hamet occupied an old castle south-southwest of the town, with the Arabian cavalry drawn up in his rear. By 2 o'clock the action had become general, and 45 minutes later the battery was silenced by the fire from the ships, and most of the enemy in that quarter being driven many ridiculous airs, whirling around, shaking their heads and roaring like mad bulls. This continued about half an hour, when they appeared to be raving mad. They ran about, as if to tear in pieces every body they met. One of them made a leap at me, but was prevented from reaching me, by the Bey, Murat and another Turk, who jumped between us. Two other Turks caught

out reinforced the party opposed to the Christian land forces. At this point the enemy's musketry fire was very hot. In the excitement the rammer of the fieldpiece was shot away and its fire in consequence slackened. Eaton saw that his little force of undisciplined troops was falling into confusion, and as the only hope of restoring confidence, he ordered a charge. The enemy fled from their defenses, firing from behind trees and houses as they retreated. At this moment Eaton was shot through the left wrist by a musket ball. O'Bannon and Mann, with the marines, Greeks, and as many of the cannoniers as could be spared from the fieldpiece, pushed on toward the battery under a heavy fire from the houses. The way was cleared for them along the beach by the ships' guns. The battery was soon captured and the American flag was planted upon its walls. The guns, which were found ready loaded and primed, were turned on the town, and with the help of the ships' fire the enemy were soon dislodged from their houses. The bey fled from his palace and sought refuge in a mosque, and Hamet took possession of the deserted residence. The Arabian cavalry flanked the flying enemy, and a little after 4 o'clock the whole town was in the hands of the assailants. The ships' boats were sent ashore with ammunition for the battery, and took off the wounded. One marine was killed and two wounded, one of them mortally; 11 others were wounded, including Eaton and several Greeks. Practically all the fighting on this occasion was done by the Christians under Eaton's command, assisted by the ships' batteries.

"May 1 the *Hornet* sailed with dispatches for Commodore Barron. The bey of Derne left the mosque, where he had taken refuge, and sought asylum in the harem of an aged sheik, who, although a partisan of Hamet, could not be induced to break the laws of hospitality by giving him up. The town was now fortified against the Tripolitan Army, which was approaching. The enemy advanced slowly, and on the 8th occupied the ground held by Eaton's forces before the capture. They spent several days in attempts to corrupt the inhabitants of the town, who were vacillating between the two parties, fearing that if they adhered to Hamet they would be slaughtered in the case of his defeat. The late bey intrigued actively from his sanctuary, attempting to incite a counter revolution in the town. At the head of 50 Christians, Eaton proposed to enter the house of the old sheik and seize the bey. This course, however, was offensive to the Arabs, and Hamet begged that action be deferred until the next day. That night, May 12, the bey escaped to the Tripolitan camp.

"Eaton believed that the enemy before Derne would disperse, but they displayed more resolution than he gave them credit for. On the 13th, apparently encouraged by the bey's tales of disaffection towards Hamet, they made an attack on the town which fell only a little short of being successful. In the morning they appeared on the heights back of the town to the number of about 1,200, including Tripolitans, Arabs, and fugitives from Derne. After reconnoitering, they attacked an outpost about a mile from the town, consisting of 100 of Hamet's Cavalry, who held their ground firmly until overcome by numbers, when they were forceed to give way. They retreated into the town, followed by the Tripolitans, who pursued as far as the bey's palace, now occupied by Hamet. Although exposed to the fire of the *Argus* and *Nautilus*, as well as of the battery and small arms from the houses, they made a vigorous attack on the palace, determined, if possible, to seize the person of the pasha. Their success seemed imminent, and Eaton began to fear that the day was lost. His little force of Christians was too weak for a sortie from the battery, and he turned the guns upon the town. A fortunate shot from a 9-pounder killed two of the enemy's mounted men. Immediately the undisciplined rabble beat a disorderly retreat, pursued by Hamet's Cavalry and harassed by the fire from the ships. On this day Hamet's people surprised Eaton by an exhibition of courage and firmness of which their previous behavior had given him no reason to believe them capable. From deserters it was learned that the enemy had lost 28 killed and 50 wounded, 11 of them mortally. Hamet lost 12 or 14 killed and wounded.

"The Tripolitans fortified their camp, about 3 miles distant, and made preparations for another attack, but their leaders could not induce the Arabs to join in it. Eaton had the same difficulty. He wished to attack the enemy's camp, but Hamet and his people could not be prevailed upon to make the attempt. Eaton was beginning to fear a dearth of provisions, as the enemy cut off all supplies from the country. The *Nautilus* sailed hold of the negro and held him, when I, by the advice of the Bey, went to the top of the north end of the castle, where I could see the sport in safety. During the frolick, I saw those negroes chase several Christians; and I was told that they often tear all their clothes off, and hurt them much by biting, etc.

May 22.—I was informed, that, in a letter which the Bashaw received the

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May 18 with dispatches, leaving the *Argus* alone before Derne. Several times the enemy seemed about to attack, but they could never persuade the Arabs to expose themselves again to the fire of the Christians; artillery they could not face. Eaton believed that if he had had money he could have bought a wholesale defection of these allies of the Tripolitans. 'We want nothing but cash to break up our enemy's camp without firing another shot.' On the 28th the enemy sent a detachment of 50 or 60, supported by cavalry, on a foraging expedition; they descended a ravine and attacked a party of Arabs, but were driven back. June 1, the *Hornet* returned with dispatches from the commodore, dated May 19, announcing that peace negotiations were about to be entered upon, and that Derne must probably soon be evacuated. June 10, the enemy, who had been largely reinforced by Arabs, made another attack and were firmly resisted by Hamet's cavalry. The engagement which ensued lasted four hours. The *Argus* was occasionally able to use her long 12-pounders when the enemy in their movements emerged from the hills and ridges, and one of Eaton's fieldpieces also gave some assistance. The Tripolitans were finally repulsed with a loss, according to deserters, of 40 or 50 killed, and 70 wounded. Hamet lost between 50 and 60 killed and wounded. O'Bannon wished to lead out the Christians and take an active part in the fight, but Eaton was unwilling to leave the defenses unmanned, and, moreover, doubted if offensive operations would be justifiable in view of the peace negotiations supposed to be in progress.

"June 11, the *Constellation*, Captain Campbell, arrived with orders from Commodore Rodgers, dated June 5, to evacuate Derne immediately, and announcing that peace had been concluded. It now became necessary to embark on the *Constellation* all the Christians, together with Hamet and his suite. This must be done secretly, moreover, as it was feared that the populace and the Arabs, enraged at being deserted, would attempt to revenge themselves by a massacre of those about to depart. Eaton was filled with disappointment and mortification at this ignominious ending of the expedition which he had hoped would result in the capture of Tripoli. But he had now no choice but to yield to necessity. To divert the attention of the people, preparations for an attack on the enemy were made June 12. In the evening patrols of marines were placed as usual to prevent communication between the town and the battery. The *Constellation's* boats came ashore and first took off the cannoniers and Greeks, with the fieldpieces and the 10-inch howitzer captured April 27. Then Hamet and his suite were embarked, and next the American officers and marines. Lastly, Eaton himself put off in a small boat, and had barely got clear 'when the shore, our camp, and the battery were crowded with the distracted soldiery and populace, some calling on the pasha, some on me, some uttering shrieks, some execrations. Finding we were out of reach, they fell upon our tents and horses, which were left standing, carried them off, and prepared themselves for flight.'

"The next morning the Arabs and many of the inhabitants of Derne fled to the mountains. The enemy had already retired, under the impression that the *Constellation* had brought reinforcements to Eaton. A Tripolitan officer, a messenger from Yusuf Pasha, who had come from Tripoli in the *Constellation*, went on shore under a flag of truce, bearing letters of amnesty from the pasha 'to the people of Derne on condition of their returning to allegiance;' but the people remaining in the town had no faith in Yusuf's promises, and in despair prepared to defend themselves to the last. This abandonment of Hamet's followers to the tender mercies of his brother was the most painful part of this whole transaction, but it is believed that no harm came to them and that Yusuf's promises in their case was fulfilled.

"The *Constellation* sailed directly for Syracuse. From this point Eaton sailed for the United States in the brig *Franklin* August 6, and arrived at Hampton Roads Nov. 10, 1805."

The situation of the unfortunate Hamet was by no means befitting to a royal exile. In a letter to Eaton, dated June 29, 1805, he acknowledges that everything had been done for him which he had any reason to expect, but suggests "some small assistance to enable me to subsist myself and suite." Accordingly, by order of Commodore Rodgers, he was allowed $200 a month for the support of himself and his 12 or 15 dependents in Syracuse. A few weeks later he appealed to the President and to the people of the United States for relief. He was allowed for a time to suffer in neglect. In April, 1806, Congress appropriated $2,400 for his benefit, but it was not delivered to him until more than a year later. The allowance authorized by Commodore Rodgers was then stopped. In the meantime, Feb. 18, 1807, he had addresed a memorial to Con-evening before, it was stated that Hassan Bey and his army were taken in Derne, by the Americans and Sadi Hamet, the Ex-Bashaw. I was desired not to mention it, because it was a great secret; and the Bashaw did not wish to let his people know it. I was also informed that the Bashaw called a council of his chiefs, and proposed to put all the American prisoners to death, but it was agreed to postpone this measure for that time.

May 23.—Twenty-five of our men were sent with a cart for timber into the country. The wind from the desert was very heavy and hot. The men almost perished in the sand, which flew and drifted like a snow storm in our country. They stopped through fatigue, and asked their driver, who was a Turk, for liberty to drink at a well which was near them. The Turk replied, that they were *Romo kelps*, Christian dogs, and said they should have no water. He gave them all a severe beating with a large club, which he always carried with him to drive them with, and made them go on with the cart, which the poor fellows had to drag, loaded with timber, through the burning sand. They returned towards night almost perished.

May 24.—At night the Bashaw dispatched a boat with powder, musket balls and money for his troops, who were collecting to oppose the approach of his

gress in which he says: "I will not, like the world, reproach the representatives of the American Nation with ingratitude. I rather implore their commiseration toward me; at least so far as to restore to me my family and to grant me a competence." In May, 1807, Dr. George Davis, who had been for some years chargé d'affaires of the United States at Tunis, went to Tripoli as consul, and one of his first acts was to demand of the pasha the fulfillment of the third article of the treaty of June 4, 1805, which provided for the restoration to Hamet of his wife and children. It was now learned that Colonel Lear had agreed to a secret article of that treaty, allowing the pasha four years to comply with this stipulation. This fact had never been communicated to the State Department nor to Congress, although Eaton had stated his suspicion of some such secret agreement in a letter to the chairman of the Senate committee on Hamet's application. The President, in his message of Nov. 11, 1807, expresses surprise at this affair, and says: "How it has happened that the declaration of June 5th has never before come to our knowledge can not with certainty be said. But whether there has been a miscarriage of it or a failure of the ordinary attention and correctness of that officer in making his communications, I have thought it due to the Senate, as well as to myself, to explain to them the circumstances which have withheld from their knowledge, as they did from my own, a modification which, had it been placed in the public treaty, would have been relieved from the objections which candor and good faith can not but feel in its present form." Doctor Davis, however, prevailed upon the pasha to restore his brother's family without further delay, and this was done in October, 1807. Dec. 18, 1807, a committee of the House of Representatives recommended further pecuniary aid for Hamet. In 1808 provision was made by the pasha for his brother's residence in Morocco, with a pension; and in the following year, through the influence of Consul Davis, Hamet was appointed by the pasha to the government of Derne. Two years later he was again expelled by his brother and fled with his family to Egypt, where he died.

Upon his return to America, Eaton was received with marked distinction. The Legislature of Massachusetts made him a grant of 10,000 acres of land in Maine. But he could never get over his chagrin and disappointment at the inglorious termination of his expedition, which he had hoped and believed would end with the capture of Tripoli, the restoration of Hamet, a brilliant victory for the United States forces afloat and ashore, and an honorable peace. The remainder of his life was embittered. Toward those who, he believed, had in any degree thwarted his plans, Lear especially, he was unsparing of his reprobation. He therefore not unnaturally made enemies, and a resolution to present him a medal was defeated in Congress by a small majority. He was embarrassed by long delay in settling his claims against the Government. Finally, in February, 1807, a bill passed in Congress authorizing the State Department to settle the accounts according to equity. Many years later his heirs applied to Congress for relief. The total expense of the Derne expedition was a little less than $40,000; Eaton would accept for his own services during this campaign only enough to cover his personal expenses. His relations with Hamet continued cordial, and for some years they kept up a friendly correspondence. Eaton died in 1811 at the age of 47.

brother Hamet, the Ex-Bashaw. The eldest son of Hamet, was confined in the castle by order of the present Bashaw. The Bashaw was so much agitated at the news of the approach of his brother, that he this day declared, that if it was in his power now to make peace and give up the American prisoners, he would gladly do it, without the consideration of money. His funds were so low, that his steward ran in debt for the supply of the kitchen. He gave his mamelukes and domesticks, and myself, but one meal per day.—The rich Turks in town took turns in supplying his few troops. He heartily repented for not accepting the terms of peace last offered by our country.

May 26.—Three frigates in sight. At about 11, A. M. the smallest came near in, and hoisted the banners of peace. The Bashaw asked his head men of the town, who were with him in his gallery, whether it was best to hoist his white flag. All except one, the charge de affairs for Algiers, declared in favour of it, and of making peace if possible. They expressed great contempt towards the Algerine consul for his advice, and said that whoever would advise the Bashaw not to hoist the white flag at such a critical moment must be his foe and not his friend. The Algerine soon disappeared and left the castle. The Spanish consul soon after came to the castle; and the Bashaw sent him in one of his handsome boats, with Shous Hammad to the frigate. They returned at evening with the joyful news of a prospect of peace. There was a visible change, from gloominess to joy, in the countenance of all the Turks.

May 27.—Both Turks and Christians were all anxiously looking out for the frigates. It was said that Col. Lear had promised to come on shore this morning and that the Spanish consul was preparing a dinner for the gentlemen who were expected to come with him. We were all agitated alternately by hope and despair. The terraces and every eminence in town, were covered with people of all classes and ages, who were looking for the wished for peace-maker. But not a frigate nor a sail hove in sight during the day.

May 28.—All looking out again for our squadron. A brig hove in sight in the morning, which we all at first thought was the flag ship. On discovering it was a brig, a gloominess again appeared on every countenance. The Turks began to think that the frigate had gone to fetch the whole fleet, which they heard consisted of sixty sail of different sizes. They thought that the flag of truce was only a plan of the Americans, to find out the force of Tripoli, etc. But at sun set three frigates and a brig appeared, which revived our hopes. The Bashaw showed the greatest anxiety for peace. He was sensible of the danger he was in from the lowness of his funds and the disaffection of his people.

May 29.—Three frigates and a brig bore down upon the town and displayed the ensigns and signals of peace, which were immediately answered from the castle. The Spanish consul, Fafah the Jew and several Turks went on board, and did not return until late at night, when it was reported that negotiations for peace were going on rapidly.

May 31.—The Spanish consul and Shous Hammad went on board to see the Commodore, and returned at night. The Bashaw sent me to inform Captain Bainbridge, that peace was agreed on, which I did to the great joy of the officers.

June 1.—The truce continued. Our men were still drove to hard labour, and our officers kept confined.

June 2.—I received a letter from Captain Bainbridge stating that the terms of peace were agreed on, and that we should soon go on board the squadron. I immediately read this letter to our crew, who were so overjoyed that many of them shed tears. They were still drove to hard work, and many of them flogged.

June 3.—The articles of peace were signed, and salutes fired from the frigates and batteries.

June 6.—I bid the Bashaw a final adieu, at which he seemed much affected.

James Fenimore Cooper writing of the war with Tripoli, in his "History of the Navy of the United States of America," makes the following comments upon this naval campaign and its results:

"It is not easy to express approbation of the terms of this peace. America had been contending for the usages of civilization, and the rights of nations, and the ransom was a direct abandonment of both. When we remember the force that was about to assemble before Tripoli, the season of the year, the fact that Derne was occupied by Hamet Caramalli, and the disposition that so generally prevailed in the squadron to renew the attacks on the enemy, we find it difficult to believe that better terms might not have been obtained. How far the course of the negotiator was compelled by his instructions, we have no means of saying, but the treaty was approved and ratified. While many condemned it as unwise, all, however, rejoiced that it was the means of restoring so many brave men to their country. It is no more than liberal, moreover, to believe that the situation of these unfortunate officers and men, had a deep influence in inducing the Government to forego abstract considerations, with a view to their relief.

"Thus terminated the war with Tripoli, after an existence of four years. It is probable that the United States would have retained in service some officers, and would have kept up a small force, had not this contest occurred, but its influence on the fortunes and character of the Navy is incalculable. It saved the first, in a degree at least, and it may be said to have formed the last. Perhaps no service, either in the way of ships or officers, ever had so large a proportion of what was excellent in it, and so small a proportion of that which was defective, as the Navy of the United States, the day peace was signed with Tripoli. A stern discipline, a high moral tone, rare models in seamanship, active warfare, the means of comparison, and a spirit of emulation that is certain to carry the national character to the highest level, whenever the national energies can be permitted to exhibit themselves, had conspired to produce this end. The petulant and always questionable proofs of private rencontres, which are so apt to sully the renown of infant services, had disappeared in a chivalry that seemed to have forgotten all but the country and her honor. Not a duel was fought during the command of Preble; the brave men assembled under his orders, regarded each other as brothers, and the honor of one appeared to be connected with the honor of all. An admirable *esprit de corps* was created, and the button, which bore the emblem of the common profession, was deemed a signal of the presence of a friend. Men had stood by each other

108165—22——6

in moments of severe trial, and even the body of the Nation, which is so little addicted to the sentimental, or the abstract, began to regard the flag with open pride. In a word, the tone, discipline, pride, emulation, and spirit, that the Navy derived from this remote and, in one sense, unimportant war, prepared it for another and a severer trial that was at hand. The impression produced in the Mediterranean was also favorable, and the head of the Romish church is said to have publicly declared, that America had done more for christendom, against the barbarians, than all the powers of Europe united."

EDITORIAL.

SIR PATRICK MANSON.

The death of Sir Patrick Manson, the distinguished parasitologist and teacher of tropical medicine, occurred on Sunday, April 9, 1922, at his house in London. The Lancet and the British Medical Journal for April 15 contain glowing tributes to his memory. He was born in Aberdeenshire on October 3, 1844, and was educated at Edinburgh and at the University of Aberdeen, where he graduated in medicine in 1865. He spent the early part of his professional life in the East.

In 1866 he went to Formosa to act as medical officer to a group of merchants and missionaries. Here he encountered diseases, especially beriberi and elephantiasis, which for the most part were unstudied in the medical schools of Great Britain, while their etiology was unknown to the entire scientific world. After practicing in Formosa for five years he went to Amoy, in China, where he acted as medical officer to the Chinese maritime customs and was in charge of a large native hospital. In Amoy he saw many forms of elephantiasis, but could at first find no satisfactory solution of the problem it presented. During a visit to London in 1874 he heard for the first time of the discovery made by Timothy Lewis in 1872 that in the blood of a proportion of the inhabitants of certain districts of India was to be found an organism which Lewis called the *Filaria sanguinis hominis*. These parasites Lewis has encountered in association with elephantiasis. On his return to China in 1876 Manson discovered that these parasites were present in many districts in a high percentage of the population. He spent the next two years in working out the life history of filaria. As the parasite showed no evidence of growth while in the blood or any features warranting the supposition that it was capable of reproducing itself, the inference was that it was an immature form. After much search

Manson found that this was the case, although the discovery had been anticipated by Bancroft as well as by Lewis. Turning his attention to the manner in which this organism entered the body it occurred to Manson that, as it was never found in any of the natural discharges, it could not escape spontaneously so as to pass from man to man without the aid of an agent capable of penetrating the skin and withdrawing blood. The mosquito appeared to him to be the most likely agent in the dissemination of falaria. To determine the frequency with which that parasite was present he examined the blood of a thousand natives with the help of two Chinese medical students. These assistants were employed in the hospital, one working in the daytime, the other at night. The one who worked at night brought Manson many specimens, the other seldom found a filaria. Investigating this point he found that in ordinary conditions of health, this filaria came into the peripheral blood stream about sunset, increasing in numbers toward midnight, but decreasing toward morning. This filaria periodicity suggested an adaptation of the habits of the parasite to the nocturnal habits of the mosquito. The next step was to determine whether the filaria was ingested with the blood which the mosquito imbibed and, if so, what changes occurred. An examination of the abdominal contents of mosquitoes which had fed at night upon a patient having filaria in his blood, showed the presence of the organism and its stimulation by the digestive juices to certain structural changes; its inclosing sack had been broken and discarded, while considerable growth had taken place, accompanied by the development of a mouth and alimentary canal. In later years, after months of research, it was demonstrated by Dr. G. C. Low, one of Manson's pupils in the London School of Tropical Medicine, that the filaria in its modified form leaves the stomach of the mosquito, reaches the thoracic muscles and finally the proboscis, in which locality it is ready to infect man. It was thus proved that certain kinds of mosquitos are carriers of this filaria and are agents in transmitting the diseases to which this parasite gives rise.

In 1883 Manson returned to England where he worked for the first time with an oil immersion lens then recently perfected. While at home he published a small book on filariasis, and in 1884 returned to China, where he confirmed his previous work with the better apparatus now at his disposal and made his original researches into sprue. The years 1885 to 1889 were spent at Hongkong in general practice, where he founded a medical college for the Chinese.

In 1890 he returned to England, and with his unrivaled personal knowledge of tropical medicine began practice as a consultant in London. He became physician to the Seamen's Hospital Society in 1894, and in 1897 was appointed medical advisor to the colonial office. In 1898 he delivered at St. George's Hospital a lecture on the need of the special study of tropical diseases, which resulted in the establishment of the London School of Tropical Medicine.

Manson's knowledge of the life history of filaria was of value in clearing up the mystery surrounding the malaria parasite which had been discovered by Laveran in Algiers in 1880. Manson reasoned that this parasite like the filaria, to pass from man to man, must require the intervention of some blood-sucking insect as the mosquito. It had already been noticed that the malaria organism underwent certain changes, becoming flagellated when removed from the human body, and Manson concluded that these flagellated bodies were an early form of the extra-corporeal phase of the parasite. At Manson's suggestion the life history of the malarial parasite was worked out in India by Sir Ronald Ross to the satisfaction of the scientific world, and two well known experiments conducted in Italy and in London demonstrated to the world at large the means of preventing malarial infection. The first of these experiments was the sending out to the most malarious port of Italy two observers, Dr. Louis Sambon and Dr. G. C. Low, who were to live among the malaria-stricken population, exposing themselves all day to the ordinary environment, but who were to retire for the night before sunset into houses specially protected from invasion by mosquitoes. These men remained healthy, while the inhabitants of the district were ill and often dying of malaria. The second experiment consisted of subjecting healthy subjects in London to the bites of infected mosquitoes collected in the malarious parts of Italy. These men suffered from malaria fever two weeks after they were bitten, the parasites being found in their blood.

"Sir Patrick Manson retired from active practice in 1913," we are informed by the Lancet, "and for a time traveled in Ceylon and South Africa noting hygienic problems. On his return he continued to take a deep interest in the conduct of the London School of Tropical Medicine and the progress of his special branches of science. He exercised great influence upon all who worked with him, for which nothing was too big or too small for him to consider; his clinical acumen was sound, so that he made few mistakes. His habit of thought may be summarized in his own words written in 1909 to his son-in-law: 'Never refuse to see what you do not want to see or which might go against your own cherished hypothesis or against the views of authorities. These are just the clues to follow up, as is also and emphatically so the thing you have never seen or heard of before. The thing you can not get a pigeonhole for is the finger point showing the way to discovery.' His own scientific hypotheses had a knack of turning out right—for example, his forecast of the life history of *Schistosoma haematobium* in the fourth edition of his manual of Tropical Diseases in 1907; also his suggestion in 1903 of the two species of schistosoma proved true by Leiper in 1915. Younger men who came under Manson's influence remarked always that in outlook and in knowledge he remained eager and enthusiastic to the end. His interest in his work never flagged. Only 14 days before his death he visited the London School of Tropical Medicine and critically examined some microscopical preparations, showing his usual perspicacity in picking out the important points in each specimen and emphasizing the lessons they taught. Almost the last words he uttered expressed his hopes for the future of this school for which he anticipated a still wider field of work in cooperation with the Rockefeller scheme for the new Institute of Hygiene.

"He married, in 1876, Henrietta Isabella, daughter of Capt. J. P. Thurburn, R. N., by whom he had two sons and three daughters, one of whom is the wife of Doctor Manson-Bahr, the editor of the last edition of Sir Patrick Manson's famous Treatise on Tropical Diseases."

We learn from the British Medical Journal that "Manson was a devoted disciple of Izaak Walton and at one time used to fish in Scotland every year. In recent years he deserted the rivers of his native land for Ireland and took a place at Clonbur, County Galway, where he indulged his sport to his heart's content. After his retirement from practice he retained his interest in the London School of Tropical Medicine and usually spent part of the winter in London. For many years he had been crippled by gout and rheumatism, but his mind remained vigorous." (W. M. K.)

THE DEMAND FOR TRAINED LEADERSHIP IN SANITATION.

On reading Capt. W. H. Bell's article on the Sanitary Inspector of the Community, which appeared in the July number of the BULLETIN, we recall to mind the new types of technically expert individuals demanded by the expanding conception of health. It has been estimated that in the next 10 years the number of persons engaged in public-health work in civil communities in this country must be doubled. The same ratio of increase will undoubtedly be noted in regard to naval sanitarians. In discussing the demand for trained leadership in public-health work George E. Vincent, president of the Rockefeller Foundation, said: "Only in the last few years have opportunities for special public-health training been available in the United States. With exceptions almost negligible in number, American health officers have had no other formal training than that of doctors of curative medicine. They have gained what special competence they may possess in the hard, wasteful, and one-sided 'school of experience.' That a few have attained the level of 'sanitary statesmen' is an evidence of exceptional ability and character, not a vindication of rule-of-thumb, trial-and-error methods. The future of preventive medicine depends upon drawing first-class men and women into the profession and giving them efficient, modern, specialized training and supervised practical experience." (W. M. K.)

ON THE USE OF THE SCHICK TEST, ANTITOXIN, AND TOXIN-ANTITOXIN IN THE PREVENTION OF DIPHTHERIA IN THE NAVY.

The Schick test and the active immunization of individuals susceptible to diphtheria are procedures rapidly coming into more frequent use. Important work in this direction has been carried out on a large scale among school children and those in orphanages and similar institutions. Particularly notable was the work of Park and Zingher, who administered immunizing doses of toxin-antitoxin mixtures to more than 52,000 nonimmune school children in New York City. The conclusion reached as the result of this work is that all children between the ages of 6 months and 5 years should receive immunizing doses of toxin-antitoxin, and that all children of school age found by the Schick test to be susceptible should be immunized by the same method. The conclusions in regard to the immunization of adults are less definite. In view of the fact that so large a proportion of adults have severe reactions following the immunization treatment, Doctor Park does not even urge nurses to submit to it. This work brings us face to face with the problem of diphtheria prevention in the Navy. To what extent, if at all, are we to make use of the Schick test, antitoxin, and toxin-antitoxin in the prevention of the occurrence and spread of diphtheria?

The Schick test and its purpose are well known. Descriptions of the usual method of immunization by toxin-antitoxin have appeared in previous publications of the Bureau of Medicine and Surgery, and it is unnecessary to give more than an outline of it here. Briefly, it consists of three subcutaneous injections, at seven-day intervals, of a 1 c. c. mixture of diphtheria toxin and antitoxin. If it should be thought desirable to immunize the personnel of the Navy it would be advisable to do a preliminary Schick test on all individuals and immunize only those who are, by this procedure, found to be susceptible to diphtheria. It would also be necessary to apply the Schick test three to six months after the course of injections to determine whether the individual had been rendered immune. Active immunity develops slowly, often requiring 8 to 12 weeks. In his follow-up work in New York City, Park found that three injections of toxin-antitoxin mixture had produced an immunity in about 90 per cent of those who had been previously nonimmune.

During the 11-year period ending December 31, 1920, the average annual admission rate per thousand for diphtheria in the Navy was 2.22. The death rate for the same disease was 5.77 per 100,000, and the case fatality rate 2.6 per cent. The death rate for the United States in 1917 was 16.5 per 100,000. In Massachusetts in 1919 it was 15.4 per 100,000. These are representative figures.

There are a number of reasons for the lower death rate from diph theria in the Navy as compared with the population at large. In the first place, the naval personnel is an adult population, and, as so conclusively shown by Park and others, most adults are immune to diphtheria. The figures for New York and other city populations show about 12 per cent of adults susceptible as against 50 per cent of children under 5. In rural communities the percentage of nonimmunes is somewhat greater, but in a mixed adult population the average figure would probably be not far from 20 per cent. Park believes that the repeated exposure of one living in the congested districts to the diphtheria bacillus, resulting in slight, unrecognized, mild infections of the mucous membranes, leads to sufficient development of antitoxin to produce an immunity—the so-called natural or contact immunity. Living conditions in the Navy approximate fairly closely, as regards crowding, the densely populated quarters of our cities, and it is probable that after a few months of Navy life the number of nonimmunes should approach the city figure of 12 per cent.

Another reason for the lower death rate for diphtheria in the Navy is the fact that the personnel is under constant medical supervision. Wherever numbers of men are grouped together a medical officer is readily available. Moreover, line officers cooperate with the medical officers during epidemics in seeing to it that the men report to the sick bay when the first symptoms develop. Control of the epidemic is thus facilitated, and in the case of diphtheria the early administration of antitoxin is made almost universal.

As a result of the high degree of immunity of the naval personnel and the prompt steps taken to prevent diphtheria spread when a case develops diphtheria should not be a menace in the Navy. Rarely do more than a few cases develop on board ship in any so-called epidemic. In view of these facts the need of general immunization measures in the Navy is not as great as is the case among the population at large, and any method which introduces any seriously objectionable features would scarcely be justified.

That there are objections to the general administration of toxin-antitoxin in the Navy is indicated in the reports of medical officers who have used it extensively among the naval personnel. At the Naval Training Station, Great Lakes, Ill., toxin-antitoxin immunization against diphtheria was carried out on a large scale. The workers there found, as Park has found in New York, that the percentage of very sore arms and the constitutional reactions necessitating bed treatment is very great in adults as compared with the lack of reaction in infants. A large proportion of those inoculated had to be admitted to the sick list for at least one day. Many others were inconvenienced to a greater or lesser degree. Aside from the damage to the Navy in "sick days," there is the added objection that any procedure which causes such inconvenience is bound to be unpopular and lessen the confidence of the naval personnel in immunization measures in general. This, of course, would be a great misfortune.

There is another very important reason why most naval medical officers who have to do with the use of toxin-antitoxin on a large scale are not as enthusiastic over it as they were at the outset of their work. They have reached the conclusion that immunity, at least as revealed by Schick test interpretations in the Navy, is not constant. Large numbers of men who had given negative Schick tests on one occasion were tested several months later and a considerable percentage of them found to be Schick positive, i. e., susceptible to diphtheria. This could not be explained entirely by the personal factor on the part of those reading the tests, because the same medical officer made all the readings on both occasions, and any error, therefore, would tend to be constant. This observation was made at Great Lakes by Hughens and at Annapolis by Houghton. At Annapolis, in the fall of 1918, all susceptible individuals were immunized by the injection of a toxin-antitoxin mixture furnished by the New York Department of Health. In the following spring an epidemic of diphtheria developed in this same group. The entire personnel was Schicked again, and of the 1,147 who had received toxin-antitoxin 22 per cent gave positive tests. One very striking example of the temporary quality of even active immunity was demonstrated by one individual who had a definite attack of diphtheria in the spring of 1918, gave a positive Schick and received toxin-antitoxin in November, 1918, and developed diphtheria again in March, 1919. These facts brought out by medical officers in the Navy are of particular interest to the service, and although there may be certain instances where immunization by means of toxin-antitoxin among certain given groups is advisable its general use is probably not justified.

In the control of a diphtheria epidemic, which actually exists, we have, of course, an entirely different problem. Toxin-antitoxin would be of no avail here because of the length of time necessary for the establishing of active immunity. Along with the usual preventive measures, many have advocated performing the Schick test on all contacts and the administration of prophylactic doses of antitoxin to those who are found to be susceptible. The question of the phophylactic use of antitoxin in the Navy can not be answered by a sweeping statement, and it must be settled by the individual medical officer as the occasion arises. But, in order to avoid the false sense of security which such a method so often carries with it, its shortcomings should be realized. The immunity produced would be of very brief duration, quite possibly not outlasting the epidemic. The possibility of serum sickness must also be considered. Although serum sickness is seldom serious, its effect on the morale of the crew and their possible loss of confidence in such a sovereign remedy as diphtheria antitoxin, is not to be overlooked.

In case it is not considered advisable to use antitoxin in epidemics, there is still the question as to whether those among the contacts who are immune, should be identified by the Schick test. It is contended that, if the medical officer knows which men are immune, these immune individuals can be disregarded in the attempt at early identification of clinical cases of diphtheria. Under certain conditions, and where the medical officer feels confident of his ability to interpret the Schick test, this procedure may be advantageous. Before the crew can be tested and readings made, however, two or three days or perhaps more have elapsed. After all, the strict observance of the usual preventive measures is the procedure of prime importance in the Navy. The application of the Schick test can only be an accessory.

These observations are made with the idea of presenting some of the new problems in the prevention of diphtheria with which naval medical officers have to deal. The questions involved can not be decided now. Much work and careful compilation of data is necessary and it would be regrettable if the investigations along these lines should not be continued. In the meantime, we should realize the limitations of these procedures as applied to the Navy, and recognize that with us they are still in the experimental stage. (L. J. R.)

ON QUININE AND MALARIA: EFFECTS AND MODES OF ADMINISTRATION.

Quinine is still the drug par excellence in the treatment of malaria, although occasional reports of wonderful cures by other methods are sometimes seen, notably by the intravenous injection of arsphenamine. As in the case of many other so-called specifics, the limitations of quinine are being more and more appreciated. Lane in his critical review of recent malaria literature in Tropical Diseases Bulletin for February, 1922, brings out some very interesting findings. It has been long known that relapses in the malignant tertian type are less apt to occur than in the benign forms. Acton and his coworkers in Dagshai have also demonstrated this fact, showing that quinine cured the malignant cases but that the benign ones were wont to relapse. Wayne and Wenyon have independently shown that this selective action of quinine, so to speak, applies only to the asexual phase of the parasite. With regard to the gametocytes the opposite seems to hold true. The quinine apparently has a specific action on the gametocyte of the benign tertian whereby its subsequent development in the mosquito is prevented, whereas the gametocytes of the malignant type do not suffer during quinine administration but retain their faculty of developing in the mosquito. Hence even if benign infection is difficult to cure with quinine, the danger of spreading the disease is practically nil while the patient is under treatment. The patient suffering from the malignant type, however, is always a danger in this regard until complete cure has been established (i. e., as long as the gametocytes persist).

With regard to the modes of administration the modern tendency is to give the drug by mouth to the exclusion of the intramuscular and intravenous routes. The latter method is indicated only when marked gastric disturbance is present or when other conditions (especially pernicious types of the disease) render oral administration impossible or impracticable. The intravenous injection is condemned as a routine measure on account of the inherent dangers of such a procedure.

In order to minimize as far as possible the dangers from the intravenous introduction of the drug, it is well to bear in mind that the procedure should be carried on with aseptic technic; the drug should be given in marked dilution and very slowly. The size of the dose should never exceed 15 grains and it is better to start with a smaller dose (5 to 10 grains). The dilutions should be ½ grain of the drug to 1 c. c. of solution and the injection should be given at the rate of 1 c. c. per minute.

The injection should be discontinued at once if there is any sign of the solution not entering the vein properly. In case of circulatory collapse, adrenalin will be found of great value.

After the indications for intravenous injections have subsided, oral administration should be started.

The intramuscular route has no advantages over the oral one. McLay in Macedonia (J. Roy. Army Med. Corps, February, 1922) obtained evidence that the malarial parasite disappeared more rapidly from the blood by oral than by muscular administration of quinine. The intense reaction, sometimes amounting to abscess formation, and the marked discomfort which it produces in the patient are too important disadvantages to make this method of administration even tolerable.

With regard to the oral administration of quinine, the method, embodied in the Standard Treatment of this country so ably advocated by Bass, probably is as good as any. According to this method 30 grains of quinine are given daily during the period of symptoms and then 10 grains a day for a period of at least 8 weeks.

This method of administration is based on the fact that a marked difference exists between the clinical cure of the disease and the thorough disinfestation of the patient. Experience has shown that the latter is a fractional process and that even the daily administration of 10 grains of quinine for 8 weeks is not always effective. A certain number of patients subjected to this method of treatment will continue to have relapses. But with each course of treatment the number of relapses grows smaller and smaller. The point to bear in mind, however, is that no person with malarial parasites should have less than 8 weeks of standard treatment. (E. P.)

ON ORAL HYGIENE AS APPLIED TO HOSPITAL PRACTICE.

In conjunction with the Forsyth Dental Infirmary at Boston, the Massachusetts Homeopathic Hospital has taken up the work of oral hygiene and prophylactic treatment of the mouth in all cases admitted.

The work as it is at present conducted consists in having the house officers list cases they wish treated, these cases then being examined and treated by dental hygienists from the Forsyth Dental Infirmary. These hygienists clean the teeth, give toothbrush drills, and massage gums, and then report the condition of the patient's mouth, suggesting any necessary further treatment.

The results aimed at are several: During pregnancy the teeth are often neglected and allowed to decay. This, of course, can be prevented by dental care. This factor of the care of the teeth during pregnancy is a very important one from the educational standpoint. If women in the obstetrical wards can be shown that it is desirable to care for the teeth during pregnancy, the loss of teeth will be prevented and many diseased conditions which result from poor teeth and mouths infected with pyorrhea will be prevented.

Another result is the instruction of children in the care of the teeth, in order that they may be started in the proper way. Faulty dental conditions are often at the bottom of digestive disturbances in children. Another result is the prevention of bronchitis and pneumonia which sometimes occurs from the inhalation of septic material about faulty teeth during the course of ether administration. As a preventive measure it is highly desirable to have the mouth and teeth in the best possible condition prior to anesthesia. This is particularly so in nose and throat work, in which it is most important that the oral cavity be as clean as possible before operative measures are undertaken.

Focal infection of the mouth plays an important part in orthopedic conditions. Many cases of infectious arthritis clear up under dental prophylaxis and treatment. In medical cases also the care of the mouth and prophylactic dental treatments are valuable. A clean mouth may have a tendency to prevent communicable diseases of the respiratory tract. Many of the vaguely indefinite digestive symptoms in adults may be alleviated by oral hygiene, because if the teeth are put in good conditions, they are more capable of functioning properly, thus rendering food in better form for digestion.

Viewed from the standpoint of education, oral prophylaxis is extremely valuable because by means of such treatment the attention of the patient is called to the fact that teeth do need care, and if he is shown how to care for them himself after he leaves the hospital he is likely to carry on the work started there. (W. M. K.)

ON ISCHIORECTAL ABSCESS.

A recent careful review of 90 cases shows but a scant 25 per cent of complete cures, with a large number of unsatisfactory results.

In order to incite bacterial suppuration within the ischiorectal fossa the organisms must be provided with a means of entry. This does not exist under normal conditions. Any mechanical factor that produces a tear or puncture of the mucuous membrane of the anal canal opens the pathway of infection. This break in the mucous membrane makes a short path for the organisms to the ischiorectal fat. This fat is of a very loose nature, subject to frequent trauma and low in resistance to bacterial infection.

The relation of tuberculosis to ischiorectal abscess and fistula in ano has long been a debated question. G. S. Dudley writing in the American Journal of Surgery on ischiorectal abscess quotes many statistics to show that this association is rare and that not more than 2 per cent of anal abscesses and fistulas are due to that cause.

The operation must be approached on the scale of a major procedure. In preparation, castor oil catharsis is indispensable, since it not only empties the intestinal tract thoroughly but also there follows a period of two or three days during which defecation is not likely to occur. General anesthesia is the rule, since thorough manual dilatation of the sphincter is essential. This should be done gradually and gently. The anal mucous membrane is then inspected and palpated to locate the point of entrance of the infection. If no such point can be found, the abscess is opened by an ample radial incision and a further search made for the point of entrance. The opening of the abscess is completed by a clean transverse incision through the external sphincter continuous with the radial skin incision. A single transverse division of this muscle is seldom followed by permanent loss of power. The wound is packed lightly with petrolatum gauze and a dry dressing applied.

The first dressing is done after the first bowel movement, usually on the third day of convalesence, the gauze is removed and the wound irrigated, then repacked. (L. W. J.)

ON THE TREATMENT OF HIGH BLOOD PRESSURE.

The control of hypertension has been attempted in many ways. None of them have been completely successful; some of them rest upon hearsay and tradition rather than upon clinical observation. For many years protein foods were considered to be at the root of the "blood-pressure evil." The dietary prescription of meat once a day or less and as few eggs as possible has been advocated until the meatless diet has become a popular slogan. There is no doubt about the fact that many of our citizens through an overindulgence in starchy foods are becoming obese and favoring the development of "high blood pressure" and "hardening of the arteries" by the very diet that is supposed to prevent these maladies. The feeding of protein, as meats or otherwise, will not tend to increase the blood pressure of a hypertensive individual.

The former idea that the retention of the end products of protein digestion act as irritants that stimulate the heart and the arteries to increased activity and raise the blood pressure can not be considered to be correct. Many of these cases do have a high blood pressure, but its cause must be sought in another direction. Dietetic therapy in these instances demands a lowered protein intake, but while ordering it we must be clear in our minds that we are doing it to relieve the kidney of its burden and not to diminish the hypertension. Enough protein food should be allowed to maintain the body in an efficient condition, and nothing is to be gained by the routine restriction of meat, fish, or eggs.

The starches have always been considered the most innocuous of foods; their final digestive products are carbon dioxide and water, which put no strain on any of the eliminative functions. The one drawback to an excessive carbohydrate diet is that it is prone to engender obesity in the individual. Many persons may become obese and exhibit no increase in their arterial tension; others are not so fortunate. If the combination of obesity and increased blood pressure does exist, a restriction of the starchy foods may bring relief. In individuals who are overweight, a control of the starchy food may be of distinct importance in regulating the blood pressure.

What has been said in regard to the relation of starches to obesity and hypertension may be repeated for the fatty foods. The fats in themselves appear to have no other specific effect upon the level of the blood pressure.

The effect of fluid intake upon blood pressure is practically negative when only such quantities of liquids are ingested as supply the normal needs of the body. When huge amounts of fluids are taken the arterial tension may be increased, but the normal allowance shows no changes, and it is not worth while to trouble patients in restricting the fluids with any idea of controlling the blood pressure.

The only procedure that has been at all satisfactory in yielding a drop in blood pressure that may be regarded as a definite effect of therapeutic interference has been nervous relaxation obtained by longer or shorter periods of rest. It can not be said without reservation that rest and removal of nervous strain will lower pressure in every instance, but it is vital to regulate the business and family cares of hypertensive patients to eliminate nervous strain, and this requires an unusual amount of tact, cooperation, and forbearance on the part of all concerned.

Drugs have failed to furnish us with the means of permanently reducing hypertension. This is the consensus of opinion at the present time of the best minds, and drugs are not being extensively used for this purpose to-day.

H. O. Morsenthal, writing in the Medical Clinics of North America for January, 1922, on the treatment of high blood pressure, remarks that it is worth remembering that essential hypertension is a disease that occurs commonly and is, in its early stages, not associated with kidney involvement; that as the increased blood pressure persists certain secondary changes occur. These, in their order of vital importance to the patient, are: Cardiac hypertrophy, dilation and failure, apoplexy, and nephritis and uremia. One of the most important elements in the treatment of hypertension is the prevention of these sequelæ. Aside from symptomatic therapy, there is in the majority of instances no specific effect to be expected from any form of treatment. Relief from nervous strain and rest for shorter or longer periods offers the best means of reducing the blood pressure and lessens the strain upon the heart and arteries, for a time at least. Diet as a whole or its various constituents, proteins, fats, carbohydrates, fluids, or salt have no direct effect upon the degree of arterial tension; indirectly the regulation of the various dietary factors so as to reduce weight, diminish the number of red blood cells, or bring about undernourishment may lower the blood pressure.

A careful general survey of the patient will indicate what other measures should be taken in regard to the teeth, gastrointestinal canal, genito-urinary tract, etc., which in some instances may be productive of far-reaching results. The above represents the facts concerning the treatment of essential hypertension as we possess them to-day; there is much in the routine therapy of this disease that is traditional and that demands investigation before it can be successfully or conscientiously applied. (J. J. O'M.)

ON NEUROPSYCHIATRIC DISABILITIES.

For purposes of description, neuropsychiatric cases may be divided into four groups which differ from one another in the requirements of treatment. These are:

1. Injury or disease of nerve tissue.
2. The psychoneuroses (or neuroses).
3. The psychoses (or insanities).
4. Certain constitutional nervous deficiencies.

Group 1 is comparatively small in size and relatively simple in its requirements. It includes such cases as gunshot and other accidental injuries to nerves and the damage produced by diseases of the nervous system, such as meningitis, "strokes" of paralysis, etc. Uncomplicated disabilities of this kind can be adequately treated in general hospitals or relief stations.

Group 2, the psychoneuroses, is by far the largest, but for hospitalization it should be extremely small. It includes the great majority of those conditions which were loosely and erroneously described as "shell shock" during the war—the "nervous breakdowns," hysteria, neurasthenia, anxiety neurosis, psychasthenia, and the so-called functional diseases of the heart, stomach, and other organs.

In essence, the neurosis is a "way out" of some intolerable conflict or difficulty. The feelings of stress, apprehension, and worry that belong to the conflict are interpreted by the patient as evidences of disease or injury, the origin of which is referred back to some accident or illness—gassing, influenza, overwork, etc., of the more or less recent past. The suffering is genuine and none the less real because the symptoms are ascribed to disease or injury. The treatment of such cases must consist of discovering the conflict or difficulty, convincing the patient of the real facts, and then helping him to find some more satisfactory method of dealing with it which is within his capacity. To place such a patient in a hospital is to confirm his belief in the existence of serious disease or damage. Furthermore, it very effectually brings a cessation of the responsibilities and needs for adjustment that brought about the disorder. It is often extremely difficult to discharge such patients; it is a much simpler problem to keep them out of a hospital.

Douglas and Singer, writing in Mental Hygiene for January, 1922, on the care of neurpsychiatric disabilities among ex-service men, are very strongly of the opinion that special hospitals for the treatment of psychoneuroses will eventually be found unnecessary, provided adequately staffed out-patient clinics are established.

Group 3, the psychoses, in the great majority, must be treated, often for long periods, in a hospital.

The fourth group of constitutional nervous deficiencies comprise (*a*) the feeble-minded, (*b*) the psychopathic personality (constitutional inferiority), and (*c*) the epileptic.

The feeble-minded man who was accepted in the service is in practically all cases among the higher grades of defective. He is capable of placement in some activity, though the effort to carry this out may have to be repeated many times before a finally successful adjustment is secured. In attempting this placement and vocational training, it is essential that the capabilities of the man be very carefully studied. An unwise selection may result not only in the discouragement of the patient, but also in greater disability than was present at first. Selection of vocation and environment should be made by an expert, with all the advice he can get from the physician who has really studied the patient.

The psychopathic personality.—The psychopathic personalities present some of the most difficult problems of all. Such persons may show comparatively low intelligence, but they may also grade even above the average upon test. The essence of the defect lies in the personality. Often such persons are plausible and superficially shrewd, but they seem to be incapable of steady application and soon tire of any task. No State has yet succeeded in dealing with this group satisfactorily.

The epileptic.—The epileptic in very many instances can get along in the community, especially where compensation and supervision through an out-patient clinic are possible. In a certain proportion of cases, when the fits are frequent or the patient has difficulty in adjustment due to personality, segregation from ordinary society is advisable. The character of the institution to which he is sent should be that of a model community with its own industries, amusements, etc., rather than a hospital.

In the opinion of Douglas and Singer the greatest need of the service at the present moment is for trained personnel. It is an unfortunate fact that neuropsychiatric medical officers, nurses, and social workers exist only in limited numbers, in no way commensurate with the demands. To supplement the available supply and to

108165—22——7

prepare for the increased demand that will come with the opening of new hospitals and out-patient clinics, the establishment of a training center for medical personnel is highly desirable. This center must be accessible to university instruction and also to field facilities. Any of the existing psychopathic institutes, if provided with out-patient clinic facilities, would be suitable and doubtless would be willing to cooperate. St. Elizabeths Hospital in Washington is being used for the purpose of training naval medical officers in this special line of work.

Douglas and Singer, in their article draw attention to the frequent misconception existing with regard to the relation of occupational therapy and vocational training.

Occupational therapy is not in any sense an effort "to make something." The purpose with which it is employed is quite variable, as the following classification will indicate. It may be prescribed (*a*) as a diversion; (*b*) because it brings into play certain muscles or joints which are functionally damaged; (*c*) to produce sedation or stimulation; (*d*) as an education in habits of application. The product of occupational therapy is the effect it has upon the patient. The articles produced in the process are, like the copy books of the child in the primary school grades, of no importance.

Vocational training, on the other hand, is a training of the patient to carry out some technical operation and thus to give him a means of earning a livelihood. The product is, therefore, the patient placed in industry. Articles produced in this process must have a market value, and there is absolutely no place for the merely beautiful but fancy products, the value of which is personal and largely artificial. (J. G. Z.)

On Airplane Ambulances.

Strange as it may seem a stretch of seacoast extending almost from Cape Henry, Va., to Wilmington, N. C., having a population of nearly 3,000, is quite devoid of medical attendance. One looking at a map of this region will note a series of sounds—Albemarle, Currituck, and Pamlico—extending along the coast and separated from the Atlantic by low-lying sandy islands. In places these stretches of sand are fairly wide and high, and have become sufficiently fertile to permit the growth of a few trees and underbrush; in other parts, for mile after mile, one encounters nothing but barren reaches of sand.

The storms of winter deal severely with this stretch of coast which mariners regard as treacherous as any seacoast in the world, often preventing communication with the mainland for days.

The inhabitants of these desolate sand bars are mainly seafaring folk connected either with the Coast Guard, the Navy radio stations, or the fishing industry. Among them up to the year 1918 there labored a physician who dwelt in the little village of Hatteras, but the influenza epidemic of that year cut short his career and no other physician has found these sand reaches sufficiently enticing to take his place.

In the towns on the mainland there are doctors, but they are busy men, and a trip across the sound to the sand reaches, 5, 10, perhaps 20 miles away, can be made only in a great emergency. So it came about one day last winter when the young wife of a Coast Guard man had been in labor for 72 hours and required the services of an obstetrician, some one conceived the idea of asking the commandant of the fifth naval district by radio to send assistance to the suffering woman by airplane. In an hour a Navy seaplane with a naval surgeon and an obstetrical outfit was on its way to the lonely Coast Guard station near Cape Hatteras and both mother and child were saved.

A few weeks later a Coast Guard man with pneumonia and a man with acute appendicitis were transported comfortably through the air to the hospital at Norfolk. Since then many people living in this isolated region have received medical attendance brought by airplane from the naval operating base at Hampton Roads.

The average airplane is not suited for ambulance work because of its construction, and as the Coast Guard and the personnel of the Navy radio stations on duty along this coast are entitled to medical attendance, it is hoped that before long specially constructed air ambulances will be avilable for this service.

The air ambulance has passed the experimental stage and is now in daily use in many parts of the world. Airplane ambulances have been used in the Air Service of the United States Army since early in 1918, and it is very evident from the following news item abstracted from the Figaro, Paris, December 5, 1921, that the French Army is using airplane ambulances to an increasingly greater extent:

"It appears that the ambulance airplanes of the Levant and in Morocco are growing rapidly in their emulation of each other, which is both admirable and profitable. Every day a new record is made by one or the other.

"A few weeks ago in Morocco they made a remarkable record by transporting 18 wounded men 80 kilometers; now we hear that in the Levant they have just evacuated 44 wounded a distance of 400 kilometers over the desert of Syria between Deir-ez-Zor, on the Euphrates at the southern border of our mandate, and Aleppo. This last operation is a record for transporting wounded by airplane. Moreover, the conditions under which it was done and the advantages gained merit attention.

"After the victorious battles of the 24th and 26th of October, fought in the region of Deir-ez-Zor by Colonel Debieuvre against the war-like tribe of Ogueidats, who fought all the more fiercely against our troops because they had given a severe setback to the British in 1920, General Gouraud, high commissioner in Syria, gave orders on October 26 to Medical Inspector Emily, chief surgeon of the Army of the Levant, and to Major Denain, commanding the Air Service, to prepare for the evacuation as rapidly as possible to Aleppo of the wounded we had during the course of these glorious combats. This work was rendered particularly difficult and dangerous, due to the fact that the 400 kilometers which separate these two places is an inhospitable desert, without landing places, occupied by hostile Bedouin tribes, with atmospheric conditions impossible to have a gas station at Deir-ez-Zor, which is 20 days from Aleppo by camel convoy.

"A detachment, composed of all the ambulance airplanes in service with the Army of the Levant, was immediately organized at Aleppo under the command of Lieutenant-Pilot Vindreau and of the chief surgeon of the Air Service in the Levant, Doctor Liegeois. On October 25 a military surgeon, Doctor Chevalier, went to Deir by airplane to render the urgent surgical assistance needed. The same day five airplanes brought back 10 wounded, covering in a few hours the 800 kilometers for the round trip from Aleppo to Deir-ez-Zor and return, a very remarkable performance when the difficulties enumerated above are considered.

"Evacuation continued the following days, and soon all the transportable wounded—44 in all—were transported by air to the military hospital in Aleppo, making in three hours and a half and under very satisfactory conditions, as far as comfort was concerned, a trip which requires at least a week by motor ambulance, and by camel or cacolet (form of saddle for horse or mule, carrying two men in a sitting position) more than three weeks over heavy roads. This would have been very trying on the wounded men.

"Thanks to the airplane, Principal Surgeon Chartres, division surgeon of the second division, was able to go to Deir to superintend the evacuation and care of the wounded. Doctor Liegeois, who followed and directed the operations from the medical standpoint, estimates that, without counting the suffering that was avoided, five wounded men owe their lives to this method of evacuation.

"The results are a great honor to the air service of the army of the Levant and especially to the pilots who, not satisfied with being courageous war pilots, have on this occasion given proof of their skill, endurane, and training by bringing safely into port all the wounded confided to them, in spite of the difficulties of such a long flight.

"It should be noted that in all the time that this means has been used for evacuation in the Levant, not a single wounded or sick man has been the victim of an airplane accident." (J. D. B.)

CLINICAL NOTES.

NOTES ON THE ORTHOPEDIC SERVICE, U. S. NAVAL HOSPITAL, CHELSEA, MASS.[1]

By J. W. WHITE, Lieutenant, Medical Corps, United States Navy.

With the advent of the Veterans' Bureau patient, the orthopedic service at this hospital increased in activity so that now it handles well over twice as many patients as it did a year ago. A great many of the patients referred by the Veterans' Bureau are reconstruction problems following old war injuries and comprise such cases as resection of painful scars, reamputation for painful stumps, and osteotomy to correct deformities. Many of these patients suffer from some form of arthritis aggravated usually by some postural strain or some chronic condition existing previous to discharge and needing operative treatment, such as internal derangement of the knee joint, hallux valgus, free bodies in joints, and exostoses associated with old fractures, etc. Inasmuch as physiotherapy, in some form, is indicated in the post-operative treatment of most of the surgical cases, particularly where the operation is on or closely associated with joints, these cases are transferred to the Parker Hill Hospital, a near-by Public Health hospital, which is equipped with a complete physiotherapy department, as soon as they have sufficiently recovered from their operation. They return from time to time for observation and further directions as regards treatment. A complete physiotherapy department is to be supplied to this hospital in the near future and the post-operative treatment can be better controlled.

The naval patients, to a large extent, are admitted for recent traumatic conditions, while it is seldom that a Veterans' Bureau patient is admitted with anything of recent origin. Men in training are the only ones strictly entitled to treatment for conditions not associated with previous service.

In spite of the fact that routine treatments often are ill advised, we have devised some routine measures for conditions such as chronic back strain and foot strain, which we have found are the most difficult cases to treat satisfactorily. For the patients suffering from back pain, after satisfactory X-ray examinations of the entire spine

[1] From the Annual Sanitary Report, U. S. Naval Hospital, Chelsea, Mass.

have been taken to rule out organic disease, and physical examination is otherwise negative, hyper-extension in bed is employed until the patient is relieved from pain and muscular spasm. A snug fitting plaster jacket is then applied and kept on for varying lengths of time. In the case of Veterans' Bureau patients, they are discharged from the hospital wearing this jacket and the rest of the treatment is carried on at the Veterans' Bureau dispensary, where, upon removal of the jacket, the patient is supplied with a back brace to maintain the corrected posture for a longer period. Exercises are started to regain the normal mobility of the spine at this time as well. While this treatment is by no means satisfactory, we have by considerable experience decided it is the most rational for this group of cases. Of course, where there is any indication of arthritis present, a thorough search for surgical foci is carried out and the indicated eradications are performed if practicable. As a rule, teeth have been found to be the main offenders. These patients all are on an antiarthritic diet which is a balanced diet with as low a carbohydrate content as possible, as advised by Pemberton of Philadelphia.

Patients with pes planus sufficiently severe to require hospitalization usually show acute foot strain. A routine type of treatment is applied to these cases that do not require manipulation under an anesthetic. If full correction can not be obtained on admission because of muscular spasm, they are manipulated to a position of extreme varus and are held in plaster for three or more weeks. This is usually sufficient to correct the worst cases. There have been some cases where there was extreme bony deformity produced usually by the inward and upward deviation of the neck of the astragalus which were at the time treated conservatively but which will ultimately come to operation such as an astragaloscaphoid arthrodesis or some similar procedure. The routine treatment consists of absolute rest in bed, light massage and contrast baths. This is kept up until all evidence of foot strain has disappeared. The patient is continued in bed a few days longer, during which time exercises are started which he is to continue after being allowed on his feet, a few hours at first and then gradually increasing the time until he is up the normal time. These cases are all carried on our antiarthritic diet as described above. When the patient is allowed up his feet are strapped in as extreme varus as possible and the contrast baths are discontinued. This strapping is renewed frequently to retain the corrected position. The exercises followed are those which tend to strengthen the muscles upon which the normal arch depends, for it is muscles and not ligaments that maintain correct posture not only in the feet but throughout the body. Symptoms are produced when any constant strain is put upon ligaments whose function essentially is to prevent abnormal extremes of motion. The form of support used most frequently is the one devised by Whitman, of New York, which is corrective, almost forcing the patient to walk properly and yet preventing the ligamentous strain-causing symptoms. In feet where the deformity is extreme, this type of plate can not be employed and frequently the usual type of plate is used in the way of palliative treatment. In general, the use of plates of all sorts is discouraged and relief from symptoms is hoped for as a result of muscle training, proper shoeing, and correct walking. While under treatment at the hospital these cases are made to walk slightly "dingtoed."

In the case of naval patients with definite evidence of acute flat feet, which, on examination show that there will be a predisposition toward recurrence, the policy of recommending them for medical survey is followed with few exceptions. These men can temporarily be relieved of symptoms, but with as little cooperation in following exercises and adhering to proper methods of walking as one gets in most flat-foot cases, they will soon be appearing at sick call again, particularly if they are put on some detail distasteful to them. A congenital flat foot is always predisposed to acute foot strain, and it is only by the patient's efforts that he can keep free from symptoms. By flat foot is meant everted foot and not the anatomically flat foot without eversion, which rarely causes symptoms. In naval patients that do show cooperation and are otherwise well adapted for the service, an attempt is made to return them to duty. They are retained at the hospital until they understand the proper exercises, continue to be free from foot strain and if thought advisable, particularly in the case of petty officers, are given Whitman plates to be worn to prevent the recurrence of their foot strain.

Among the more interesting cases treated during the year may be mentioned a case of hematomyelia causing an almost complete transverse myelitis at the level of the fifth cervical segment, following a fracture of that vertebra and with practically complete recovery in five months without operation; a case of multiple bone cysts which ultimately proved to be Von Recklingshausen's disease; and a successful repair of a ruptured anterior crucial ligament of the knee.

An interesting series of four fractures of the femur has been observed, two supracondyllar and two of the shaft. Malunion consisting of outward anterior bowing occurred in the latter group, both due undoubtedly to premature weight bearing. In fractures of the shaft, it has been my experience that unsupported weight bearing short of six months is hazardous. In both of these cases, an osteotomy was performed at the point of malunion with the result that in one case the shortening was reduced from an inch and a half to three-eighths of an inch with practically perfect function of the knee, which latter element is always a serious problem to face after such long immobilization. The other case is still in his Thomas ring splint through which, via calipers in his shoe, his weight is supported, being now on his sixth month. His knee is receiving the usual baking, massage, and manipulation, and already there is about 30° of motion in it. This patient originally had the same shortening that was present in the first case, but as the angulation was not so great and as there was more overriding he still has five-eighths of an inch shortening. His convalescence was considerably complicated by a hemolytic-streptococcic septicemia, originating in all probability from an old extensive war wound on his other thigh. Four days following the operation his left subdeltoid bursa was opened and several ounces of pus was removed, from which a pure culture of the above-named organism was obtained. Several days later a large phlegmon on the anterior aspect of his thigh containing 5 or 6 ounces of the same sort of pus discharged through the lower end of the operation incision well away from the site of the operation, which has never given any indication of becoming septic. For about three weeks following the operation his old war wound on his other thigh gave him considerable discomfort, and it was expected that it, too, would break down. It never progressed further than getting red objectively and subsided spontaneously. The patient, needless to say, was very sick, and the fact that he lost so much weight rather jeopardized the position of the fragments in the cast. The return of his strength has been slow and he did not get about as much during his fourth month in his cast as is usual in such cases. It is confidently expected that he will be returned to duty.

The mechanical treatment of these cases is as follows, and may be said to be divided in three periods: The first period immediately following operation, at which time a plaster spica from well above the costal border extending down to the toes with the leg held in as correct position as is thought possible, consists of rest in bed for two months. X-rays are taken through the plaster to determine the position a few days following the operation. If accurate alignment has not been obtained, the deformity continuing to exist is corrected by cutting a wedge out of the plaster at the appropriate point and of the calculated size and then approximating the edges of this wedge, leaving a corresponding open wedge on the other side of the cast. More plaster bandages are then employed to hold this corrected position. This plaster is allowed to remain on for two months. It is then removed and the leg is examined to see if there is union. X-rays are taken before another heavier plaster of the same extent is applied. After this plaster has thoroughly dried the patient is gradually got up on his feet. It is surprising to see how well one can get about with such an extensive cast. Activity is urged until this cast is removed at the expiration of the fourth month which completes the second period. The patient is then put into a Thomas ring caliper brace extending down and inserted into the heel of sufficient length to take practically all the weight from the operated leg. Strenuous treatment is then instituted to mobilize the knee which has been absolutely immobilized during the previous four months. Little difficulty is experienced with the ankle or hip. This brace is discontinued at the end of the sixth month, which completes the third period.

One of the supracondyllar fractures of the femur was a fresh case and I had him practically from the first. There was the usual marked posterior rotation of the lower fragment. Skin traction with adhesive in a Thomas splint was employed with only increase in the deformity. This is what may usually be expected because of the location of the points of origin of the gastrocnemius. Skelatile traction by the use of "ice tongs" applied to the femoral condyles reduced the malposition without difficulty in spite of the fact that there was an intercondyllar fracture as well. Unfortunately the tongs were only allowed on for three weeks, and after removal the inner fragment rotated slightly. This case was returned to duty four months later with a perfectly stable knee and over 90° of painless motion.

The other supracondylar fracture was three years' duration with the usual unreduced lower fragment allowing 30° hyperextension at the knee and with $1\frac{5}{8}$ shortening when the knee is in full extension and 3 inches when fully hyperextended. His symptoms were due for the most part to knee strain, as might be expected. An osteotomy was performed at the point of malunion. Correction was maintained by the use of bone wedges taken from the tibia. The convalescence of this case was complicated by an attack of renal colic for which he underwent operation for the removal of a ureteral calculus. He has satisfactorily convalesced from the operation. At the present time he still has an inch shortening, but there is only the normal amount of hyperextension at the knee.

These two cases demonstrate the importance of using skelatile traction in these supracondylar fractures. Very little discomfort was experienced from the tongs, and there was less discomfort than with skin traction. A small amount of osteomyelitis persisted on one side for about four weeks before the sinus healed. At no time was it painful and did not interfere in any way with his convalescence.

Two cases of recurrent dislocation of the shoulder have been operated upon, and the revived Clairemont-Ehrlich operation has been adhered to. This consists in passing a good-sized muscle flap from the posterior portion of the deletoid, being careful to preserve its enervation and blood supply, from behind anteriorly through the quadrilateral space and attaching it to the coracoid process of the scapula. This forms, as can be readily understood, a sling which prevents any tendency toward a downward or forward dislocation of the shoulder. This is the only type that has any tendency to recur. One was a chief boatswain's mate and was returned to duty four months ago and so far has had no recurrence. The other case was a Veterans' Bureau patient and was only discharged a month ago and is too early to report (no recurrence has occurred four months after the above observation). He states, however, that he can abduct his arm with a perfect feeling of security and has little limitation in motion.

We have at the present time a case of generalized ostitis fibrosa under observation. A multiloculated cyst was removed from the right tibia five months ago bacause the patient was experiencing local symptoms. He has a similar lesion in a corresponding point of his other tibia which causes no symptoms. Other lesions are present in the head of his left humerus and a large fusiform swelling in the mid shaft of his right humerous involves the entire shaft. This proved on exploratory operation to be fibrous replacement of bone typical of this condition. X-rays have been taken of all his long bones and there is very little of the cortex of the pipe bones that is normal. In appearance, it resembles cancellous bone with the trabeculæ running longitudinally. He is being fed on a high calcium diet at the present time in the hopes that this might have some effect on his apparently deranged calcium metabolism. There is some question whether the conditions variously known as adult rickets, osteomalacia, Paget's disease, Von Reckingshausen's disease, and ostitis fibrosa are not all different manifestations of the same entity with which calcium metabolism is in some way associated. It is feared that if we operate on this patient at the present time there may be some difficulty in getting a graft to take properly.

We have had various types of Pott's disease of the spine, from the very earliest to the extreme case with emaciation and double draining psoas abscess. Absolute recumbency usually in a plaster shell or some similar retentive apparatus and heliotherapy comprise the essentials of the treatment. No cases have been operated upon, as in our group there appeared to be insufficient indication. It is our experience and the consensus of opinion seems to be that operative treatment should be confined to a very limited number of cases where the disease has obtained little headway. In one of our cases, which incidentally is doing very well, there are three distinct foci of tubercular infection. There has been only one other case of bone or joint tuberculosis. This was an ankle in a case that physically was going down hill. Amputation was performed at the point of election, with improvement in general condition immediately following the operation.

One of the most interesting fractures we have had was one involving both bones of the forearm, in which the fracture of the radius was located between the insertion of the pronators and suppinators. As is usual in fractures of both bones of the forearm, it was put up in mid-pronation and supination, as it is in this position that the bones are separated the widest. After union had taken place, however, only a few degrees of pronation and supination was possible. The fracture was cut down upon and it was noted that the union was immediately proximal to the insertion of the pronator radii teres. This explained the poor result. The upper fragment, to which the supinators are attached, was rotated into full supination, while the lower or distal fragment was rotated in just the other way, because both unopposed pronators acted upon it. An osteotomy was performed six weeks after the original break and the forearm put up in full supination. The end result warranted this procedure, as the patient was returned to duty and has almost normal motion at the present time.

NOTES FROM THE GENITO-URINARY SERVICE, U. S. NAVAL HOSPITAL, CHELSEA, MASS.[1]

By P. O. NORTHINGTON, Lieutenant, Medical Corps, United States Navy.

The majority of the patients treated in the genito-urinary department during the past year have suffered from gonococcus infection of the urethra and its complications. In the treatment of acute urethritis, mercurochrome was used sufficiently diluted so as not to cause irritation. The strength varied from one-half of 1 per cent to 1½ per cent. The results obtained from the use of mercurochrome in the acute cases have been consistently better than the results obtained in similar cases with silver preparations. Posterior urethritis has been treated with diuretics, urinary sedatives and mild antiseptic irrigations until the acute symptoms subsided; then silver nitrate instillations and prostatic massage were begun. In the chronic case, the urethra was dilated and prostatic massage given twice weekly, and if the case did not respond to this method of treatment, a urethroscopic examination was made to determine, if possible, any demonstrable focus or cause for the persistence of the infection. Epididymitis has responded to palliative treatment, and the Hagner operation has been abandoned as we believe that it does not materially lessen the course of the infection and it increases the possibility of producing sterility.

A large number of cases give a negative smear in a very short time after beginning treatment. However, an injection of silver nitrate solution will frequently increase the discharge and the gonococcus then can be found in the smears. When there is no discharge and the urine is clear for a week the patient is discharged to duty.

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[1] From the Annual Sanitary Report, U. S. Naval Hospital, Chelsea, Mass.

The intensive course of treatment given to the syphilitic cases, provided there are no contraindications, consists of six intravenous injections of arsphenamine and six intramuscular injections in doses of 0.1 gram mercury salicylate. Arsphenamine 0.3 gram is given for the initial dose and 0.6 gram in each subsequent treatment. Following the sixth treatment a blood Wassermann is done and a spinal fluid examination made. Arsphenamine is given by the gravity method. The number of reactions both local and constitutional have been lessened, since we abandoned the syringe method. We attribute this to the fact that in giving the solution with a syringe it was administered too fast and many cases of extravisation occurred with unnecessary hardening of the veins. At least 50 per cent of our cases show some reaction, the most constant symptoms being nausea, vomiting, watery diarrhea, and malaise which usually clears up within 12 hours. Our patients lose weight under treatment and some as much as 10 pounds during the period of a course. There has been one fatality following the administration of arsphenamine.

This patient was admitted with secondary syphilis May 9, 1921, Wassermann four plus. Administration of arsphenamine 0.3 gram on May 17, no reaction. Urinalysis on May 22 showed nothing abnormal. Arsphenamine 0.6 gram on May 24. A few hours later the patient complained of nausea, vomiting, and diarrhea. The following day he was markedly shocked and purpuric but reacted favorably to stimulants. Two days later jaundice and bleeding from mucous membranes of nasal cavities and gastrointestinal tract developed. Urinalysis revealed marked destruction of the kidneys. Patient died June 8, 1921.

It is believed that, though probably arsphenamine is more active therapeutically than neoarsphenamine, its contraindications are not always found out on examination and it is administered with a greater risk to the patient.

Spinal fluid examinations have been made routinely in the following instances:

(*a*) In all cases at the end of an intensive course of arsphenamine and mercury therapy, irrespective of the blood Wassermann reaction.

(*b*) In cases of early syphilis showing symptoms of central nervous system involvement.

(*c*) In all cases showing mental or nervous symptoms, irrespective of the blood Wassermann reaction.

Many cases showing early involvement of the central nervous system, clinically, and with characteristic spinal fluid changes, will respond to intravenous therapy, hence intraspinous treatment is not given unless there are persistent symptoms or signs after a course of intravenous therapy.

Neurosyphilis requires more intensive treatment than syphilis which does not affect the nervous system.

The following method advocated by Fordyce has been used in all intraspinous treatments.

The blood having been removed from a vein is centrifugalized, serum pipetted off, and centrifugalized again to insure complete removal of any red cells. To 10 c. c. of this serum $\frac{1}{10}$ to $1\frac{1}{2}$ milligram of arsphenamine, according to indications, is added. This mixture is incubated at 37° F. for 40 minutes and inactivated to 56° F. for one-half hour, and is then administered. The advantages of this method over the use of autosalvarsanized serum according to the Swift-Ellis method are the administration of a definite quantity of arsphenamine, the addition of a definite amount of the drug in a small quantity of serum, and the convenience of preparing several doses with the serum from one patient. There have been no reactions following this method of treatment save an occasional headache which was attributed to the puncture. This can usually be prevented by keeping the patient in a recumbent position for 24 hours.

MERCUROCHROME-220 AS A GERMICIDE IN OPHTHALMIA NEONATORUM.

By C. C. GROFF, Lieutenant, Medical Corps, United States Navy.

The following cases of ophthalmia neonatorum are reported because at the time of treatment, 1920, mercurochrome-220 had not been used in the service, so far as I am aware, in this condition.

This remedy seemed to shorten the duration of this disease, but has the disadvantage of staining the lids and face deeply, yet not permanently. The fact that it seemed to shorten the duration of the disease may commend its use to eye men in the service.

Case 1.—B. W., white, male, age 11 days, was seen February 2, 1920, two days after the discharge first appeared. Examination revealed acute purulent ophthalmia neonatorum with edena of the lids and much pus in the right eye. The cornea was clear. A smear showed pus cells with gram negative intracellular diplococci. The child was delivered by a country physician who neglected to instill silver nitrate into the eyes. After cleansing with boric acid solution, a 2 per cent solution of mercurochrome was ordered every two hours. A small quantity of boric acid ointment was smeared around the margin of the lids after the instillation of the mercurochrome. This seemed to make for a longer retention of the solution in the eye. To be absolutely sure of preventing infection 1 drop of 2 per cent mercurochrome was used in the normal eye three times a day and a shield applied.

February 5: The right conjunctival sac was almost entirely free from pus. The edema was much less and the gonococci were much fewer in number.

Treatment was ordered to be continued for a week longer.

February 12: There was a slight serous discharge but no cocci were found. Boric acid instillations were ordered.

February 27: Eye apparently normal.

Case 2.—G. E. F., colored, female, age 13 days, was seen January 14, 1920, four days after discharge first appeared. The mother stated "the accoucher dropped something in the babies eyes but its eyes were red and inflammed looking about one week after it was born." Examination revealed acute purulent ophthalmia neonatorum of right eye with left eye weeping copiously. The lids of the right eye and conjunctival sac were markedly swollen, sclera injected and cornea beginning to look dull. A smear showed numerous pus cells with gram negative introcellular diplococci. The eyes were cleansed with boric acid, saturated solution, and a 2 per cent mercurochrome solution was ordered every half hour for six applications. This seemed to be slightly irritant, and a saturated solution of boric acid was then alternated every half hour with the mercurochrome solution during the night.

January 15: Twenty-four hours later the cornea was beginning to lose its dull appearance and the march of infection seemed to have been halted. Instillations were now ordered every two hours. The left eye was receiving instillations of mercurochrome every three hours from the first examination.

January 19: The free pus in the conjunctival sac of the right eye had almost disappeared and the left eye was apparently normal. Boric acid ointment was now applied to the edges of the eyelids of the right eye, after instillation of mercurochrome to insure retention of solution. The left was still receiving instillations of mercurochrome three times a day to prevent reinfection.

January 24: The edema was now much less and a smear showed the gonococci to be much fewer in number.

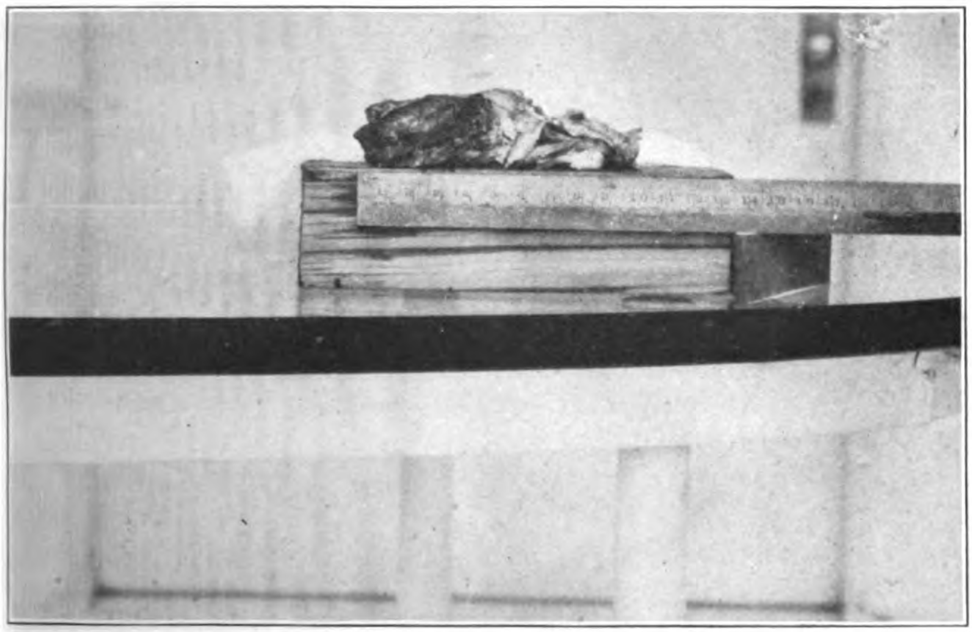
January 31: There were no gonococci present but a slight serous discharge was present. Instillations of mercurochrome were continued and saturated boric acid, camphor water and zinc sulphate were instilled every three hours alternating with the mercurochrome.

February 12: Eye apparently normal. Because of frequent instillations of mercurochrome a condition similar to argyria was looked for, but no permanent staining resulted.

AN UNUSUAL CASE OF FOREIGN BODY IN PHARYNX.

By S. B. Forbes, Lieutenant, Medical Corps, United States Navy.

The following unusual case of foreign body in the pharynx is reported, as it serves to exemplify the difficulties sometimes encoun-



FOREIGN BODY REMOVED FROM THE LARYNX.

tered in arriving at the etiological factor in patients admitted to a hospital in a comatose condition.

The patient was a white male, age 35 years, unconscious on admission; no history was obtainable.

Physical examination.—Temperature was subnormal, pulse was 126 and of fair volume. Respirations were 12 and very labored, with great inspiratory and expiratory dyspnea. There was an extreme degree of cyanosis. His skin was cold and covered with perspiration. The odor of alcohol could be detected on the breath. The pupils were equal in size but dilated, and did not react to light. The patient's condition was rapidly becoming worse and he was practically in a moribund state.

Examination of the upper respiratory passages revealed a foreign body in the oropharynx extending from the level of the tip of the uvula down to the epiglottis. The lower portion rested directly on the anterior surface of the epiglottis, forcing it down over the upper laryngeal orifice.

Removal of the foreign body was effected with some difficulty owing to its tremendous size. It was found to be a piece of roasted meat weighing 37 grams. The dimensions were as follows: Length 10.2 cm., width 3.2 cm., and thickness 3.8 cm. The illustration will give some idea of the size and shape of the foreign body.

A distinct odor of alcohol could now be detected on the breath, therefore gastric lavage was done with a warm solution of sodium bicarbonate. Several particles of undigested food were recovered. An excess of solution was allowed to remain in the stomach and the patient was returned to the ward.

Clinical course.—The dyspnea and cyanosis rapidly disappeared and the patient returned to full consciousness within 15 minutes from the time of removal of the foreign body. He had no recollection of any of the circumstances surrounding the attempted ingestion of this large bolus of food. His condition was perfectly normal the next morning.

Later a history was obtained from a relative who stated that the patient while partaking of the evening meal suddenly fell over unconscious. He volunteered the information that they had imbibed several drinks during a period of three hours prior to dinner time. A physician was called and he pronounced the case one of acute alcoholism.

This case well emphasizes the fact that the diagnosis of acute alcoholic toxemia should not be arrived at too rapidly and that a thorough physical examination should be made, thereby eliminating all possible etiological factors, before attributing the comatose state to alcohol alone.

NOTES AND COMMENTS.

The following editorial comment on the question "What is an epidemic?" appeared in the issue of the New York Medical Journal for March 1, 1922:

"'The disease is epidemic.' 'The disease is not epidemic.' 'The disease is epidemic.' Year after year we hear these statements from health officials, uttered not in succeeding breaths, perhaps, but in breaths of succeeding days. They remind one of the harlequin who rushed upon the stage with a bundle of papers under each arm. When asked what was in one bundle, he replied, 'Orders!' and when asked about the other, answered, 'Counterorders!' What is an epidemic, or when is an epidemic? If health officials do not know, who does know?

"An epidemic disease is not different in nature from the same disease when not called epidemic. Scarlet fever is scarlet fever and influenza is influenza. If there is any difference in the infectious agent, it is only a matter of more or less of its native qualities. There is nothing new about it. If there is any difference in those infected, it is again only a matter of more or less resistance. There is again nothing new or original in their state. There is an altered relationship between host and parasite, but there are all degrees of alteration. In other words, the law of relativity holds in infectious diseases as elsewhere. What is now an epidemic of smallpox was a normal state of affairs a century ago.

"There is no drawing the line between epidemic and nonepidemic disease, and there would be a more rapid advance in health matters if we were to do away with the words 'epidemic' and 'endemic,' or use the word 'epidemic' for all communicable diseases. We seem perfectly content, at least the public does, when a disease is not pronounced epidemic, but when that name is applied by official authority or, more often, by popular decision, there is suddenly much alarm and much precaution taken to avoid the disease and to prevent its spread. And yet, in its ordinary every day, every year run, the communicable disease carries off some fourteen times as many lives as in the briefer days or years when it is pronounced epidemic. The disease, then, in nonepidemic form, whatever that may mean, is fourteen times as much to be dreaded as when it is called epidemic, whatever that may mean.

"It is high time for health officials to cease quibbling about the existence of epidemics and turn their attention to the stimulation of greater interest in the ordinary incidence of communicable diseases. Let the public consider any number of cases an epidemic. We should be thankful if their public health consciousness has reached such a developed state that they are readily alarmed."

The Division of Venereal Disease of the United States Public Health Service contributes the following on gonorrhea. A review of 1921 literature:

"*Symptomatology.*—Sagot has collected the reports of 45 cases of gonococcal endocarditis, including one observed by himself and Hallé. He concludes that gonococcal endocarditis may be benign or vegetative; that the benign form is more common than is generally supposed, and is a probable cause of chronic cardiac disease; that the vegatative or ulcerative form has the character of an acute septicemia with cardiac symptoms and is usually fatal; that the danger of septicemia increases with extension of the disease to the deeper genito-urinary organs, but bears no definite relation to the severity of the primary infection.

"Rivaz describes a case of the rare complication of gonorrhea, keratodermia blenorrhagica. The patient was treated with permanganate irrigations and a polyvalent vaccine. The condition cleared up about two months after its first appearance.

"Citron reports a case of gonococcal septicemia which was cured by subcutaneous injection of 50 c. c. of meningococcal serum. He refers to cases reported by other observers which benefited by meningococcal serum—acute gonorrheal affections of the internal genital organs in women by Le Masson, and gonorrheal arthritis by Barlee, and concludes that this serum is indicated in all severe cases of general gonococcal infection.

Weill and Colaneri report another case of gonococcal septicemia. Symptoms of septicemia developed in a man during the acute stage of gonorrheal urethritis. Treatment by intramuscular injections of electrargol and afterwards by antimeningococcic serum and an autovaccine has no effect. Patient died a month after symptoms of septicemia commenced.

"Valentin remarks on the frequency of relapses in gonorrheal vulvovaginitis in children. In his 161 cases the chief source of relapse was found to be the rectum.

"*Diagnosis.*—Norris and Mickelberg give an analysis of 794 examinations of films (Gram's) from women presenting clinical evidences of gonorrhea. They believe that clinical evidence is of greater value in diagnosis than staining methods. Minor details of technique are given.

"*Prophylaxis.*—Schumacher prefers albargin to protargol, hegonon, or other silver preparations, as it contains a high percentage of silver, and can, therefore, be used in weaker solution. A 1 per cent solution is considered a sufficient prophylactic against the gonococcus. As in the case of mercury, solutions of silver salts must contain silver ions in order to be effective. Schumacher points out that perchloride of mercury acts as a prophylactic against both the spirochete and the gonococcus, and can hence be used alone. The chief objection to general use is its poisonous property. He therefore suggests the use of 10 per cent solution of albargin as a general prophylactic, and holds that the silver ions have also a bactericidal action against the spirochete.

"*Treatment*—Phélip claims good results from silver ionization in the early stages of gonorrheal urethritis. He gives method of treatment used.

"Haxthausen quotes the investigation of Eizenberg and Okolska (Zentralbl. f. Bakt., 1st Abt. Orig., 1913, 69, 312) as having shown that the action of certain disinfectants can be greatly increased by the addition of even small quantities of alcohol. He compares the results of his 100 cases of acute uncomplicated and mild complicated gonorrhea treated with a solution of protargol (0.5 per cent) and alcohol (5 per cent) with Jersild's (Ugesk. f. Laeger., 1913, 961) report on 116 cases treated with a watery solution of protargol followed by a watery solution of silver nitrate later in the disease. Haxthausen finds this comparison favorable to his treatment.

"In a subsequent paper, Jersild, who has treated 14 cases of gonorrhea of the urethra in women and of vulvovaginitis in children with alcoholic solutions of protargol and has compared the effects with those obtained in 20 other cases treated with a watery solution of protargol, has nothing good to say of the former method.

"Mann advocates acriflavin for the irrigation of gonorrhea.

"Oettinger and Deguingand report on eight cases of gonorrheal arthritis treated with antigonococcal serum. The results obtained by intra-articular injection were much more rapid and effective than when the serum was injected subcutaneously.

"Scherliess claims good results with hot-water irrigation in gonorrhea in soldiers. He gives his treatment used in 200 cases with only three failures.

"Lindblad has tested the value of milk injections in gonorrheal diseases of the eyes by a statistical comparison of the results obtained at the Sabbatsberg Hospital before and after the introduction of this treatment, which for the past year and nine months had been adopted in every case of gonorrhea of the eyes. Author concludes that this treatment is beneficial in some cases but it does not deserve extravagant praise.

"Terrien, Debré, and Paraf have studied the effect of antigonococcal serum by experiments on the rabbit. From the results obtained the authors are of the opinion that antigonococcal serum, to be effective, should be injected into the actual focus of disease. This, however, does not apply absolutely to the effects of serotherapy in the human subject.

"Sagot regards subcutaneous or intravenous injection of antigonococcal serum as the most promising form of treatment in cases of gonococcal septicemia. He mentions the experiments of Debré and Paraf with this serum in animals.

"Reenstierna reports favorable results from the treatment of gonorrheal complications by a combination of antigonococcus serum and a temperature-rising agent.

"Sézary discusses the variable results of antigonococcal vaccinotherapy. In conclusion he remarks that we must not expect too much from vaccinotherapy. Its rôle is to stimulate and reenforce the reaction of immunity, but this reaction may be slow and insufficient.

"Boyd has investigated the value of vaccines in acute gonorrhea. Comparing 270 cases treated with vaccines with 200 control cases treated without them, it was found that the vaccine had no effect on the course of acute gonorrhea.

"Demonchy advocates the use of vaccines in acute gonorrheal urethritis. From his experience he concludes that intravenous injections of antityphoid vaccine give the best results. He thinks that the specificity of the vaccine plays only a secondary part in the treatment of the complications of gonorrhea and that the therapeutic results are not proportional to the dose injected. He advises small doses repeated not later than five or six days.

"Weill reports favorable results from the subcutaneous injection of hydrocele fluid in cases of gonococcal epididymitis complicated with hydrocele. Three cases are reported, in the first of which two injections of 10 c. c. were given, in the second one of 5 c. c., and in the third one of 3 c. c. The first case improved most rapidly, and Weill considers that the therapeutic effect is proportional to the quantity of liquid injected. Weill also obtained improvement in two other cases of gonorrheal epididymitis by injections of hydrocele fluid from the first case—hetero-plasmo-therapy.

"Cumming and Glenn recommend vas puncture and injection of collargol in cases of acute and chronic seminal vesiculitis. Their method of treatment is given. As the result of an experience with 55 cases the authors conclude that this is an effectual method of treatment of gonorrheal infection of the seminal vesicles; that it should be combined with the usual treatment for associated conditions of urethritis and prostatitis; that vas puncture is contraindicated in cases with acute anterior urethritis or acute epididymitis; that while not a certain cure, it leads to improvement in most cases, and to cure in some.

"*Tests for cure of gonorrhea.*—Fraser warns against overtreatment and overinstrumentation. He concludes that there is no absolutely certain test for cure, but gives a scheme which he considers practical and sufficient. With regard to the complement fixation test, he thinks that more knowledge of the different types of gonococci and a more sensitive antigen are required before the test can be rendered reliable.

"Volarelli, who has investigated the tests for cure of gonorrhea from the results of 172 cases, considers that the best test consists in provocative injections of gonococcal vaccine, together with bacteriological and cytological examination of the secretion.

"Herrold has attempted to establish a more definite standard of cure in gonorrheal infections in the male by improved methods for cultivation of the gonococcus, and by study of the value of provocative and serological tests. He concludes that cultures of prostatic and seminal secretions and the first urine sediment furnish the most reliable means of determining whether a gonorrhea is cured."

Surg. Commander E. L. Atkinson, R. N., writing on "Immediate Surgery with the Royal Marine Artillery Howitzer Brigade in France, 1916–1918," in the Journal of the Royal Naval Medical Service for January, 1922, reviews his experiences during a period of service in France from May, 1916, to June, 1918, during which time between three and four thousand wounded came under observation and treatment. He describes in detail the dressing station used during the Somme offensive in 1916. It was a small dugout, located roughly, 3,600 yards from the front line, and provided room for five stretcher cases and a wooden table for dressings and examinations. Lighting was by means of a small acetylene lamp, supplemented when necessary by oil lamps and candles. Heating was secured by an improvised stove made from a 10-gallon gasoline drum, with a stovepipe made of biscuit tins. The entrance to this dressing station, to prevent the entrance of gas, was fitted with double curtains of blankets soaked in a saturated solution of hyposulphite of soda. A goodly supply of shell-wound dressings, splints, and stimulating food was kept on hand. Two-gallon primus stoves were used for the sterilization of instruments. Instruments for immediate use were kept in trays containing 1–20 phenol. Hypodermic and serum syringes and a supply of morphine in solution were kept sterilized. Iodine was kept prepared for application. A large supply of ammonia ampules were provided for cases of gas poisoning. There was constant demand for agate urinals.

This station proved satisfactory, but in the Battles of Arras and Ypres and in the retreat in 1918 any available shelter was occupied. In an advance or retreat one had to rely entirely upon shell and field dressings and upon what field equipment could be carried. Ambulance patients forwarded from an advanced dressing station were tagged with a description of the injury, identification, treatment, morphia, and antitetanic serum given.

Fragments of high-explosive shells and shrapnel bullets were responsible for the majority of the injuries received. Shock varied in degree and in time of onset according to the temperament of the injured man, to the severity of the injury, and the duration of previous exposure. In men lightly or moderately severely wounded the first symptoms are a feeling of chilliness and a desire for warmth, followed by drowsiness. In the more severe cases—independent of the degree of the wounds—the onset is almost immediate. There is pallor, sweating of the face and hands, the heart beating rapidly, and the breathing labored.

Cases of mild degree respond to any appropriate stimulant, such as aromatic spirits of ammonia, hot drinks, and warmth. The sitting position, with the arms pressing the knees firmly against the abdomen, was found beneficial. In moderate cases the horizontal position, with 10 minims of ether hypodermically and a large 4-inch flannel bandage compressing the abdomen, produced good results. Hot drinks in small quantities were given when the symptoms began to subside. Ether hypodermically acts quickly and efficiently. No benefit was derived from the use of strychnine.

Hemorrhage from shell wounds varied with the character of the projectiles. These wounds were generally punctured or lacerated, and bleeding from them in most cases was controlled by packing with lint soaked in sterile saline and a firm pad and bandage. Morphia, one-half grain hypodermically, assisted in the control of bleeding. No attempt was made at the advanced dressing station to tie bleeding vessels; a tourniquet was applied and the patient evacuated as soon as possible to a casualty clearing station. In cases where a tourniquet was required a special note was attached at the time of application and the ambulance orderly told to report on arrival at the clearing station.

In the early treatment of wounds the clothing was first cut away and the wound itself was covered with gauze soaked in hypertonic saline (4 per cent). The skin immediately around was cleansed with swabs soaked in gasoline. The gasoline having been removed with clean swabs, the surrounding skin was painted with tincture of iodine or with picric acid. If the iodine or picric acid gets into the wound great pain results. After the removal of fragments and dirt the wound was cleansed with 1–2,000 bichloride of mercury solution, washed out with saline solution, and packed, if necessary, with saline gauze. The results of this method were very satisfactory.

Cranial wounds were generally in a very dirty condition, the patient in collapse and bleeding severely from the scalp. When suffering from embarrassed respiration efforts were made to clean out the fauces, draw forward the tongue, and, if necessary, secure it with a stitch fixed by adhesive plaster to the cheek. The injured man was placed in a sitting position and, if shock was profound, ether was given hypodermically. The scalp was shaved and painted with iodine. The wound was then examined, any obvious bone fragments removed, and saline gauze, wool, and protective applied.

In thoracic wounds a sudden, large intra-pleural hemorrhage produces profound shock and embarrassment to respiration, which is complicated by coughing. Such large hemorrhages, however, were rare. The immediate indication was absolute rest in a sitting posture and cessation of movement, which is generally impossible in the field. Aspiration of a hemothorax was adopted in cases where the fluid reached a level causing embarrassment.

In the writer's experience, abdominal wounds produce less shock than in other regional wounds. Bullet wounds of the abdomen do not cause protrusion of gut. They are best cleaned and left alone, morphia administered, and the patient evacuated as soon as possible.

Wounds of the abdomen caused by shell fragments usually cause more laceration, and necessarily more protrusion of gut. When there was protrusion without obvious injury to the gut, morphine was given and the wound cleaned and the gut replaced under chloroform anesthesia. If the gut was injured an attempt was made to pack off the wounded gut from the peritoneal cavity.

In wounds involving joints the best practice in the field is the removal of any visible foreign body, but not to explore for the fragment causing the wound.

Rupture of the membrane tympani was exceedingly common from the near explosion of large shells.

All six of the laboratory workers of the United States Public Health Service who have been studying tularemia, a disabling sickness of man which has been known, particularly in Utah, for the last five years, have contracted the disease, two of them being infected in the laboratory in Utah and the other four in the Hygienic Laboratory in Washington. Such a record of morbidity among investigators of a disease is probably unique in the history of experimental medicine.

Two of these workers are physicians, one is a highly trained scientist, and the others are experienced laboratory assistants. One of them contracted the disease twice, once in the laboratory in Utah and again, two years and five months later, in the laboratory in Washington.

In these workers the disease began with a high fever, lasting about three weeks, and was followed by two months of convalescence. The disease has few fatalities, its chief interest arising from the long period of illness which it causes in midsummer, when the farmers of Utah are busily engaged in cutting alfalfa and plowing sugar beets.

The studies into the cause and transmission of the disease show it to be due to a germ, *Bacterium tularense*, which is conveyed by six different insects: The blood-sucking fly, *Chrysops distalis;* the stable fly, *Stomyox calcitrans;* the bedbug, *Cimex lectularius;* the squirrel flea, *Ceratophyllus acutus;* the rabbit louse, *Haemodipsus ventricosus;* and the mouse louse, *Polyplax serratus.* Only the first four of these are known to bite man. It appears possible that the germ may also enter through unbroken skin; for instance, that of the hands.

Carbon monoxide poisoning is one of the most widely distributed and most frequent of industrial accidents, says the United States Public Health Service. The gas is without color, odor, or taste. It is an ever-present danger about blast and coke furnaces and foundries. It may be found in a building having a leaky furnace or chimney or a gas stove without flue connection, such as a tenement, tailor shop, or boarding house. The exhaust gases of gasoline automobiles contain from 4 to 12 per cent of carbon monoxide, and in closed garages men are not infrequently found dead beside a running motor. A similar danger may arise from gasoline engines in launches. The gas is formed also in stokerooms, in gun turrets on battleships, in petroleum refineries, and in the Leblanc soda process in cement and brick plants. In underground work it may appear as the result of shot firing, mine explosions, or mine fires; or in tunnels from automobile exhausts or from coal or oil burning locomotives.

Carbon monoxide exerts its extremely dangerous action on the body by displacing oxygen from its combination with hemoglobin, the coloring matter of the blood, which normally absorbs oxygen from the air in the lungs and delivers it to the different tissues of the body.

Oxygen will replace monoxide in combination with hemoglobin whenever the proportion of oxygen in the lungs is overwhelmingly greater. Therefore—

1. Administer oxygen as quickly as possible and in as pure form as is obtainable, preferably from a cylinder of oxygen through an inhaler mask.

2. Remove patient from atmosphere containing carbon monoxide.
3. If breathing is feeble, at once start artificial respiration by the prone-posture method.
4. Keep the victim flat, quiet, and warm.
5. Afterwards give plenty of rest.

Among the members of our profession who have had a life of adventure few names are more familiar, says the British Medical Journal for February 18, 1922, than that of Thomas Dover (1660–1742), who took his B. A. at St. Mary's hall, Oxford, and the M. B. from Caius College, Cambridge, and became a captain in a buccaneering expedition, in which capacity he in 1710 rescued Alexander Selkirk, whom Defoe made immortal as Robinson Crusoe. Eventually Dover began the practice of medicine in London, where he became known as "the quicksilver doctor" on account of his cure for asthma and many other ills—namely, "an ounce of quicksilver daily, to be taken at what hour the patient pleases, and a spoonful of the gas of sulphur in a large draft of spring water at 6 o'clock in the afternoon and at bedtime." In his well-known collection of biographical essays, An Alabama Student (1908), the late Sir William Osler gave an attractive account of this "physician and buccaneer," with many details about his popular work, The Ancient Physician's Legacy to His Country, "designed for the use of all private families." To the February number of The Bookman's Journal and Print Collector, which we are given to understand is the only periodical in the world devoted exclusively to the collecting of books and prints, Dr. Philip Gosse, the son and grandson of leaders in literature and zoology, respectively, contributes a brightly written sketch of Dover's adventures as a pirate, based mainly on a rather rare book, A Cruising Voyage Round the World. This book was begun in 1708, and, according to the title-page, contains "Remarkable transactions as the taking of Puna and Guayaquil, of the *Acapulco* ship and other prizes; an account of Alexander Selkirk's living alone four years and four months on one island, etc., 1721," by Capt. Woods Rogers, who commanded the expedition of two ships—the *Duke* and the *Duchess*—fitted out by the merchant adventurers of Bristol at the instance of William Dampier, the famous circumnavigator, freebooter, naturalist, and hydrographer. Dampier, then 56 years of age, went as pilot, and Dover, who was practicing in Bristol, was chosen as second in command, not because he had any knowledge whatever of the sea or ships, but, strange as it may seem, on account of his bad temper; for it was shrewdly argued by the merchant adventurers who were financially interested in the expedition that Dover's vile temper would render him so unpopular that he would not have any followers should he attempt to break away from the main party—a danger that had led to the failure of previous expeditions in which a popular second in command had been persuaded by a discontented party to go off on a separate cruise. As may be imagined, the voyage was not free from quarrels over the distribution of the spoils. After sacking Guayaquil the English sailors stored their plunder in the churches and spent the night there to guard it, but their sleep was much disturbed by the smell of corpses recently buried as the result of an epidemic of "plague." Next day they returned to the ships, but within 48 hours 180 of the crew of one ship were down with the plague; here Dover stepped in and ordered the ships' surgeons to bleed every sick man to a hundred ounces, and to give large drafts of dilute sulphuric acid; it is recorded that this drastic treatment was justified by the recovery of all but eight patients.

The editor of the British Medical Journal makes the following comment on "the destruction of vitamins" in the issue of that periodical for February 11, 1922:

"The two facts of greatest practical importance about vitamins are, first, that a certain minute supply of these substances is essential for animal life, and, secondly, that they are very easily destroyed. It is most necessary to bear this second characteristic in mind, for the actual existence of vitamins can only be demonstrated by the disastrous effects produced by their absence from the diet or their presence in it in insufficient quantities; indeed, since vitamins occur naturally in nearly all fresh foodstuffs, it is probable that their existence would never have been suspected had they not been such unstable bodies.

"An abundant supply of vitamins exists in all fresh vegetable foods, and considerable quantities occur in milk and in meat, provided that the latter are obtained from animals fed on fresh foods. A normal adult living on an ordinary diet containing a reasonable proportion of fresh vegetables is, therefore, certain of obtaining a plentiful supply of vitamins. Unfortunately these indispensable food constituents are, as has been said, very readily destroyed. All three vitamins are rapidly destroyed by heating in the presence of air or oxygen. Hopkins showed that the fat-soluble vitamin A in butter was completely destroyed by heating the butter to 120° C. for four hours if oxygen was bubbled through the butter, although practically no destruction occurred if the butter was heated without aeration. The experiment established the important fact that this vitamin, though fairly resistant to heat, is readily destroyed by oxidation. Zilva found that the antiscorbutic vitamin C was completely destroyed by boiling for an hour in the presence of oxygen, but that no destruction occurred when it was boiled for two hours in an atmosphere of carbon dioxide. The destruction of vitamins depends largely upon the length of time for which they are heated in the presence of air. Hess, for instance, showed that little destruction of vitamin C occurred when tomatoes were heated to 100° C. for 15 minutes, but that four-fifths of the vitamin was destroyed when the tomatoes were heated to 100° C. for an hour. Similarly, it has been shown that a greater destruction of the vitamin C present in fresh milk occurs when it is heated to 60° C. for half an hour than when it is boiled for a minute. The reaction of the fluid containing the vitamin is also of importance, for vitamins are much more readily destroyed in an alkaline than in an acid fluid. The fluid need only be feebly acid. The antineuritic, water-soluble vitamin B is more resistant than vitamin C, but it also is readily destroyed by boiling in an alkaline fluid in presence of air.

"A fair proportion of all three vitamins in fresh vegetables appears to survive all ordinary cooking; but prolonged boiling, such as occurs in making stews, destroys nearly the whole of vitamin C and probably most of vitamins A and B. The vitamins in milk are unfortunately very unstable; ordinary pasteurization destroys practically the whole of vitamin C and a considerable amount of vitamin A.

"The extraordinary difficulty of retaining vitamins in preserved foods is in large measure due to the fact that vitamins slowly oxidize on keeping. Vitamin A is the easiest to preserve, for it appears to be fairly stable when dissolved in oil, and it can be kept in cod-liver oil for months and probably for years; it also survives for many months in tinned meat. Vitamin B can be preserved in the dry state, and whole-meal flour and unpolished rice retain their content of this vitamin for long periods. The preservation of vitamin C, the antiscorbutic vitamin, is by far the most difficult problem. This is well known; efforts have been made for the last hundred and fifty years to find some satisfactory way of obtaining a concentrated, portable, and stable preparation of the antiscorbutic element in fresh fruits or vegetables. The problem is of the greatest importance to the Navy and to explorers; in special circumstances it may be of first-rate importance to the Army also. A stable preparation of vitamin C is essential for the prevention of scurvy when fresh vegetables and fruits are not obtainable. Lemon-juice was introduced as an antiscorbutic in the eighteenth century, and its use reduced the mortality in the Navy enormously. Lemon juice is very rich in vitamin C, and the acids present help to preserve the vitamin. Unfortunately, in the nineteenth century lemon juice was discarded for lime juice, which has only one-quarter the vitamin content of the former. Lemon juice, however, is not a really satisfactory vehicle for the preservation of vitamin. C. Bassett-Smith found that commercial lemon juice lost all its vitamin content rapidly; he showed, on the other hand, that dried lemon-juice tablets retained their vitamin for at least a year. Harden and Robison found that dried lemon juice kept in a desiccator for 15 months at room temperature only lost 50 per cent of its activity. Hess ascertained that tinned tomatoes retained their vitamin C content with little loss for three years. He also found that if perfectly fresh milk was dried by a suitable process and stored in sealed tins its vitamin C content was preserved for many months. The simplest way of transporting vitamin C is by the use of dried peas; they contain little of the vitamin when dry, but produce large quantities when allowed to germinate. By the use of germinating peas an abundant supply of vitamins can be obtained by explorers or troops in sterile countries. It is important to realize that although dozens of different methods of food preservation are known, yet the few examples mentioned above are practically the only methods by which vitamin C can be preserved for any length of time.

"Individuals living under normal conditions may suffer from vitamin lack, owing to an improper diet from which all vitamin-containing foods have been eliminated. All that is needed in such cases is the addition of such foods to the diet. The following foods are particularly rich in vitamins: Cod-liver oil contains about 240 times as much vitamin A as butter, yeast is the richest source of vitamin B, and fruit juices contain a large amount of vitamin C Germinating seeds contain large amounts of both vitamin B and C, while green vegetables and tomatoes contain large quantities of all three vitamins. An abundant supply of all the vitamins can therefore be obtained simply by the addition to the diet of cod-liver oil and the fresh vegetables mentioned.

"Certain workers claim to have produced concentrated preparations of vitamin B, but no methods are known by which either vitamin A or vitamin C can be obtained in concentrated form. Any attempt at chemical treatment produces a rapid destruction of the vitamins. As already pointed out, it is a matter of great difficulty to devise any means by which vitamin C can even be preserved, and its concentration is at present impossible. It is extremely easy to obtain an abundant supply of vitamin C by the use of fresh foods, but it is very difficult to retain more than a fraction of this vitamin in any form of preserved food. No substance is known which contains more vitamin A than cod-liver oil, and, as has been said, it is only in the case of vitamin B that any success has attended the repeated efforts that have been made to purify or to concentrate vitamins.

"In spite of the fact that ordinary fresh foods are the simplest, cheapest, and richest sources of vitamins, the public apparently demands to be supplied with vitamins in the form of medicinal products. A large number of preparations are on the market which claim to contain vitamins. Some of these preparations are so far satisfactory that the prepared article has been proved to contain vitamins, although even in these cases a few ounces of green vegetables would probably contain more vitamins than large quantities of the preparation. In the case of certain manufactured products, however, it is simply stated that the preparation is made from substances very rich in vitamins. This statement means nothing, for, from the facts mentioned in this article, it is obvious that even if a preparation is made from a raw material rich in vitamins, it does not follow that the finished article will contain any vitamin at all when it reaches the patient.

"We have endeavored to state the known facts as plainly and directly as possible, and invite manufacturers to take note of them. They may be unwelcome, but they are, we believe, incontrovertible."

NURSE CORPS.

DREAMS.

By an Old Dreamer.

Much has been written on the subject of dreams, and some of these writings have been pernicious nonsense even though emanating from high authority. But why let the voice of authority dominate our reason without giving it the " once over " on our own account?

The imagination, literally the making of pictures, is a faculty of the mind, and a very entertaining faculty at that, which goes on alike whether we are awake or asleep, and the pictures which are made are for our delectation. The normal physiological exercise of any bodily function gives a pleasurable sensation; thus while we are asleep with consciousness partially suspended or disassociated, but never completely obliterated, the reins of imagination are loosened. Without the restraining influence of other faculties of the mind, such as the logical, the moral, the cautious, the imagination literally plays and paints its fantastic pictures for the amusement or consternation of the latent consciousness.

The instinct of play, while universal, is strongest in youth. Sleep rejuvenates, not only in a physical sense, but also gives to one the mind of a child by submerging the barriers of sophistication.

Sometimes dreams terrify rather than amuse, in which case the latent consciousness generally says: " See here, young person, I'll not stand for that, you know," and emerges from the too violent shock. In such cases it usually happens that consciousness proceeds to reflect upon this picture too vividly painted. Wide awake, it remembers with horror the vision of the executioner wearing that curious red mask, standing just under the scaffold. How black his beard looked showing below the mask! Why did he not wear a black mask, then his beard would be red, like Uncle George's—why it is " Uncle George "—and lo, one is asleep again, and " Uncle George " this time puts the noose around one's neck and gives it a tug—and again consciousness emerges and the painting is suspended. It is a characteristic of the dream to recur to the same subject and present it in many different aspects, and this specimen dream is related to indicate the transition between sleep and wakefulness, also to show that the imagination may continue to follow the same figment uninterruptedly in both states, back and forth, repeatedly playing with the image and changing it in color and form, though retaining the motive which in this case gave the consciousness a shock of horror.

Sleep, as a part of life, is curiously undervalued by most of us, if one may judge from popular habits and daily routine of the general pleasure seeker. All that the young realize about sleep is that it is a part of the daily life to be postponed as long as possible, although usually prolonged at the further end. To the young and healthy sleep is "lost time," and they would discredit the fact that it is supposed to be a pleasurable part of one's existence. And yet children are adept dreamers; the imagination paints rare pictures for the young both waking and sleeping. Thankful we may be that the sophisticated theorist can not impute to the age of innocence his idea of the subject matter of dreams. And the child is no martyr of repressed desires, or I know not the child!

To those of us who have experienced the sensations of life and have realized the numbing effects of sophistication, then is the response deeper than recognition of the poetic beauty of the lines:

> "Above thy deep and dreamless sleep,
> The silent stars go by."

Such a degree of disassociation of the conscious mind as expressed by "deep and dreamless sleep" is perhaps the fullest pleasure the cup of life contains.

Sleep may be dreamless. Just as in the case of the Cape Cod captain, while we are awake "we sometimes sit and think and sometimes we jest sit"; so, while we are asleep the imagination may rest, or, as high authority declares but can not prove, the disassociation is so great that memory does not register. Various physiological states account for this—such as the amount of blood in the brain and the degree of fatigue or excitement which preceded sleep. A high pillow will tilt the head forward and lessen the blood supply, and this has been found to lessen the number of dreams. The influence of the digestive functions upon dreams is too well known to require comment. From such stimuli of the body arise the hints which start the imagination on its wild excursions. After allowing for all such causes, however, it certainly leaves a vast horde of ideas unaccounted for. Transitions are instantaneous and without apparent connection; nor can acts or thoughts of the wakeful hours give the clue to the flash of memory which revives something long forgotten.

A creative faculty is sometimes manifest; one may compose verse, devise an invention, or plot a story. Not infrequently do we hear of individuals who have writing materials at the bedside so that ideas which sleep creates may not be lost to waking consciousness. This power of innovation is strong evidence that all dreams are not suggested by external stimuli. The cause of such unsuggested dreams is the well-recognized but entirely mysterious power of the imagination of making spontaneous mental combinations. When such combinations are the most varied they result in inventions, and the individual is called a genius. In dreams also genius is at work.

All this is subject matter of common observation, and it requires no elaborate theory to elucidate. If perchance one dreams that it is thirty degrees below zero, and that it changes to sixty degrees below, and some one knocks at the door and asks if one is going skating, it requires no great mental feat to perceive that one dreamed because one was cold. A psychoanalysis may explain that the dream of zero weather means the repressed desire for another blanket; but the desire does not remain repressed after one has sufficiently come to consciousness to make even a reflex movement toward the foot of the bed where the extra coverings hang; yet it is the repressed desires of the *awakened* existence which this theory would have as the cause of our dreams. Surely there is no place for *that* explanation in the case of a sensation of the body occurring while we are asleep.

It would be absurd to deny that to a certain number of dreams this psychoanalytical explanation is applicable, but can not this be over-advertised? Is there not a Zurich school of analysis as well as a Viennese? As a matter of fact, what are these desires which we so persistently repress in our waking hours as to afford material for our nightly volume of dreams? The majority of us adults are under the impression that the human animal is not given over to practicing self-control, and one can not credit him with much in the way of repression. "Lead us not into temptation, for if you do, assuredly we shall yield," would seem an honest prayer for the majority of the human adults.

That the general color of our dreams may be influenced by the general color of our lives is not denied, but a closer relationship of cause and effect between the acts and thoughts of the day and our dreams at night other than that of the broad general emotions, anxiety, sorrow, pain, and their opposites, does not always occur. A patient suffering from a chronic ailment may have depressing dreams of death or of varied calamities. His thoughts during the day may not have embraced a single one of the specific elements of his dream, but (shall we say subconsciously) they determine the field in which his imagination rambles at night.

And so the study of our dreams may give a hint to the character of our lives, whether we are placid or morbid, spiritual or sensuous. But in spite of "high authority" may not we who are merely plodders on the road of life state that we do not think that they can give more exact or explicit information? Certainly knowledge of ourselves so obtained is not in the least comparable in value to that afforded by a study of our waking hours, and, also, one would hate to acknowledge that the stuff one's dreams were made of were made in Austria.

THE RÔLE OF THE NURSE IN CURE AND PREVENTION.

Speaking of the rôle of the nurse in the cure and prevention of disease George E. Vincent, president of the Rockefeller Foundation, in his review of the foundation's activities in 1921 says:

"The modern hospital and doctors and surgeons are largely dependent upon the trained woman nurse, who has made an invaluable contribution to curative medicine. Public health administrators are recognizing the visiting or health nurse as equally indispensable to the success of public and personal hygiene. Already maternity and child welfare nurses, school nurses, tuberculosis nurses, and several other specialized types have taken their places in private health systems and in Government departments. One State has announced as its goal the appointment of a health nurse for every 2,000 of the population; another has fixed the ratio at 1 to 3,000.

"Questions as to the exact function of the bedside nurse, the kind and length of training she should receive, have been under discussion for some time. The advent of the health nurse raises similar problems. How far should her education coincide with that of the hospital nurse? In what should consist her special training? How much time should the entire course occupy? Should there be different grades of both bedside and health nurses? Is there a place and function for a lay worker or a health visitor? In 1919 the foundation invited a group of persons who are most familiar with nursing problems to a conference which nominated a survey committee under whose auspices a competent expert has been making a study of the subject in all its phases. A report is promised in the summer of 1922. The expenses of the survey have been met by the foundation.

"During 1921 the International Health Board contributed toward short courses for New York State nurse training. Four nurse training centers in France were aided not only to train *visiteuses d'hygiene* but to improve in certain hospitals standards of ward nursing and administration. The Cavell-Depage Memorial School of Nursing in Brussels will be an integral part of the reorganized hospital and medical school to which the foundation is contributing a large sum. The International Health Board is cooperating with the new Government hospital in Rio de Janeiro in establishing good standards of nursing under the leadership of American trained nurses.

The foundation supports a nurse training school in connection with the Peking Union Medical College. A survey of nurse training in Great Britain and on the Continent, to be begun early in 1922, has been authorized."

NOISE.

A recent publication has stated that scientific investigations have shown that "there are few more active robbers of our energy and strength than noise. Whistling, whether it be the effort of the passing boy, the shriek of the railway engine, or the blare of the police alarm, is only a type of the many noises with which the inhabitants of all towns are cursed. These noises are really a serious menace to the health and happiness of all communities. Those of us who live in cities believe that we become accustomed to the din, but this is not entirely correct. What we think is a process of becoming accustomed to noise is in fact a state of active resistance to it. We ignore by refusing to hear, but this can not be done without expending more energy than we can afford."

This nerve energy which transmits outside sounds to the brain may be likened to the electric energy which operates a telegraph system or the familiar house electric bell. In all these cases the sending of the message, be it the noise from ear to brain, the code from operator to tape, or the push button to bell, uses up a given quantity of nerve or electric energy, tending to ultimate exhaustion of the nerve centers or batteries. Our nerves of hearing expend some of their energy transmitting sounds to our brains; when we make an effort to refuse to hear an unnecessary waste of nerve energy goes on. It is claimed the amount of this waste is measurable. The intense effort required for not hearing is accompanied by a rise in the pressure of the blood stream on the walls of the arteries, and an ingenious mechanism attached to the pulse measures this increased pressure of a column of mercury. It is thus our total available stock of energy is reduced and we have not enough left to bring our "not hearing" faculty into play and noise becomes a torture.

One of the most persistent criticisms made of our naval hospitals is the amount of noise the sick are forced to endure. Heavy boots, slamming doors, rattle of dishes, loud talking, scraping of metal furniture—all these have been enumerated. To the query, "Why do you not report these disturbances?" there is but one answer, "I have tried, but I am regarded as a crank." Outside the hospitals city authorities have tried to help in the suppression of noise by notices of "Zone of quiet," but few could assert that these signs have restrained any motorist from blasting his horn or any motorcyclist from cutting out his muffler. The boat proceeding up the Sound passes a hospital at the water's edge; the wall bears a 3-foot sign, "Quiet—No unnecessary noise," but at this particular point the boat sends forth a siren whistle.

Employers of labor now recognize that time and energy are wasted from the fatigue engendered by the noise of machinery and manual operations, and it is believed that more active measures will be taken to control unnecessary and preventable noises. When one is very ill, one fully realizes how great must be the stock of energy required to intercept noise.

It is not work that kills but the continuous drain of nervous energy entailed by our efforts not to hear distracting din. Even if one does not entirely agree to this statement, one can not gainsay the retarding effect of noise in cases of sickness, and such united and persistent efforts as can be made to promote quietude in our hospitals will result in greater good to the patients and increased efficiency on the part of the personnel.

BOOK NOTICES.

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REVIEWERS.

Lieut. Commander W. M. Kerr, Medical Corps, United States Navy.
Lieut. John Harper, Medical Corps, United States Navy.
Lieut. L. J. Roberts, Medical Corps, United States Navy.

Still am I busy books assemblynge,
For to have plentie it is a pleasant thynge
In my conceyt, and to have them in hande,
But what they mene do I not understande.
(Medieval book collector.)

Protein Therapy and Nonspecific Resistance, by *William F. Petersen, M. D., associate in pathology, University of Illinois, College of Medicine, Chicago, Ill.* The MacMillan Co., New York, 1922.

A book on this subject is timely. For the past six or seven years clinical data has been accumulating which indicates that it is necessary for us to broaden our views in relation to biologic therapy. For the past 30 years the idea of specific immunity has so dominated medical thought that it is difficult for us to think in terms of nonspecific protein therapy. The fact of the existence of a nonspecific reaction, however, has been established, and its application in the treatment of disease is becoming more and more widespread. Therefore, because of the opportunity it offers of keeping us abreast of the times, it is very fortunate that the author has made available such a complete and judicious résumé of the subject.

The book is divided into three sections, the first dealing with "The method," the second with "Theories," and the third with "The clinical results." In the first section the author gives a sketch of the early history of nonspecific protein therapy, followed by an enumeration and brief discussion of the various nonspecific agents which have been used. He then describes the so-called nonspecific reaction, taking up in detail the rather marked effect which the intravenous injection of 25 to 50 million dead typhoid bacilli has on the physiological balance of the body. The last chapter of this section deals with the focal reaction in response to nonspecific protein injections. In the section on "Theories" the author discusses briefly those advanced by various writers to explain the mechanism of the nonspecific reaction. This is followed by a rather extensive discussion of his own views on the subject. He has formulated what appears to be a very plausible theory explaining the probable mechanism of the reaction. In considering the clinical results of nonspecific protein therapy the application of this form of treatment to various diseases is taken up. The methods of procedure are merely outlined and dosages either not mentioned or merely suggested. We are given a brief summary of the forms of nonspecific therapy used and the results obtained in the diseases in which it has attained any application worthy of note. The final chapter on indications and contraindications contains information with which everyone should familiarize himself before attempting to use this form of therapy. One of the most valuable features of the book is the extensive bibliography which it contains. There has been published a surprisingly large mass of literature on nonspecific protein therapy and allied subjects, and the author has gone to a great deal of trouble in compiling this bibliography for the benefit of those who may wish to refer to the original sources.

The volume under discussion will undoubtedly disappoint those who have been looking for a ready reference book to which they might turn for definite well-developed methods of treatment by means of nonspecific agents. Nonspecific protein therapy, however, can not at present be carried on by rule of thumb, and this book serves an entirely different purpose than that of an outline of treatment. As the author says in his preface: "The summarizing of our present knowledge in this particular field has seemed of some possible value, not with the idea of popularizing a new therapeutic measure but rather in stimulating interest in a direction that seems to offer decided possibilities of advance. I have therefore merely indicated some of the methods at present employed in nonspecific therapy without effort to define precise modes of application or indications for therapeutic use. On the other hand I have endeavored to present the possible theoretical basis and some of the collateral fields of application as fully as our present knowledge will permit." With an understanding of the author's point of view in the presentation of this subject one can more readily read the book with appreciation. In dealing with so new a subject it has been necessary to include reference to, and in some cases relatively lengthy discussions of, methods and theories which may later have to be discarded. The average reader will be inclined at times to be skeptical of the value of some of the material used. But if we bear in mind that the author's purpose is to present a subject in which he wishes to stimulate further investigation this material is seen to be essential.

It must not be thought, however, that this book is not written for the practicing physician. As the author states: "It was the clinic that directed that attention to this form of therapy." It is a method of treatment, and, therefore, must of necessity be handled by those caring for patients. The use of protein therapy is outlined in the case of some of the diseases with enough definiteness to enable one proceeding cautiously and with judgment to carry out with safety in certain selected cases some of the methods described. The final paragraph indicates the spirit of caution and yet the enthusiasm with which the author has attempted to present his subject. He says: "Needless to say, nonspecific therapy does require judgment, careful attention, and bedside study on the part of the physician perhaps in greater measure than any other therapeutic procedure. It should never be a routine; to be useful it must be an individualized therapy, with dosage and preparation and time of application varied to the disease, its intensity, its duration, and the resistance of the patient, So used, nonspecific therapy should prove to be one of our most useful measures both in acute infectious diseases and chronic inflammatory lesions."

The enthusiasm embodied in this last sentence may be unwarranted. But even though some may not be willing to accept all that the author claims for nonspecific protein therapy, this book is undoubtedly a distinct contribution to medical literature. (L. J. R.)

A TEXTBOOK OF GENERAL BACTERIOLOGY, by *Edwin O. Jordan, Ph. D., professor of bacteriology in the University of Chicago and in Rush Medical College.* Seventh edition. W. B. Saunders & Co., Philadelphia, 1922.

In the new seventh edition of this well-known work the author has made a thorough revision with the addition of 52 pages of subject material. The chapters on the methods of studying bacteria, the hemophilic bacteria, and spore-forming anerobes have been rewritten and enlarged. Extensive revision has been made in the chapters dealing with the streptococcus and pneumococcus. Typhus fever has been revised and placed in the appendix under the chapter dealing with infectious diseases of doubtful origin or unknown causation. The spirochaetal diseases have been brought up to date and grouped under a separate heading.

A commendable feature of this edition is the effort on the part of the author to get away from the present loose and unsatisfactory bacteriological nomenclature by using, so far as practicable, the nomenclature proposed by the committee of the Society of American Bacteriologists. Objections to adopting new names for old ones will be heard mainly on the ground of confusion, but it is a well-known fact that wherever confusion has reigned, the establishment of order always results in temporary greater confusion. (J. H.)

BACTERIOLOGY, GENERAL, PATHOLOGICAL, AND INTESTINAL, by *Arthur Isaac Kendall, B. S., Ph. D., Dr. P. H., professor of bacteriology in the Northwestern Medical School, Chicago, Ill.* Second edition. Lea and Febiger, Philadelphia and New York, 1921.

The author is to be congratulated upon the appearance of an edition that has been thoroughly revised and, where needed, rewritten.

This edition, similar to the first, is divided into 5 section and 32 chapters: Section I—General bacteriology; Section II—Pathogenic bacteria; Section III—Higher bacteria, molds, yeast, filterable viruses, and diseases of unknown etiology; Section IV—Gastro-intestinal bacteriology; Section V—Applied bacteriology.

In nearly every chapter extensive changes and additions have been made, in accordance with the advance in the science of bacteriology in recent years, prominent among which is the chapter on anerobic bacteria.

The subheadings, spacing, and print are excellent. Illustrations are few but good. References are extensive, and the revision has been accomplished with practically slight increase in size—30 pages. The reviewer believes that this newer edition will prove even more popular than the preceding one. (J. H.)

A TEXTBOOK OF BACTERIOLOGY, by *Hans Zinnser, M. D., professor of bacteriology, College of Physicians and Surgeons, Columbia University, New York City;* with a section on Pathogenic Protozoa, by *Frederick F. Russell, colonel, Medical Corps, U. S. Army.* Fifth edition. D. Appleton and Co., New York City, 1922.

This work is a new edition in every sense of the term, as it brings all the subject matter up to date. Consistent without advancing knowledge of certain pathogenic organisms, the chapters dealing with the pneumococcus, streptococcus, meningococcus, influenza, and anerobic bacilli have been extensively revised or rewritten. Those familiar with the extensive literature concerning these subjects will appreciate the brief, yet complete, manner in which the author has summarized the results of the numerous investigations.

The same applies to the chapters dealing with spirochetal infections, diseases caused by filterable virus, and diseases of uncertain etiology in which yellow fever, Rocky Mountain fever, typhus fever, etc., have been revised in accordance with our present knowledge of these diseases.

The section on pathogenic protozoa by Russell has been completely revised, is thoroughly up to date, and contains many excellent illustrations.

A commendable and outstanding feature of the work which will be appreciated by the laboratorian, clinician, and public-health worker alike, is the successful effort on the part of the authors to correlate laboratory knowledge with clinical and preventive medicine by the inclusion of a wealth of clinical and epidemiological data.

(J. H.)

MODERN ITALIAN SURGERY AND OLD UNIVERSITIES OF ITALY, by *Paolo De Vecchi, M. D., F. A. C. S.* Paul B. Hoeber, New York, 1921.

Before the war American students of the medical sciences went to France, to Germany, or to Austria to visit the great clinical centers which existed in those countries, but they never went to Italy to visit the hospitals or to learn from Italy's medical teachers. The achievements of Italy in medicine and surgery during the war have been so great and the country is so interesting that the American medical man, with an inclination for a trip abroad, might well profit by a visit to her sunny shores. It is with the idea of familiarizing American surgeons with the Italian School of Surgery in the hope that they will visit Italy "not only as a pleasure resort or as a center of antiquities, but as a new country and a new seat of education" that Doctor De Vecchi has written this readable book.

In spite of the antiquity of the Italian peninsula, Italy, as we know her to-day, *is* a new country. Only 62 years have passed since Giuseppe Garibaldi, with 1,000 volunteers, landed in Sicily and started a revolution which ended the domination of the Bourbons and resulted in the unification of Italy. Yet during that short time the Italian people have learned to rely on their own capacities and to depend on their national unity, in which lies their strength, power, and ability to develop their own resources to their utmost extent.

Among the surgeons of modern Italy who have achieved prominence may be mentioned Edoardo Bassini, of Padua, who devised the well-known operation for the cure of inguinal hernia; Francesco Rizzoli and Alessandro Codivilla, of Bologna, who are noted for their work on orthopedics; Enrico Bottini, of Pavia, who has made valuable contributions to the surgery of the prostate gland; Edoardo Porro, of Milan, whose name is associated with his special uterine operation; Antonio Carle, of Turin, and G. F. Novara, of Genoa, who have contributed to the surgery of the intestines; Francesco Durante, of Rome, who has devised an iodine treatment of bone tuberculosis; Raffaele Bastianelli, also of Rome, who has extensively contributed to the surgery of the thorax and kidneys; Davide Giordano, who has contributed to the surgery of the kidneys; Giuliano Vanghetti who experimentally devised a successful method of utilizing the muscles of a stump to actuate artificial limbs; and Antonio Ceci, of Pisa, who, applying the principles of this method to the human subject, attained a much more satisfactory prosthesis than ever before achieved. There are a host of other men who, while perhaps not quite so prominent, have attained distinct renown. These men Doctor De Vecchi introduces to his readers as he conducts them, in the pages of this book, through the Italian universities.

In the book will be found an excellent review of Italy's medical and surgical achievements during the war, an account of the work of reconstruction and of orthopedic surgery in Italy. The latter half of the book is devoted to an account of the Italian universities and their relation to modern Italian surgery. "There are at present 17 universities in Italy all under the control of the Government, with a complete course of medicine and surgery of six years' duration. Each is administered by the same standard and regulations, and provided with a staff of professors and instructors elected by a special board after public examinations, or by the exhibition of some special scientific studies or contributions which would entitle the candidate to the responsible position of teacher."

The number of universities in Italy far exceeds the needs of the country. Before the unification of Italy, when the land was divided into small kingdoms and principalities, the existence of a university for each State was justified, especially for political reasons. It is unfortunate that some of these centers of learning have not been consolidated, as such a concentration would strengthen the universities retained and would provide large clinics, promote more uniformity of work, and would undoubtedly attract more attention from the outside world. Educational centers in Turin, Rome, Naples, and Palermo might well supply the demand, but certainly such a consolidation would deprive the visitor to Italy of the charm of the universities in the smaller cities of Bologna, Modena, Parma, Padua, Pavia, Genoa, Pisa, and Siena, which Dr. De Vecchi describes. (W. M. K.)

EPHRAIM MCDOWELL, FATHER OF OVARIOTOMY AND FOUNDER OF ABDOMINAL SURGERY, by *August Schachner, M. D., F. A. C. S.* J. B. Lippincott Co., Philadelphia, Pa., 1921.

This is a remarkable book, the biography of a surgeon who in the early years of the last century laid the foundation of modern abdominal surgery. Biographies of men who have achieved success in any line are always fascinating. A natural curiosity exists concerning such persons. We like to read of their everyday life, their habit of thought, and of their accomplishments. A certain lapse of time must follow the death of one more or less entitled to fame before the story of his life can properly be written, because his contemporaries are so close to him that they can not view the details of his life with the proper perspective, and if they do write of him they are apt to set down merely a series of facts, some of which are relatively unimportant.

The contemporaries of Ephraim McDowell could not possibly realize the intricate and marvelous development of abdominal surgery which was the logical outcome of his discovery that the peritoneal cavity could be successfully invaded under proper precautions; nor could they have understood the factors which forced him to explore fields which surgeons practicing in the great medical centers of that time dared not enter.

Ephraim McDowell practiced in Danville, Ky., when it was a small frontier town. His practice extended for miles around. This was before the days of roads or stage coaches, and his visits to his patients were made on horseback at times through trackless regions. Some of these calls meant absence from home for a week or more, especially when a surgical operation was involved. Doctor Schachner gives a delightful review of the frontier life in Virginia and Kentucky, and indicates its influence upon McDowell and his surgical work.

On December 13, 1809, McDowell was asked to see a Mrs. Jane Todd Crawford, who lived in the wilderness some 60 miles from Danville. He found her to be suffering from a large ovarian tumor, a condition which up to that time had been considered inoperable. Realizing the possibility of relief only through surgery he induced Mrs. Crawford to make the journey to Danville, where he successfully removed the diseased organ.

When we realize that this was the first time this operation had been performed and the fact that it was done without the aid of anesthetics, antiseptics, trained help, or any operative accessories, save the simplest domestic utensils, we can understand the dramatic possibilities of the occasion.

To Doctor McDowell apparently this operation was but an incident in his daily life and it is possible that he did not realize its full significance, as seven years passed before his friends could prevail upon him to publish an account of three such cases which he had successfully operated upon. When he did publish his modest account of the first ovariotomy it exposed him to the ridicule and sarcasm of some of the foremost surgeons in England. Doctor Schachner ably reviews the entire controversy and defends McDowell from those who attempted to dispossess him of his justly earned and richly deserved honors.

Ephraim McDowell came more or less in contact with many important personages of his day and Doctor Schachner has woven into his tale delightful sketches of such men as John Bell, of Edinburgh, and Philip Syng Physick, of Philadelphia. He concludes the volume with a very readable sketch of Mrs. Jane Todd Crawford, whom he aptly styles the heroine of the first ovariotomy. (W. M. K.)

QUERIES.

Medical officers are invited to submit queries and to present their problems to the BULLETIN, *which, being in a position to draw on varied and extensive sources of information such as are not available elsewhere, will use every means of securing authoritative opinion.*

All queries will be answered by mail; and the replies, if of sufficient general interest, will also be published in this column.

To the Editor: Please publish in the Query section of the BULLETIN some good methods for the destruction of lice on the body.

LIEUTENANT, *Medical Corps, U. S. N.*

The following outline found in "Sanitary Entomology," by W. D. Pierce, will be found useful:

Control of lice on body.

A. *Crab louse.*—(1) Kerosene emulsion soap: The soap is made by boiling 1 part of soap chips in 4 parts of water and then adding 2 parts of kerosene oil, or 4 parts of gasoline. This jellies when cold, and 1 part of this soap jelly is added to 4 parts of warm water, making a good liquid soap at very small cost.

This is followed by vermin jelly:

Texas fuel oil, sp. grav. 0.86 b. p. 250 to 350° C	50 parts.
Crude vaseline	20 parts.
Soft soap	30 parts.

The cutting or shaving of pubic or axillary hairs is to be avoided because of the discomfort caused. Powders such as N. C. I., etc., should not be used in the pubic regions.

B. *Head louse.*—Wash head with equal parts of kerosene and vinegar or 25 per cent acetic acid for one-half hour, keeping the head covered with a towel. The vinegar separates the eggs from the hairs, while the kerosene kills them. Use a fine-toothed comb to remove the eggs and lice. Wash the head with warm water and soap containing kerosene (Nuttall).

C. *Body louse.*—(1) Bathe, using liquid kerosene soap emulsion; (2) disinfect and disinsect clothing, possessions, etc.

In absence of facilities for the above—insecticidal powder (Moore).

Creosote	1 c. c.
Sulphur	½ gr.
Talc	20 gr.

Superior to N. I. C.

Fumigation: Entomologists prefer cyanide.

In "Investigation of the Louse Problem," by W. Moore and A. D. Hirschfelder, the authors give the following summary of the problem:

1. Lice and their eggs are destroyed by the ordinary laundering processes used in the washing of cotton and khaki goods; for woolens slight alterations in the methods of washing are necessary.

2. Chlorpicrin may be used for fumigation of garments, accomplishing the desired results in a short period of time, with a small quantity of the chemical, without the use of high temperatures.

3. The sachet method of controlling lice is ineffective or very expensive.

4. Louse powders may be used with success but, being a wasteful method of applying an insecticide, are not recommended.

5. Impregnation of the underwear is the most promising method of louse control between lousings. Active chemicals of very low volatility are necessary to prove effective for the longest period of time. Halogenated phenols, such as dibrommetacresol, dichlormonobrommetacresol, and their sodium salts, dibromcarvacrol, and dibromxylenol were found to be the most promising under laboratory conditions.

To the Editor: I was interested in reading the communications regarding the treatment of burns which "Ambustio" submitted for publication in the last number of the BULLETIN as evidence to support his contention that picric acid is not a proper agent to use in the treatment of burns. I believe the reaction against the use of picric acid set in because it was feared this chemical might be a factor in the production of shock. In this connection the following extract from an editorial which appeared in the Journal of the American Medical Association, February 25, 1922, is offered as a commentary on the fact that shock may be produced in burns by other agents than picric acid, which I have found to be an extremely useful agent in certain types of burns.

COMMANDER.

"Cannon[1] has recently summarized the best-known features of wound shock as characterized by a low venous pressure; a low or falling arterial pressure; a rapid, thready pulse; a diminished blood volume; a normal or increased erythrocyte count and hemoglobin percentage in peripheral blood; a leukocytosis; an increased blood nitrogen; a reduced blood alkali content; a lowered metabolism; a sub-

[1] Cannon, W. B.: Studies in Experimental Traumatic Shock, IV, Evidence of a Toxic Factor in Wound Shock, Arch. Surg. 4:1 (Jan.), 1922.

normal temperature; a cold skin, moist with sweat; a pallid or grayish or slightly cyanotic appearance; thirst; rapid respiration; often vomiting and restlessness; and anxiety, changing to mental dullness and lessened sensitivity. Many of these features, he adds, may appear at once or as soon after the reception of the wound as the observations can be made, or they may develop only after the lapse of several hours. At one time it was urged that the widespread effect in the organism induced by severe trauma might be due to nervous impulses. Numerous investigations, however, have made such a theory untenable. It matters little for the outcome of the trauma whether the injured parts are denervated or not; in truth, there is no clearly demonstrable essential relation between the production of shock and an excessive stimulation of the central nervous system. Equally true is the now-recognized fact that the low blood pressure initiated by severe injury is not primarily due to a loss of vasomotor tone or any comparable sort of exhaustion. As Cannon has convincingly pointed out anew, if the low blood pressure resulting from local trauma is not due to loss of blood into the injured region, or to reflex vasodilation, or to depression or exhaustion of the vasoconstrictor center, or to fat emboli, or to acapnia, the connection between the local damage and the general bodily state may reasonably be looked for in the remaining great connecting system—the circulation.

"In harmony with this conclusion there has arisen a theory of a toxemic cause of wound shock, based on evidence for the existence of a toxic factor liberated in the injured tissues. Striking analogies between the physiologic effects of certain occasional tissue components and the phenomena of surgical shock have been presented by Dale [2] and his associates in England. Poisonous protein derivatives, products of partial digestion, of bacterial action, and tissue manipulation readily produce a fall of blood pressure attended with a series of changes in which 'dilation of the capillaries and pooling of blood within them, poisoning of their endothelial walls so that they are abnormally permeable, escape of plasma through these walls into the tissue spaces, and consequent concentration of the corpuscles are the main features.' Championing the importance of these features characteristic also of traumatic shock, Cannon has presented a convincing review of clinical as well as purely experimental evidence for traumatic toxemia, citing in particular the notable contributions of the French surgeon Quénu.[3] They show, among other in-

[2] Dale and Laidlaw: Memorandum upon Surgical Shock and Some Allied Conditions, English Medical Research Committee, February, 1917. Dale, Laidlaw, and Richards: Traumatic Toxemia, English Medical Research Committee, Report Series 26, March, 1919, p. 9.

[3] Quénu: Rev. de chir. 56: 204, 1918.

teresting observations, that anything which delays or checks absorption from the injured region delays the development of shock; but if there is a sudden removal of the check serious results follows.

"If shock is actually the outcome of an intoxication, presumably by protein derivatives set free from areas of tissue destruction, some of the manifestations of severe burns become more easy of interpretation. As Cannon concludes, in harmony with other experts in this field, the present conception seems to be that not only the shock following burns, but also the delayed shock consequent on severe trauma, is properly placed in the same category with some forms of general depression of bodily functions and defective circulation due to the setting free of toxic material in the body."

To the Editor:

Is there any way of rejuvenating dried-out adhesive plaster?

LIEUTENANT.

Unroll the plaster, and, without stripping off the muslin covering, wipe over with a gauze sponge wrung out of cottonseed oil. Warm over a radiator or in a sterilizer for an hour and the result will be all that could be desired.

THE DIVISION OF PREVENTIVE MEDICINE.

Lieut. Commander R. F. JONES, Medical Corps, United States Navy, in charge.

Notes on Preventive Medicine for Medical Officers, United States Navy.

INSTRUCTIONS TO MEDICAL OFFICERS.

STUDIES ON VENTILATION OF CLOSED COMPARTMENTS.

Conducted in the laboratories of the Naval Medical School, by Lieut. Commander R. F. Jones, Medical Corps, U. S. Navy, and Lieut. J. E. Henry, Medical Corps, U. S. Navy.

BRIEF DISCUSSION ON MODERN VIEWS OF VENTILATION.

The problem of supplying air in sufficient quantity and of proper quality to an occupied space must take into consideration, first, physical properties—temperature, humidity, and air movement—which control the cooling power of the air upon the surface of the body; second, chemical constituents; and third, the variability from time to time of the physical properties already mentioned. Inasmuch as the cooling or heating power of the atmosphere surrounding the body governs to a large extent the physiological function of heat elimination, the physical properties of air should be given first consideration. The chemical purity of the air is also an essential; but, contrary to the former belief of sanitarians, the physical properties are of far greater importance than the chemical. The importance of the third factor—viz, the proper range of variability in the physical properties of air supplied for human consumption—has not perhaps been fully realized. Yet a variation in these properties undoubtedly stimulates the human mechanism, giving tone to the vasomotor system, exciting muscular activity, and thus assisting the proper functioning of glandular, respiratory, digestive, and vascular organs.

I. COOLING POWER OF THE AIR.—The comparison of the human body to a furnace is, in many ways, an apt one. However, the ordinary furnace is kept at no particular temperature and a variation of many degrees is unsually unimportant, whereas the human body is a special furnace that must constantly be kept at a temperature of about 98.6° F. and a variation of so little as 1½° from that temperature will cause discomfort. Through centuries of hardships in the past the human body has been admirably trained to resist cold but it has been shown that only to a limited extent can it resist heat. Therefore, one of the biggest problems in ventilation is to avoid overheating, which in reality is more injurious than the reverse—unless it be in the case of the very young, the very old, or invalids.

Through various physiological processes the body is continuously eliminating heat to maintain itself at a standard temperature of approximately 98.6° F. Some of the more important of these processes are the dilation of the cutaneous capillaries to allow the exposure of a larger volume of blood to the cooling air about the body surface, the accelerated heart action to increase the rapidity of flow and consequently the amount of blood that can get to the surface in a given time, and the secretion of perspiration and its evaporation. On the other hand, the body, when necessary, may check to a degree the amount of heat that it will give off. It can also provide extra heat when elimination from outside causes is great by increasing its fuel consumption. In addition, in our civilization, man successfully provides against too much loss of body heat by warm clothes and by artificially heating the air of his living apartments. In fact, since this is so often overdone, we have to deal with overheating in our ventilation systems more than with underheating. In general then the problem of ventilation is to surround the body with air of such physical properties that the heat loss will be just sufficient to maintain body temperature at 98.6° F. without having to call too much on those automatic devices by which a person can increase or decrease his heat elimination.

If the physical conditions of the surrounding air take the heat away from the body too rapidly or too slowly the body protects itself against heat loss or heat gain by those means with which nature has provided. If it does not readily succeed these mechanisms have a heavier and heavier strain put upon them, and if they finally fail the body suffers the consequences of a decreasing or increasing body temperature (98.6° being the standard). The oppressive feeling, the drowsiness, and other discomforts associated with a warm, close room are the results of too little cooling power of the air (physical property) and not to an increase in the CO_2 in the air (chemical property).

This was proved some years ago by Flugge. He placed men in a closed cabinet and allowed them to breathe and rebreathe the air contained therein until they were very uncomfortable. He then introduced fresh air to them through tubes without changing the condition of the air that surrounded their bodies. They got no relief at all, although they were getting air which contained little carbon dioxid and about 21 per cent of oxygen. He then allowed men outside of the cabinet to breathe the air from within the cabinet through tubes while their bodies were surrounded by fresh outside air. They experienced no discomfort, although they were breathing the foul air of the cabinet which contained an excess of carbon dioxid and other expired impurities, as well as a decreased amount of oxygen. The excessive heat and humidity that were generated in the cabinet by the bodies of the men were the causes of the discomfort (physical changes) and not an increase of carbon dioxid and other impurities (chemical changes). As the heat and humidity in the compartment rose the cooling power of the air, of course, grew less and less until the body could no longer eliminate enough heat to keep itself at 98.6° F. As a consequence the body temperature began to rise, and as it rose the discomfort became more and more marked. Men outside not in contact with this heat and humidity did not have a consequent rise in their body temperatures and were, therefore, entirely comfortable, although they breathed the cabinet air.

The cooling power of the air upon the body is dependent on:

(1) *Radiation.*—This is dependent on the difference between the temperature of the body (98.6°) and that of the surrounding air. The colder the air the greater the radiation. Hence, the importance of the temperature regulation of the air.

(2) *Convection and conduction.*—Air movement and temperature of the air are both involved. Currents of air (which need not be drafts) replace frequently the aerial blankets of warmed air about the body with cooler air. The frequency of replacement (air movement) as well as temperature of the replacing air, then measure the amount of heat that is taken away from the body by convection. High humidity at a temperature of 65° F. and under favors heat loss by convection and conduction, whereas at 70° or over it prevents heat loss by hindering evaporation of perspiration.

(3) *Evaporation.*—This depends on three things—temperature, air movement, and water-vapor tension of the air. The higher the temperature of air the more moisture it will hold and the greater will be its capacity to evaporate the perspiration that covers the skin. In stagnant air evaporation of perspiration would soon cause the body to be surrounded by an aerial blanket of almost completely saturated air, and as a result no more evaporation could take place. Air movement would remedy this and would replace this blanket surrounding the body with air not so nearly saturated with water vapor, and, therefore, capable of permitting evaporation. The drier the air or the lower its water-vapor tension the greater its evaporation capacity.

To summarize, the cooling power of air upon the body is dependent on:

(1) Radiation, affected by—
  (*a*) Temperature of surrounding air.

(2) Convection and conduction, affected by—
  (*a*) Air movement.
  (*b*) Temperature of surrounding air.
  (*c*) High humidity at less than 65 ° F.

(3) Evaporation, affected by—
  (*a*) Air movement.
  (*b*) Temperature.
  (*c*) Water-vapor tension (determining the amount of moisture which the atmosphere is still capable of absorbing).

To attain, then, the proper air movement, water-vapor tension, and temperature and to have proper variations in them is the aim of the modern ventilation engineer.

It is better in our ventilation work to think of humidity in terms of water-vapor tension or as grains of moisture contained in each cubic foot of air rather than as relative humidity. For example, air of 25 per cent relative humidity at a temperature of 55° F. dries the skin and mucous membranes in an unpleasant manner; but if the same air is maintained at 25 per cent relative humidity and is raised to 85° F., it has an agreeable effect upon the skin and mucous membranes. The explantion of this is that at 55° F. air can hold only 5 grains of moisture per cubic foot when fully saturated. Twenty-five per cent relative humidity, then, gives only 1¼ grains of moisture per cubic foot of air, which is too dry for the skin and mucous membranes. The vapor tension of such air is about 2.8 mm. of mercury. At 85° F. the capacity of the air is about 12.5 grains per cubic foot and with 25 per cent relative humidity it would contain over 3.1 grains per cubic foot and have a vapor tention of about 7.9 mm. of mercury as compared with 1.25 grains and 2.8 mm. of mercury for the same relative humidity (25 per cent) at 55° F.

It is readily apparent that if all these factors contribute to the cooling power of the air, and if this is of such prime importance in ventilation, an instrument that could register cooling power would be of immense value. It would, indeed, indicate the effects of many causes—some of which, such as air movement, are not readily measured—in one figure. Such an instrument has been devised and is known as the katathermometer. A description of it follows. Many hundreds of observations with it have convinced the authors of its great value, practicability, and accuracy. Its inventor has introduced another instrument for the same purpose, but adapted more particularly for popular use. This he calls the comfimeter. A description of it also follows. Many observations have been made with the comfimeter by us, but judgment on it is reserved until it has been more completely studied.

The katathermometer.—The katathermometer is an instrument devised by Leonard Hill to measure the cooling power of the atmosphere exerted on its surface at body temperature (36.5° C.).

It is in reality an alcohol thermometer with a relatively long cylindrical bulb 4 cm. long by 2 cm. in diameter and a stem 20 cm. in length, graduated between 95° and 100° F.

To use the instrument, it is immersed in water at a temperature not over 80° C., until the column of alcohol (colored red) is raised above 100° F. and overflows into and half fills the overflow reservoir. The thermometer is then taken from the water and suspended in the air. A stop watch records the number of seconds required for the column to fall from 100° F. to 95° F.

Each instrument has a factor determined for it at the factory, which, when divided by the number of seconds consumed in falling from 100° F. to 95° F., will give the cooling power of the air in mille-calories per square centimeter per second exerted on its surface at 98.5° F.

Two readings are commonly taken, a wet and a dry. To get the wet kata reading, the bulb is covered with a knitted cot, immersed in hot water and held in the air. The cooling effect of evaporation enters into this reading. The dry kata observation is obtained by immersing the bare instrument, drying it, and holding it in the air.

The rate of cooling of the surface of this instrument (and by analogy, of the surface of the human body) depends on convection, evaporation, and radiation. The dry kata cooling power depends almost entirely on convection and radiation, since the surface of the instrument is not covered with a wet cover and is purposely wiped dry. The wet kata reading depends on all three factors; the difference between the wet and dry gives the cooling power from evaporation alone.

It should be remembered that this instrument measures the *power* of the atmosphere to cool its own surface when the temperature of that surface is 98.5° F. If the atmosphere has a certain cooling power on objects at this temperature the rate of cooling of the surface of such objects will depend on their character as well as the cooling power of the atmosphere. In the case of the skin, the rate would depend on such things as the amount of clothing, the amount of moisture produced by the body, and the structure of the skin and tissues under it, as well as the cooling power of the air around the body.

The experiments performed by the authors seemed to indicate that the cooling power of air should not be less than 15 wet kata and 6 dry kata for sedentary occupations.

The instrument appears to accurately measure the cooling power of air, and, since the comfort of man depends so much on the control of his heat elimination, it is very important to know just how much heat a surrounding medium can take from him. This is probably the most important single factor in the realm of ventilation. The katathermometer, or some modification of it, has probably come to stay.

The comfimeter.—Comfimeter observations in these experiments are recorded for what they are worth. No opinion has yet been formed as to the value of this instrument, but data is being gathered for this purpose. Leonard Hill is the inventor of this instrument also, and in a letter he makes the following preliminary remarks. He has informed us that he will soon publish a paper on this subject.

In order to keep comfortable conditions in rooms by determining the cooling power by convection or radiation—convection depending on the temperature and movement of the air—I have designed an instrument, which I call a "Comfimeter." This takes the place of the katathermometer for ordinary civilian use. The katathermometer requires to be heated in water, and the cooling rate measures as the meniscus drops from 100° to 95° F. The warming of the katathermometer and the time measurements are against its popular use. The comfimeter is an instrument which can be read at any time just as the ordinary dry bulb thermometer; it consists of a cylindrical metal box 18 cm. high and 10 cm. in diameter, in which is inserted an 8 candlepower carbon filament lamp, the lower part of the box being removable for this purpose. On the top of the box is fixed a metal cone, which in its turn forms a union with a chimney 25 cm. long and 2½ cm. in diameter. There are some holes in the lower and upper part of the box for the purpose of ventilation. An ordinary dry bulb thermometer is introduced into the chimney so that the bulb hangs within it to a depth of 9 cm. The thermometer rests on the top of a chimney by means of wire which is twisted around its stem in a suitable fashion. There are two disks of gauze through which the stem of the thermometer passes to give it a central position within the chimney. The candlepower lamp acts as a constant source of heat and the box and the chimney are cooled by radiation and convection.

Under satisfactory conditions in ideal summer days, with the windows open, the comfimeter standing on the table in my room indicated a temperature of about 30° C. In a close room, heated, with hot-water coils on and the windows shut, the comfimeter indicated a temperature of 40° C. If the comfimeter be sheltered from wind by a screen of cotton material placed around it, it will indicate in place of, say, 30° C., a temperature of about 50° C., while the dry bulb thermometer standing within the same screen will only vary a degree or two as the result of screening. These figures show how sensitive the comfimeter is to the cooling power of the wind. It must, of course, be given time to get in equilibrium with the environmental conditions.

When the comfimeter indicated 30° C. the dry katathermometer gives a cooling power of about 7 mille-calories per square centimeter per second. So long as schools and factories are kept with the comfimeter indicating somewhere about 30° C. fresh conditions suitable for work will be obtained.

In another letter of January 22, 1922, he states:

We have been investigating the behavior of the "Comf." against that of the "Kata" recently. We use the "Comf." as made by Siebe Gorman (Ltd.), 187 Westminster Bridge Road, London, with measurements, blackened surface, orifices, and thermometer arranged according to instructions given to this firm. The lamps we use are 8 British candlepower carbon filament ones supplied to us by Edieswan & Co., Queen Victoria Street, London E. C. This firm picks out lamps for us which take the same number of watts.

It does not matter whether the current be, say, 100 or 200 volts, but it does matter that the voltage should be steady. It does not matter if the voltage swings up and down a little as leads come on and off, and average, say, 100, but it matters considerably if the voltage is 95 or 105 in place of being 100. Given the right lamp and voltage, the "Comf." in air of rooms with no sensible draft gives readings which can be graduated against the "Kata" quite well. The "Comf." is not meant to be used in sensible drafts. The paper dealing with it we are now preparing for the press, and when ready we shall probably send it to the American Journal of Industrial Hygiene.

II. Purity of air.—In the past, physiologists and sanitarians believed that the bad effects of close, ill-ventilated rooms were due to increased carbon-dioxid content and decreased oxygen. This was a plausible theory. Acting on it, sanitarians set a standard of so many parts of carbon dioxid per 10,000 as a maximum, which should not be exceeded, and required sufficient air turnover to keep it at or below that figure. By doing this they overcame the discomforts due to poor ventilation, for they were getting rid of other conditions at the same time they removed the carbon dioxid.

The experiments of Flugge and others definitely proved that the harmful effects had not been due to the carbon dioxid or other impurities but to the physical effects of air on the surface of the body. Many clung to the idea that emanations from the body were responsible for some of the ill effects, but no acceptable proof of this has ever been offered. Of course, in submarines and other occupied closed compartments, carbon dioxid will soon reach dangerous concentrations and the oxygen will be reduced very rapidly unless provision is made for purifying the air. Body odors—for esthetic reasons, if for no others—are not tolerated in any good system of ventilation. But ordinarily, if air be obtained from a good source and is free of gases, smoke and dust, we do not have to concern ourselves with its chemical composition. If pure at the source, the turnover necessary to take care of the physical properties prevents any serious vitiation. In fact, long before any such acquired impurities could have any effect conditions would have become intolerable from other causes.

III. Range of variability in the properties of the air.—When all has been said and done about ventilation, nothing is better or healthier than window ventilation properly handled. This system permits of the best range of variability. A hothouse plant, constantly subject to the monotony of unnatural and unvarying warmth and humidity, is fragile and delicate, full of sap and lacking in fiber. Yet, if the temperature, humidity, and air movements are given constant variation without going to foolish extremes a much more hearty and virile plant can be raised even in a hothouse. Monotony tends to stagnation and disintegration, whereas variety stimulates and freshens. By widening the range of variability we stimulate and keep active all the functions—the circulation is quickened, waste products burned and removed, muscular activity is increased and every gland and organ in the body is made more healthy and active. Variety is literally the spice of life.

EXPERIMENTS.

The studies submitted herewith deal mainly with the physical conditions of air in closed occupied compartments. In some of the experiments the chemical aspects were also considered.

The conditions dealt with are unusual, such as might exist in submarines or compartments into which and from which no air can be taken. The conclusions are, therefore, applicable to such problems only and would probably be of little value in ordinary ventilation.

From the evidence obtained it would seem that relief from the acute distress resulting from extreme physical and chemical conditions in such compartments is entirely feasible and that men may be made comfortable in such places by reconditioning the air for short periods without injurious effects. Whether long confinement in them would be possible without danger is another question.

Experiment I was performed to show, first, the rise of carbon-dioxid and fall in oxygen within supposedly safe limits in a closed occupied compartment; second, how temperature and humidity may be satisfactorily controlled at the same time by means of cold coils and fans. The experiment was done three times in order to give a good check on the work.

Experiments II to VII were performed to show the effects of air motion (electric fan) and cold running water in coils on air conditions in a closed occupied compartment.

The chamber used was a double-walled cabinet of special construction and so insulated as to allow a minimum escape of heat, gases, or sound. The dimensions were 7 by 7 by 5.83 feet. After proper deductions for furniture and other contents, there was a net capacity of 278.8 cubic feet.

There were 44 lengths of water coils, each 33.5 inches by 1 inch in diameter (outside measurement). The inside diameter of the piping was ¾ inch.

The fan was a 16-inch Westinghouse. It was always run at first speed.

To show rise of CO_2 and fall in O_2 within supposedly safe limits in a closed occupied compartment, and to show how humidity and temperature may be satisfactorily controlled at the same time by cooling coils and a fan.

EXPERIMENT I (A).

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Per cent of CO_2.	Per cent of O_2.	Remarks.
1.15					29	101	18	5.2	32.9	20.9	0.5	Five men entered cabinet of 278.8 cubic feet capacity.
1.45	71	79.25	68		45	182	11.7	2.9	37.2	19	.9	Fan turned on at 2.08 at request of the men.
2.15	75.5	80.5	80		*20	*57	*26	*9.3	31.4	(2)	1.9	Men comfortable.
2.45	77	82	80		44	147	12	3.6	31.1			Fan stopped at 3.04 to 3.09. Men became very uncomfortable without fan.
3.15	77.5	82.5	80		40	158	13.2	3.3	34.3	14.5	3.03	Water allowed to flow through coils at 3.09; respiration 24. Men said "water helped."
3.45	71	79.5	66		35	125	15	4.2	31.5			Fan off at 3.21 to 3.24. Men uncomfortable.
4.15	72	79.5	70		34	108	15.5	4.9	32.1	12.7	4.89	Fans off at 4 to 4.05. Men very uncomfortable; respiration 23. Men reported slight headaches at 4.15.
4.26				Men released.								Heavy body odor perceived by outsiders on opening cabinet. Not noticed by men.

* Taken in front of fan, which was undesirable.

NOTES.

(1) Five men were used, whose total weight was 736 pounds. Approximately 13 cubic feet should be deducted from the total capacity (278.8 cubic feet) of the cabinet on account of space occupied by them.

(2) The chemist was not entirely satisfied with results obtained in the oxygen analyses.

EXPERIMENT I (B).

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Per cent of CO_2.	Per cent of O_2.	Remarks.
1	64.5	80.5	42	4.66	40	248	13.2	2.1	39.9	0.05	20.9	Warm; majority perspiring.
1.30	79	87	70	9.45	67	341	7.9	1.5	40.7			Hot; all perspiring.
2	86.5	90	86	12.7						1.83	19.0	Respirations 20; fan and water after the 2 p. m. observation. Men asked for relief.
2.30	68	77	64	6.40	28	96	18.8	5.5	29.5			Bottom of drip pan covered with water; men comfortable.
3	63	74.5	53	4.77	25	90	21.1	5.9	28.6	3.34	17.6	Cool; match would not burn.
3.30	62	74	51	4.59	25	78	21.1	6.8	27.7	3.85	16.8	Comfortable to cool; respirations 21.
4	62	74.5	50	4.50	27	102	19.6	5.1	29.4	4.5	16	Quite cool; no headaches; no complaints.

NOTES.

(1) Five men were used, entering at 1 p. m. and emerging at 4 p. m. Net capacity of cabinet 278.8 cubic feet, less 13 cubic feet for space occupied by the men themselves.
(2) Water flow, 40 liters per minute.
(3) Water temperatures:

Time.	Inlet.	Outlet.
2.20 p. m.	4.3° C.	5.3° C.
2.50 p. m.	4.1° C.	5.0° C.
3.30 p. m.	3.9° C.	4.7° C.

To show rise of CO_3 and fall in O_3 within supposedly safe limits in a closed occupied compartment, etc—Continued.

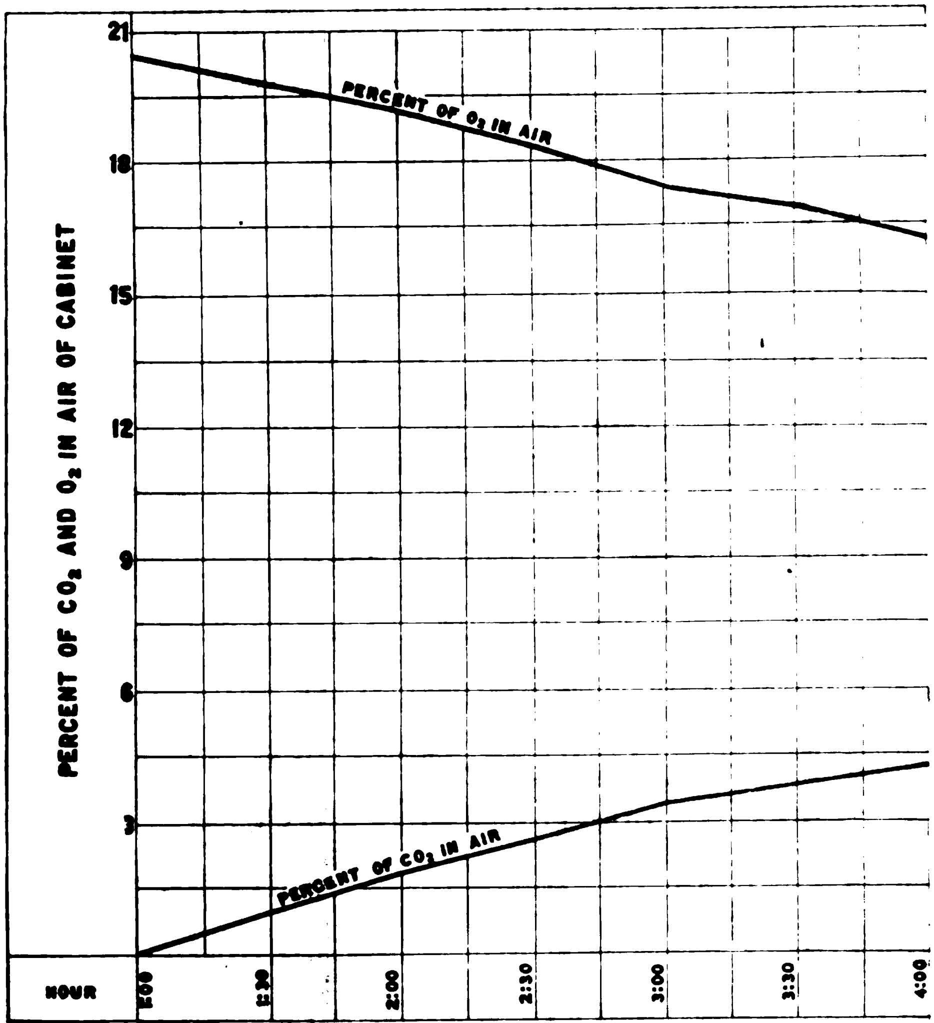
EXPERIMENT I (C).

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Per cent of CO_2.	Per cent of O_2.	Remarks.
1........	72	84	57	7.13	53	275	9.9	1.9	39.8	0.04	20.9	Warm, men perspiring; respiration 18.2; no fan; no cooling coils.
1.30......	81.5	87	79	10.67	75	347	7	1.5	40.6	....	....	Hot, men perspiring freely; respiration 19.2.
2........	85	88.5	86	12.21	52	183	10.2	2.9	35.1	1.7	19.3	Fan on at 1.52. Afforded some relief; close, heavy; heavy perspiring; respiration 22.
2.30......	91	92.6	94	15.04	66	291	8	1.8	35.3	2.5	18.6	Hot, uncomfortable; respiration 23.2. Three men complained of headache.
3........	77.5	80.5	87	9.57	29	90	18.5	5.9	31.2	3.51	17.3	Water on at 2.46. Relief felt in a few minutes; respiration 22.4.
3.30......	68.5	75.5	72	6.84	23	71	23	7.4	28.3	3.8	16.9	Matches would not burn. Respiration 23.1. Quite cool; headache relieved.
4........	67	76	64	6.08	21	69	25.1	7.6	27	4.4	16.2	Cold, chilly; suggestions to turn fan off; respiration 25.
												OUTSIDE CONDITIONS.
1........	60	79.5	30	3.21	35	156	15.1	3.4	....	....	....	Comfort fair.
4........	62	80	36	3.96	37	165	14.3	3.2	....	....	....	Do.

NOTES.

(1) Five men were used, entering at 1 p. m., emerging at 4 p. m.
(2) Net capacity of cabinet 278.8 less space occupied by men themselves.
(3) Water passed through coils at rate of 40 liters per minute.
(4) Temperature of water as it entered and left the coils:

Time.	Inlet.	Outlet.
2.51 p. m.	6.3° C.	6.9° C.
3.16 p. m.	4.1° C.	5.1° C.
3.36 p. m.	4.0° C.	4.8° C.
3.56 p. m.	4.1° C.	4.6° C.



EXPERIMENT 1(c) SHOWING PERCENTAGES OF CO_2 AND O_2 IN ATMOSPHERE OF A CABINET OF 265 CUBIC FEET CAPACITY WHEN OCCUPIED BY 5 MEN FOR 3 HOURS.

Conclusions, Experiment I.

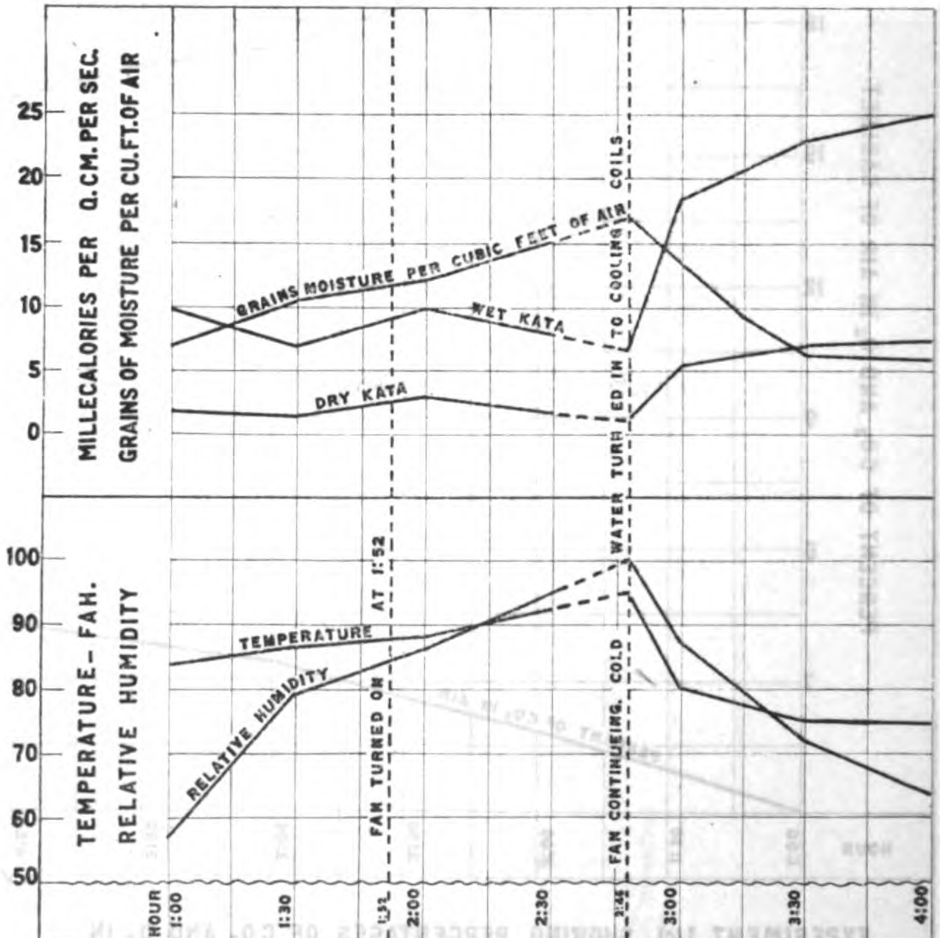
1. Five men in 265 cubic feet of air raised the carbon dioxid to 4.5 per cent in about three hours. They lowered the oxygen to about 15 or 16 per cent in the same time.

2. These limits for that length of time caused no distress to men not engaged in manual work, when humidity and heat were controlled.

3. Before the carbon dioxid reached 4.5 per cent and oxygen 16 per cent, when the heat and humidity were not controlled, the com-

partment became oppressive if not unbearable as a result of the heat and humidity emanating from the bodies of the men.

4. Carbon dioxid and oxygen conditions and body odor conditions to some extent are susceptible of control by method practiced in sub-



EXPERIMENT 1 (c). EFFECT OF COOLING COILS AND AIR MOTION (COMBINED) ON UNFAVORABLE TEMPERATURE AND HUMIDITY CONDITIONS WITH FIVE MEN CONFINED IN AIR-TIGHT CABINET OF 265 CU. FT. CAPACITY FOR 3 HOURS.

marines. Heat and humidity in submarines are probably taken care of by cold water on the skin of the ship and precipitation of moisture on the inside.

5. Since no such escape of heat and moisture from air within closed compartments in the center of a large ship is possible, un-

doubtedly some consideration will have to be given to these factors in caring for air conditions under such circumstances.

6. This experiment showed that fans up to a certain limit will give great relief; this limit being approximately the body temperature (98.5° F.) and very high relative humidity. The effects of convection and evaporation from a fan would then cease to operate.

7. When the above limits had been approximated in the experiments, cold water was run through coils, thus giving a cooling unit as well as a surface for precipitation of moisture. The fan was left on and rapidly passed the moist, hot air over the cold coils.

8. Complete relief was obtained in this way.

To show the effect of air motion (electric fan) on high temperature and low relative humidity.

EXPERIMENT II (a).

[Observations were made when the fan was turned off for a short interval.]

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
9.45......	70.5	93	33	5.28	54	717	9.8	0.73	47.2	Uncomfortable. Free evaporation of perspiration; fan turned on.
11.45.....	70	88.5	40	5.60	53	434	9.9	1.2	45.1	Still very uncomfortable. When observer entered at 11.30, before fan was turned off, the comfimeter was 35.1.

NOTES.

(1) Observer (weight, 184 pounds) entered at 9.30, made observations and went out at 9.45; entered again at 11.30 and made the 11.45 observations. Allowances must, therefore, be made for admission of some air both on leaving at 9.45 and entering at 11.30. Further, by his presence in the cabinet, he added both heat and moisture for at least 30 minutes.

(2) Fan used at first speed.

(3) Comfimeter reading of 35.1 at 11.30 in moving air changed to 45.1 in still air by 11.45. There was, however, a perceptible difference in degree of comfort.

EXPERIMENT II (b).

[Observations were made while the fan was running.]

2.15......	65	91	23	3.52	20	230	26.4	2.3	36.2	Uncomfortable, but evaporation of perspiration makes condition bearable.
4.15......	66	87	30	4.15	20	154	26.4	3.4	34	Comfortable with fan on.

NOTES.

(1) Observer left and reentered cabinet during experiment, and allowances should be made as in Experiment II (a).

Conclusions, Experiment II.—(1) Two hours of brisk air motion made little change in temperature and humidity if allowances cited in preceding notes (Experiment II (a) and (b)) are made and consideration is given to the fact that there was, no doubt, slight heat loss from the cabinet in spite of special construction.

(2) Although air motion does not actually take out heat and humidity, it does make a great difference in comfort when temperature is high and humidity is low, which fact is due mainly to evaporation.

To show the effects of cold running water in coils on high temperature and low relative humidity.

EXPERIMENT III.

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
2.25......	70	97	25	4.50	47	....	11.3	....	47	Uncomfortable, but easily bearable. Free perspiration.
2.40......	66.5	88.5	31	4.40	42	338	12.6	1.6	45.5	Moisture on coils at 2.35. More comfortable.
2.55......	65.5	83.5	38	4.64	45	258	11.8	2.0	44	Small drops on coils at 2.55.
3.10......	65	83	37	4.44	45	242	11.8	2.2	42.8	Still uncomfortable but bearable.
3.25......	64.5	82	38	4.26	44	205	12.0	2.6	42	No dripping.
3.40......	63.5	80.5	39	4.29	45	202	11.8	2.6	41.4	Some dripping..
3.55......	63.5	79	43	4.52	43	194	12.3	2.7	41.2	Still uncomfortable.
4.10......	63	77.5	45	4.50	41	188	13	2.8	40.9	Almost comfortable.

NOTES.

(1) Observer (weight, 184 pounds) entered cabinet at 2.15 and remained throughout the experiment. Allowance should, therefore, be made for the heat and moisture he gave off.
(2) Coils turned on at 2.25 p. m.
(3) Water passing through coils at rate of 15 liters per minute through orifice 3.4 inch in diameter
(4) Water temperatures in coils:

Time.	Ingoing.	Outgoing.
2.39 p. m.	4.4° C. (39.9° F.).	4.8° C. (40.6° F.).
2.54 p. m.	4.8° C. (40.6° F.).	5.0° C. (41° F.).
3.09 p. m.	4.7° C. (40.5° F.).	4.9° C. (40.8° F.).
3.24 p. m.	4.7° C. (40.5° F.).	5.1° C. (41.2° F.).
3.39 p. m.	4.3° C. (39.7° F.).	4.8° C. (40.6° F.).
3.54 p. m.	4.8° C. (40.6° F.).	5.2° C. (41.4° F.).

(5) Dry kata time at 2.25 could not be gotten on account of high dry bulb temperature.

Conclusions, Experiment III.

In 1 hour and 45 minutes there were marked improvements. These were mainly due to (*a*) lowering of temperature (7° in wet bulb and 19.5° in dry bulb temperature), and (*b*) improved dry kata conditions, as seen in columns 2, 3, and 9.

2. Readings of the comfimeter decreased very slowly.
3. Wet kata conditions did not change greatly.

To show the combined effects of air motion and running water in coils on high temperature and low humidity.

EXPERIMENT IV.

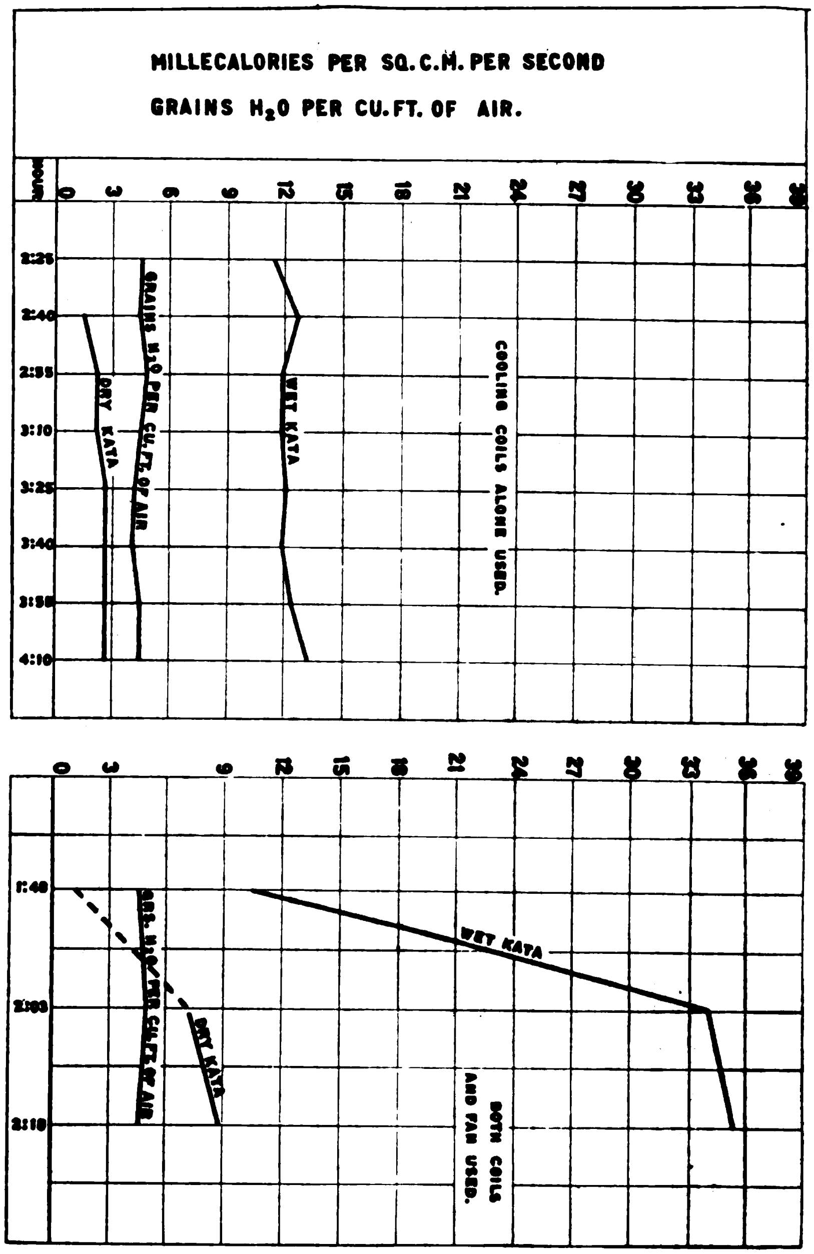
Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
1.48......	70	97.5	25	4.60	50	....	10.5	....	44.6	Quite uncomfortable, but easily bearable. Slight moisture on coils in five minutes. Soon felt much better.
(Water and fan turned on at 1.48 p. m.)										
2.03......	65.5	82	42	4.87	41	270	12.9	1.9	39	Not ideally comfortable but better.
(Fan temporarily off for these observations.)										
2.18......	63	77	46	4.55	36	183	14.7	2.9	36	Fine droplets of moisture on coils. No drops. Comfortable with fan.
(Fan temporarily off for these observations.)										
2.33......	59	72.5	44	3.74	36	161	14.7	3.3	32.5	Almost comfortable without fan. Comfortable with it on.
(Fan temporarily off.)										
2.03......	....	....	....	....	15.5	74	34	7.1	36	Taken with fan on.
2.18......	....	....	....	....	15	61	35.2	8.7	33.5	Taken with fan on.
2.33......	....	....	....	....	15	60	35.2	8.8	29	Taken with fan on.

NOTES.

(1) Rate of water flow through coils was 40 liters per minute.
(2) Temperature of water in coils:

Time.	Ingoing.	Outgoing.
2.04 p. m.	4.5° C.	4.6° C.
2.19 p. m.	4.4° C.	4.6° C.
2.34 p. m.	4.2° C.	4.3° C.

(3) Observer entered at 1.35 p. m. and remained in cabinet throughout experiment. Water and fan turned on at 1.48 p. m.
(4) Dry kata observation at 1.48 p. m. could not be taken because of the high temperature.



EXPERIMENTS 3 & 4. COMPARATIVE EFFECTS OF COOL COILS ALONE AND COILS AND FAN ON HIGH TEMPERATURE AND LOW HUMIDITY. TEMPERATURE 97° F. AND RELATIVE HUMIDITY 25% AT BEGINNING OF EXPERIMENT.

Conclusions, Experiment IV.

1. In 30 minutes, from 1.48 to 2.18 p. m., better conditions were obtained than was obtained in Experiment III with cold running water in coils in 1 hour and 45 minutes, from 2.25 to 4.10. In other words, with high temperature and low relative humidity, air motion and cold coils together were over three and one-half times as effective

as cold coils alone. The added efficiency obtained from a fan depends, of course, on its size, speed, and position with relation to the amount of air passing directly over the coils.

2. Although air motion itself does not take out heat and humidity (Experiment II (b)), it does force the air over the coils many times more rapidly than it would naturally pass over them, thereby getting much more rapid action from the coils.

To show the effect of air motion (electric fan) on high temperature and high relative humidity.

EXPERIMENT V.

[Observations made with fan off.]

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
2........	87.5	92	85	13.34	121	555	4.4	.95	43	Very uncomfortable.
4.15......	83.5	87	87	11.74	70	310	7.5	1.7	41.5	Uncomfortable.

NOTES.

(1) Observer entered cabinet at 1.45 p. m. and left it at 2 p. m and entered again at 4 p. m. Allowance, therefore, should be made for increase of humidity and temperature due to his presence for 30 minutes. Allowance also should be made for some dilution of air when he left and reentered the cabinet during the experiment.

(2) When observer entered at 4 p. m. the comfimeter registered 33.2 (fan had been on). In 15 minutes it registered 41.5° (fan off).

Conclusions, Experiment V.—(1) With a high temperature and high relative humidity actual physical conditions were little changed by brisk air motion.

(2) With high relative humidity a fan can do little for comfort by evaporation since the air is almost saturated. With high temperature it can do little by convection, because removal of the warm aerial blanket about the body and its replacement by air almost as warm as the body helps very little.

(3) Comparison of (a) and (b), Experiment II, shows that comfort conditions were much improved with high temperature and *low* humidity when the fan was on, due principally to possibilities of evaporation.

To show the effect of cold running water in coils on high temperature and high relative humidity.

EXPERIMENT VI.

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
2.........	87	91	86	13.07	95	360	5.5	1.4	42.5	Water turned on. Soon more comfortable.
2.15......	77.5	85	72	9.14	55	212	9.6	2.5	41.9	Uncomfortable, but slight improvement.
2.30......	74	80	76	8.36	54	193	9.8	2.7	41.2	Do.
2.45......	70.5	79	67	7.04	53	172	10	3.1	40	Do.
3.........	69.5	78	67	8.83	46	169	11.5	3.1	40	Do.
3.15......	67.5	76	66	6.27	49	161.5	10.8	3.3	39.5	Do.
3.30......	66.5	75.5	64	6.02	46	151	11.5	3.5	39.2	Do.
3.45......	65	74.5	60	5.46	43	154	12.5	3.4	39.1	Almost comfortable.
4.........	64.5	74.5	59	5.37	42	147	12.6	3.6	39.1	Do.

NOTES.

(1) Rate of flow of water in coils 15 liters per minute.
(2) Temperature of water in coils:

Time.	Incoming.	Outgoing.
2.15 p. m.	4.8° C.	5.1° C.
2.30 p. m.	4.5° C.	4.9o C.
2.45 p. m.	4.5° C.	4.8° C.
3.00 p. m.	4.4° C.	4.7° C.
3.15 p. m.	4.4° C.	4.8° C.
3.30 p. m.	4.3° C.	4.7° C.
3.45 p. m.	4.5° C.	4.8° C.
4.00 p. m.	4.6° C.	5.2° C.

(3) To attain the high temperature and humidity registered for this experiment an electric heater was used, wet towels were hung in various parts of the cabinet, and the large electric fan was turned on at first speed. On entering, at 1.45 p. m., before the fan was turned off, it was noted that the comfimeter registered 31°, whereas the temperature was 91°, relative humidity 86 per cent, and conditions were very uncomfortable. In 15 minutes after the fan was turned off the comfimeter registered 42.5. After that it rose a little and then began to fall very slowly as recorded in experiment.

(4) Water flow, 15 liters per minute.

Conclusions, Experiment VI.—(1) Coils alone made conditions almost comfortable in two hours.

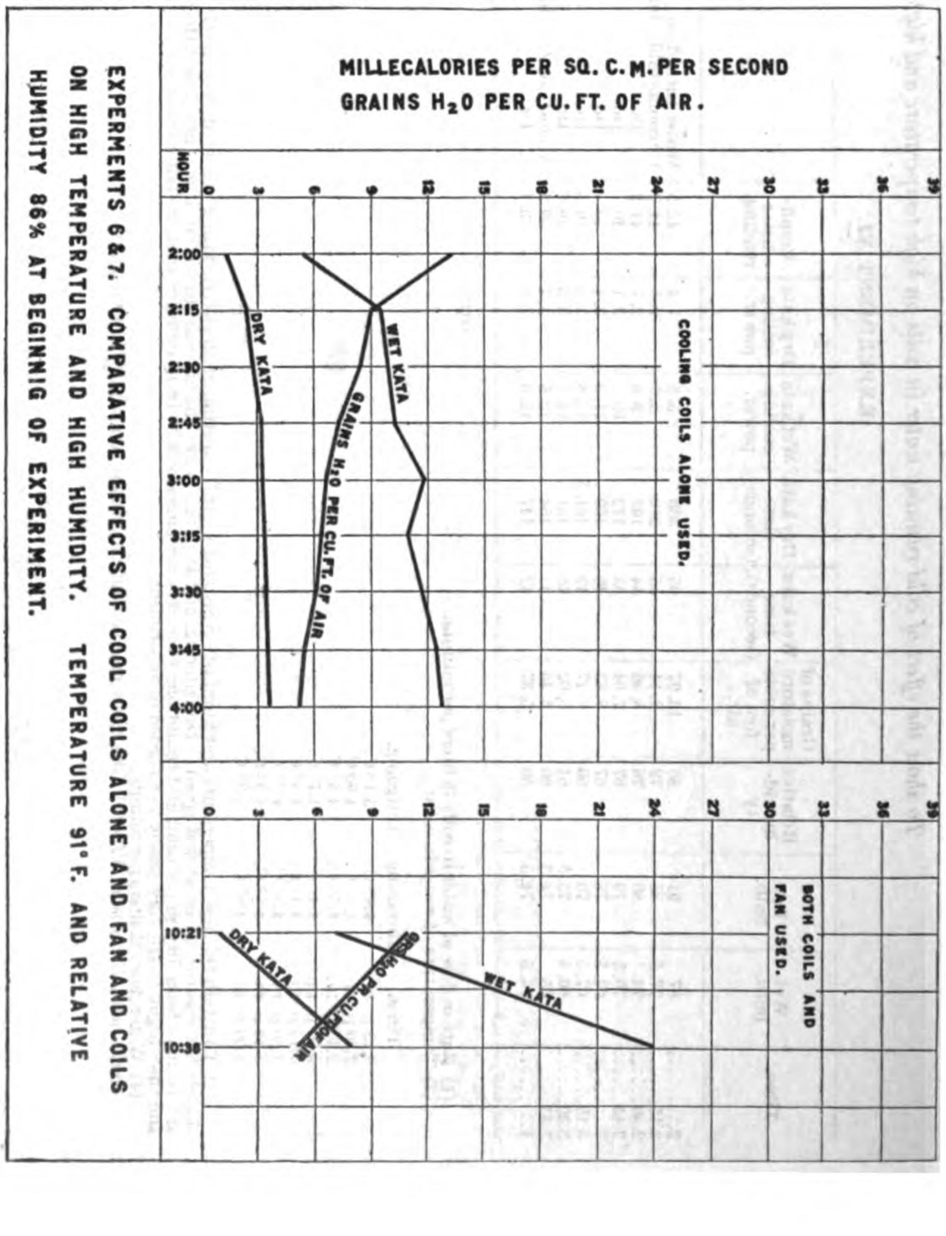
To show the combined effect of air motion (electric fan) and cold running water in coils on high temperature and high relative humidity.

EXPERIMENT VII.

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Grains of moisture per cubic foot of air.	Wet kata time (seconds).	Dry kata time (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.	Remarks.
A. M. 10.21	82	89	75	10.9	75	451	7	1.2	44	Soon very comfortable. Moisture on coils at 10.22. Felt improvement almost at once.
10.36	63	73	58	5.04	22	65	24	8	27.8	Drops on coils at 10.28; dripping from coils at 10.30; very comfortable at 10.36.

NOTES.

1. Water running at rate of 40 liters per minute.
2. Temperatures of water: Time, 10.25 a. m.; ingoing, 6.0° C.; outgoing, 6.3° C.
3. Observer remained in cabinet throughout the experiment.



EXPERMENTS 6 & 7. COMPARATIVE EFFECTS OF COOL COILS ALONE AND FAN AND COILS ON HIGH TEMPERATURE AND HIGH HUMIDITY. TEMPERATURE 91° F. AND RELATIVE HUMIDITY 86% AT BEGINNIG OF EXPERIMENT.

Conclusions, Experiment VII.

The following table shows that in 15 minutes (10.21 a. m. to 10.36 a. m.), with worse initial conditions, better results were obtained with both fan and cold-water coils than were gotten in 105 minutes (2.15 p. m. to 4 p. m.) in Experiment VI with cold water alone.

Time.	Wet bulb.	Dry bulb.	Relative humidity.	Wet kata time. (seconds).	Dry kata time. (seconds).	Wet kata cooling power.	Dry kata cooling power.	Comfimeter reading.
Experiment VII:								
10.21 a. m.	82	89	75	75	451	7	1.2	44
15 minutes later	63	73	58	22	65	24	8	27.8
Experiment VI:								
2.15 p. m.	77.5	85	72	55	212	9.6	2.5	41.9
105 minutes later	64.5	74.5	59	42	147	12.6	3.6	39.1

The combination of water and fan as run accomplished the same work as the water alone in less than one-seventh the time.

HEALTH CONDITIONS OF THE NAVY.

Health conditions of the Navy are better than they have been at any time during the past five years. The annual admission rate for all causes from January 1 to July 8 being 589 per 1,000 per annum, as compared with 776.27 for 1918, 676.02 for 1919, 778.99 for 1920, and 625.65 for 1921. The morbidity rate for all causes for the four-week period ending July 8 was 385 per 1,000 per annum; for diseases only, 340 per 1,000 per annum; and for injuries and poisons, 45 per 1,000 per annum.

With the exception of malaria, there have been very few communicable diseases reported during the past four weeks. The following table compares the admission rates for certain diseases for June, 1922, with the average admission rates for that month for the previous four years.

Annual admission rates per 1,000 for certain communicable diseases, current month of June, 1922, in comparison with the mean annual admission rates, month of June, for the four-year period 1918–1921, inclusive.

Disease.	June, 1918–1921.	June, 1922.
Cerebrospinal fever	0.13	0
Diphtheria	2.37	0.88
German measles	2.53	1.68
Influenza	21.70	6.81
Malaria	24.30	14.31
Measles	4.21	1.28
Mumps	11.07	.99
Pneumonia	4.34	2.27
Scarlet fever	2.29	.30
Smallpox	.15	.30
Tuberculosis	4.02	3.26
Typhoid fever	.19	.10

It will be noted that the morbidity rates for measles and mumps are exceptionally low; this is no doubt due to the fact that few recruits have been inducted into the Navy during the past few months. Although the admission rate for malaria is lower than the average, it is believed that this rate should be further lowered. Very few admissions for malaria are being reported from stations in the United States, except Quantico, or from ships serving in and around United States ports; the vast majority of the cases were reported from San Domingo and Haïti.

The annual admission rate for venereal disease for the four-week period ending July 8 was 96 per 1,000, which is considerably lower than the annual admission rate for 1919, 1920, or 1921. The progressive average rate for venereal disease for 1922 is now 107 per 1,000 per annum.

PREVENTIVE MEDICINE EDUCATIONAL MATERIAL.

The Bureau of Medicine and Surgery has forwarded to all ships and stations within the past month a set of posters dealing with general, personal, and social hygiene. It is requested that medical officers inform the Bureau of Medicine and Surgery if the material now being supplied to ships and stations is of sufficient value to continue such an educational campaign. If such posters are received favorably by the commanding officers and medical officers of ships and stations, new sets of posters dealing with the prevention of diseases and accidents will be forwarded to ships and stations from time to time. In order to keep a constant flow of material it will be necessary for medical officers to furnish the Bureau of Medicine and Surgery with sample posters and, if possible, with actual photographs of conditions existing at sea or at naval stations. If each medical officer of a ship would forward to the burean one such poster a month or, in fact, even one a year, ample material would always be available to provide a steady flow of posters.

Many accidents and diseases occur in the Navy each year which could be prevented. It is not so easy to obtain photographs showing how disease occurred and how it may be prevented, but it is a very simple matter to obtain photographs of the place of the accidents and consequences therefrom. Such photographs when placed upon posters attract attention and lead men to read the lessons contained thereon.

The next set of posters to be forwarded to ships were obtained from the National Safety Council. Many of these are excellent, but unfortunately they do not depict the life and environment of the bluejacket. It is considered that it would be far better if the Navy Department could make their own posters instead of having to call on civilian organizations. Such posters, however, will demonstrate to the medical officers the extent to which civilian manufacturing establishments are progressing along these lines.

In addition to posters, the Bureau of Medicine and Surgery is having made a series of lantern slides which may be used at the regular motion-picture shows while reels are being changed. Such slides will be self-explanatory and will not require a lecture by the medical officer in conjunction with them. If the medical officers so desire another set of slides will be made for lecture purposes. Here, also, it will be necessary for the medical officers throughout the Navy to furnish the Bureau of Medicine and Surgery with new ideas and necessary material for producing such slides.

Within the next month a 12-reel motion-picture film, entitled "The Science of Life," will be forwarded to the commander in chief of the Atlantic Fleet, the commander in chief of the Pacific Fleet, and to the naval training stations, Hampton Roads, Va., and San Francisco, Calif. Later, such a film will be forwarded to the commander in chief of the Asiatic Fleet. Medical officers afloat who desire to show this film may obtain it by forwarding a letter to the commander in chief of their respective fleets. This film has been produced by the Bray Productions (Inc.), New York, N. Y., in cooperation with the United States Public Health Service, the United States Army, and the United States Navy. The first four or five reels may require some explanation, inasmuch as these reels were produced largely for high-school students, but the remaining reels are self-explanatory. The following subjects are covered in this motion picture:

General biology.

Reel 1——Protoplasm, the beginning of life.
Reel 2——Reproduction in lower forms of life.
Reel 3——Interdependence of living things.
Reel 4——Reproduction in higher forms.

Communicable diseases.

Reel 5——Parasitism. Plants and animals that live at the expense of other plants and animals.
Reel 6——How disease is spread.
Reel 7——How to prevent disease.
Reel 8——How the mosquito spreads disease.
Reel 9——The fly as a disease carrier.

Personal hygiene.

Reel 10 (M)--Personal hygiene for young men: (*a*) Importance of understanding reproductive function in man. (*b*) Avoidance of venereal disease. (*c*) Consequences of venereal disease.
Reel 11---(Personal hygiene.)
Reel 12---------------------------------General hygiene for men and women.

ACCIDENTS AND INJURIES AMONG CIVIL EMPLOYEES AT NAVAL ESTABLISHMENTS DURING 1921.

An endeavor has been made to analyze the accidents and injuries occurring among civil employees at naval stations, reported in the annual sanitary reports for the year 1921. As the basic data from several navy yards and stations were obviously incorrect in many instances and the totals for "location of injury" and "cause of accidents" did not balance, no accurate conclusions can be drawn from such an analysis. However, it is believed the medical officers acting in the capacity of industrial physicians may obtain useful information from the following tables:

Table I compares the number and type of injuries occurring at certain navy yards and shore stations:

TABLE I.

Station.	Average number of civilian employees for the year 1921.	Amputation (avulsions).		Abrasions and contusions.		Wounds. Incised.		Wounds. Lacerated.		Wounds. Punctured.		Fractures.		Foreign bodies.		Burns.		Sprains.		Strains.		Dislocations.		Infections.		Hernia.		Total.	
		Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.	Total cases.	Number lost time.
Charleston (S. C.) Navy Yard [1]	......	3	3	162	36	1	1	138	17	44	15	3	3	126	11	35	14	13	11	3	2	0	0	6	6	1	0	535	119
Hampton Roads, Va., naval training station [2]	[4]1,400	0	0	64	89	7	0	57	56	9	6	7	190	4	0	7	53	17	41	5	6	0	0	6	5	0	0	183	446
Hingham, Mass., naval ammunition depot	165	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Iona Island (N. Y.) naval ammunition depot	141	0	0	11	0	2	0	14	0	4	0	1	1	1	0	2	0	1	0	1	0	0	0	1	0	0	0	38	1
Key West (Fla.) naval station	130	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Lakehurst (N. J.) naval air station [3]	139	0	....	19	....	4	....	25	....	13	....	1	....	10	....	5	....	9	....	3	....	0	....	4	....	0	....	93	....
Mare Island (Calif.) naval station	7.411	5	4	1,703	60	32	6	1,131	11	132	1	54	43	2,213	10	352	9	306	10	53	3	2	0	55	5	24	21	6,062	183
Newport (R. I.) naval torpedo station	1,758	0	0	100	3	148	0	185	5	50	0	2	2	65	1	31	2	7	2	5	1	0	0	24	3	1	1	618	20
Parris Island (S. C.) Marine Barracks [1]	......	1	1	1	0	0	0	4	2	1	1	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	11	5
Pearl Harbor (Territory Hawaii) naval station	[4]1,200	1	1	105	26	0	3	27	4	19	7	6	3	39	3	11	4	11	5	11	3	1	1	6	3	1	0	238	63
Pensacola (Fla.) naval air station	513	2	2	39	8	5	0	22	2	5	1	3	3	15	0	8	2	5	3	7	1	0	0	0	0	2	2	113	24
Philadelphia (Pa.) Navy Yard	7,775	4	4	1,358	220	52	5	2,553	91	241	18	43	35	842	50	531	34	238	57	61	25	15	6	177	23	19	17	6,134	585
Portsmouth (N. H.) Navy Yard [5]	......	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Portsmouth (Va.) naval ammunition depot	154	0	0	37	4	7	0	4	0	7	0	0	0	11	0	2	0	2	0	2	0	0	0	2	0	0	0	74	4
Puget Sound (Wash.) naval ammunition depot	66	0	0	50	3	0	0	9	0	5	1	0	0	3	0	1	0	1	0	0	0	0	0	0	0	0	0	69	4
Puget Sound (Wash.) Navy Yard	3,510	2	2	1,134	77	206	1	458	16	135	10	15	15	1,140	16	368	9	113	25	50	19	1	0	83	11	12	9	3,717	210
San Francisco (Calif.) naval training station	41	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
South Charleston (W. Va.) naval ordnance plant	2,070	1	1	530	29	205	2	206	3	113	3	12	9	343	2	148	11	45	9	23	2	1	1	8	1	2	1	1,637	74
Washington (D. C.) Navy Yard [3]	6,388	2	....	1,253	....	358	....	857	....	0	....	15	....	458	....	276	....	62	....	24	....	3	....	8	....	15	....	3,331	....
Yorktown (Va.) naval ammunition depot	137	1	0	2	0	3	0	0	0	0	0	1	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	11	0
Total	32,998	22	18	6,573	557	1,031	18	5,690	207	778	63	163	304	5,271	93	1,777	138	837	164	248	62	23	8	380	57	77	51	22,870	1,740

[1] Did not report the average number of civilian employees.
[2] In this case "Number lost time" means days lost instead of number of men losing time.
[3] Did not report "Number lost time."
[4] Total number of civilian employees for the year 1921.
[5] Correct statistics not available.

It will be noted that the naval station, Mare Island, Calif., had an average of 7,411 civil employees; the navy yard, Philadelphia, Pa., 7,775; and the navy yard, Washington, D. C., 6,388, and that the total number of injuries for the naval station, Mare Island, was 6,062; the navy yard, Philadelphia, 6,134; and the navy yard, Washington, 3,331. More than likely, the reason the navy yard, Washington, had fewer injuries than either Mare Island or Philadelphia, all of which are comparable as they employed approximately the same number of men, was due to the fact that this was the only navy yard or station which employed a safety engineer.

Table II shows the frequency of various types of injury, the parts of the body injured, and the cause of the accident as well as the total number of injuries for civil employees, the number of men who lost time, the average number of days absent of cases that lost time, and the average days absent of the total number of cases for various types of injuries.

TABLE II.

Nature of injury.	Location of injury (original injuries only; do not include readmissions). Eye.	Head, exclusive of eye.	Neck.	Thorax.	Back.	Abdomen.	Genital organs.	Arms.	Hand.	Fingers.	Leg.	Foot.	Total.
Amputation (avulsions)	3	3	....	....	....	....	....	1	2	20	....	....	....
Abrasions and contusions	94	485	20	89	235	57	24	546	665	3,071	760	597	437
Wounds:													
Incised	15	123	2	2	....	....	....	89	157	780	19	11	....
Lacerated	109	613	7	10	3	2	3	389	1,332	3,216	132	50	27
Punctured	4	55	3	3	1	1	2	41	234	225	25	206	24
Fractures	....	8	....	5	1	....	....	19	19	39	27	14	33
Foreign body	5,670	26	....	3	....	2	1	26	165	312	5	26	3
Burns	492	202	77	14	17	8	3	272	423	343	53	101	4
Sprains	....	....	1	10	207	1	6	211	53	102	80	193	2
Strains	1	....	7	18	105	35	28	37	7	17	21	13	....
Dislocation	....	....	....	....	....	....	....	6	2	11	2	1	....
Infections	18	12	2	1	1	....	....	39	117	251	7	11	1
Hernia	....	....	....	....	....	5	72	....	....	....	....	....	....
Total	6,406	1,527	119	155	570	111	139	1,676	3,176	8,387	1,131	1,223	521

Nature of injury.	Cause of accidents. Slips and falls.	Tools.	Lifting stock.	Nails and slivers (steel and wood).	Trucks or railroad.	Power equipment.	Belts.	Shaping machines.	Grinding machines.	Cutting machines.	Boring machines.	Press and hammer.	Miscellaneous machinery.	Liquid and gases (acids, fumes, etc.).	Total cases.	Number lost time.	Average days absent of cases that lost time.	Average days absent of total number of cases.
Amputation (avulsions)	2	2	1	....	1	2	1	3	....	4	....	2	2	....	20	18	165.00	165.00
Abrasions and contusions	1,316	1,014	261	129	159	221	61	150	237	145	429	546	600	3	5,319	558	203.79	59.58
Wounds:																		
Incised	21	195	75	88	7	15	1	61	12	117	30	2	56	....	844	18	69.16	14.21
Lacerated	377	455	249	480	102	137	22	162	121	733	163	338	1,512	....	5,021	205	85.33	24.09
Punctured	12	124	21	444	5	8	....	26	6	47	37	5	45	....	823	63	91.30	49.30
Fractures	37	17	7	1	14	7	....	4	....	1	1	6	9	....	166	304	319.11	264.40
Foreign body	1	208	10	2,796	69	83	4	115	668	186	204	36	365	65	5,845	93	32.32	4.50
Burns	7	120	5	125	26	201	....	36	57	31	20	18	269	571	1,990	138	123.96	92.78
Sprains	321	39	222	2	45	11	5	16	....	1	30	10	74	....	899	162	49.92	20.18
Strains	57	11	119	3	12	....	1	2	2	....	3	....	14	....	276	62	54.74	20.35
Dislocation	6	3	5	....	1	....	....	....	....	....	....	....	5	....	22	8	158.66	155.26
Infections	7	43	8	78	1	6	....	5	14	24	5	9	168	3	464	57	49.86	16.39
Hernia	12	1	45	....	1	....	....	....	....	....	....	....	2	....	78	51	128.76	121.08
Total	2,176	2,232	1,028	4,146	443	691	95	580	1,119	1,289	922	872	3,121	642	21,767	1,737	1,531.91	1,007.12

The annual sanitary report from Portsmouth, N. H., did not contain figures for "Cause of accidents."

It is fully realized that there are many apparent inaccuracies in Table II, particularly when it is compared with Table I, most of which are due to the fact that the report from the navy yard, Portsmouth, N. H., is included in this table, whereas it was not considered in Table I. There are also a few inaccuracies due to faulty basic data. However, this table does show the injuries most frequently encountered in navy yards and stations, the parts of the body most frequently injured, and the principal causes of accidents among civil employees.

Since the instructions relative to the preparation of statistics of accidents and injuries among civil employees did not reach the medical officers concerned until the latter part of the year, they could not be expected to have the necessary basic data with which to prepare the form in the annual sanitary report. For the year 1922 every medical officer should have the necessary basic data and tables from stations should be correct. If so, the tables published by the Bureau of Medicine and Surgery next year will be of immense value not only to the medical officers in the field but to various civil industrial concerns.

MENTAL HYGIENE AND DELINQUENCY.[1]

By William Healy, M. D., Judge Baker Foundation.

At present mental hygienists are endeavoring to get before legislators, people in charge of institutions, judges, probation officers, and others who handle delinquents an understanding that an important proportion of delinquency is directly related to abnormal functioning of the mind. But it was not many years ago that the reverse was true; we can read case histories of 10 years ago and find reformatory heads insisting to psychiatrists that certain individuals were insane, although as the result of some professional examination they had been declared sound mentally. We could give many instances of this, showing a point of view that differs widely from that taken by modern psychiatry.

A very striking though short paper appeared in the "British Medical Journal" in 1906, written by a certain Justice Rhodes, who plumped the question at the medical profession concerning whether the crime situation in England was not one for prime consideration by that part of the medical profession which had to do with mental diseases rather than one to be decided merely through legal methods. He very pertinently asked what could be the meaning of the fact, for instance, that of 186,000 convictions in 1906, upward of 10,000

[1] Reprinted from The Commonwealth, Massachusetts Department of Public Health, by permission of Eugene R. Kelley, M. D., commissioner of health.

of those convicted had been sentenced more than twenty times before. In all common sense, was this more likely to be a matter that could be remedied by continuation of these same legal methods, or was it a matter for the deeper understandings that might come through medico-psychological studies of these individuals?

And concerning recidivism itself, the repetition of offense, one may recognize at once that this is one of the cardinal points of the problem of delinquency. The individual who, taken in hand by the law, does not profit by his experience, even by punishment meted out to him, what can be his mental make-up? The figures of recidivism for this country can not be given, because as yet we have developed no sort of general or nation-wide study, not even statistical, of our most expensive problem of delinquency and crime. But if one looks up the facts of any of our metropolitan institutions for criminals, one finds that they readily approach the figures found in the "Blue Book of Crime and Statistics" in Great Britain, or the carefully worked-up statistics that are available from other countries. The implications of recidivism, or the failure of the law to successfully cope with a repeated offender, are of vast significance for us in America.

Twenty or thirty years ago almost the only explanation offered for the career of the delinquent or criminal was comprised in the term "degeneracy." The criminal man was the degenerate man; and under the influence of the positivist school, volume after volume was produced descriptively setting forth the characteristics of the delinquent man, woman, and child, as if one were dealing with a certain species or subspecies of human beings. But in the really remarkable developments of the last two decades all this has been changed. Much more has been learned of the nature of mental disease, and vastly more, particularly through psychological studies, of the nature of mental defect. And these two principal divisions of mental abnormality, mental disease and mental defect, are being studied every day more and more in their relation to delinquency and crime.

Now there is no need whatever for exaggerating the extent of the correlation between mental abnormality and delinquency. It must be confessed at once that enthusiasts have indulged in rash and ridiculous statements in connection with their earliest studies, particularly with the first introduction of the use of mental tests. And there have been people, including lawyers, who have been willing to state that "crime is a disease" and ergo the criminal is a diseased man. But all such sweeping generalizations are worth little.

Judging by the most careful and consistently undertaken studies, the fact regarding mental defect and its relation to delinquency and crime seems to be that among young delinquents there are very many more times the number of mental defectives than is to be found among the general population. The definite percentage varies for different places, of course, and naturally is greater in institutions, when, under probation, the brighter ones are selected as offering the most promise of doing better outside of institutional walls. But under any circumstances, taking cases just as they come in any one of the large juvenile courts, it will be found that at least 10 per cent of the delinquents are mentally defective. We have made very careful studies of several thousand youthful offenders in Chicago and Boston, and our conservative estimate is that at least 25 per cent of these must be regarded as abnormal mentally. Of this 25 per cent, by far the largest number are to be classified as mental defectives. It is unnecessary to more than mention the classic studies of family groups in this country where mental abnormality and delinquency were closely related—the Jukes family, with the recent restudy of this family, the story of the tribe of Ishmael—an Indiana family, and the Kallikaks as studied by Goddard.

The size and importance of the problem is clearly apparent from all this.

The percentage of delinquents or criminals who are suffering from definite psychoses varies widely. Figures as published are unfortunately particularly dependent upon the inclination of the observer toward some given theory, but in situations where judgments are conservative we still see that there is a very considerable relationship betwen actual mental disease and the commission of an antisocial offense. Statistics might be quoted that range from the 2 to 5 per cent of mental disease, which we ourselves have found among young offenders, to the large percentage of even some special mental disease which some observers claim to have found in particular court or institutional groups of older criminals.

A much wider viewpoint has recently been taken—and very correctly taken, I believe—by the exponents of the modern ideas of mental hygiene. It is not only the frank psychoses, the "real cases" of mental disease, and the plain cases of mental defect that are important for the students of mental health, but also many other matters that are to be properly classified as unhealthy functioning of the mental life, and matters that pertain to peculiarities of the structural make-up of the mental powers in a given individual, even though there be no feeble-mindedness.

By studies in this field we come across the facts of, as well as the causes for, intense dissatisfaction, grudge formations, impulsations and even obessions, mental conflicts, jealousies, emotional outbreaks, urgent desires, and other affairs of the mental life as originating from within or from without, any of which directly cause or directly underlie tendencies toward delinquency. Surely these are matters of the highest importance for therapeutic endeavor under the heading of mental hygiene. They are matters of the greatest social as well as personal concern. They require study which is only competently undertaken by persons with a wide range of knowledge of what is available in psychology, normal and abnormal, and of what bears on the given situation in medicine.

We have many instances of minor abnormal mental manifestations such as occur during the course of disease, as in chorea, or during a period of life, as in adolescence. School dissatisfactions leading to delinquency—"the kindergarten of crime"—are based upon special disabilities for learning and many other factors in the whole school situation. We have the production of unfortunate mental states as the result of reactions to irritating conditions in home or school life or in employment. And in connection with recreations, or even with reading, we sometimes find the development of a most unhealthy type of ideation. In many ways undesirable mental habits are formed as the result of experiences or inner tendencies. Some of the very deepest emotional upsets are to be observed in normal or even unusually intelligent individuals as the result of untoward happenings experienced at particularly susceptible periods of their lives. Any and all of these, we know from the study of many cases, are conditioning elements at the foundation of careers of delinquency and crime.

Observation also shows the immensely fruitful field that there is in all this for the therapeutic approach that the term mental hygiene implies. It is a work for trained specialists with open minds, who know not only the phenomena of mental disease as such, but who are also students of personality, characteristics, and trends, of psychological capacities and incapacities that are quite beyond the implications of "an intelligence quotient," who are students of all that goes to make the individual (always through the mental life itself) exhibit unfortunate antisocial tendencies.

There are adjustments that can be made with the greatest hope of success in ways that are not at all contemplated by the alienist as implied in his dictum "insane or not insane," "feeble-minded or not feeble-minded" (which amounts to institutional care or not institutional care), or by the work of the modern psychiatrist, though he deals more carefully than ever with definite psychoses. There may be much more to it for professional work as our science develops. We hope for much more, whether it be by glandular therapy, or by study of toxins affecting brain cells, or through other investigations from a physiological or psychological standpoint. But, even as it stands now, the direct, proper, and main avenue of approach to the problems of delinquency and crime is through the field which has come to be designated mental hygiene.

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ASPECTS OF MENTAL HYGIENE RELATED TO ALCOHOLISM AND DRUG ADDICTION.

Any one who has even half studied *human inebriety* must have reached the conclusion that many alcoholics are defective or insane. And one may hold this opinion without being in the least an extremist. Neff well writes: "It has quite often been said that all inebriates are more or less insane or mentally defective, but it is our opinion that when all inebriates of all social grades are classed together it will generally be found that the majority are neither defective nor insane." This statement is merely preliminary to the recognition of a very practical fact for treatment, namely, that a considerable proportion of drunkards are by virtue of mental abnormality not responsive to treatment.

Taking cases of habitual and periodic drinkers who have been repeatedly arrested, Anderson found in his court work that 56 out of 100 had a decidedly inferior level of mentality. He considered 37 of them clearly feeble-minded, 7 were insane, 7 were epileptic, and 32 of them showed evidences of an innate psychopathic constitution. This is probably a fair sampling of the chronic offenders in a metropolitan court where many arrests are made for drunkenness.

No other statement is needed to show the relationship of mental health problems to the social scourge of alcoholism. That another feature is added in very many of these cases through alcoholic mental degeneration, the result of definitive poisoning of brain cells, goes without saying.

Drug addiction is an issue before the country at present as never before. In connection with the problem of drug addiction, probably the student of mental hygiene is more concerned with the results of the drug itself upon the mental powers than with the original constitutional weakness of those who become drug users, in this respect being a variation from the problem of alcoholism. The fact that some observers working in courts have found evidences of a considerable proportion of mental abnormality, either defect or psychotic tendencies, is not so significant as in cases of inebriety, because nearly all of these drug users as they appear in court are delinquent individuals involved in other antisocial behavior than the use of drugs. They are either innately so abnormal mentally or have become so deteriorated that they place themselves in situations where they readily come under the ban of the law. Comparatively few of their arrests are for breaking the drug law. As a matter of fact a vast number of drug habitues never come in contact with the law because, of course, their use of the drug does not entail such socially offensive behavior as does drunkenness.

The problems of mental hygiene, however, are involved in practically every case of habitual drug using even if there is no drug psychosis or any innately defective mental constitution. This main fact constitutes one of the great points of attack in treatment. Mental dissatisfaction itself, for example, whether through ill health or other stress, is one of the prime reasons for entering into and continuing the drug habit. Anyone who would merely attempt to get an understanding of why human beings respond to such artificial stimuli or satisfaction must take into account the facts of mental life.

As in the case of the relationship of mental hygiene to delinquency, we see here again the fact that mental health means much more than freedom from a definite psychosis, just the same as bodily health means much more than freedom from specific and well-known diseases. The student of health must take into account the functioning of the organisms upon levels of efficiency, adaptation, and satisfaction to the individual—facts that are not usually dwelled upon in textbooks of pathology, either of mind or body.

MENTAL HYGIENE AND PROSTITUTION.

The studies and reports, some of them very extensive, of the earlier vice commissions which, 10 or 12 years ago, first undertook the difficult task of public enlightenment concerning *prostitution* had very little to say concerning the mental personality of publicly immoral women. The swing from the nonrecognition of the problems of mentality involved to the most exaggerated statements concerning the amount of feeble-minded and psychopathic conditions to be found among these women was the natural swing of the pendulum.

The real situation seems to be about as follows: Of course, no one who knows the facts would presume to argue that such immorality entered into by women as a gainful occupation is highly correlated with mental incapacities of any kind. The only studies of mentality that have been made are of those women who have been so foolish that they did not avoid the notice of the police or other preventive agencies, or, more rarely, of some groups of those who have been openly and notoriously plying their trade and have been willing to be studied. Even the superficial investigations of vice commissions show that a vast amount of prostitution is engaged in by women who are sharp enough to keep out of public notice and to avoid showing any evidences of law breaking. There is no reason to believe that these women differ in mentality from the average run of the population.

But through the study of women who are easily accessible, because of open immorality or being under arrest, we get a picture that demonstrates clearly a very considerable correlation between mental abnormality and such "caught offenders." In the opinion of the Massachusetts Vice Commission, about half of the women seen were to be considered as mentally defective. It is of local interest that Anderson, taking 100 women who were seen in his laboratory in the Boston municipal court, found that about half of them represented pathological mental types, among which feeblemindedness ranked highest. But here again we have the fact that many of them evidently came to attention as violators of the law because they were alcoholics or drug habitues. Indeed, some of them had already begun to show deterioration from these poisons.

The point of the whole matter is that no individual or general social therapeutic or preventive treatment of prostitution can be considered, even in terms of common sense, without reckoning on the highly practical human factors of mental conditions as they most necessarily affect prognosis.

The problems of *illegitimacy* are to some extent the same as those of prostitution. Here again it is clear that the brighter individuals take care of themselves and of their offspring in ways to avoid public notice. But a study of cases of illegitimacy as they come to public agencies reveals a very considerable percentage of mental abnormality among the mothers. Probably the best source of information for readers of this bulletin is Kammerer's "The Unmarried Mother."

MENTAL HYGIENE AS RELATED TO VAGRANCY AND DEPENDENCY.

It is easy to understand that the *vagrant* or *tramp* very frequently indeed is a psychopath. The fact of his lack of success or of finding satisfaction under ordinary conditions, when, as is usually the case, he has a fairly good physique, is evidence of something abnormal in his personality. Of course there are economic reasons, fairly clear at different periods, which must be taken into account in estimation of the causes of wandering or vagrancy. But the study of the ordinary or habitual tramp in this country as well as in Europe, where an important literature has developed concerning the subject, reveals a considerable list of mental troubles in the background of the tendency toward a vagrant life.

One mental disease in particular has received considerable attention as relates to vagabondage, and from observation of individual cases we have no doubt that this disease (dementia præcox) plays an unusually large part in the situation.

In the fellowship of tramps—and it sometimes exists to the extent that there are tramp colonies—degenerate practices are very frequently carried on which may well develop a tendency toward deterioration, toward living at a lower level than the innate mental constitution of these men would warrant.

Apropos of social prevention of the ills that such irregular living implies, it is most interesting to note that in communities where feeble-minded youths and cases of mild psychoses have been taken care of early in greater proportion, there is very much less evidence of vagrancy or tramp life. The problem can be solved—it is solved to a greater extent in Massachusetts, through better care of the mentally abnormal, than in most States in this country.

Much can be done by early attention to the real needs of the feeble-minded, the mentally diseased, the epileptic who has mental disturbances, and the psychopathic inferiors. We can find evidence of it in the better control in certain localities of tramp life, prostitution and delinquency. Constructive measures undertaken are related not only to the welfare of these individuals themselves, but also to their progeny, for, of course, *dependency* results from the nonsupport and the desertions that are connoted by alcoholism, prostitution, and vagrancy. And much more is involved than the economic situation resulting in State care and placing out of children; we have only too frequently the matters of actual disease in these children, physical and mental, which are most costly to our civilization.

There is thus every argument for assailing in the most direct way those burdens of our social life which come under the head of delinquency, alcoholism, drug addiction, prostitution, illegitimacy, vagrancy, and dependency through an approach to them which can only be gained by knowing their intimate relationship to the facts of mental hygiene—through understanding what each of these means in terms of departure from mental health.

NOTES FROM THE NAVAL BASE, HAMPTON ROADS, VA.

Newly enlisted recruits began to arrive at the naval training station on the 20th. As has been the custom for the past year or more, all of these men have been very thoroughly reexamined physically by a medical officer; including an examination of urine, which is not customary, I think, at other training stations. This procedure has brought to light more than a dozen men, having albumin persistently present in their urine. These men, of course, have been held up, transferred to sick quarters and placed under observation. The functional efficiency of their kidneys will be determined, and, if found necessary, they will be surveyed. Other defects, principally heart disease, have been found in various recruits. Surveys have already been held upon those who are not physically fit for the service. We are proceeding on the assumption that the Navy requires only men as nearly perfect physically as it is possible to obtain.

SANITATION DIVISION.

The work of mosquito prevention has been vigorously carried on during the month, and all breeding places, both on the naval operating base and the Virginia Terminal property, have been kept thoroughly covered with larvæcide. The prevailing heavy rains have made the work of mosquito prevention quite an undertaking; but by directing most of the time and attention of the division toward this particular work, the situation has been kept well in hand.

Instead of the routine inspections that have been carried out heretofore, inspections have been made to determine the probable breeding places of mosquitoes and flies. All places that were, or could possibly become, breeding places for these pests have been covered with larvæcide.

NOTES FROM THE UNITED STATES NAVAL TRAINING STATION, SAN FRANCISCO, CALIF.

The general admission rate for the month of May was 634 per 1,000 per annum as compared with 899 per 1,000 per annum for April. There were but two admissions for communicable diseases; one with diphtheria and one with tuberculosis.

About 20 per cent of all hospital corpsmen are found to be carriers of the organisms of Vincent's angina, usually with minute lesions of the gums. The same condition applies to the personnel of the Hospital Corps training school. Active treatment of lesions, disinfection and in appropriate cases isolation is practiced.

NOTES FROM THE NAVY MINE DEPOT, YORKTOWN, VA.

During the month of May a bacteriological examination of the water supplied to this station was made and it was found to contain *B. coli.* No chlorine was being used at this time, as the supply had been exhausted. Upon investigation of the watershed it was found that a number of laborers were working around the group of springs supplying the water mains, and that there was a small amount of pollution of the hillsides around the springs. Rigid regulations were instituted at once to prevent further contamination, a supply of chlorine was secured from a neighboring Army camp, and everyone concerned was advised by a station notice to boil the water before using it for drinking purposes.

INSTRUCTIONS TO MEDICAL OFFICERS.

Circular letter. FEMcC–EFL 124842(103).
Serial No. 195–1922.

WASHINGTON, D. C., *June 13, 1922.*

To: All naval hospitals.
Subject: Report of board for consideration of standardized forms.
Reference: (*a*) Bureau's letter No. 124842(103) of February 14, 1922.
Enclosure: Report of board, No. 124842(103), June 6, 1922.

1. The recommendation of the board contained in the attached report is approved.

2. The new forms will be put into effect when the stock of old forms at the supply depot have been exhausted.

F. L. PLEADWELL, *Acting.*

FEMcC–EFL 124842(103).

WASHINGTON, D. C., *June 6, 1922.*

From: Board for consideration of standardized forms.
To: Chief of Bureau of Medicine and Surgery.
Subject: Report of board.
Reference: (*a*) Bureau's letter No. 124842(103) of Nov. 30, 1921.
(*b*) Bureau's letter No. 132–1921, of Oct. 16, 1921.
(*c*) Board's report of Jan. 30, 1922.
(*d*) Bureau's letter No. 124842(103) of Feb. 14, 1922.

1. In response to reference (*d*) seventeen reports were returned from the commands to which reference (*c*) was referred. Nine of the reports received expressed concurrence with the board's recommendations.

2. The following is an abstract of the criticism received and grouped under each form considered:

(*a*) *N. M. S. Form No. 10.*—"Recommended that the following be added immediately after absentee report (reverse side):

Mast report.

Name: rate: offense: date, etc.: Remarks.

This gives the commanding officer daily information as to all mast reports, awaiting-action cases, etc. (Pearl Harbor.)

"Daily personnel report, which should contain more than twenty-one wards" (Great Lakes).

"This form as submitted is incomplete in that summary does not show number of patients died, deserted, in confinement, on leave, or absent without leave. Summary should also show number of hospital corpsmen on duty, in confinement, on leave, or absent without leave." (Norfolk.)

"It is recommended that 'Changes in staff' be made a seperate report instead of being printed on the back of the 'Personnel report.' The data for the changes in staff and the absentee report is, at a large hospital, more efficiently handled at a desk other than the one handling the personnel report, and, due to the delay often occasioned by definitely determining the absence of an individual, the distribution of the personnel report would be unnecessarily delayed." (New York.)

(*b*) *N. M. S. hospital Form No. 3.*—"Horizontal lines are not practicable in that copies seldom agree with original when inserted on typewriter, due to faulty printing. An unruled page, allowing names to be typewritten single spaced, will permit listing of twenty or more names instead of ten as on suggested form, an item of interest to large hospitals. Space allotted to listing of service records, health records, and pay accounts should be reduced, thus permitting long names to be written in full followed by service number. Numbering of lines is not necessary." (Norfolk.)

(*c*) *Baggage check.*—"In order to render this check more difficult to change or counterfeit in the case of loss, more important as a means of identification to the owner and to better serve its purpose as a baggage check, it is recommended that both the tag and its stub be numbered consecutively in conspicuous type." (Newport.)

"Recommended that first action section of stub have space for patient to sign as receipt. Stub to be filed by baggage man for future reference in case a claim is made for baggage or missing clothing after patient has left hospital.

"U. S. Naval Hospital __________
"All personal property received this date __________
"Witness: __________

"*Bagroom keeper.*" (Pearl Harbor.)

"The advantages of this form believed to be of a doubtful nature. Experience at this hospital has demonstrated that only constant watchfulness on the part of the corpsman detailed in baggage room will prevent thieving, and it appears that the loss of baggage check and consequent finding of it by another person would tend to give the finder access to baggage not his own were he inclined to be dishonest. The above remarks are based on the assumption that the possession of the detached part of the tag will gain access to baggage indicated on the check. It is suggested that the service number or some other form of a check appear on the original check (not on the duplicate) that can be furnished only by the bona fide owner of the baggage." (Charleston.)

(*d*) *Change of diagnosis.*—"This office recommends adoption of attached standardized forms with alteration of "Notice of change of diagnosis" to read as follows, due to the fact that patient might be carried with a diagnosis other than the one with which admitted to hospital:

Diagnosis changed { From: ____________________
To: ____________________

(Annapolis.)

"Recommended space be provided for approval by executive officer in smaller hospitals, or by supervisors of medicine or surgery in the larger hospitals. Eliminates mistakes (technical or otherwise) by junior inexperienced medical officers and keeps immediate superiors familiar with status of patients under their supervision. Authorizes personnel office to make necessary record changes." (Pearl Harbor.)

"A similar scheme in the form of a memorandum has been tried out in this hospital and has not met with success. A book kept in the record office and accessible to medical officers is believed to give results and such book is now being used as an experiment in this hospital. Too often the card fails to reach the record office and only a constant check of health records insures the form 'F' card being closed out and a new one for the new diagnosis opened. The book is believed to provide a more stable record." (Charleston.)

(*e*) *Operations scheduled.*—"It is believed that if space were provided on this form to show the ward to which patients to be operated on are assigned, it would aid in proper distribution of the several copies where more than one ward is concerned." (Charleston.)

"Suggested that the word 'anesthetist' be added to the heading anesthetic. In most hospitals where there are several anesthetists, the above additional information assures equal distribution of this duty and gives necessary preparatory information." (Pearl Harbor.)

"Operations scheduled" should contain several more spaces for names." (Great Lakes.)

"That all new forms recommended in paragraph 7 be adopted except (*b*). It is believed that the 'Operations scheduled' in its present form could be omitted or modified for the following reasons:

"First. Emergency cases could not be planned in advance.

"Second. Operating surgeons must be allowed leeway as to what anesthetic is to be used, as the case comes to operation.

"Third. With a senior operator and several assistants, it is impossible to tell in advance which assistant would be given the opportunity to do routine work as the need for post-operative watching of a patient, and other conditions will modify the schedule.

"Fourth. Under present conditions most operating surgeons are men of sufficient experience to be trusted with the details of the work they are doing, and I believe all hospitals now have in effect some form of official approval of work planned, but not in such detail as indicated.

"Fifth. A schedule such as proposed would be constantly changed, either by additions or omissions, depending upon changed condition of patients. It would soon, of necessity, degenerate into a perfunctory, useless formality.

"Sixth. Many times the 'Professional assistant to the executive officer' or the executive officer has followed a case more carefully than the commanding officer, and the determination to operate, or not to operate, can be better decided by him than by the commanding officer. As a matter of fact, a majority of 'approvals' are in the nature of taking the recommendation of the 'Professional assistant to the executive' or the operating surgeon.

"Seventh. In most cases it would be as important for the commanding officer to give his approval for instituting radical treatment in medical cases as in the ordinary run of surgical cases. The question of venesection, the use of oxygen, and the more powerful forms of medication, are not ordinarily referred to the commanding officer for approval in advance, nor do I believe the average run of surgical cases need approval." (San Diego.)

The following are the views of the board regarding the above comments:

(a) *N. M. S. hospital Form No. 10.*—Inasmuch as the regulations require that a special report book be kept, which report book contains entries of all disciplinary refractions, further entries regarding this subject are deemed out of place on this form.

In order that more space for wards be allowed without increasing the size of the form, it is recommended that the horizontal lines be eliminated from the form as originally proposed. This will permit any probable number of wards to be enumerated.

The present form, if correctly made out, would show the disposition of all personnel in the body of the report. It is, therefore, recommended that no addition be made to the "summary of patients," since the aggregate of change in personnel of the day is believed to be sufficient for requirements. A complete daily summary for hospital corpsmen is believed to be unnecessary, as daily changes are infrequent and a weekly report is already in existence.

The recommendation of the New York hospital as to daily changes in staff would necessitate a new form, which is not recommended.

(b) *N. M. S. hospital Form No. 3.*—The board concurs in this recommendation and recommends its adoption.

(c) *Baggage check.*—The proposed form provides for a storage number.

Receipt of patient for baggage is covered by Form "G" when his signature is obtained on discharge or transfer, Form "G" should be filed in his jacket, thereby being made available for any future correspondence covering the subject.

The board believes that the duplicate checks should be in the custody of the ward nurse and not carried by the man concerned on account of possibility of loss. The nurse is in a better position to identify the man than the bag room keeper.

(d) *Change of diagnosis.*—The recommendation of Annapolis Hospital is concurred in.

If a hospital demands that this report be signed by the executive officer or supervisor of a department, this may be accomplished by having the proposed report initialed by the officer concerned.

It is the opinion of the board that while several hospitals are now using this form (which is believed to be adequate and its adoption recommended for this reason), nevertheless it would appear that the best procedure would be to return the health record at the time the change is made to the record office so that it may be checked by officers concerned and the record office.

A book for this purpose is not recommended.

(e) *Operations scheduled.*—The form as proposed is for the official notification and approval of an operation by the commanding officer and does not abridge any of the prerogatives of the operating surgeon with respect to professional judgment.

Other suggestions not concurred in.

4. Copies of all forms recommended are appended.

F. E. McCullough,
Captain (M. C.), U. S. N
H. W. Smith,
Commander (M. C.), U. S. N.
H. L. Gall,
Chief Pharmacist, U. S. N.

Circular letter.
Serial No. 196–1922.

WJCA: ESK 129733(64).

WASHINGTON, D. C., *June 29, 1922.*

To: All naval hospitals.
Subject: Occupational therapy work for Veterans' Bureau beneficiaries; report of.
Reference: Letter from Assistant Director, U. S. Veterans' Bureau #BWC: HW: R: 10.Hosp. Sec.

1. In order that the United States Veterans' Bureau may have a complete record of all occupational therapy work done by U. S. Veterans' Bureau beneficiaries in U. S. naval hospitals, you are requested to forward, on the first of each month, a report covering this work for the past month.

2. It is understood that the committee composed of representatives of the Army, Navy, Public Health Service, Soldier's Home, and the U. S. Veterans' Bureau have adopted a new form for reports on this type of work. United States Veterans' Bureau form Med. 1870 will be used until such time as the newly adopted forms are received.

3. All of these reports shall be forwarded (in duplicate) by the commanding officers to the Director, U. S. Veterans' Bureau, via the Bureau of Medicine and Surgery.

F. L. PLEADWELL, *Acting.*

Circular letter.
Serial No. 197–1922.

WSG/T 132586, 132641.

WASHINGTON, *July 12, 1922.*

To: All naval hospitals, U. S. naval medical supply depots, and U. S. Naval Medical School.
Subject: (*a*) An act to readjust the pay and allowances of the commissioned and enlisted personnel of the Army, Navy, Marine Corps, Coast Guard, Coast and Geodetic Survey, and Public Health Service, approved June 10, 1922.
(*b*) An act making appropriations for the naval service for the fiscal year ending June 30, 1923, and for other purposes, approved July 1, 1922.
References: (*a*) ALNAV TWENTY-EIGHT, 4230–1230 of June 30, 1922.
Enclosures: (A) Copy of above (*a*) (H. R. 10972).
(B) Copy of above (*b*) (H. R. 11228).

1. The bureau encloses herewith copies of the two acts above mentioned, and directs that they be made available for all members of the staff, including hospital corpsmen engaged on office work; the acts are supplemental to one another, and should be considered together.

2. An accurate knowledge of appropriational matters is essential to the proper allocation of charges; that this knowledge is not so widespread throughout the Medical Department as it should be is evidenced by the large number of invoices received in the Bureau of Supplies and Accounts on which the wrong appropriations of the Bureau of Medicine and Surgery are debited.

3. The strictly bureau appropriations are found on pages 19 and 20 of the naval act.

4. The appropriation "Care of hospital patients" will continue under the immediate and direct control of the bureau, but *under no circumstances* will any charges be placed against it, except directly by this bureau.

5. Legislation relating to "Passenger-carrying automobiles" will be found on pages 20 and 21 of the naval act.

6. The value of commuted rations stopped on account of sick in hospitals is fixed by the naval act for the fiscal year 1923 at seventy-five (75) cents (page 17); this rate for three meals will govern the charges made against the pay of civilian employees for subsistence; it will also be the rate of charge in the duty officer's mess; the charge for less than three meals in all cases will be twenty-five (25) cents per meal.

7. The pay and allowances of members of the Nurse Corps are defined in sections 5, 6, and 13, of the "Act to readjust the pay and allowances," except that the naval act (Encl. B), page 17, provides for "subsistence in kind at hospitals and on board ship in lieu of subsistence allowance of female nurses";

the Assistant Secretary of the Navy in Alnav twenty-eight (ref. a) directs that at hospitals and aboard ship nurses "shall be subsisted in kind as heretofore."

E. R. Stitt.

Circular letter. HWS:MFD 125221 (71).
Serial No. 198–1922.

Washington, D. C., *July 13, 1922.*

To: All medical officers.
Subject: Training of flight surgeons.

1. A large number of medical officers will be needed for training in aviation medicine and subsequent duty as flight surgeons.
2. The training period will consist of a course of instruction of approximately four months' duration either at Washington, D. C., or at Mineola, L. I.
3. Any medical officer who may desire to identify himself with the specialty of aviation medicine is requested to make early application to the bureau, enclosing a report of a physical examination such as is prescribed for pilots.

E. R. Stitt.

VITAL STATISTICS.

The "Monthly Health Index," which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this Bulletin are summaries compiled from those published in the "Monthly Health Index."

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. Stitt.

Table No. 1.—*Monthly report of morbidity in United States Navy and Marine Corps for the month of June, 1922.*

	Entire Navy.	Forces afloat.	Atlantic Fleet.	Pacific Fleet.	All shore stations.	Atlantic stations in United States[1]	Pacific stations in United States.	Marine Corps.
Average complement	121,590	81,224	28,301	29,920	40,366	25,038	6,064	21,480
All causes:								
Number of admissions	4,709	2,331	849	968	2,378	1,034	185	852
Annual rate per 1,000	464.73	344.36	359.98	388.23	706.91	495.57	366.09	475.97
Diseases only:								
Number of admissions	4,083	2,004	757	838	2,079			744
Annual rate per 1,000	402.95	296.05	320.98	336.09	618.02			415.64
Injuries and poisons:								
Number of admissions	626	327	92	130	299			108
Annual rate per 1,000	61.78	48.31	39.01	52.14	88.88			60.33
Communicable diseases exclusive of venereal disease:								
Number of admissions	373	142			231	49	5	134
Annual rate per 1,000	37.01	20.98			68.67	23.48	9.89	74.86
Venereal disease:								
Number of admissions	1,024	685	258	191	339	135	20	160
Annual rate per 1,000	101.06	101.20	109.39	76.60	100.77	64.70	39.58	89.38

[1] Does not include ninth naval district.

Note.—Asiatic and unassigned ships not reported.

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases and annual rates per 1,000 for the month of June, 1922.*

	Forces afloat, Navy and Marines (complement), 81,224.		Forces ashore, Navy and Marines (complement), 40,366.		Total (complement), 121,590.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases	2,004	296.05	2,079	603.16	4,083	402.95
Injuries and poisons	327	48.31	299	88.88	626	61.78
Total	2,331	344.36	2,378	706.91	4,709	464.73
Class III.						
Appendicitis, acute	26	3.84	46	13.67	72	7.11
Autointoxication, intestinal	11	1.63	20	5.95	28	2.76
Cholangitis, acute	22	3.25	22	6.54	44	4.34
Cholecystitis, acute	7	1.03	4	1.19	11	1.09
Colitis, acute	2	.30	5	1.49	7	.69
Constipation	7	1.03	19	5.65	26	2.57
Enteritis, acute	11	1.63	15	4.46	26	2.57
Gastritis, acute catarrhal	6	.89	7	2.08	13	1.28
Gastroenteritis	21	3.10	49	14.57	70	6.91
Hemorrhoids	31	4.58	24	7.13	55	5.43
Pharyngitis, acute	9	1.33	18	5.35	27	2.66
Ulcer of duodenum	1	.15	4	1.19	5	.49
Ulcer of stomach	1	.15	0	....	1	.10
Total	155	22.90	230	68.37	385	38.00
Class VII.						
Varicocele	17	2.51	16	4.76	33	3.26
Class VIII.						
Chicken pox	4	.59	1	.30	5	.49
Diphtheria	1	.15	7	2.08	8	.89
German measles	16	2.36	1	.30	17	1.68
Influenza	41	6.06	28	8.32	69	6.81
Measles	11	1.63	2	.59	13	1.28
Mumps	7	1.03	3	.89	10	.99
Pneumonia, broncho	1	.15	6	1.78	7	.69
Pneumonia, lobar	11	1.63	5	1.49	16	1.58
Scarlet fever	2	.30	1	.30	3	.30
Smallpox	0	....	3	.89	3	.30
Whooping cough	1	.15	0	....	1	.10
Total	95	14.03	57	16.94	152	15.00
Class IX.						
Dysentery, bacillary	1	.15	0	....	1	.10
Dysentery, entamebic	1	.15	2	.59	3	.30
Typhoid fever	0	....	1	.30	1	.10
Total	2	.30	3	.89	5	.49
Class X.						
Dengue	19	2.81	18	5.35	37	3.65
Filariasis	0	....	1	.30	1	.10
Malaria	19	2.81	126	37.46	145	14.31
Total	38	5.61	145	43.10	183	18.01
Class XI.						
Tuberculosis (all forms)	7	1.03	26	7.73	33	3.26
Class XII.						
Chancroid	67	9.90	50	14.86	117	11.55
Gonococcus infection	579	85.54	235	67.86	814	80.33
Syphilis	39	5.76	54	16.05	93	9.18
Total	685	101.20	339	100.77	1,024	101.06

TABLE No. 2.—*Number of admsisions reported by Form F cards for certain diseases and annual rates per 1,000 for the month of June, 1922*—Continued.

	Forces afloat, Navy and Marines (complement), 81,224.		Forces ashore, Navy and Marines (complement), 40,366.		Total (Complement) 121,590.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per, 1,000.
Class XVIII.						
Bronchitis, acute	94	13.89	56	16.65	150	14.80
Laryngitis, acute	2	.30	4	1.19	6	.59
Pleurisy, acute fibrinous	3	.44	4	1.19	7	.69
Rhinitis, acute	6	.89	7	2.08	13	1.28
Tonsillitis, acute follicular	186	27.48	109	32.40	295	29.11
Total	291	42.99	180	53.51	471	46.48
Class XX.						
Hernia	31	4.58	25	7.43	56	5.53

TABLE No. 3.—*Summary of annual admission rates for venereal disease reported from ships and shore stations.*

	Annual rate per 1,000, May.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All ships	0	107.04	888.88	0	124.46	746.41
Battleship and cruiser force:						
Atlantic Fleet	27.27	107.25	346.15	44.47	104.17	237.25
Pacific Fleet	21.60	69.67	129.79	62.36	93.10	121.36
Asiatic Fleet	112.85	136.17	181.81	39.56	187.50	277.39
Destroyer force:						
Atlantic Fleet	0	148.77	827.58	0	147.39	594.05
Pacific Fleet	0	79.74	888.88	0	92.87	373.54
Asiatic Fleet	0	136.96	594.05	0	243.50	555.74
Miscellaneous:						
Atlantic Fleet	0	130.43	750.00	0	124.55	347.36
Pacific Fleet	0	90.04	470.58	0	77.00	220.58
Asiatic Fleet	0	219.06	375.00	0	316.68	746.41
Unassigned, including ships on special duty	0	126.03	413.79	0	155.95	432.43
	Annual rate per 1,000, June 4 to July 1, 1922.			Average rate since June 1, 1922.		
All naval districts in the United States	0	61.64	116.51	3.56	84.51	232.00
First naval district	0	27.50	70.94	18.00	33.04	82.76
Third naval district	0	63.19	109.03	3.56	63.98	123.01
Fourth naval district	41.93	71.99	79.10	6.25	147.22	113.31
Fifth naval district	0	69.84	111.51	26.53	111.01	178.43
Sixth naval district	0	73.10	116.51	44.06	56.18	73.50
Seventh naval district	0	0	0	24.16	24.16	24.16
Eighth naval district	0	52.57	61.97	87.37	116.02	232.00
Ninth naval district	101.67	101.67	101.67	70.03	70.03	70.03
Eleventh naval district	11.81	19.32	34.07	11.07	29.80	43.47
Twelfth naval district	54.66	80.15	104.55	60.60	111.21	128.74
Thirteenth naval district	0	0	0	13.86	31.81	70.90

Ratio of gonococcus and syphilis infection to total cases of venereal disease.

	Per cent, May.		Per cent since Jan. 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All ships	73.88	7.69	66.78	11.06
Battleship and cruiser force:				
Atlantic Fleet	75.90	6.02	69.86	11.60
Pacific Fleet	83.09	11.26	82.60	9.93
Asiatic Fleet	75.00	0	64.28	12.24
Destroyer force:				
Atlantic Fleet	71.92	7.89	62.79	8.67
Pacific Fleet	86.66	1.66	78.67	6.34
Asiatic Fleet	63.88	5.55	50.00	13.05
Miscellaneous:				
Atlantic Fleet	72.94	4.70	62.44	11.53
Pacific Fleet	64.00	22.00	77.43	10.61
Asiatic Fleet	55.55	22.22	51.85	20.20
Unassigned, including ships on special duty	67.44	2.32	60.63	11.34
	Per cent June 4–July 1, 1922.		Per cent since Jan. 1, 1922.	
All naval districts in the United States	72.67	12.67	68.87	16.26
First naval district	57.14	0	67.64	14.70
Third naval district	53.33	20.00	63.46	24.03
Fourth naval district	73.07	15.38	79.53	6.43
Fifth naval district	75.86	10.34	62.08	15.20
Sixth naval district	75.00	8.33	77.41	14.51
Seventh naval district	0	0	100.00	0
Eighth naval district	75.00	25.00	67.07	30.30
Ninth naval district	85.71	14.28	79.48	15.38
Eleventh naval district	66.66	33.33	85.25	8.82
Twelfth naval district	77.77	11.11	68.05	25.00
Thirteenth naval district	0	0	84.61	15.33

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the four-week period, June 4 to July 1, 1922, inclusive.*

	Navy (complement), 100,110.		Marine Corps (complement), 21,480.		Total (complement), 121,590.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases of blood	3	0.36	0	....	3	0.30
Diseases of circulatory system	36	4.31	8	4.47	44	4.34
Diseases of digestive system	395	47.34	120	67.04	515	50.83
Diseases of ductless glands and spleen	4	.48	2	1.12	6	.59
Diseases of ear	79	9.47	19	10.61	98	9.67
Diseases of eye and adnexa	76	9.11	13	7.26	89	8.78
Diseases of genito-urinary system (non-venereal)	150	17.98	24	13.41	174	17.17
Communicable diseases transmissible by oral and nasal discharges	111	13.30	20	11.17	131	12.93
Communicable diseases transmissible by intestinal discharges	3	.36	3	1.68	6	.59
Communicable diseases transmissible by insects and other arthropods	62	7.43	108	60.33	170	16.78
Tuberculosis (all forms)	27	3.24	3	1.68	30	2.96
Venereal diseases	763	91.45	160	89.38	923	91.09
Other diseases of infective type	228	27.33	67	37.43	295	29.11
Diseases of lymphatic system	59	7.07	12	6.70	71	7.01
Diseases of mind	12	1.44	3	1.68	15	1.48
Diseases of motor system	63	7.55	23	12.85	86	8.49
Diseases of nervous system	30	3.60	9	5.03	39	3.85
Diseases of respiratory system	515	61.73	84	46.93	599	59.12
Diseases of skin, hair, and nails	71	8.51	24	13.41	95	9.38
Hernia	46	5.51	4	2.23	50	4.93
Miscellaneous diseases and conditions	66	7.91	13	7.26	89	8.78
Parasites (fungi and certain animal parasites)	107	12.83	24	13.41	131	12.93
Tumors	12	1.44	1	.56	13	1.28
Diseases of women	1	.12	0	....	1	.10
Injuries	430	51.54	101	56.42	531	52.40
Poisons	18	2.28	7	3.91	25	2.47
Total	3,367	403.57	852	475.97	4,219	416.37

TABLE No. 5.—*Deaths reported, entire Navy, for the four-week period, June 4 to July 1, 1922, inclusive.*

	Navy (complement), 100,110.	Marine Corps (complement), 21,480.	Total (complement), 121,590.
CAUSES.			
Pneumonia, lobar	2	0	2
Pachymeningitis, cerebral	1	0	1
Paragonimiasis	1	0	1
Malaria	0	1	1
Malignant growths	1	0	1
Other diseases	2	0	2
Drowning	3	0	3
Accidents and injuries	6	3	9
Total	16	4	20
Annual death rate per 1,000, all causes	1.92	2.23	1.97
Annual death rate per 1,000, diseases only	.84	.56	.79

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This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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TABLE OF CONTENTS.

PREFACE.

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form, such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

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U. S. NAVAL MEDICAL BULLETIN

VOL. XVII. SEPTEMBER, 1922. No. 3.

SPECIAL ARTICLES.

WOUNDS OF THE KNEE JOINT: THEIR SURGICAL IMPORTANCE AND TREATMENT, WITH SPECIAL REFERENCE TO THE METHODS DEVISED AS A RESULT OF THE GREAT WAR FOR THE TREATMENT OF SEPTIC KNEE JOINTS.

By C. M. OMAN, Commander, Medical Corps, United States Navy, and E. J. CUMMINGS, Lieutenant, Medical Corps, United States Navy.

This article was prompted by a case of knee-joint injury followed by severe infection that came under our care several months past. Happily the outcome has been good, and the patient is now well and walking with a good functional result. The surgical importance of injuries of the knee joint has been impressed upon us by the cases which have occurred in our practice as one of special concern and interest to the naval surgeon.

It is necessary for us to draw freely from literature, giving a short epitome of the management and treatment of wounds of the knee joint as developed and outlined by men of large surgical experience and skill who have specially treated and studied these types of cases. It is our purpose to present to the surgeon, in a simple way, the best methods that have been devised in the treatment of these injuries and their attendant complications. In order to present the subject as a basis for our application of these methods in peace-time military surgery or civil surgery we will have to refer to the contributions made as a result of the war on the surgery of the knee joint. The wounds of the knee joint in military surgery in times of peace and in civil surgery will vary in several respects from those of war surgery, but the fundamentals of surgical circumspection and treatment remain the same.

Surgery of the knee joint has always been a difficult and hazardous problem, due largely to the great size of the joint and its peculiar anatomical conformation. Infection of the knee joint is doubly hazardous and vexing on account of the recesses and pouches within the joint that act as reservoirs for the collection of pools of pus, prohibiting the accomplishment of proper surgical drainage and threatening the patient as to life and limb. It is the consensus of opinion among all surgeons, American and European, who handled large groups of gunshot wounds of the knee joint, that these injuries are very serious. If the joint becomes infected as a result of injury, the outlook for the patient becomes serious, first, as to life; second, as to limb; and, third, as to function. It can be readily seen from these few facts that the surgeon who is confronted with any injury of the knee joint has a formidable situation to handle.

In the various studies made by different surgeons on the groups of these injuries some very interesting and instructive data have been collected and some good deductions and lessons have been drawn. Kellogg Speed published an article in which he gives an interesting general collection of knee injuries as made by H. G. Barling, in the Rouen Hospital district, from June to December, 1916. Barling discovered that the statistics clearly revealed a high proportion of patients whose wounds required early excision, removal of the damaged bone and any retained foreign body, joint irrigation and closure by suture, and which later followed a course of satisfactory healing requiring no further surgical interference. The findings in 845 knee joints operated on in the Rouen district are presented, as follows:

Results of 845 operations on the knee joint.

Classification of wounds.	Number of cases.	Percentage.
1. Total number cases of injury to knee operated on	845	....
2. With bone injury	438	....
3. Without bone injury	407	....
4. Wound excised and closed	322	....
5. Cases under (4) requiring further operation [1]	82	25.2
6. Wound excised and packed	336	....
7. Cases under (6) requiring further operation [1]	128	38.4
8. Excision of knee	42	....
9. Arthrectomy, partial or complete	15	....
10. Excisions or arthrectomies amputated	13	22.8
11. Deaths after excision or arthrectomy	13	22.8
12. Amputation without excision	151	....
13. Deaths under class 12	49	32.4
14. Total amputations	164	19.4
15. Total mortality	72	8.5

[1] One hospital with a large number of cases was unable to separate the cases under items 4 and 6.

It will be noted in this group that of the 322 wounds that were excised and closed 82, or 25.5 per cent, required further operation, indicating that 74.5 per cent got well without further surgical procedure. Of the 336 wounds, however, that were excised and packed 38.4 per cent required further operation, only 61.6 per cent getting well without further surgical procedure. This shows clearly better results following excision and closure. The total amputations numbered 164, about 20 per cent of the cases, or one-fifth of the number, a rather high percentage, as later improvements and different treatment in the management of these cases shows. The mortality of 8.5 per cent is rather high, but we must bear in mind the serious character of the injuries and the lack of any uniform or conclusive method of handling or treating these cases at that time.

Kellogg Speed in a series of 85 cases had but 2 deaths, 1 death not as a direct cause of knee injury but from a gas infection of the arm. The amputations numbered 9, or approximately 10 per cent, a much lower ratio than that of Barling. Out of the 85 cases 65 were treated as nearly as possible by wound excision and joint closure, leading to 55 fair to excellent results, which again shows the advantages of early excision and closure. Of the 65, 6 suffered amputation, 2 died, and 47 wounds healed cleanly, demanding no surgical interference. The general results of the series of 85 cases were excellent in 25 instances, good in 36, fair in 13, loss of limb in 9, and death in 2. He makes an observation that is noteworthy: We might believe that the result depends not so much on whether a wound is penetrating or through and through as it does on other factors, namely, early surgical excision and the presence or absence of concomitant bone injury. His operative technique is given as follows: First comes careful skin shaving and disinfection. The leg should be held up off the table by an overhead swing. Second, the track of the missile is completely, carefully, and slowly excised with a sharp scalpel, but no scissors. The sliding of the tissues over each other is avoided and the contused edges are removed in one piece. Sufficient skin opening is made to permit access to the foreign body on the joint surface. Fresh towels and instruments are then procured. No fingers or instruments are inserted through the wound into the joint, since not only may infection be carried in but the foreign body may be pushed into an inaccessible area. The comminuted bone and foreign bodies are removed. The synovial surface should not be sponged or irritated or exposed for any longer time than necessary. It matters little about the length of the skin incision, but the amount of skin removed should be sparing to avoid undue tension in the closure. Skin plastics may be performed. If the foreign body is buried in bone, it its removed and with it the surrounding damaged bone. Third, the joint may be irrigated with physiologic sodium chloride solution. Various operators use ether, flavine, proflavine, or eusol. As far as we can tell, the solution used makes little difference. Mechanical cleansing without joint trauma is desired. Fourth, the wound is closed in layers. The synovia is closed by stitching to bring only smooth surfaces in contact and the skin and superficial tissues are closed snugly, unless there is great edema and contusion. In that case a small drain may be put down to the closed synovial surface, not into the joint. If the synovia can not be closed, a gauze pack is placed down to its surface. Injection of formaldehyde solution, glycerine, ether, or other irritants into the closed joint is of doubtful value. Fifth, a Buck's extension is attached to a Thomas splint on the leg, and flannel bandages cover all. For comfort and steadiness the application of the splint should be exact, requiring skilled attention. Most patients should be retained from 24 to 48 hours before transportation. Dressings and splints are not disturbed unless there is pain, fever, or looseness. We introduce this for your study that you may compare it with the technique of Willems, as given later. It might be well to state with reference to after treatment that when Speed finds aseptic healing is in progress and the joint is not painful slight passive motions may be started in the second week.

In an article on knee-joint war injuries, McWilliams and Hetzel state that Willems (a Belgian surgeon) gives the following statistics in regard to the final outcome of 100 of his consecutive knee cases, 18 of which were accompanied by a purulent synovitis of a virulent type, chiefly streptococcus. In the 100 cases there were no deaths and no amputations. There was one resection and two stiff joints. These are very striking results and stand in profound contrast to the reports we have just studied of Barling and Speed.

The following are the general principles of Willems's treatment as given in the article of McWilliams and Hetzel: Preliminary Roentgen ray examination of the joint with the object of determining the degree of fracture, if any; also the marking out on the surface of the position of the foreign body beneath. At the operation careful debridement of all the damaged tissues surrounding the wound, external to the opening in the synovial membrane, and the removal of all the hemorrhages in the fascial planes about the wound. Changing of the instruments, or resterilization before entering the wound. Removal of the contused edges of the synovial wound with its enlargement up and down sufficiently to do the necessary subsequent work. The joint should be kept open just as short a time as possible in order that the synovial membrane may dry as little as possible, since a dry synovial membrane seems to predispose to ankylosis. Removal of the foreign body, all clothing, and loose detached bone fragments. Smoothing off of all rough bone edges. If the foreign body is buried in the bone, it is chiseled away, following the tract to its end and removing all the devitalized bone surrounding the tract. If possible, all the procedures should be performed without the gloved hands being introduced into the joint, or without touching any contacting part of the instrument to be introduced. At this stage, one will determine whether there is sufficient undamaged articular cartilage left to make possible the hope of subsequent restoration of function by immediate, post-operative, mobilizing movements. The joint is then thoroughly washed out with any nonirritating, bland solution, such as Dakin's or normal salt solution, followed, finally, by a flushing with pure ether, and then the capsular opening edges are completely closed with a plain continuous catgut suture either through and through, or, as some prefer, so passed that no suture appears inside the joint. Unless the effusion into the joint is frank pus, as in neglected cases, the synovial membrane is completely closed, disregarding the length of time that the injury has existed prior to the operation. The tissues external to the closed capsular wound need not be closed, however, and had better not be, if the injury has existed over 12 hours. The external open wound may be loosely packed with gauze, wet in Dakin's solution, or Carrel's tubes may be placed in position in the wound for subsequent treatments with Dakin's solution. The important point to be emphasized is that the entire opening in the synovial membrane *must* be completely closed.

A bandage is so loosely passed about the dressing as not to impede subsequent movements.

At the time the joint is open, a culture is taken of its contents to subsequently determine the presence or absence of hæmolytic streptococci, which, when found, requires speedy drainage of the joint. No splint to be applied, and this is all-important.

After treatment.—Just as soon as the patient is out of the anæsthetic he is made to *actively* (never passively) move the articulation in bed. Passive motions are painful and set up an inflammatory reaction, and later on an extra-articular abscess may be caused to rupture into the joint. The patient's hands grasp the sides of the thigh, which is lifted from the bed by muscular contractions, his heel remaining resting on the mattress. At first there is excessive fear of trying these motions, but as the pain is felt to be very slight, courage is soon established. The sooner motions are begun after the operation, the less is the pain, because the periarticular structures do not have time to become infiltrated with exudate. The nurse sees that this is done every two hours, night and day, to the greatest extent possible short of actual pain. To the faithfulness, consequently, of the nurse in following these instructions will be due the subsequent restoration of function. There is astonishingly little pain when active motions are started immediately after the operation, providing no bony fragments are displaced, in which case movements are not indicated. Patients say that if painful sensations appear during repose the best means of making them disappear is to repeat the movements.

Willems's treatment of a wound of the knee joint may be briefly outlined as follows: (This summary was taken from the article by Burton James Lee.)

1. Accurate foreign body localization.

2. Careful debridement of all soiled and devitalized soft tissues and soiled bone.
3. Removal of all loose bone fragments and foreign bodies.
4. Irrigation of the joint with saline.
5. Filling of the joint with ether.
6. *Primary closure of the joint by suture, usually including the skin.* With considerable injury to knee or muscle, it is wiser to close the joint capsule, but leave the skin and muscle unsutured.
7. *Early and frequent repeated active motion of the knee*, no splint being applied, save with massive bone injury. This mobilization is begun upon the second day, and is continued at two or three hour intervals. The patient is up about the ward, with crutch support, on the fourth day, and is encouraged to walk without any support by the tenth day.

We have not had access to the original article of Willems, but his methods have been so thoroughly described and presented by other experienced surgeons that we feel that reference to the original article is hardly required.

In connection with the progress of the case following closure, it should be noted that effusion into the joint sometimes occurs. Effusion into the joint at once puts a stop to the movements, and as soon as the liquid is withdrawn by puncture, mobilization instantly is reestablished, which means that it is not the wound which abolishes the function but the articular distention. Should the joint become distended, should temperature rise and sepsis seem to be starting, an aspiration may be performed to decide the character of the intra-articular fluid and to obtain a culture. Staphylococcus infection is less to be feared than streptococcus. Objections to aspiration are found in the wounding of the synovial surface and leakage of the infected joint contents through the puncture hole into poorly resisting periarticular tissues, resulting in a rapidly spreading sepsis. The joint surface has more resistance than the periarticular tissues.

In the cases of septic knee joints, Willems manages them in the following manner: As soon as frank pus is evident, either by signs of inflammation or bacteriological examination, thorough drainage must be at once established by vertical external and internal excisions. The joint is washed out thoroughly with Dakin's solution at the time of the operation. Tubes had preferably better not be used at first, but may be later if drainage is found to be insufficient. When they are used, the internal ends should project just inside the synovial membrane and no farther. The after treatment is conducted exactly as in the case of noninfected joints, by active (not passive) motions carried out to the point of pain. These are begun immediately after the anæsthetic has worn off and are repeated every two hours thereafter, day and night. Even a day's delay will prejudice the final functional result. Walking is important because the muscular contractions compress the joint and cause a marked increase in the expulsion of pus. The patient is made to walk the next day after the operation without crutches. It is surprising how much pus will exude from the incisions after each walk. It is very important that sufficient drainage openings be made to allow for an adequate escape of the pus. These openings should be sutured just as soon as the discharge becomes serous. If the active motions are performed often enough and vigorously enough, these secretions are expelled through the drainage openings as they are formed. Drainage seems to be more thoroughly accomplished by this method than by any other, thus limiting the infection to the synovial membrane, and tending to prevent its spread to the cartilage and bones.

In civil injuries the results of operations with debridement, joint closure and immediate subsequent mobilization should be much better than in war injuries, because ordinarily the patient is operated upon more quickly, the infection is not so virulent, there is no transfer to another hospital; and, finally, the after nursing should be more effectually done.

This method of treatment is in absolute contrast with the usual teachings regarding infected joints where immobilization for a long period has been the rule. However, the distinct advantages derived from active mobilization of septic joints prove its value as a sound form of treatment. By mobilization, efficient drainage of the joint is established, the time consumed in recovery is much shorter, and the percentage of good functional results is much higher.

Mayo Robson and Kellogg Speed devised a form of drainage for septic knee joints known as subcrural pouch drainage and inversion treatment. This method consisted in opening the joint in the subcrural pouch through a small incision through the quadriceps extensor muscle in the midline of the thigh. A tube is introduced through this opening into the joint and the leg firmly held in a Thomas splint. In order to effect drainage, the patient was turned over on his face for several hours several times a day, thus permitting the exudate to run out of the small opening, which, in this way, became the most dependent point of the joint. The limb may be also held in the vertical position at right angles to the body in the Thomas splint, supported by fixing it to an overhead bar. This position also favors drainage but not as effectively as in the prone position. Speed suggests this treatment for the first stage of knee-joint infection and even for those that threaten to become severe.

In reviewing the methods and reports concerning the management of knee-joint injuries, with their attendant complications, it appears that the technique adopted by Willems, followed by immediatė active mobilization, is the standard to follow. Many able surgeons practiced the principles of wound excision and joint closure, but to Willems belongs the distinction of having practiced with marked success the principles of active mobilization in noninfected and infected knee joints. The splendid functional results following the conduct of this principle insures its adoption in the prescribed treatment. We have purposely refrained from introducing into the article a discussion of knee-joint injuries complicated by severe bone injuries. The subject is too vast to enter all its phases, hence we have confined ourselves to a discussion of the early treatment shortly following injury and when complicated by sepsis.

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SOME FEATURES OF PLAGUE.[1]

By Surgeon GEORGE W. McCOY, United States Public Health Service.

INTRODUCTION.

As there are excellent treatises on plague I shall not attempt to cover the whole subject, leaving out of consideration in general the history, clinical manifestations, and pathology, which can be found without difficulty, and devote myself more particularly to features which are not usually stressed or which are not so readily accessible.

There are two main clinical and epidemiological types of plague in man, but so far as we know but one type occurs as a natural infection in rodents. The two types in man are the pneumonic and bubonic, and ordinarily these breed true, i. e., pneumonic plague gives rise to pneumonic plague, is not associated with this disease in rodents, and for practical purposes may be said never to give rise to cases of the bubonic type. Primary bubonic plague frequently presents secondary pulmonary manifestations, but, with rare exceptions, never gives rise to cases of the pneumonic type.

[1] A lecture delivered at the United States Naval Medical School, Washington, D. C.

A third class is sometimes recognized, the septicæmic type, but careful post-mortem examination will usually show deep buboes in these cases.

In general, pneumonic plague is a disease of cold countries, and the little we know about it is derived chiefly from Manchurian experience; while the bubonic type is a disease of warm climates or warm weather in temperate climates. In this connection it may be noted that, while the lung type prevails almost exclusively in northern China, in southern China it is almost unknown, and the more usual bubonic type is quite common. Inasmuch as the pneumonic type does not appear to have special significance for us in the United States, my remarks will principally be with reference to the bubonic type.

The present-day importance of plague is indicated by data taken from the Bulletin of the International Office of Public Hygiene at Paris, which catalogues plague for 1921 at the following places:

In Africa: Eastern English possessions, Algiers, Angola, Cape Verde Islands, many provinces in Egypt, Anglo-Egyptian Sudan, Lybia, Madagascar, Senegal, Tunis, the Union of South Africa.

In America two cases of human plague of squirrel origin were reported from California, and, though they are not reported, it should be stated that a number of cases of rodent plague have occurred in Gulf coast cities and in three States in Mexico.

In South America the list includes Argentine Republic, Brazil, Chile, Ecuador, Peru, Paraguay.

In the West Indies, Porto Rico infestation is shown in six localities.

In Asia: Ceylon, China (including Hongkong), British India, East Indies, French Indo-China, Asiatic Russia, Siam, the Straits Settlements, Turkey in Asia.

From Europe, infection was reported during the year at three points in Greece, five points in Italy, in Portugal, in the Azores (Portuguese possessions), in Russia, in the new State of the Serbs, Croats, and Slovenes, and in Turkey. In 1920 an outbreak of something like 100 cases occurred in Paris and there were infections in at least one of the French seaports in that year.

From the Pacific islands, Australia and Hawaii reported cases.

GENERAL CONSIDERATIONS.

While the list of places in which plague has prevailed within the last year may give the suggestion that in these modern times it is a serious menace, yet we must class it with the other diseases which are yielding to the advance of civilization and to progress in sanitary science. To justify this statement one has but to read the history of plague in England, where for a period of about 600 years ending with about the beginning of the eighteenth century, plague was present and existed as a serious menace, and to compare this with the occasional trifling outbreaks which have occurred in the British Islands in the last 20 years. In the earlier centuries, the deaths from this disease for many years were numbered by the tens of thousands, while in more recent years these cases may be counted by the dozen only.

In its spread from country to country plague, like other diseases, follows the line of trade; and because trade between countries is chiefly in ships, plague is usually a ship-borne disease. Even where facilities for land transportation would at first sight seem to be superior to those for water transportation, plague appears to prefer water-borne commerce as the medium by which it shall be carried. I think it is more than a coincidence that the only communities in the United States which have ever suffered from plague are those enjoying a considerable water commerce, notably San Francisco, Seattle, New Orleans, Pensacola, Galveston, and Beaumont.

Many interior communities, with easy and direct railway communication to the places I have named, have escaped infection; although it can scarcely be said that the measures taken to prevent the spread of the disease were such as would have guaranteed against its extension. While we may take effective measures as soon as the disease is found among people, there is every reason to believe that, ordinarily, human cases occur only after rat infection has gained much headway, and during the period prior to the occurrence of human cases there is ample opportunity for spread to other communities.

BACTERIOLOGY.

Before considering the other aspects of our subject, a few words may be said about the recognition of the plague bacillus. There are few pathogenic organisms more readily recognized or more certainly identified than is this organism. For all practical purposes but four culture media are necessary, viz, agar slants, on which it grows as a tenacious, sticky, grayish streak; "salt agar" slants, containing about 2 per cent sodium chloride, on which, within one or two days, most pronounced changes in morphology occur; broth tubes, which present a delicate surface growth, with dependent fringes; and litmus milk, which is rendered slightly acid by the organism. These features, together with its ability to induce characteristic lesions in laboratory animals, suffice for the exclusion of other organisms with which, conceivably, it might be confused. Protective tests, using the Yersin antiplague serum, may be made as the final diagnostic procedure in an exceptionally important test. Puncture of a gland with a hypodermic syringe will practically always result in the securing of fluid for morphological, cultural, and inoculation investigation.

This is an appropriate place to say a few words about plague-like diseases. It should be understood, first, that these occur only in rodents; for practical purposes we may say that there is no plague-like disease of man. Of the plague-like diseases of rodents, two may be given brief consideration: Pfeiffer's pseudo-tuberculosis rodentium organism produces lesions in guinea pigs which are very difficult to distinguish from plague; however, this organism is practically without effect on rats and is never found naturally in rats or in man. In the work of the Public Health Service we have not encountered any pest-like organisms save Pfeiffer's pseudo-tuberculosis bacillus already mentioned, which is closely related to the plague bacillus—indeed, some workers have regarded them as identical. This particular organism confers immunity to subsequent infections of plague.

A plague-like disease is found as a natural infection in ground squirrels and rabbits and is caused by a remarkable organism, *Bacterium tularense*. In squirrels and in guinea pigs, it gives gross appearances which defy the most experienced; however, cultures on the media used for the plague bacillus are always negative and the infectivity for rats is relatively low, so that if one is on the lookout for it no confusion occurs. This organism seems to be highly pathogenic for man but without producing plague-like lesions.

It seems to require but a slender basis on which to report an organism as "plague-like." For instance, there has recently come to our attention a report of a "plague-like" organism which is described as motile, flagellated, giving a greenish-yellow growth on agar, producing gas in sugar media, and rendering milk acid and clotting it. It also failed to infect animals when rubbed on the shaven skin of the belly. It is difficult to conceive of any organism much further from the plague bacillus than this.

PATHOLOGY.

With respect to the post-mortem diagnosis of plague, it should be emphasized that the gross lesions are as characteristic as those in any diseases in which we are accustomed to rely on post-mortem findings for diagnosis. I know of no infectious disease, with the possible exception of lobar pneumonia, which gives equally characteristic appearance after death as does bubonic plague. This point is stressed because we are accustomed to receive requests for smears and cultures to enable laboratory workers to become familiar with plague. While cultural investigation may be necessary to clinch the diagnosis with evidence which would convince the most skeptical, for practical purposes the gross pathological appearances are pathognomonic.

The tumors in the region of the lymph glands, the bloody gelatinous exudate beneath the skin, the pronounced hemorrhagic appearance around the lymph node, the enormously enlarged and softened bloody gland, all combine to give a picture which is not duplicated by anything else. The examination of smear preparations. the making of cultures, and the inoculation of animals may, and perhaps in many cases should be done, but such appearances as I have indicated leave no one with experience in doubt.

In laboratory animals, and indeed in the wild rodents where the infection has been studied, the lesions are almost equally characteristic, although it is not necessary to discuss them in detail.

ANATOMICAL PECULIARITIES IN RODENTS.

There is a remarkable difference between the lesions of bubonic plague in certain rodents. Perhaps the best contrast is between guinea pigs and rats. While each species presents a bubo, the visceral lesions differ markedly. In acute plague in the guinea pig the spleen is always full of whitish-yellow necrotic foci; in the rat these are not found, but the organ is enlarged and purple in color; on the other hand, in the rat the liver is usually liberally sprinkled with necrotic foci, while in the guinea pig the corresponding organ is generally free from lesions. In the rat there is often a marked, dusky red subcutaneous injection that is most striking, but this is not seen in the guinea pig, and, finally, in the rat we have often a marked serous effusion which is wanting in the guinea pig. Indeed, the bubo is the only lesion found in both species of rodents which are commonly used as test animals.

Chronic plague in rats has been thought to be the means whereby plague was carried over from season to season, although the evidence is not very strong.

Among rodents, susceptibility to plague extends through many groups. It is mentioned here in order that an exception to the rule may be noted. In our experiments with the rodents found in the far West, no example of immunity to plague was found in any species save the pocket gopher. This little animal, which is very common in California, was, to our surprise, found to be highly resistant to the infection, surviving with regularity doses of highly virulent cultures which were uniformly fatal to other rodents. Perhaps there is a suggestion in this fact for immunity studies.

Plague is a disease affecting primarily the rats of cities; but, from the point of view of control, the more obstinate infection among rural rodents is not so well known. Let me refer to several examples:

In our own Pacific coast region there is, in the State of California, a squirrel plague focus covering an area of several thousand square miles. It is perhaps 50 miles wide by 150 in length. Since its discovery some 10 years ago it has been the theater of persistent, intelligent attempts at eradication, but the results have not been satisfactory. To suppress squirrels effectively would require an enormous expenditure on the part of a control agency; that is, the State or the General Government, or the practically simultaneous expenditure of larger or smaller sums by individual landowners. Neither condition up to the present time has been brought about; indeed, after enjoying opportunities of familiarity with the work from the beginning, I am driven to the conclusion that the eradication of this focus is impossible with present resources. Indeed, it may well be questioned whether we would be warranted in spending on this work the large sum that would be required to do the job thoroughly. Human plague of squirrel origin is relatively a rare disease, only one or two cases occurring in a year, and, of course, this is insignificant in comparison with many other diseases. What we must do is to watch the rodents of adjacent cities and endeavor to prevent their infection from squirrels; this is readily done by the creation of squirrel-free zones around large communities.

On one of the islands of the Hawaiian group we have a focus of plague of over 20 years' standing among rats, chiefly among the species *Mus rattus* living in the sugar-cane fields. In spite of eradicative measures, which on the whole have been as consistently and effectively carried out as is believed to be possible with any reasonable expenditure of money, this focus persists and gives rise to a few cases of plague, usually two or three each year, sometimes with intervals of two or three years between cases. An examination on the ground is necessary to enable one to appreciate the—for all practical purposes—almost insuperable difficulties attending on attempts to wipe out the infection. Here, as in California, the most we are able to do is to prevent infection of villages and towns, and we must pay the toll of an occasional human case.

Within the last few months, a new focus of infection has been found in South Africa, where two rodents, a gerbill (similar to a brush rat) and a multimammate mouse (similar to a house mouse), have been found infected in nature, the discovery having been consequent upon the occurrence of cases of human plague in isolated parts of Cape Colony.

The area known to be infected in South Africa is at least 5,000 square miles, and from the point of view of eradication, presents a problem similar to our squirrel plague infection on the Pacific coast. The evidence all indicates that this particular focus among rural-dwelling rodents is of many years' standing.

The oldest of the infections among wild rodents probably is that of Siberia and Manchuria, and it is the one about which we know the least. Very recently, for the first time, we have reports of animal plague infection among the marmots of Manchuria, although the evidence has long pointed to these rodents as almost unquestionably the source of the outbreaks of the pneumonic type of the disease which according to available reports have occurred almost yearly for a long time, and probably have a longer history than is indicated by evidence so far obtained.

Zoologically the marmot is closely related to our ground squirrel of the Pacific coast, and we have every reason to believe that the problems are somewhat similar, although, as I have stated, trustworthy evidence is meager.

These foci of plague among rodents of rural regions are all marked by the following features:

(1) They are exceedingly widespread.

(2) They present more serious difficulties in eradication, if indeed this be possible.

(3) They may give rise directly to only a few human cases. This holds for all except the Manchurian focus.

Human plague of squirrel origin has several points of divergence from that of rat origin; briefly stated, these are:

In the first place, the location of the primary bubo in all, or nearly all, of the cases is in the axilla when squirrels are the source of the infection, while in the majority of the cases of rat origin the primary evidence of infection is to be found in the groin, usually in the region of the femoral glands. The infection from squirrels comes from fleas that get on the hands when squirrels are picked up, while rat fleas do not come directly from the natural host, but from the ground or from the floor.

In the second place, there is a smaller mortality in the cases of human plague of squirrel origin, only about 50 per cent of the cases proving fatal, while a much higher rate ordinarily obtains in infections of rat origin.

The only hopeful thing with respect to the squirrel situation is the fact that bringing the land under intensive cultivation drives out these rodents. It is uncultivated and largely pasture land in which the ground squirrels thrive in California, and it is among the squirrels of these lands that we find plague prevailing.

Among the most difficult things to explain in plague epidemics is the long intervals between the finding of infected rodents. In some of our southern cities several months pass during which many rats are taken without detecting infections; then a plague rat will be taken, and again a long interval, with many negative examinations. In Hawaii the interval is often a year or more.

The early English workers laid considerable stress on a particular species of flea, *Loemopsylla cheopus*, as the essential agent in the transfer of the disease from rat to man. Further work and accumulated experience, particularly that in the United States, clearly indicates that other fleas may, and probably do, serve equally effectively as vectors; possibly one exception to this should be made; the blind flea of the mouse, *Ctenopsylla musculi*, frequently found on rats, appears not to bite man. Some of the work done at our plague laboratory in San Francisco with this flea gave negative results, while positive results were obtained with all other fleas with which we worked. Somewhat later Professor Martin and Doctor Chick got, working in England, practically identical results.

IMMUNITY OF RODENTS.

While rats undoubtedly serve as the chief agents in the transmission of the bubonic type of the disease, they are themselves far from uniformly susceptible.

It has long been known that rats in infected regions show rather high resistance to infection; thus, as much as 20 per cent of the San Francisco rats were resistant after plague had prevailed for a very considerable time. Only recently, however, we have been able to show that rats from communities in which plague never has prevailed show a similar degree of resistance. In work at our plague laboratory in Pensacola, Doctor Spencer found that rats shipped from Mobile, Ala., where plague has never existed, showed a percentage of immunity comparable to those in infected regions.

With respect to ground squirrels, an interesting state of affairs exists in California. The ground squirrels in the sections where plague has never prevailed show an exceedingly high degree of susceptibility, dying promptly with definite manifestations of acute plague, while those secured from regions where plague has prevailed for many years show a considerable degree of immunity. The difference is so striking that it leads one to believe that those rodents of this species which have long been exposed to plague have a hereditary immunity, and perhaps it affords some ground for the hope that in due time the disease may become extinct by reason of the increased percentage of nonsusceptible squirrels.

SUPPRESSIVE MEASURES.

In each community local conditions will dictate, to some extent, the measures to be taken. The experience gained on the Pacific coast with gray rats and ground squirrels was of little avail when dealing with the black rat of Hawaii, which is found both in buildings and in sugar-cane fields. Similarly, the ratproofing much used in this country is economically out of the question in India. Cyanide fumigation, much used in southern mills and dwellings, is inapplicable in India on account of the loose roof construction which readily permits the escape of gas. In the East Indies, for example, where bamboo is extensively used for building purposes, one of the important measures is to find a substitute for this material which offers excellent rat harborage.

Workers in India who have recently made many observations on rat poisons, conclude that barium carbonate is the best; and when it becomes necessary to vary this, or when it is not available, arsenous acid is to be chosen. The effective dose of the former is 1½ grains and of the latter one-half grain.

These observers found great variation in the readiness with which various baits were eaten, spiked millet being preferred, rice coming next, and wheat coming low in the list. (Indian Jour. Med. Res., Jan., 1921, p. 446, vol. 8, No. 3.)

In India attempts at rat extermination have not been very successful, but the account of the efforts leads one to agree with the authors that the fault lies in inadequate means of rat destruction. Ratproofing seems out of the question. (Indian Jour. Med. Res., Jan., 1921, vol. 8, No. 3, p. 409.)

A few words about vaccines and serums: Disposing first of the serum, I may say that there is no very satisfactory evidence that it is of value. Controlled tests of its therapeutic usefulness have not been particularly satisfactory, although isolated series generally leave the users with the impression that it has done some good.

Haffkine's antiplague vaccine has been used for many years; here, too, the evidence is not particularly satisfactory. On the whole, perhaps, it is fair to say that biologic products have, from the public health point of view, no place in dealing with outbreaks of plague.

FUNCTIONS AND ORGANIZATION OF MEDICAL CORPS UNITS SERVING WITH THE MARINE CORPS IN THE FIELD.

By S. N. Raynor, Major, United States Marine Corps.

THE DIVISION SURGEON AND THE MEDICAL STAFF.

In this article an attempt will be made to give an outline and general discussion of the duties and functions of the division surgeon and some of his assistants of the medical staff; their relations to the general staff; their sources of information; channels of communication; stations and division of duties; and method of management of the medical troops and units.

The duties and functions of the surgeon of a brigrade acting independently would differ from those of the surgeon of a division only as limited by the special functions and actions or movements of the organizations composing the brigade, the number of medical troops attached thereto, and consequent restrictions of medical functions.

RELATIONS AND DUTIES OF THE MEDICAL DEPARTMENT AND SURGEON.

The medical department is a supply and technical service of the organization to which attached. Its principal function is the preservation of man power throughout the organization and maintenance of activities for prevention of disease, early restoration of the disabled to duty, and the elimination of the physically unfit.

The division surgeon is the chief of this service, and as such is a member of the supply and technical staff of the headquarters of the organization to which he is attached. The medical department as a service, and the surgeon as a chief of service, are not independent entities but only part of the whole military machine, with definite functions of an auxiliary nature. As these functions are not included in the primary rôle of the organization of which they form a part, they as well as the necessities of this service must conform to those of the organization of which the medical department forms an integral part. Supervision, cooperation, and coordination by the organization commander through his staff are essential. The medical service, however, is technical and complex, and such control of it as is assumed by the division commander or his representatives should be limited to that necessary for the preservation of discipline, efficiency, and cooperation, and should not enter into its intracorporeal structure or technical activities so long as the foregoing desiderata are not affected.

DUTIES OF THE DIVISION SURGEON.

In general the duties of the division surgeon are the administration and technical supply of the medical service of the division, and the care of the troops.

In detail the duties of the division surgeon are as follows:

1. Commanding officer of the medical regiment and medical troops of the division for medical department technical service. (Coordinated by G-4.)

2. Sanitary inspection and prevention of disease. (Coordinated by G-1.)

3. Collection and transportation of the sick and wounded. (Coordinated by G-4.)

4. Care and hospitalization of the sick and wounded. (Coordinated by G-4.)

5. Procurement and issue of medical, dental, and veterinary supplies. (Coordinated by G-4.)

6. Replacement of medical department personnel. (Coordinated by G–1.)

7. Movements and stations of medical units. (Coordinated by G–4 and G–3.)

8. Records of sick, wounded, and dead. (Coordinated by G–1.)

9. Training of medical troops. (Coordinated by G–3.)

10. Plans of evacuation. (Coordinated by G–4.)

11. Action to secure publication of memoranda, orders, and parts of orders through appropriate general staff sections, i. e., G–1, G–3, or G–4.

CHANNELS OF COMMUNICATION, DIVISION SURGEON.

The channels of communication used by the division surgeon are as follows:

1. Through G–4: All matter not relating to training, sanitation, and health, purely technical and intramedical department subjects, and excepted subjects.

2. Through G–3: All matters relating to training.

3. Through medical department channels. Strictly medical and technical subjects.

4. Through other staff departments. Excepted subjects. (See diagram at end of article.)

AGENCIES FOR PERFORMING THESE DUTIES.

According to diagram at end of article.

SOURCES OF INFORMATION OF DIVISION SURGEON.

1. Conferences with commanding general, with heads of general staff sections; and with surgeon of corps, army, and neighboring divisions.

2. Personal reconnaisance and inspection.

3. Reports and conferences with sanitary inspector, assistants, dental and veterinary surgeons, second in command of the medical regiment, battalion commanders (medical supply officer, regimental and battalion surgeons. (See diagram at end of article.)

DIVISION SURGEON'S OFFICE.

The location of the division surgeon's office during campaign is at the headquarters of the medical regiment. In a permanent camp it is usually located at division headquarters. For the organization of the division surgeon's office, see diagram at end of article.

Under the situations given below the division surgeon will take measures, either directly or through the proper staff officers (indicated in the right-hand column), to act or secure the measures or action indicated.

THE DIVISION IN MOBILIZATION AND TRAINING (MEDICAL DEPARTMENT).

(*a*) Organization and assignment of personnel as given in diagram and tables of organization. (Coordinated by G–1, G–4.)

(*b*) Selection of positions of regimental and battalion dispensaries, medical regiment, and station hospital. (Coordinated by G–4.)

(*c*) Secure publication of annex to administrative order covering reports and returns to be rendered and general routine of the medical service of the camp or cantonment. (Coordinated by G–4.)

(*d*) Secure publication of annex to administrative order covering sanitation of camp and cantonment. (Coordinated by G–1.)

(*e*) Secure inclusion of training program for the medical troops in G–3 training order. (Coordinated by G–3.)

(*f*) Make arrangements with local civil authorities for mutual sanitary cooperation. (Coordinated by G–1.)

(*g*) Take necessary action to secure medical department, ordnance, and quartermaster supplies. (Coordinated by G–4.)

MOVEMENT OF THE DIVISION BY RAIL OR WATER (MEDICAL DEPARTMENT).

(COORDINATED BY G–3.)

A. Warning message. Secure inclusion of sanitary inspector in division quartering party. (G–1, G–3, G–4.)

B. Field order. (G–3.)

(*a*) Secure inclusion of the division surgeon in movement of first echelon. (G–4.)

(*b*) Secure inclusion of one sanitary company, one ambulance company, and one hospital company in first troop movement. (G–3, G–4.)

(*c*) Secure inclusion of the headquarters of the medical regiment and the main bodies of the sanitary, ambulance, and hospital battalions, the service company and veterinary company in the troop movement of the main body of the division. (G–3, G–4.)

(*d*) Secure inclusion of one sanitary company, one ambulance company, and one hospital company in last troop movement. (G–3, G–4.)

(*e*) If wagon transportation moves overland, move animal-drawn units of the medical regiment with animal-drawn unit train. (G–3, G–4.)

(*f*) Detail assistant division surgeon to remain with representative of G–A at old headquarters until move is completed. (G–4.)

C. Administrative order. (G–4.)

(*a*) Plan for evacuation of casualties. (G–4.)

(*b*) Location of salvage dump for medical department supplies. (G–4.)

A MARCH IN CONCENTRATION TO BIVOUAC, OR TO BATTLE (MEDICAL DEPARTMENT).

A. Field order. (G–3.)

(*a*) Assignment of a sanitary company and an ambulance company (or detachments thereof) to the advance guard or other covering force. (Usually the animal-drawn ambulance company.) (Coordinated by G–3, G–4.)

(*b*) Designation of the order of march of the medical units in the column. (Coordinated by G–3, G–4.)

B. Administrative order. (G–4.)

(*a*) Assignment of sanitary and ambulance companies to cover march casualty collection. (If an ordinary march, without possibility of contact with the enemy, animal-drawn ambulances are distributed to regiments.) (Coordinated by G–4, G–3.) (If contact with the enemy is possible the animal-drawn ambulance company will be with the advance guard and motor companies must be used. In this case march collecting stations must be designated approximately 3 miles apart along the route of advance.)

C. Field order for the halt. (G–3.)

Designation of the site of bivouac for the medical regiment. (Coordinated by G–3, G–4.)

D. Administrative order for the halt. (G–4.)

(*a*) Inclusion of sanitary inspector in division quartering party. (Coordinated by G–4.)

(*b*) Designate method of collection and evacuation of casualties, and medical supply surgeon prepares field order which, on approval, becomes annexed to administration order. (Coordinated by G–4.)

PREPARATION FOR AN ATTACK (MEDICAL DEPARTMENT).

(*a*) G–4 informs surgeon of approximate date and plan of attack. Consultation as to roads available for ambulances, condition of roads, etc. (Coordinated by G–4.)

(*b*) Surgeon (in consultation with corps or army surgeon when practicable) arranges plan of evacuation from division. (Coordinated by G–4.)

(*c*) Surgeon requires medical supply officer to accumulate additional supplies. (Coordinated by G–4.)

(*d*) Surgeon requires and inspects for completion of equipment of all medical troops. (Coordinated by G–4.)

(*e*) Surgeon requires and arranges for evacuation of all sick.

DEVELOPMENT FOR PREPARED ATTACK (MEDICAL DEPARTMENT).

A. Field order (G–3).

Location of collection station to be stated in paragraph 4 of field order. (Coordinated by G–3, G–4.) (Taken from plan of evacuation.)

B. Administrative order (G–4.)

(*a*) Plan of evacuation. (Coordinated by G–4.)

(*b*) Assignment of sanitary inspector to supervise police of battlefield. (Coordinated by G–4.)

ATTACK IN OPEN WARFARE SITUATION (MEDICAL DEPARTMENT).

A. Field order (G–3).

In paragraph 4, designation of sites for collecting stations. (Coordinated by G–3, G–4.)

B. Administrative order (G–4).

Plan of evacuation (field order of medical regiment). (Coordinated by G–4.)

C. Reconnaissance.

(*a*) By division surgeon and division veterinarian for plan of evacuation.

(*b*) By sanitary inspector for police of the battlefield.

(*c*) By second in command and battalion commanders of the medical regiment for collection and evacuation.

PURSUIT (MEDICAL DEPARTMENT).

A. Field order (G–3), (or administrative order, if issued, G–4).

(*a*) Inclusion of *reserve* sanitary, ambulance, and hospital companies in pursuing force. (Coordinated by G–3, G–4.)

NOTE.—If pursuit is by an unengaged division, the medical regiment is divided between pursuing columns according to their relative strength and mission, keeping reserve units with main body.

NOTE.—If pursuit is not to extend over 6 or 8 miles, all hospital companies are left to police the battlefield and cover pursuit from last battle position.

(*b*) Arrangements for police of the battlefield. (Coordinated by G–4.)

A RETREAT (MEDICAL DEPARTMENT).

A. Field order (G–3).

(*a*) Order of relief, movement, and march of the elements of the medical regiment. (Coordinated by G–3, G–4.)

(*b*) Attachment of sanitary and ambulance companies to the rear guard. (Coordinated by G–3, G–4.)

B. Administrative order (G–4).

(*a*) Designation of evacuation points. (Coordinated by G–4.)

(*b*) Assignment of additional transportation to assist in evacuation. (Coordinated by G–4.)

RELIEF OF A DIVISION HOLDING A DEFENSIVE SECTOR (MEDICAL DEPARTMENT).

A. Warning message (G–3).

(*a*) Preliminary reconnaissance. (Coordinated by G–3, G–4.) By the surgeon, sanitary inspector, division veterinarian, executive officer, and battalion commanders of the medical regiment, and medical supply officer, each as to his own special function. Call on the surgeon of the occupying division, securing sector maps and guides to stations of officers of similar duties.

(*b*) Examination of establishments in sector and subdivisions as to shelter, day and night routes, distribution of medical trench stores, water supply, medical history of sector, plan of evacuation, fire habits of the enemy, method and site of burial, sanitation, bathing, delousing, billets, etc. (Coordinated by G–1, G–4.)

(*c*) Location of battalion and stations, regimental aid stations, bearer stations, collecting stations, ambulance roads (day and night), ambulance stations, hospital stations, evacuation and supply points. (Coordinated by G–3, G–4.)

(*d*) Preliminary reconnaissance by the sanitary, ambulance, hospital, and veterinary company commanders as to local conditions. (Coordinated by G–4.)

(*e*) Preliminary reconnaissance by regimental surgeons with regimental commanders as to local conditions and stations, local aid posts, battalion and stations, bearer relay posts, regimental aid stations, and routes. General situations. (Coordinated by G–3, G–4.)

(*f*) Arrangements for details of relief between division surgeons, taking over time, plan of occupation, and evacuation, retention for 24 hours of one officer of each medical unit relieved, and transfer of property by local commanders of medical units. (Coordinated by G–3, G–4.)

B. Field order (G–3). To include point, time, and route of relieving medical units. (Coordinated by G–3, G–4.)

C. Administrative order (G–4). (*a*) Inclusion of the division medical staff in advance parties. (Coordinated by G–3, G–4.)

(*b*) Plan of evacuation, battle position. (Field order of the medical regiment.) (Coordinated by G–4.)

1. Collection.
2. Hospitalization.
3. Supply.
4. Routes and destinations of casualties.
5. Classification.
6. Method of evacuation.

(*c*) Same plan of evacuation, intermediate position. (Coordinated by G–4.)

RELIEF OF A DIVISION FROM THE LINES (MEDICAL DEPARTMENT).

(*a*) Time of relief of medical units, routes of movement, detachment of officers remaining temporarily with new organizations as arranged between the division surgeons. (Coordinated by G–3, G–4.)

(*b*) Designation of sanitary, ambulance, and hospital companies and detachments of veterinary companies to cover march collection.

and hospitalization in staging area or new area. (Coordinated by G-4.)

(*c*) Billet or cantonment of medical regiment in staging area or new area. (Coordinated by G-1.)

(*d*) Include sanitary inspector in division quartering party. (Coordinated by G-1, G-4.)

(*e*) Division surgeon and staff turn over to like officers plan of collection, hospitalization, supply, routes, and evacuation, and maps of sector; arrange for transfer of material, log books, time of relief, guides and officers to remain with incoming units. (Coordinated by G-4.)

SPECIAL TRAINING FOR AN OFFENSIVE (MEDICAL DEPARTMENT).

(*a*) Training and instruction of attached medical troops in duties of battalion and regimental medical troops, first aid, dressing, collection, evacuation, effects of fire and gas, use of cover, construction of shelter, physical training in littering and marching. (Coordinated by G-3.)

(*b*) Training and instruction of medical regiment units in collection, dressing, and evacuation, use of cover, effects of fire and gas, construction of shelter, management of transportation, physical training in littering and marching. (Coordinated by G-3.)

(*c*) Training of all medical troops in general medical plan of the offensive. (Coordinated by G-3.)

HANDLING OF REPLACEMENT.

(*a*) Physical examination prior to distribution. (Coordinated by G-1.)

(*b*) Segregation of defectives and contagious suspects. (Coordinated by G-1, G-4.)

WELFARE IN THE DIVISION.

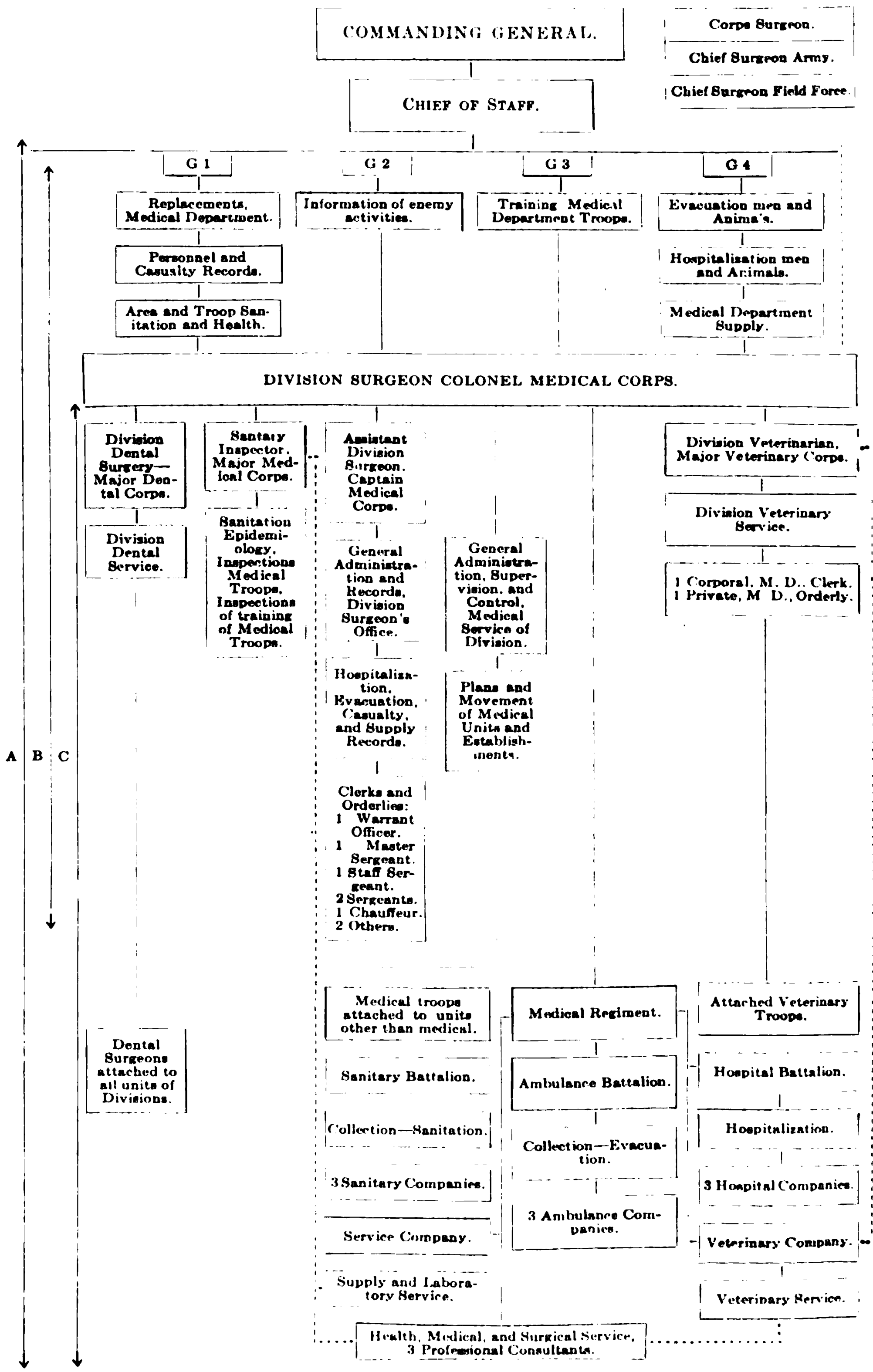
(*a*) Physical examination prior to acceptance of entrants in physical competitions. (Coordinated by G-1.)

(*b*) Sanitary inspection of huts, kitchens, and food supplies. (Coordinated by G-1.)

(*c*) Promotion of all personal relations, amusement, educational, supply, and physical training activities in medical department establishments. (Coordinated by G-1.)

NOTE.—The subject matter of this article has been compiled from War Department publications and pamphlets used in the courses of instruction at the general service schools, Fort Leavenworth, Kans., and the Marine Corps schools, Quantico, Va. From its very nature much of it has been copied verbatim. By quoting or modifying the text of those publications and pamphlets where, for the purposes of this article, such modification seemed desirable, the writer has endeavored to present a clear and understandable picture of the division surgeon and the medical staff, but disclaims any credit for originality except in the method of presentation.

DIAGRAM.—DUTIES OF THE DIVISION SURGEON.



A—Channels and Subject of Communication, Information, Supervision, and Coordination.

——— General Channels.

.... Technical Channels.

B—Organization of the Division Surgeon's Office.

C—Agencies available for Maintenance of the Medical Service.

TRANSILLUMINATION AND ELECTRIC VITALITY TESTS.

By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

With the modern conception of the value of dental diagnosis, it would seem of vital importance that the dental officer should have at his immediate disposal methods for the determination of the vitality of the pulps of the teeth, not only for patients referred in cases suspected of oral sepsis, but for use in connection with conscientious routine dental examinations. Doctor Mayo has said that the next great step in advance in the prevention of disease rests largely upon the shoulders of the dental profession. In this connection, it would seem that methods for determining the vitality of the pulps of teeth are pertinent and should be utilized to the extent of their reliability. If prevention means anything it means the determination in advance of the factors which may cause disease and their elimination if possible. Routine dental examinations should therefore be conducted systematically in such a manner that with the minimum expenditure of time teeth which are vital can be so noted and thus practically eliminated from further vitality consideration, while those which are not normal can be checked for further examination. As it is a well-recognized fact that pathological conditions are not to be expected about the apices of vital teeth, a reliable vitality test would at once place in the safe class those teeth which offer the normal response, while conversely it would direct attention to the teeth not so responding. Unfortunately, the dental profession has not at its command a vitality test which offers unerring accuracy combined with absence of destruction of tooth substance. Several methods are in use, depending upon the facilities at the disposal of the operator and the thoroughness with which the examination is conducted. The Navy, for instance, does not furnish as equipment dental cauteries, and thus the application of the heat test resolves itself into the laborious process of heating an instrument in the ever elusive alcohol flame, at intervals testing its temperature by its charring action on paper, until the proper temperature is reached, upon which the instrument is placed against the tooth. This test is a valuable one in its place, but an effort to test an entire set of teeth is a disheartening procedure for several reasons, aside from the time factor. Placing a piece of hot gutta-percha against a tooth has been recommended; this likewise has its good points, but presents difficulties similar to those encountered with the use of a heated instrument when an attempt is made to test more than a limited number of teeth. The application of cold to an individual tooth, either as ice, ice water, or ethyl chloride spray, presents difficulties at once appreciated by the dental practitioner.

As is well known to the dental profession, the X-ray or dental film does not offer evidence upon which a diagnosis of pulp vitality can be made, other than in those cases where the pathological condition has progressed to such an extent in the immediate area of and in connection with the affected tooth as to cause a difference in the density of certain shadows portrayed on the film. Diagnosis by reading dental films should never be undertaken without clinical examination and history; the fact should particularly be borne in mind that only one plane of tissue is portrayed and an area of tissue rarifaction may overlie or underlie a tooth apparently involved in it, when in reality the tooth in question may be vital. It is hardly necessary to call attention to the fact that a radiolucent area does not necessarily mean a nonvital tooth, and it is a source of satisfaction to have at hand methods which will help us to speedily determine the actual condition of the tooth by other means. Again, a radiolucent area may exist in a position not connected with the source of origin, and therefore if X-ray evidence is the sole dependence for the determination of the condition of the offending tooth a vital tooth might easily be sacrificed to no avail.

Probably the most reliable methods of testing the vitality of the pulps of teeth are the electric vitality test and transillumination used in conjunction with each other. The former is essentially that of the comparative determination of the amount of electric current necessary to apply to a sound portion of a tooth to obtain a definite response, while the latter method, transillumination, which will be described below more particularly, is based on a comparison of the translucency of tissues enjoying normal circulation with the opaqueness displayed by tissues with impaired circulation.

A recent revision of the dental supply table will fortunately place at the disposal of the naval dental officer a very valuable appliance for use in transillumination tests. This is a modification of the straight Cameron light, and might be described as an all-glass tubular dental mouth lamp, the last inch or so of which is curved at right angles to the main stem of the lamp. This results in the light rays being projected at right angles to the long axis of the lamp stem. This feature permits of the control of the direction of the light rays in the mouth, and they may be directed onto the surface of a tooth or the alveolar process, the manner and degree in which the light is transmitted through to the opposite side of the tooth or process gives to this method its name of transillumination. A normal vital tooth will transmit a more or less clear pink glow, while a nonvital tooth presents, under the same conditions, a decidedly opaque or dull appearance. The appearance of an individual tooth may, of course, be modified by the presence of a large filling. Not only may the translucency of the various teeth be compared, but by placing the lamp above the teeth on the alveolus in the vicinity of the apices of the teeth darkened areas caused by poor light transmission may be seen on the opposite side of the alveolus about the roots of teeth which are surrounded by abnormal tissue. It is claimed that the destruction of hard tissue is not necessary to obtain this differentation between the appearance of normal and abnormal tissue, as the shadow cast by the latter is caused by the increased amount and condition of the hemoglobin found in conditions of retarded circulation or blood stasis which accompany pathological conditions. The composition of these lamps has been perfected to such an extent that they may be sterilized by boiling.

In 1916 the writer had the pleasure of witnessing a clinic by Dr. Howard R. Raper, demonstrating the use of electricity for the determination of pulp vitality. The simplicity of the apparatus and method of procedure made an appeal, particularly as the logic of the method was apparent. Parenthetically it may be stated that experience has somewhat modified the original impression of the simplicity of procedure, as so often the results of the test are particularly desired on teeth the condition of which present difficulties to its application. After thinking over the theory of pulp response to the electric current, the writer in 1916 pressed into service a cheap 1-cell "shocking machine," improvising an insulated electrode by drawing over the broach holder used as the electrode a piece of rubber tubing, which had the advantage of being renewable after the disintegration incidental to repeated boilings.

It is gratifying to learn that Doctor Raper has recently published a volume entitled "Electro-radiographic Diagnosis," wherein he gives the results of his extensive experience which is of particular value to the dental diagnostician, as Doctor Raper in the practice of his specialty, radiography, has had unlimited opportunity to compare directly the results of the electric vitality test with radiographic findings, and also to reverse the operation by using the test to substantiate or elucidate radiographic showings. Although Doctor Raper advises against placing reliance on this test for determining any factors except the vitality or nonvitality of the pulp, it has proven in the hands of the writer of value in localizing the cause of pains of obscure dental origin. The hypersensitiveness of a certain tooth to the amount of current necessary to obtain a normal response in the other teeth of similar class in the patient's mouth, indicating with a minimum expenditure of time the one which should be viewed with suspicion and subjected to a thorough examination.

The crude shocking machine of early use has been replaced by a rheostat made for the purpose of electrodental diagnosis and connected with the 110-volt lighting circuit. This apparatus is nicely graduated as to the amount of resistance cut out and permits of a gradual increase in the strength of the current, but nevertheless is open to the major objection applicable to any apparatus which conveys current from any electric main to a patient—that of the possibility of a short circuit. In using an apparatus of this kind it might seem an advisable precaution before using each time to test the reliability of the insulation and rheostat by setting the indicator above zero, holding an electrode in contact with each thumb and placing one hand on a metal portion of the chair.

The writer is indebted for his limited knowledge of the procedure of electric vitality pulp testing to Doctor Raper, and those interested in the technical details he would refer to the interesting text-book on the subject recently published. No originality regarding the procedure is claimed by the writer of this little article, but it may be of benefit to some to learn of the utility of this method, its limitations and value. First we shall consider it in relation to routine dental examinations.

Dental examinations are an important part of a dental officer's service and are of value only in so far as they let no guilty tooth escape. The following is outlined as a method of procedure for the examination of patients not having constitutional symptoms: First, a careful clinical examination of the teeth, gums, and mouth, with charting; second, an examination of the translucency of the individual teeth by transillumination; third, transillumination of the alveolar processes; fourth, electric vitality test for teeth which appear abnormal under the transillumination test or are otherwise suspicious; fifth, X rays of crowns, bridges, nonvital and doubtful teeth. The above is modified when the patient has been referred or is exhibiting constitutional symptoms of disease by testing the vitality of all teeth and radiographing areas from which teeth are missing, and, if the case requires, radiographing all the remaining teeth. Efficient dental service should result in the identification of nonvital teeth in the absence of local manifestations before the patient is aware of their lack of vitality.

In connection with the use of the electric vitality test, its limitations should be borne in mind. For example, a recent clinical examination revealed on the distal aspect of an upper molar a large pyorrhea pocket extending well into the bifurcation of the roots; the electric vitality test was normal, but the tooth was recommended for extraction. The principle illustrated is that destruction of tissue from pyorrhea alveolaris does no interfere with the test, unless the pulp is involved. The condition is sometimes met where, with more than one canal, one may be septic with vitality remaining in the other canal or canals. In such cases a normal response to electricity may be obtained; but transillumination is usually negative, and in a case with conflicting indications we at once bring to our aid all the facilities at our command for the diagnosis.

Doctor Raper brings out very clearly the value of his test in cases in which radiographs show the apparent involvement of the apices of several teeth. A few minutes usually suffices to determine which teeth are vital and which are actually involved. Also the value in the not uncommon cases where the dental film shows the roots of the bicuspids or molars confluent with the floor of the antrum. Not least is the ability to determine which tooth is nonvital in cases where the area of degeneration apparently involves a tooth which in reality is vital, the cause of the trouble being a tooth near by which may present no evidence of being the offending member. This test would also seem to offer an easily applied one in the very difficult diagnosis of teeth which are adjacent to nonvital teeth, particularly those which are classed as suspicious from radiographic findings.

One of the unfortunate limitations is that crowned teeth can not be tested without removal of the crowns.

The electrode used in the test should be insulated except at the point, and it should be applied only to sound enamel, as enamel which is undermined with decay or covers a metallic filling gives a response which is not a true index for diagnostic purposes. Large fillings should not be touched with the electrode, as they may convey the current with a disconcerting intensity either to the pulp, to the gums, or adjacent fillings. Allowance should be made in elderly persons for the resistance offered by secondary dentine, and in doubtful cases it is sometimes necessary to make a pit through the enamel and introduce into this the electrode.

For use on nervous individuals, Doctor Raper suggests the moisture contact, which is the water bridge formed from an excess of water or salt solution on the cotton wrapped electrode and the tooth surface placed in close proximity.

The recording of the electric vitality test is made by using suitable slips previously numbered, each slip with the figures from 1 to 32. After the number indicating the tooth being tested, place the minimum amount of current necessary to obtain a definite response from that tooth, and a comparison of the figures following; the bicuspids, for instance, should give an approximate index of the normal test for teeth of that class in that individual.

Best and Waldron, in an article on "Oral diagnosis and treatment," say: "Vitality tests of the pulps of the teeth are essential in order that a well-balanced diagnosis may be formulated. There are many intances of the death of pulps that are not revealed in roentgenograms. The tendency for the tooth pulp to undergo degeneration is more pronounced as the patient approaches middle life. This is not a new observation, but a fact that has been known for years. The vitality of each tooth is determined by testing the individual tooth with the faradic current. This test is of great importance and in no case should be omitted."

Machat, on "Pulp Vitality: Modern Means of Determining It (A Process by Exclusion)," says: "Four years ago, when I first presented my method of diagnosis, I made the forecast that electro-diagnosis would be found indispensable. Now, we feel that a differential diagnosis of the internal conditions of teeth is not conclusive until checked up with the electric current. By electro-diagnosis of a tooth, I mean the reaction of a tooth to a weak current of electricity as compared with a previously fixed index. An index is taken by making contact with the mesial or distal electrode upon the labial surfaces of manifestly normal incisor teeth; the saturation or tolerant point is the guide or index for that individual. The normal index can be ascertained by the practitioner in accordance with the instrument to be used for testing.

"Finally it should be realized that electro-diagnosis is not infallible. Like the radiogram, it is not an oracle for every diagnostic perplexity. It is limited in value for those who are unwilling to study its intricacies and wide range of usefulness. On the other hand, when mastered, it is a trustworthy friend. In the last analysis, however, it is only part of a system of diagnosis."

GAS WARFARE—THE TREATMENT OF GAS CASUALTIES, EARLY AND LATE.[1]

By Maj. W. R. Galwey, O. B. E., M. C., Royal Army Medical Corps.

Before the foundations for a rational treatment of cases of asphyxiant gas poisoning can be laid a clear idea must be formed of the causes which are operative in threatening the life of the patient.

It is agreed that the seriousness of the case varies with the degree of want of oxygen which is present, and treatment must therefore be directed to prevent the development of this condition or to relieve it when established, and so give the patient time to mobilize his reserves to fight and defeat it.

Recent research into the physiology of normal respiration has thrown much light on the causation of and symptoms produced by oxygen want, and in addition has explained such well-known clinical phenomena as periodic or Cheyne-Stokes breathing and orthopnœa.

It is necessary to refer briefly to the factors which regulate normal breathing to understand the sequence of events in asphyxiant gas poisoning.

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[1] Reprinted from the Jour. Roy. Army Med. Corps, March, 1922.

When, on inspiration, the lungs expand to a certain point, expiration is initiated; similarly, on collapse to a certain point inspiration begins. The nervous impulses concerned are carried by the vagus nerves, but the reflex itself is controlled by the action of the carbon dioxide in the blood on the respiratory center.

A certain percentage of CO_2 in the blood is necessary to fire off this reflex, and if too much CO_2 is washed out of the blood—as, for instance, in forced breathing—the subject goes into apnœa until sufficient CO_2 again accumulates to fire off the reflex.

On the other hand, a very small increase in the pressure of CO_2 in the blood—0.2 per cent—will double the respiratory ventilation, increasing both the depth and rate of breathing. Anything, therefore, which interferes with the normal discharge of CO_2 from the lungs will bring about hyperpnœa.

What the respiratory center really responds to when it reacts to increase of CO_2 is the balance of the hydrogen ion concentration in the blood. To any alteration in this balance the respiratory center is extremely sensitive, and the increased breathing in the presence of increased CO_2 is an effort of the body to reduce the hydrogen ion concentration by washing out the carbon dioxide.

In spite of the fact that different parts of the lung are unequally ventilated, it has been shown that the percentage of CO_2 in an average sample of alveolar air from a normal individual is relatively constant.

Though a definite percentage of CO_2 is normally necessary to fire off the respiratory reflex, it has been proved that it responds to a lower percentage in the presence of lack of oxygen. The first response to this condition is therefore an increased depth and rate in breathing owing to the lowered "threshold value"—as it is called—of CO_2.

As the condition of oxygen lack develops the next response is periodic breathing unless the want of O_2 is considerable, when a condition of rapid shallow breathing is established.

When the blood comes in contact with the air in the lungs it takes up oxygen and gives off CO_2. CO_2 is much more readily diffusible than O_2 and much more can be stored in the body, which has a relatively small capacity for storing O_2.

When, therefore, there is interference with respiratory exchange the main effect is on the O_2 intake rather than the CO_2 output unless there is considerable blocking of air passages which prevents air leaving large numbers of alveoli.

To turn now to the tissues. The blood gives up its oxygen in them more rapidly and effectively in the presence of CO_2; if, therefore, from any cause, as by increased ventilation, the CO_2 is washed out of the blood, it will then part less readily with its oxygen. If, in addition, the supply of oxygen itself is diminished, the tissues quickly suffer from the lack and their functions are disturbed. A slight diminution of oxygen is more quickly felt and has more serious effects on such organs as the brain, particularly the vital centers, such as the respiratoy, and on the heart. A vicious circle is thus set up; the lesion in the lungs interferes with the respiratory exchange, this in its turn reacts on the vital centers with a resulting diminution in the efficiency of the ventilation of the lungs and the circulation of blood through the body.

The circulation itself is regulated in the main by the rate at which the tissues allow blood to return to the heart, rather than by the heart itself, which simply pumps at increased pressure the blood delivered to it. The rate of delivery from the tissues is regulated by—

(1) The degree of saturation of the blood with oxygen; and

(2) The degree of saturation with CO_2 and consequently its reaction in the capillaries.

The capillaries do not merely react passively to blood pressure but actively contract and dilate.

We have now, I think, sufficient data to understand what happens in asphyxiant gas poisoning and why the serious cases fall into two main groups:

(1) Those with purple-colored cyanosis, distended veins, hyperpnœa, and evident distress; and

(2) The gray cases, with pallid lips, shallow breathing, but no distension of the veins and little respiratory distress.

The latter being the more serious.

Remember the anatomical conditions which occur—the acutely inflamed condition of the air passages, particularly in poisoning by chlorine; the damage to the alveolar epithelium, particularly with phosgene, the engorgement and thrombosis of capillaries with flooding of the lung by œdema. These bring about a condition in which both the pulmonary circulation and the respiratory exchange are interfered with. Owing to the swelling and exudation, oxygen can not get through quickly enough to the blood to saturate it during its passage through the pulmonary vessels. The damage to the capillaries causes leakage of fluid, and, in consequence, the blood is more concentrated and its volume is reduced below the danger point. As the heart fails, there is cardiac inhibition and loss of vasomotor tone.

The hyperoxæmia of concentration does not compensate for the anoxæmia due to unsaturation, but does make for stagnation by throwing more work on the heart.

A combination of the types of want of oxygen—anoxæmia—which Professor Barcroft describes as the most serious consequences of gas poisoning, are thus brought about: (1) The anoxic type in which the oxygen pressure in the blood is too low, the hæmoglobin is not saturated and the blood is dark; and (2) the stagnant type where, though the blood is normal, it is supplied in insufficient quantity.

Besides the lack of saturation of the blood with oxygen, the discharge of CO_2 from the lungs is also interfered with, and this is the main cause of the hyperpnœa. The lack of oxygen causes failure of the right heart, which is then unable to cope with the increased work of pumping blood through the œdematous lung. As the right heart fails, the superficial veins become distended, and if there is retention of CO_2 the capillaries will also dilate.

The causes, then, underlying the symptoms of the first group of cases—those with plum-colored cyanosis—are (1) lack of oxygen, (2) retention of CO_2, and (3) failure of the right heart.

So long as the heart is not losing much ground and the lack of O_2 is not extreme the cyanosis will remain plum colored.

Owing to bronchitis, emphysema, and areas of relative collapse in cases of chlorine poisoning, there is probably more CO_2 in the alveoli which are still permeable, whereas in phosgene poisoning the injury to the air passages being less there is less likelihood of retention of CO_2, but the lack of oxygen is greater since the alveoli are more damaged. There is, therefore, in phosgene poisoning a greater likelihood of the second type of cases—the gray type. In these the lack of oxygen is more profound and the breathing therefore becomes rapid and shallow. There is practically no hyperpnœa, because the increase of breathing washes out the CO_2 from the blood. For the same reason there is little distension of capillaries.

But the lack of CO_2 causes the blood to part less readily with its O_2 to the tissues. If there is less CO_2 in the alveoli the blood takes up O_2 more readily and the arterial blood will be redder, but since there is less CO_2 in the capillaries the blood parts with its O_2 less readily and the want of oxygen becomes more serious.

With an equal degree of deoxygenation of the oxyhæmoglobin there is less free O_2 in the blood when little CO_2 is present or when blood is a little more alkaline than when more CO_2 is present or the blood is a little less alkaline.

There has been a considerable amount of controversy on the question of acidosis in cases of irritant gas poisoning.

Professor Haldane points out that the increase of circulation and respiration caused by the want of oxygen diminishes the CO_2 in the tissues and brings about a condition of alkalosis, as indicated by the urine becoming less acid or alkaline and the NH_3 formation in the body sinking to a minimum. The alkali reserve of the body gradually diminishes; that is to say, the amount of soda available for combination with CO_2.

On the other hand lack of oxygen does produce acidosis, and Professor Barcroft found evidence of acids other than carbonic acid in the blood.

How, then, does the subject combat these conditions? In three ways:

(1) By increasing his ventilation.

(2) By increasing his circulation.

(3) By the consolidation or shutting off of the injured area of lung.

(1) *By increased ventilation.*—As soon as the oxygen want begins to develop the subject breathes more quickly, partly owing to the fact that CO_2 has a lower threshold value in the presence of a slight lack of oxygen and partly owing to the stimulus of oxygen want itself.

The increased ventilation raises the pressure of O_2 in the lungs and reduces the lack of oxygen and tends to stave off its more serious development.

(2) The circulation rate is increased, and if a blood gas analysis is made in a patient who is maintaining his position it will be found that the venous blood contains more O_2 than normal. This is not because the tissues are using less oxygen, but because the blood is being propelled around the body more quickly.

(3) So long as the respiratory center and the heart can withstand the strain involved until the third line of defense is established, the patient will make good. This third line of defense is the shutting off of the damaged area of lung. As I described in my last lecture, the alveoli most affected become consolidated and the blood practically ceases to flow through them. Others less affected clear up and the patient carries on with less available lung substance until the œdema is absorbed and the lung becomes practically normal, as it does in the majority of gassed cases which recover, though some may have scar tissue and emphysematous areas.

We can now formulate a rational line of treatment for cases of asphyxiant gas poisoning, and modify it according to the need of individuals.

(1) The first point in treatment should be to diminish the patient's need of oxygen by every possible means—by keeping him at rest and by warmth. To keep him at rest necessitates a special organization for evacuation of gas casualties when these occur in numbers, and I shall hope to refer to this again in my last lecture. Warmth can be given by means of hot water bottles or by preparing a stretcher with folded blankets and applying warmth by means of a Primus stove as was done in cases of surgical shock. If circumstances permit, patients should not be evacuated to the lines of communication until all serious symptoms have disappeared.

(2) The next and most important point is the administration of oxygen. But on service, oxygen is difficult to obtain in large quantities and also difficult to transport. What then should be the indications for administration of oxygen?

If a patient has no cyanosis—whether of the plum-colored or pallid variety—oxygen is not necessary. If he has cyanosis, oxygen is necessary and should be given at the earliest possible moment to prevent the vicious circle initiated by even slight anoxæmia.

This is most easily and economically given by the portable apparatus devised by Professor Haldane, and with comparatively little trouble an installation can be arranged so that two or three orderlies can attend to a number of patients.

The administration should be begun early and should be persevered with, even though apparently there is little improvement in the patient. Remember that lack of oxygen may have already done damage to important structures and organs and that it will take the patient time to recover from this even though oxygen administration may prevent further damage.

Usually a delivery rate of 2 to 3 liters per minute is a sufficient dose, the mask being withdrawn for five minutes every half hour. In very bad cases up to 5 liters per minute have been given with excellent results.

Once the patient regains his color and his pulse improves and the improvement is maintained, oxygen may be stoped; but any return of the symptom indicates resumption of the administration.

Oxygen is itself irritating to the lungs in large quantities and should not therefore be pushed further than necessary.

Before leaving this treatment it is only fair to say that in a series of experiments carried out on dogs exposed to standard doses of gas by Underhill, the American observer, he found that administration of oxygen neither delayed the time of death nor increased the percentage of recoveries. Clinical experience in France, however, proved beyond doubt the value of this treatment. Again and again apparently hopeless cases recovered when oxygen was given efficiently and over long periods.

Venesection.—Clinical experience in France was in favor of bleeding in irritant-gas poisoning, but not as a routine treatment in all cases. It is certainly justifiable in cases with venous congestion to relieve an overburdened right heart. The quantity removed should amount to 20 ounces (550 cubic centimeters) and the bleeding should be done slowly—about 20 minutes for the quantity mentioned.

In the pallid cases the treatment was not considered justifiable. On the other hand, the work of Underhill in the treatment of gassed dogs brings forward very strong evidence in favor of early bleeding and still stronger evidence in favor of bleeding and injection of saline. In phosgene poisoning he found that in many cases early bleeding was sufficient to save the animal, whereas in chlorine bleeding plus infusion was indicated. The reason he gives for this difference is that in phosgene poisoning there is in the early stages a preliminary dilution of the blood—the fluid being probably withdrawn from the tissues—before the stage of blood concentration and stagnation sets in. Early bleeding to 0.5 per cent of the body weight of the animal relieved the distension of the heart, and in many cases this treatment sufficed. In some cases, however, the condition of dilution recurred, and was always accompanied by a rise of temperature. When this happened he bled the animal again, and even repeated the procedure a third time until blood to 1.5 per cent of the body weight had been withdrawn. If after this the stage of concentration occurred he infused or injected intraperitoneally normal saline.

In chlorine poisoning he did not find this stage of early dilution occur. The blood immediately began to concentrate, and for this reason he bled the animal and infused a quantity of normal saline equal to the amount of blood withdrawn.

There are obvious objections to adopting this as a routine treatment in the case of human patients. To begin with, the personnel required would be very large when gas cases were numerous. Nor does experience in France go to show that bleeding was necessary in all cases.

One thing is, however, fairly certain, i. e., that in the early stages of blood concentration and stagnation bleeding does no harm, and that bleeding and infusion with saline will probably do good by increasing the volume of circulating blood.

The experimental evidence goes to show that normal saline is the best diluting fluid to employ.

Drugs.—The inhalation of *ammonia vapor* often gives relief in the early stages of chlorine poisoning. It probably acts more as a stimulent than in any other way. It should not be given in too strong a concentration, and if it increases the cough or dyspnœa it should be withdrawn.

Atropine was tried as a means of relieving the bronchial spasm which sometimes occurs, but little benefit appears to have been gained by its use.

Cardiac stimulants.—Brandy has proved very effective. Pituitrin 0.5 cubic centimeter hypodermically, at intervals of not less than three hours; hypodermic injections of camphor, or caffeine have been well spoken of. Neither strychnine nor digitalis proved of much value.

Morphia should only be given in cases of extreme restlessness, and then the dose should be small.

Expectorants should be given with caution. Their use in the first two days is contraindicated for fear of increasing the damage to the lung by coughing.

Aspirin and phenacetin should not be used to relieve the headache which occurs.

Such methods as emetics, tickling the throat, and posture to aid the drainage of fluids from the lungs have been used with success.

Food should only be given in fluid form and sparingly in the acute stage, and the diet should be light till convalescence is well established.

There seems to be little to be gained by any form of treatment specially designated to correct the accumulation of carbonic acid or other acids in the blood.

TREATMENT OF THE LATE EFFECTS OF GAS POISONING.

Apart from the treatment of the neurasthenic symptoms and functional disturbances which appear in certain patients during convalescence, and which I shall refer to when dealing with the treatment of mustard-gas poisoning, there is evidence to show that the cases of cardiac disturbance and spasmodic dyspnœa are due to chronic lack of oxygen.

Observations on these patients have shown that their breathing is much shallower than that of normal persons, and shallow breathing is a cause as it is also a result of lack of oxygen.

It may be that during the acute stage the respiratory center has been so damaged that the reflex controlling inspiration and expiration becomes abnormally sensitive and fires off before the normal distension or collapse of the lung has been reached.

The lack of oxygen is not due to the anatomical condition of the lung itself, for in the great majority of cases, if the patient survives, the lung quickly returns to normal and very little permanent damage remains.

The shallow breathing is accentuated by the lying posture, and this explains the dyspnœic attacks at night.

The condition is markedly relieved and in many cases was cured by administration of oxygen either by means of a Haldane apparatus or by making the patient sleep in a special chamber in which the atmosphere was enriched by oxygen.

Moreover, experiments on an ergometer showed that patients suffering from the effort syndrome could perform more work without dyspnœa if given inhalations of O_2.

VESICANTS.

Mustard gas poisoning.—The time at our disposal does not permit of more than an outline of the lesions and associated signs and symptoms due to poisoning with mustard gas, but to those who wish to study the subject further, I would recommend an article by Drs. C. M. Wilson and J. M. Mackintosh in the Quarterly Journal of Medicine, volume xiii, No. 50, January, 1920.

At the time of exposure to this gas, nothing is noticed save the faint smell usually likened to garlic or mustard.

After a lapse of two or three hours symptoms begin to make their appearance and the intensity and duration depend upon the concentration of the gas.

The eyes usually are the first to show signs of the mischief—an acute conjunctivitis, which develops rapidly. There is extreme lachrymation accompanied by headache. Blepharospasm is marked. From the second day the discharge is mucopurulent, and the injury may go on to corneal ulceration, but this complication is not common. Later, photophobia of functional origin develops in a considerable number of cases.

Coinciding with the development of eye symptoms there is nasal catarrh, and sneezing is frequent. Nausea, retching, and vomiting, with epigastric pain, are common at the same period.

During the next few hours other signs and symptoms make their appearance. The throat feels dry and burning, the voice becomes hoarse and a brassy cough develops.

A red erythema appears on the skin of the face and neck, and other parts of the body (particularly where the skin is moist) are similarly affected. Small blisters and blebs appear later in these areas. In the early stages the condition resembles the rash of scarlet fever.

During the second 24 hours the vesicles develop into large blisters, while the scrotum and penis, if affected, become œdematous and painful.

Respiratory signs now appear with the onset of bronchitis, and in the mucopurulent sputum large sloughs from the inflamed tracheal lining may be found.

Secondary infections of the respiratory tract, varying from purulent bronchitis through broncho-pneumonia to bronchiectasis and even gangrene of the lungs, supervene and cause death.

The temperature, pulse, and respiration rates vary in accordance with the character and severity of these affections.

Post-mortem.—The most important changes are found in the respiratory tract. Throughout its entire length it is acutely inflamed and covered with a yellowish-white false membrane, representing the disintegrated and desquamated epithelial lining mixed with a fibrinous exudate. On removal of this membrane a red granulating surface is exposed, sometimes pitted by small ulcers. The lumen of the trachea is filled with a thin pus, and pus can be squeezed from the bronchioles when the lung is cut.

The lungs are voluminous, but they do not exhibit the massive œdema characteristic of the asphyxiant gas cases.

In early deaths small hemorrhages may be found and scattered areas of emphysematous and collapsed alveol.

As a secondary lung infection extends, the appearance are those of typical broncho-pneumonia, going on in some cases to small abscess formation.

The alimentary tract.—Although vomiting and retching are early signs of mustard-gas poisoning they do not as a rule persist after the first 24 hours.

According to English observations a true gastritis is rare, though it does occur. French writers, on the other hand, state that in their view the digestive system frequently participates in the syndrome; gastric pain and discomfort and diarrhea, often bloody, help to weaken the patient, and when there is a general affection of the skin produced by mustard gas, and not a purely local one, the digestive apparatus is always involved. In their view the lesions in the digestive tube are sufficiently marked to account for the symptoms. The gastric mucosa has lost its sheen and is dark in color; ecchymotic areas and sometimes true ulcers are found.

German observations do not support this view. In this connection one may say that apart from the mustard gas, which may be actually swallowed with saliva, there is experimental evidence to show that dichlorethyl sulphide when injected subcutaneously appears to be obsorbed and excreted by the mucosa.

The Americans claim to have obtained systemic effects which are quite characteristic and unmistakable on the heart, alimentary tract, and central nervous system. They state that these effects are produced by hydrolysis—the mustard gas being broken up into hydrochloric acid and a body which can be recognized by converting it back again into mustard. And that the products of hydrolysis are found in the urine. The time taken for a solution of mustard gas to hydrolyze in vitro corresponds with the time taken for symptoms to appear after exposure to the vapor. The experiments are not yet conclusive, but the Americans hold that the evidence already to hand strongly supports their view.

Urinary system.—Albuminuria is present in serious cases as an early symptom, and if persistent is a sign of grave import.

Acute hæmorrhagic nephritis has been described.

Circulatory system.—The heart is unaffected at first, except by changes associated with the pulmonary complications. Later, in convalescence, symptoms of D. A. H. and the effort syndrome are observed in a considerable number of cases. Observers are agreed that these symptoms are of nervous origin, and depend largely on the methods of treatment adopted in the early stages.

Blood changes.—The leucocyte count is of importance in mustard-gas poisoning.

In the early stages, from the first to third day, occasionally later, there is a great leucocytosis which may rise as high as 35,000. The increase is due to the polymorpho-neutrophiles, which number about 98 per cent of the total.

Even when the total count is not raised, there is a relative increase in these cells.

The lymphocytes are reduced in numbers; eosinophile and basophile cells practically disappear. The large mononuclears remain either normal or are reduced.

In serious cases a fall in the leucocyte count beginning about the third or fourth day is a sign of bad omen, unless there is marked improvement in the patient's condition; and a leucopænia occurs just before death.

There is no change of note in the red blood corpuscles. But the coagulation time of the blood is said to be markedly diminished.

TREATMENT OF CASUALTIES FROM MUSTARD GAS.

Immediately on arrival at the gas casualty center, or, if practical, at the aid post or advanced dressing station, steps should be taken to get rid of all traces of mustard gas from the patient, his clothing, and equipment.

I have already dealt with the methods of disinfection of clothing, and need only add that when clothing is taken from the patient it should *at once* be disposed of in a safe place where it can not injure others by continuing to give off gas.

The patient should then be washed from head to foot with warm soapy water to which bicarbonate of soda 20 parts per 1,000, or lime water 1 part per 1,000, has been added. Particular attention should be paid to his hands, which may be infected, lest by scratching he convey the poison to other parts of the skin.

He is then dried and put to bed in clean clothes.

Care should also be taken to prevent injury to the personnel attending to the patient.

The conjunctivæ should then be washed well with a 2 per cent solution of bicarbonate of soda or warm boric lotion, and liquid paraffin instilled. This treatment should be frequently repeated, particular attention being paid to the corners and the eyelids being everted, if possible. If liquid paraffin is not available, castor oil may be used, but is more irritating.

If the cornea is affected, 1 per cent sterile atropine ointment should be used instead of paraffin, and repeated sufficiently often to keep the pupils dilated. Cocaine should not be employed. Washing with potassium permanganate 1 in 4,000, or the application of an ointment containing potassium permanganate or methylene blue are recommended.

If the discharge becomes mucopurulent, 2 per cent solution of argyrol or protargol should be applied once a day.

The eyes should never be bandaged. Dark glasses or shades may be given for the first two or three days, but should be dispensed with as early as possible. The photophobia which follows the affection of the eyes is nearly always functional, the patients are in a very suggestible condition, and unless a firm attitude is adopted and an atmosphere of cure established at once by impressing on them that the injury will not be permanent a neurasthenic condition develops which is very intractable and prolongs convalescence indefinitely. Plunging the head into cold water with the eyes open often cures these functional symptoms.

The nose and naso-pharynx should be washed out with warm alkaline solution three times a day. This should be poured in, not snuffed up.

Relief to the condition of the larynx may be obtained by inhalation of steam from boiling water to which an ounce of tincture benzoin co. and 10 grains of menthol have been added. The French recommend a laryngeal injection of gomenol oil 1 to 2 cubic centimeters daily.

The laryngitis usually clears up in a fortnight, but a functional aphonia may develop which is best treated by strict methods.

Tracheitis may be eased and the risk of secondary infection lessened by the use of a perforated metal mask moistened with drops of an antiseptic solution, such as:

Menthol	grains	20
Tinct. iodi	minims	30
Oil of eucalyptus	do	30
Creosote	dram	1
Chloretone	do	1
Alcohol to	ounce	1

When secondary infections such as broncho-pneumonia occur the appropriate treatment should be given. Venesection or oxygen may be used if cyanosis develops, but these measures are never called for in the early stages of mustard-gas poisoning.

The vomiting and other symptoms arising from infection of the alimentary tract may be relieved by warm drafts of a solution of bicarbonate of soda.

The diet in the early stages should be mild and light. Indeed, inflammation of the posterior pharyngeal wall may make swallowing a matter of difficulty.

Skin lesions.—After the initial washing with soapy water and bicarbonate solution, a dusting powder of boracic acid, chalk, starch, and zinc oxide or calamine lotion should be applied to relieve irritation. Fatty ointments give no protection against the poison.

Small burns heal well under Lassar's paste with 2 per cent salicylic acid.

Washing with 4 per cent solution of potassium permanganate and applications of ambrine have also been recommended, but before the latter is applied care should be taken to render the skin aseptic.

Large excoriations or areas with pyogenic infections should be treated by soaking with boracic lotion for a short period and then applying zinc ointment with ammoniated mercury.

Functional symptoms.—Mustard gas cases are very liable to develop during convalescence hysterical symptoms, such as vomiting, photophobia, aphonia, or D. A. H., and it is of the greatest importance to remember this and frame the early treatment so that what the French describe as "benign contagion"—an atmosphere of cure—is established at once.

Unless this is done, not only may the patient remain in hospital but he may become a confirmed neurasthenic.

In France it was found that by adopting a strict and hopeful attitude a very large majority of the cases of mustard gas poisoning were fit for discharge from hospital within four to six weeks. In England, on the other hand, many cases were still unfit at the end of twice or three times that period. Allowing for the fact that the most serious cases went to England, this period is too long, and investigation proved that a great number were suffering from neuroses.

How far these neuroses are the result of gas or of general war strain is a matter of doubt. In any case, the neurotic element should never be forgotten in gas poisoning.

Being a new weapon it was naturally very terrifying, and the fact that unless in large concentrations the smell was almost imperceptible, kept men in a state of expectant strain. Many men thought they were gassed when they were not, and toward the end of the war it became necessary to send men to the gas centers diagnosed N. Y. D. gas or query gas, just as they were sent to the neurological centers diagnosed N. Y. D. nervous. In such cases it only required a little injudicious sympathy to bring about a nervous breakdown with all kinds of symptoms which were merely manifestations of a conversion hysteria.

I have mentioned D. A. H. as one of the neurasthenic manifestations in the late stages of mustard-gas poisoning.

As far as can be judged this syndrome did not arise from the same cause as the D. A. H. of cases of irritant gas poisoning. In the latter it appears to have been consequent on the lack of oxygen in the early stages which having upset the nervous reflexes gave rise to chronic shallow breathing. In the cases of mustard gas, on the other hand, it appears to be a symptom of the general neurasthenic condition of the patient.

It is well then whilst adopting energetic treatment of actual lesions to restrain oversympathy with the patient and to impress upon him that he will in all probability shortly be quite fit to return to duty.

Chlorarsines.—When the blue cross shell was first introduced the effects were limited to irritation of the eyes, nose, and throat and a burning pain in the chest. These symptoms were transitory and did not produce serious casualties.

Later, however, definite symptoms of poisoning by these compounds were observed and were probably due to the introduction of ethyldichlorarsine or to drinking of water contaminated by the blue cross shells.

These symptoms were as follows: Burning pain in the nose, mouth, and throat; smarting of the face; aching pain in the eyes with intense lachrymation and mild conjunctivitis; frontal headache and copious watery discharge from the nose; burning pain in the chest; salivation; pain in the stomach, nausea and vomiting.

In some cases sensations of pins and needles were experienced, or temporary numbness and loss of power in the limbs without the sensation of pins and needles giving place to aching pain, but with no tenderness of the main nerve trunks.

A curious symptom is the extreme degree of mental misery to which exposure to this compound gives rise.

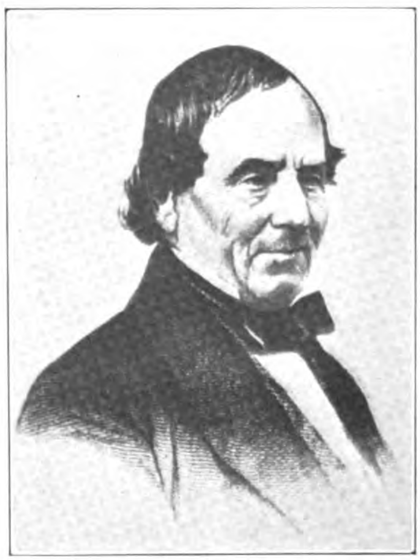
These symptoms are in the main transitory and in many cases were not sufficient to cause evacuation of the patient; or, at the worst, cleared up in a few days, except in those patients who developed neurasthenic symptoms which were rather attributable to general war strain and weariness than to the action of the gas.

In a certain proportion of cases alterations of sensation and of reflexes appear in the late stages, but authorities are agreed that the lesions can not be attributed to a definite arsenical neuritis, and that they are probably functional in origin.

Such is the clinical picture of the casualties inflicted by the enemy use of the arsine compounds; but there is definite experimental evidence to show that these compounds can cause much more serious symptoms, and may be lethal.

Pathological examinations of animals which succumbed to the effects of these compounds show that lesions occur in the respiratory tract which are sufficient to cause death. Pulmonary œdema is common and frequently severe, but the chief feature is serious damage in the upper air passages.

Frequent exposure apparently increases susceptibility to their effects.



Usher Parsons, Surgeon, United
States Navy.

HISTORICAL.

USHER PARSONS (1788–1868), SURGEON, UNITED STATES NAVY.[1]

By F. L. PLEADWELL, Captain, Medical Corps, United States Navy.

Usher Parsons was born in the town of Alfred, York County, Me., when Maine was still a district of the State of Massachusetts, so that both States may rightfully count him among their distinguished sons. The date of his birth was August 18, 1788. He was the youngest of the nine children of William and Abigail Frost (Blunt) Parsons. William Parsons was descended from Joseph Parsons, who came to this country from England in 1635, settling first at Springfield, later at Northampton, Mass. His oldest son, Joseph, became a prominent citizen and trader in Northampton and died there in 1729. Joseph's oldest son, also named Joseph, graduated at Harvard College in 1697, and was a pupil of the Rev. Increase Mather. He became a clergyman at Lebanon, Conn., afterwards at Salisbury, Mass., where he died in 1740. His oldest son, in whom was still perpetuated the name of Joseph, was a clergyman at Bradford, Mass., from 1726 to his death in 1765. This Joseph, who married Frances, daughter of John Usher, lieutenant governor of New Hampshire, was Usher Parsons's grandfather. Joseph and Frances Parsons had six sons, and of these three graduated at Harvard and were, respectively, clergyman, physician, and lawyer. The remaining three children became mechanics or traders. It is noteworthy that of the two groups of children those who went to college survived only to an average age of 36 years, while those who remained at home and followed the trades reached an average age of 76 years. The fifth son, William, was Usher's father. He was born in Bradford, Mass., in 1743, and followed, by turns, the calling of trader, farmer, manufacturer of potash, lumber merchant; he was also a town officer.

William Parsons left Bradford and settled first in South Berwick, Me., then in Alfred, where he died in 1826. He married Abigail Frost Blunt, daughter of Rev. John Blunt, of Newcastle, N. H., whose wife was a daughter of Hon. John Frost. The mother of John Frost was a sister of the celebrated Sir William Pepperrell, who captured Louisburg in 1745.

[1] For much of the material appearing in this article the writer is indebted to the article on Usher Parsons in Kelly and Burrage's "American Medical Biographies" and to a "Memoir of Usher Parsons, M. D.," by his son, Charles W. Parsons.

The family connections mentioned in this review of Usher Parsons's ancestry will explain not only the origin of his Christian name, but also his interest in writing in 1855 a life of Sir William Pepperrell, who possessed the distinction of being the only native of New England who was created a baronet during its connection with the mother country.[2]

Usher Parsons's boyhood was spent in Alfred, where he attended the village school in winter and worked on his father's farm in summer. He was 11 years of age when General Washington died and often recalled wearing crape and taking part in a mourning procession of school children on the occasion of this sad event. When 12 years of age he was sent to school at the Berwick Academy, but only remained there a year, a period far too limited for him to acquire more than the bare rudiments of a preliminary education. After leaving school he worked as a clerk in several retail stores in Portland and Wells (now Kennebunk), Me. His service in the latter town terminated on March 29, 1807. As an indication of its very satisfactory character the following certificate of his employer is quoted:

> This may certify that I, the subscriber, of Wells, have employed Usher Parsons as a clerk to assist me in my store for upwards of eight months; and have found him to be a capable Lad, possesst of steady habits, and well calculated for book-keeping. Wells, August 16th, 1806. Daniel Little.[3]

On May 6, 1807, when not quite 19 years of age, Usher Parsons began his life work by entering the office of Dr. Abiel Hall, of Alfred, as a student in medicine. His industry as a clerk had enabled him to accumulate a little money, and these savings were drawn upon now for board, lodging, books, and later for a course of anatomical lectures which he attended at Fryeburg, Me. These lectures were delivered by the well-known Dr. Alexander Ramsay, an eccentric but gifted Scotchman, who had come to this country from Edinburgh in 1802 to offer his services at the time of the yellow-fever epidemic in New York. Usher Parsons's lifelong interest in anatomy had its origin in the teachings of Doctor Ramsay, who was himself an enthusiast in this branch of medical science. During his apprenticeship with Doctor Hall he studied anatomy, saw a little of the practice of medicine, read Dr. William Cullen's First Lines of the Practice of Physic (1776–1794), and studied the works of Erasmus Darwin[4] and the celebrated Dr. John Brown.[5]

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[2] Life of Sir William Pepperrell, Bart., Cambridge, Mass., 1855.

[3] Father of the late Charles C. Little, of the firm of Little, Brown & Co., Boston.

[4] Erasmus Darwin (1731–1802), whose Loves of the Plants (1789) and Zoönomia (1794) emphasized the gradual evolution of complex organisms from simple primordial forms, the struggle for existence in animals and plants, sexual selection, protective mimicry, and the indirect influence of environment in producing transformations which may modify species." (Garrison.)

[5] John Brown (1735–1788). "The disputatious and disreputable Brown," as Allbutt styles him, was a coarse man of low habits whom Cullen had taken up and launched,

His medical studies were often interrupted by visits home, where he worked on his father's farm, and by periods of teaching school in Alfred and neighboring towns, in order to add something to his slender funds. While still at Kennebunk, Parsons printed his first literary production, in the shape of some verses entitled "A Pettifogger's Soliloquy," which appeared in the Freeman's Friend, a newspaper published in Saco, Me.

Of the incidents of his daily life at this period, and of his efforts at self-improvement, both in general education and in medical work, and of the difficulties met with and overcome in prosecuting his studies, we may learn most satisfactorily from the following extract, which is taken from an account which he wrote himself in later years:

> Being disappointed of a remittance from my father of some money to enable me to attend a second course of lectures in Portland, by Doctor Ramsay, I walked about 15 miles in the night, nearly to Saco, slept a few hours on some hay in a barn, and I reached Kennebunk the following noon, and Alfred in the evening. During my moonlight walk, I meditated on the past and the future course of my life. I thought of the misspent time of my past years, of my low aims in the medical profession, until within the last few weeks, and asked if it would be possible, at this my 21st year, to begin a new course, that should redeem the time, and elevate me to a respectable rank in the medical profession. I was now wanting in preparatory education, unable to parse the most simple sentence in Latin, and hardly able to write a common letter in English grammatically. I had no means of educating myself but by school keeping. How many years am I willing, I asked, to devote to this and to hard study for the attainment of a rank in the profession that, with my present ambitious views, I shall be satisfied with? I concluded that 10 years would be required, and determined that all my energies should be employed for that length of time.

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but who, like Colombo, Borelli, and other ingrates of medicine, turned against his quiet teacher with the plebian's usual tactics of reviling his intellectual betters in order to exalt himself. Yet the Brunonian theory, as it was called, actually held the attention of Europe for a quarter century, and as late as 1802 a rixa, or students' brawl, between Brunonians and non-Brunonians at the University of Göttingen lasted two whole days and had finally to be put down by a troop of Hanoverian horse. As far as it went, the theory was absolutely consistent and complete in all its parts. Brown regarded living tissues as "excitable," in lieu of the Hallerian "irritability," and life itself as nonexistent, except as a resultant of the action of external stimuli upon an organized body. Diseases are then "sthenic" or "asthenic," according as the vital condition of "excitement" is increased or diminished. The essentials of diagnosis are simply whether a disease is constitutional or local, sthenic or asthenic, and in what degree, and the treatment consists in either stimulating or depressing the given condition. To this end, opium and, of course, alcohol were Brown's favorite agents. Hippocrates said that no knowledge of the brain can tell us how wine will act upon any particular individual, and Brown proceeded to apply this experimental idea in propria persona to elucidate his theory, using successive doses of five glasses at a time. Abuse of opium and alcohol eventually killed him. His method gained little support in France and England, but Rush took it up in America, Rasori, Moscati, Brera, and others in Italy, and in Germany, after Christoph Girtanner's plagiarisms of 1790 had been exposed and the "Elementa medicinae," translated by M. A. Weikard, Brown came into his own. The book hypnotized even Peter Frank and Röschlaub, and was greeted by a flood of pamphlets and salvos of praise. Although his errors were pointed out by Humboldt and Hufeland, Brown had the unique distinction of polarizing the German profession. His therapeutic ideas, Baas asserts, destroyed more people than the French Revolution and the Napoleonic wars combined; nor will we dispute the same historian's pronouncement that he was "morally deserving of the severest condemnation." (Garrison.)

and to be satisfied could I arrive at eminence in respect to knowledge, although the tenth year should find me as penniless as at this hour.

My resolution was now fixed and my plans matured this night, and in the main were not deviated from during that length of time. I determined to obtain the degree of A. M. and M. D., and to become a teacher of anatomy. On arriving at Alfred, I packed up my Latin books, and went to Sanford, 4 miles off, and placed myself in the family of Parson Sweat. I began with the Latin grammar, and by the last of November had gone over it several times and read two books in Virgil, and was able to read the Greek Testament a little. I then taught school two months in Elliot; then returned to Parson Sweat's a few months; then went in May to keep school three months half a mile from Berwick Academy; then attended the academy one quarter, and read two or three of the Evangelists (in Greek), and four orations against Catiline; then kept school at Alfred three months, and during evenings read Virgil nearly through, finished the Evangelists and the book of Romans. I now felt that to go through college in this tedious way would be likely to consume the 10 years. I therefore concluded to return to medicine; to read a few months with Doctor Hall, at Alfred, and then study with some very eminent person six months, which would complete my three years, to attend a course of lectures, and then commence practice, or be ready to commence whenever a vacancy offered, and endeavor to go through the college studies whilst trying to get into practice. Accordingly I went to Doctor Kittredge, of Andover, but found him from home. I then went to Boston and entered the office of Doctor John Warren, for six months. It was with much difficulty that I got through with the expense of lectures and board, although assisted to $50 by my father.

Following the plan mentioned above, Usher Parsons went to Boston in July, 1811, and succeeded in establishing himself under the preceptorship of the eminent surgeon, Dr. John Warren, brother of Doctor Joseph Warren, who fell at Bunker Hill. While in Boston he boarded at the Market Tavern in company with his brother-in-law, Gen. Samuel Leighton, then representative to the General Court from Elliot. In February, 1812, he underwent a successful examination before the censors of the Massachusetts Medical Society, and was duly licensed as a "practitioner of medicine."[6]

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[6] [SEAL] COMMONWEALTH OF MASSACHUSETTS.

We the subscribers, Censors of the Massachusetts Medical Society duly appointed and authorised have examined Usher Parsons of Alfred in the County of York a candidate for the practice of Physick and Surgery; and having found him qualified do approve and license him as a Practitioner in Medicine, agreeably to the law in that case made and provided.

Dated at Boston this 7th day of February A. D. One Thousand Eight Hundred and twelve.

LEMUEL HAYWARD, MD.
THOMAS WELSH, MD.
AARON DEXTER, MD.
JOSIAH BARTLETT, MD.
WILLIAM SPOONER, MD.

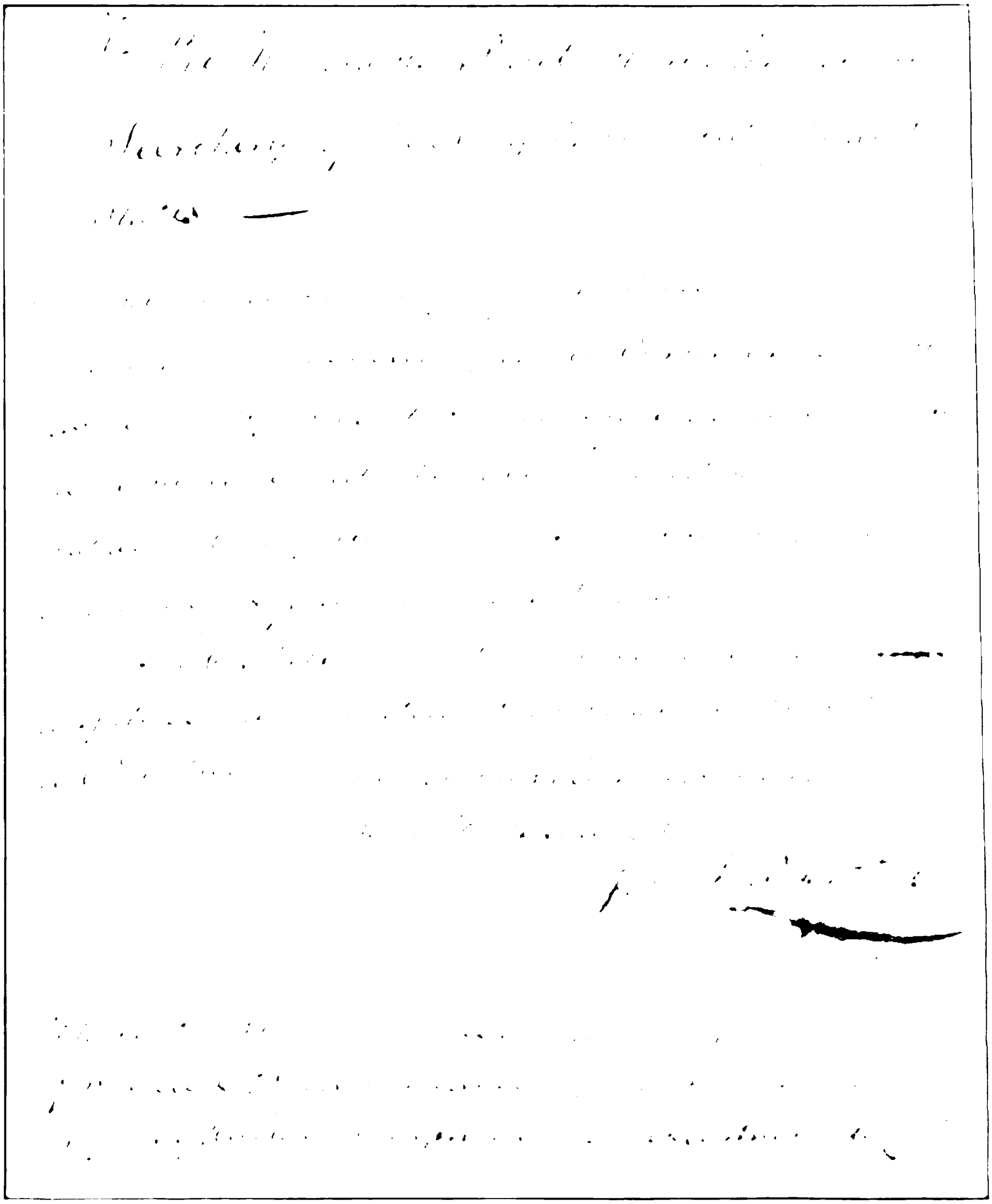
By virtue of the power rested in me, I have hereunto affixed the Seal of the Massachusetts Medical Society.

JOHN WARREN, MD.

Attest:

JOHN C. WARREN, *Recording Secretary*.

A true copy of the original.
Attest:
J. WHEELER,
Dover, N. H., May 24, 1812.



Letter recommending Usher Parsons for appointment in the Navy.

After passing his examination before the censors, he returned to his home in Alfred, but as war with Great Britain now seemed imminent,[7] and openings for beginning practice in civil life not encouraging, he made an attempt to get an appointment as surgeon's mate in either the Army or Navy. At first his efforts met with no success, but enlisting the support of his Congressman, Dr. Josiah Bartlett, of New Hampshire, he was shortly commissioned as a surgeon's mate in the Navy. His commission bore the date of July 6, 1812.[8]

The following copy of the credentials mentioned in Doctor Bartlett's letter has been found, and is believed to be worthy of reproduction here:

BOSTON, *January the 20th 1812.*

This certifies that Doctor Usher Parsons has been three full years a student of Physick under Physicians of approved and established reputation during which he diligently applied himself to the various branches of his Profession; attending lectures in Anatomy and Surgery, the Theory and Practice of Medicine, Chemistry and Materia Medica and Midwifery—That his proficiency in these respectively has been such as deservedly to acquire the approbation of all the gentlemen under whom he has received his education, and that his moral character has been immaculate. I therefore recommend him accordingly.

JOHN WARREN.

A true copy of the original, attest:
J. WHEELER.
Dover, N. H., May 24, 1812.

His experiences at this time are best revealed by quoting again from the sketch of his early life:

After an unsuccessful attempt to get a school, to repair my wardrobe, I went to Exeter to get a place as physician, but was soon discouraged. I then went to Dover for a few months, but received no encouragement, and the expenses here added to my debts and poverty. There was now a prospect of war, and I tried hard for a place of surgeon's mate in the Army, but failed. At length an invitation was forwarded me by the surgeon of the *John Adams* to join him as mate, assuring me he would try to get my appointment of mate confirmed by a commission, but adding that I must be in Boston in 60 hours. I made all dispatch, but did not reach there till 64 hours, and then found the ship had sailed. I was now left with $1, but I succeeded in borrowing another and returned. At Salem I tried for a berth on board a privateer. I

[7] War was declared on June 18, 1812.

[8] To the honorable PAUL HAMILTON, *Esquire,*
Secretary of the Navy Department of the United States:
The Undersigned a citizen of New Hampshire begs leave to give the name of Usher Parsons now of Dover in said State as a suitable candidate for an appointment in the medical part of the Navy. It is not now recollected that any citizen of New Hampshire is either a surgeon or surgeon's mate in the Navy and from the credentials, copy of which is enclosed, the subscriber believes that said Parsons would be useful in that department if a vacancy will admit his introduction.
I have the honor to be your humble servant,

JOSIAH BARTLETT.

N. B. His preceptors in medicine were Dr. Hall of Alfred, district of Maine and Dr. John Warren of Boston, Massachusetts, Professor of Anatomy and Surgery in the Harvard University, Cam^{de}.

reached Dover discouraged, indeed, and not a little mortified. A few weeks previous to this I had applied for a mate's commission in the Navy, but despaired of success, and I had now no hope left but that a chance might offer in a privateer. In about four days from my return from Boston I was told there was a package in the office for me. I went and found it to be a commission of surgeon's mate in the Navy, my pay to commence from that day. No one can imagine my joy; it was ecstatic, frantic.

In spite of his failure to catch the *John Adams* at Boston he was destined to go to this ship finally, for orders issued from the Navy Department under date of August 15, 1812, directed him to report on board that vessel in New York. The period of Doctor Parsons's service on the *John Adams* appears to have been very brief, for in September he as well as other officers and men of the ship volunteered for an expedition being fitted out under Commodore Isaac Chauncey for service on the Great Lakes. There was at the time very little exact information about the proposed expedition, nor is there now any written record of orders for Doctor Parsons to join it. On the contrary, there is evidence that he was directed to go to St. Marys, Ga., but these orders he never received, and he asserted an entire ignorance of them in correspondence with the department later. It was by a narrow margin, therefore, that fate decreed him to go where his services in battle a year later were to bring him the well-earned renown, which even now, more than a century later, makes him deserving of "perpetual rediscovery by the medical profession of the United States."[9]

The force of men composing the expedition which Parsons now joined left the Brooklyn Navy Yard for Albany on September 24, 1812, traveling first by boat to that point, and thence to Buffalo by wagons and on foot. It required only 5 days to reach Albany (from New York), but 18 days passed before the expedition arrived at Buffalo.

During the succeeding winter and spring, 1812–13, Doctor Parsons was in charge of the sick and wounded at Black Rock, near Buffalo. At this time an epidemic of pleuro-pneumonia prevailed here and in other parts of the country. His observations on the treatment of this disease formed the basis of his first medical publication.[10, 11]

This small paper, written in the form of an open letter to a Doctor Ross, and published in a local newspaper, gives us an idea of Doctor

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[9] Am. Med. Biogs., 1920, p. 890.

[10] On Pleuro-Pneumonia. Addressed to Dr. John Ross. The Buffalo Gazette (circa Jan. 19, 1813).

[11] This epidemic was the so-called "cold plague" of William Steward, D. D., author of the pamphlet "The Healing Art," 1812. A detailed account of the disease as it prevailed in the United States Army was written by Dr. James Mann, a hospital surgeon, in his Medical Sketches of the Campaign of 1812, 1813, and 1814, Dedham, 1816. A very complete review of this epidemic, with bibliography, has recently appeared in the Lancet under the title "The Cold Plaugue of the War of 1812–14," by the Hon. William Renwick Riddell, LL. D. (Lancet, Mar. 11, 1922, p. 512).

Parsons's professional acumen, and reveals his controversial tendency, of which evidence will appear again somewhat later.

This article indicates a decided predilection for copious bleeding in the affection under discussion, and gives his experience with this treatment, which had been criticized by Doctor Ross. Doctor Parsons's contention about the seat of the disease (as being in the thorax) and not in the "right hypochondrium," as claimed by Doctor Ross, is fully supported by a number of postmortem examinations of victims of the disease. In closing his letter, he states that he is "actuated principally by a desire to remove from the minds of my patients any undue prejudice against the use of the lancet, which the publication of your sentiment may occasion."

An attack on one of the enemy's batteries on the Canadian side of the Niagara River, which was made in November, 1812, resulted in casualties which gave Doctor Parsons a number of surgical cases, as did also the attack on Fort George on May 27, 1813. When, on May 28, the British blew up their magazines at Fort Erie, and retreated, Doctor Parsons with a Doctor Purcell and some 20 citizens crossed the river, took 2 prisoners, and marched to the fort. On arriving near the fort 2 men met them with a flag of truce and surrendered. The party then walked to the fort and were received most hospitably. Doctor Purcell was sent back with information of this occurrence, and in the evening the colonel in command crossed with a regiment and took possession. This incident was the basis for his story of receiving the surrender of Fort Erie, told by him on many occasions in later years.

Some two months previous to the events just related Capt. Oliver Hazard Perry had arrived at Erie (Presque Isle), Pa., from Newport, R. I. At this point the fleet was being built which was to meet the British force later in the year. It was in June that Captain Perry came to Black Rock for the purpose of taking back to Erie several small vessels intended to be fitted as men of war. Doctor Parsons appears to have been assigned to this force and accompanied Perry on June 14 when they sailed for Erie. Apparently many men were ill at this time with fever, the so-called lake fever, and Doctor Parsons was actively engaged in caring for them in a large unfinished courthouse, fitted as a hospital. This duty at Erie continued until some time in August. In this interval Doctor Parsons, with other officers, entered into the social life of the community and formed many pleasant acquaintances among the people of the town. On August 12, the little squadron under Perry sailed from Erie to the head of the Lakes. Doctor Parsons was assigned as the junior surgeon's mate on the flagship *Lawrence*. On the 19th the squadron was visited by Gen. William Henry Harrison and Col. Lewis Cass, and on the 26th it arrived at the mouth of the

Detroit River, sailed thence to Sandusky, and then to Put-in-Bay, where the force anchored. Sickness was rife. Commodore Perry and fully half the officers and many of the men were down with bilious remittent fever. Doctor Parsons himself did not escape, nor did his medical associates, Doctor Barton on the *Niagara*, or Doctor Horseley, his immediate senior on the *Lawrence*, but fortunately for Doctor Parsons, on the date of the battle, he was sufficiently recovered to be fit for duty, while the other surgeons were still too ill to be of service.

In speaking of his illness he states, "I did not escape an attack myself, which confined me two or three days, and during this time more than 100 lay sick without any medical aid." On September 3 he adds, "I never was so much emaciated." And now we come to the narrative of the Battle of Lake Erie:

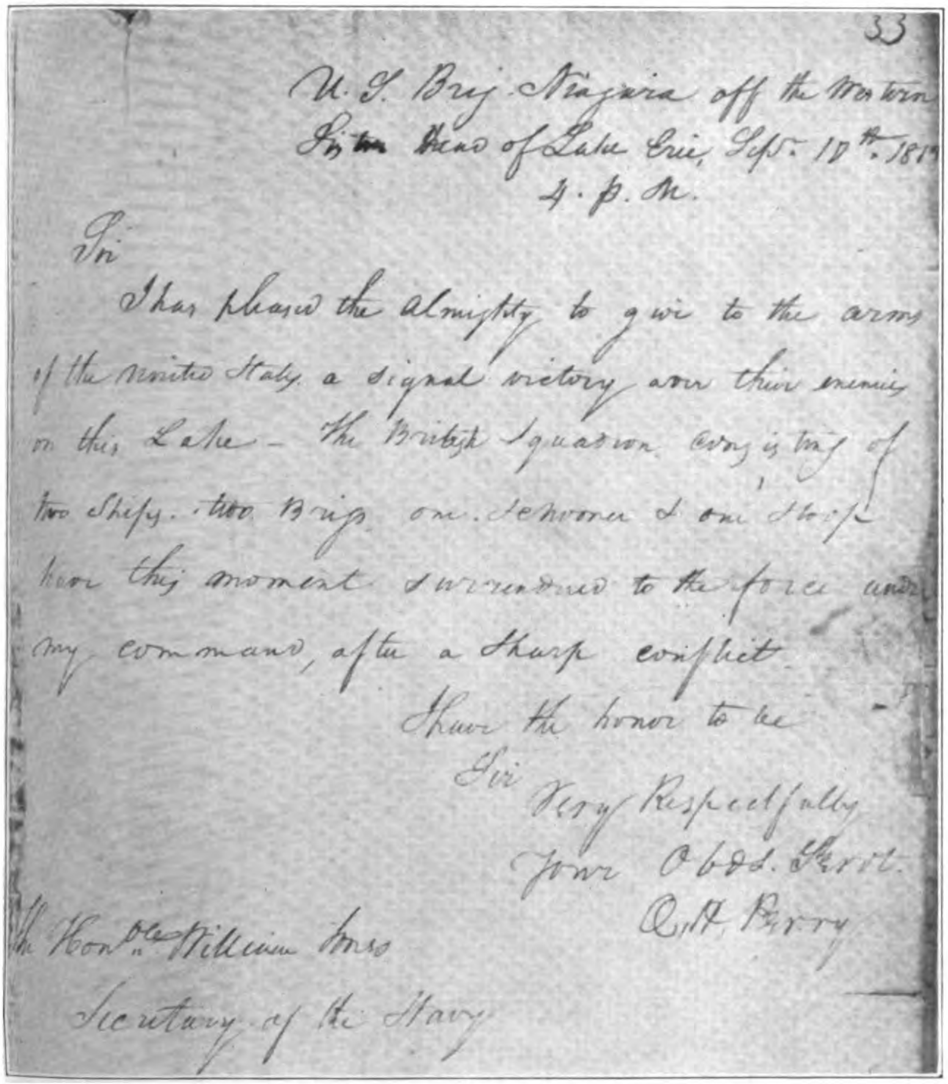
In this weakened condition, with only one doctor in the squadron to attend the sick and take charge of the wounded of a battle, we met the enemy (September 10, 1813). The action was soon very severely felt on board the *Lawrence*, the two largest vessels of the enemy engaging her at short distance for nearly two hours. The *Lawrence* being shallow built, and affording no cock-pit, or place of security for the wounded, they were received on the ward-room floor, which was nearly level with the surface of the water. Being only ten or twelve feet square, this floor was soon covered, which made it necessary to pass them out into another apartment, as fast as the bleeding could be staunched. Several, however, were wounded a second time before this could be done. Midshipman Laub was moving from me with a tourniquet on his arm, when a cannon ball struck him in the breast; and a seaman brought down with both arms fractured was struck by a cannon ball in both legs. An hour and a half had so far swept the deck that new appeals for surgical aid were less frequent. This change was rendered the more desirable at this time, from the circumstance that the repeated request of the commodore to spare him another man had taken from me the last one stationed to assist in moving the wounded; in fact, many of the wounded themselves took the deck at this critical moment.

Having sole charge of the wounded of the whole fleet, and the wounded being passed down to me for aid faster than I could attend to them in a proper manner, I aimed only to save life during the action by tying arteries or applying tourniquets to prevent fatal hemorrhage, and sometimes applying splints as a temporary support to shattered limbs, etc. In this state the patients remained until the following morning, under the free use of cordials and anodynes. At sunrise (the 11th), I began amputations, and in the course of the whole day and evening was able to finish all operations and dress at least once or twice, and to do justice to them all. On the following day, I visited the other vessels and brought all the wounded on board the *Lawrence* and treated them in like manner.

In another account of the battle which Doctor Parsons wrote additional incidents are recorded:

PUT-IN-BAY, *Friday, September 10.*

At five o'clock, A. M., discovered the enemy's squadron bearing North West, wind South West. At seven could see all the vessels, viz:—two ships, two brigs, one schooner, and one sloop. At ten called all hands to quarters. At quarter



33

U.S. Brig Niagara off the Western
Sister Head of Lake Erie, Sept. 10th. 1813
4. p.m.

Sir

It has pleased the Almighty to give to the arms of the United States a signal victory over their enemies on this Lake — The British Squadron consisting of two Ships, two Brigs one Schooner & one Sloop have this moment surrendered to the force under my command, after a sharp conflict.

I have the honor to be
Sir
Very Respectfully
Your Obdt. Servt.
O.H. Perry

The Honble. William Jones
Secretary of the Navy

Perry's letter to the Secretary of the Navy announcing the victory on Lake Erie.

before meridian the enemy commenced the action at one mile distance. In half an hour we came within musket shot of the enemy's new ship *Detroit*. At this time they opened a most destructive fire on the *Lawrence* from their whole squadron. At half past one, so entirely disabled we could work the brig no longer. At two P. M., most of the guns were dismounted, breechings gone, or carriages knocked to pieces. At half past two, when not another gun could be worked or fired from the *Lawrence*, Captain Perry hauled down the fighting flag, which bore this motto, *Don't give up the ship*, repaired on board the *Niagara*, and there raised it again. In ten minutes after we struck to the enemy Captain Perry made all sail with the *Niagara*, which hitherto had kept out of the action, and in fifteen minutes passed in among the British squadron, having the *Detroit*, *Queen Charlotte*, and *Lady Prevost* on the starboard side, and the *Hunter* on the larboard side, and silenced them all, and ten minutes before three they hauled down their colors. Two small vessels attempted to escape, but being overhauled struck a few minutes after three.

Killed on board the *Lawrence* (one lieutenant, eighteen midshipmen, and three others; sixty-three wounded).

Slept but little, and dressed about one-third, and secured with tourniquets such as bled copiously. During the action I cut off six legs in the cockpit, which were nearly divided by cannon balls.

Still further details of the action appear in the following extract from a letter to his father:

NEAR THE HEAD OF LAKE ERIE,
ON BOARD THE U. S. SLOOP LAWRENCE,
September 22, 1813.

Before the arrival of this an account of our victorious engagement with the British squadron on this Lake will reach you. I can only add a few particulars. Most of the action was supported by this vessel, as you will suppose when informed that out of one hundred and fifty men (our ship's crew), thirty-one of whom were sick previous to the action, we had rising eighty killed and wounded, among whom were nearly all our officers save the intrepid Commodore. On board all the others were about thirty killed and wounded. This vessel was engaged with the enemy's two ships on one side and a brig astern raking us for two hours, all within musket-shot, during which we rendered the ships unmanageable, and when this vessel could not discharge another gun, the Commander repaired on board the *Niagara;* and within fifteen minutes after he arrived within close action with them, the enemy's three vessels struck.

Unfortunately for the wounded, the two surgeons had been confined for several days with fever, and could render them but little assistance. It has however operated in my favor, as I have had all the amputations to perform; and it affords me the greatest pleasure to reflect that in no case have I failed of the best success. This has inclined the Commodore's opinion so much in my favor that I have no doubt he will render me assistance towards obtaining a better situation. He is the first warm friend I have met with in the service capable of assisting me. I am now on my way in the *Lawrence* for Erie, having all the sick and wounded of the squadron on board, and shall continue in the hospital with them till they in a measure recover, and will then direct my course toward Cape Home.

General Harrison was on board the *Lawrence* this morning, and his army was on an island within half a mile of the vessel. It is supposed to consist of at least eight hundred regulars, militia and Indians. To-morrow they cross to Malden, a distance of about eighteen miles. Since the capture of the British squadron, the Indians have evacuated Detroit, after burning the place, and (as is reported) massacring the inhabitants. The enemy's squadron mounted more guns than ours, and carried more men by at least one-fourth. I had some narrow escapes for my life during the action. Five cannon balls passed through the room in which I was attending to the wounded. Two of the men I had dressed and laid aside in the commencement of the action were killed, before it closed, by other shots.

I have had very poor health all the cruise, am reduced to a skeleton, but am recovering. Never will I cruise again on this lake or any other. The action was fought within about ten miles of Malden. The enemy came out over night for the purpose of attacking us, and in the morning were within about fourteen miles of us, the wind in their favor. We made sail to meet them, and the wind changed in our favor, which gave us an advantage over them. They had more killed and wounded than we.

It was a unique and almost unparalleled experience for a surgeon to have such a burden of casualties thrust upon him in so short a period of action, and the results speak well for Doctor Parsons's skill. Twenty-two officers and men were killed on the *Lawrence*, and several others with shattered limbs died shortly afterward. The wounded on the *Lawrence* numbered 61; in the whole squadron 96. Except for a consultation with two British surgeons on September 13, and assistance rendered by a surgeon sent him on the 14th from General Harrison's army, Doctor Parsons handled all the wounded himself. In referring to his work, Commodore Perry, in a letter to the Secretary of the Navy stated:

Of Dr. Usher Parsons, surgeon's mate, I cannot say too much. In consequence of the disability of both the other surgeons, Drs. Horsely and Barton, the whole duty of operating, dressing and attending nearly an hundred wounded, and as many sick, devolved entirely on him; and it must be pleasing to you, sir, to reflect that, of the whole number wounded, only three died. I can only say that, in the event of my having another command, I should consider myself particularly fortunate in having him with me as a surgeon.

Doctor Parsons attributed his success in the treatment of the wounded to several factors. From the 12th to the 22d of September they were lodged in the open air on the upper deck of the *Lawrence*, sheltered by an awning. In addition they had a plentiful supply of cordials, fresh vegetables, and provisions, and finally they were buoyed up by the cheering influence of victory. On September 23 the *Lawrence* reached Erie, and the sick, wounded, and prisoners were landed and placed in the hospital there. For nine months Doctor Parsons continued in charge of this hospital at Erie, during which time he made many friends and formed many endearing associations there, which were a great source of pleasure to him in later years.

Congress voted medals commemorative of the Lake Erie victory to all participants and Doctor Parsons received one of them in common with other officers. He also received a share of prize money, which was used to pay off the balance of debt incurred in obtaining his medical education. Not the least of the rewards which came to him as a result of his service on the Lakes was the surgical experience and Commodore Perry's friendship.

During the period from January 1 to February 5, 1814, he appears to have had service with the land forces at Erie, being assigned as surgeon of the Twelfth Regiment, Pennsylvania Militia, by orders from Maj. Gen. David Mead.

On April 15, 1814, Doctor Parsons received his promotion to surgeon, and on the 19th he sailed with the fleet from Erie for Detroit and Lake Huron. Troops were embarked at Detroit, and the combined land and sea forces then proceeded through Lakes St. Clair and Huron, and attacked Fort Mackinac. The attempt to reduce the fort was unsuccessful, and several officers and men were lost. The fleet returned, and Doctor Parsons was back at Erie on September 21.

The incidents of Doctor Parsons's career from this time on are best described by quoting directly from the "Memoir of Dr. Usher Parsons" by his son. Except for a few minor changes in phraseology the text of this work has been followed strictly:

Perry had returned to the seaboard, and been appointed to command the new frigate *Java*, building at Baltimore, and was allowed to select his own officers. He chose several of his companions in lake service, among others, Dr. Parsons, who on the second of December, 1814, received orders to report to Perry at Baltimore. He was attached to the *Java*, under Perry, through the years 1815 and 1816. He appears to have now revisited his native village. It was at this period that he first came to Providence, traveling by stage with his comrade, Thomas Breese. They lodged at the house since known as the "Manufacturers Hotel." He passed the year 1815 mostly with the frigate, at Baltimore, Norfolk, New York, and other ports. War with England had ceased, and the frigate was ordered to the Mediterranean, to look after American interests, especially in connection with the Barbary States, and the threatening attitude of Algiers.

He sailed from Newport as surgeon of the *Java*, January 22, 1816, and reached the Straits of Gibraltar, February 12. On February 7, in a severe storm, several men were thrown from the masts and yards; some were killed, and others required surgical operations. In assisting to move them, Dr. Parsons was thrown between decks, breaking his right knee-pan. For this, he many years afterwards received a pension. His diary during this voyage of the *Java*, contained an account of his daily occupations, with full description of local customs and interesting places. He visited Gibraltar, Malaga, Port Mahon on the island of Minorca, Algiers, Tunis, and the ruins of Carthage, Tripoli, Messina, Palermo, and Naples. Perry gave his officers every proper facility for excursions on shore, which were often made by several of them in company.

On arriving at Algiers, April 1, they found the British fleet, under Lord Exmouth, which had gone there to secure the liberation of Christian slaves, and prevent future enslavement of captured citizens. The barbarous customs of piracy and the reduction of captives to servitude, and of demanding tribute from commercial nations, were beginning to call on that State the vengeance of the great Christian powers. In 1815, Decatur had secured by force of arms a treaty which relinquished claims to tribute from the United States, and released all American captives. Lord Exmouth now visited Algiers for a similar purpose. He obtained the release by a large ransom, of several hundred Christian slaves mostly belonging to nations of Southern Europe. Dr. Parsons writes, April 7: "The British fleet departed for Tunis with Christian prisoners. They paid from five hundred to one thousand dollars per head for them, except a very few belonging to the British, which were not ransomed.

Misunderstanding arose between the Dey and Commodore Perry, and a fight was expected. Dr. Parsons writes, April 8: "Volunteered my services to go in Captain Perry's boat, and prepared both for fighting or doctoring."

In May, he set out from Messina to visit Mount Etna. The excursion occupied four days. He was accompained by Dr. Hoffman, of the United States Navy. His diary describes the villages and ancient ruins that they passed,—the three regions, torrid, temperate and frigid,—the exhausting ascent of the great cone, and the grand view from its summit, the sea, the flaming islands of Lipari, the varied landscape of Sicily, and the slopes of the mountain itself, its successive zones, its many villages, and its black rivers of solidified lava. From the village of Nicolist, which is half-way up the mountain, he was accompained by a local magistrate, who had never before visited the crater; and who, reading in an old French Gazeteer that Lima was in South American inquired whether the United States were near that.

While at Naples, he examined repeatedly the remains of Pompeii and Herculaneum.

His journal of this voyage ends abruptly, at Naples, July 21. The *Java* revisited several ports on the Mediterranean, Tripoli, Algiers, Malaga and Gibraltar, and sailed in January, 1817, for the United States, bearing a new treaty with Algiers. The crew suffered with the small pox on the homeward voyage. On the occurrence of the first case, the men were mustered, and it was found that eighteen of them had never had either small pox or kine pox. They were vaccinated, but with matter brought from the United States a year previously, and the vaccination failed. Dr. Parsons thereupon inoculated them with small pox virus, and all had the disease mildly. Some continued sick when the *Java* arrived in Newport, and the town authorities gave permission to "land a number of persons from on board the said ship, with the small pox, at Coaster's Harbor island."

A more detailed report of the circumstances attending this epidemic was made by both Commodore Perry and Dr. Parsons, as will appear from the following letters:

U. S. Ship Java,
Newport, March 3, 1817.

Sir: The *Java* having arrived in the United States with several cases of the small pox on board; it becomes a duty which I owe to myself to account to you for a circumstance, which may appear to shew a want of that attention in me, so essential on the part of a Commander toward the health of his crew.

The Invalids of the Squadron together with a number of men whose term of service had expired were sent on board the *Java* a few days before my departure from Port Mahon, and exchanged for an equal number of her crew. Shortly after sailing a case of the Small Pox was discovered, and an attempt was made to vaccinate those who were in danger of taking the infection; but unfortunately the matter proved bad. It therefore became necessary to innoculate them for the Small Pox, and to my surprize, on inquiry it was found necessary to perform this operation upon eighteen of those who had lately been received on board. The same number, I regret to add, have since taken it in the natural way, four of whom have died. I had taken the precaution to have the *Java's* Crew vaccinated prior to my leaving the U. S. States.

Permit me Sir, to suggest for your consideration the propriety of making it the duty (by a special order) of the Commander and Surgeon of a public vessel and of Surgeons attending Rendezvous, immediately on a man's being shipped or received on board, who has not been vaccinated, to cause the same to be performed on him, and that the former be directed to report to the Department before sailing on a Cruise, their performance of this duty; and that the Surgeons be directed to keep constantly on hand a sufficient quantity of the vaccine matter.

For your further information Sir, I have the honor to enclose a report to me from the Surgeon, Dr. Parsons.

I am Sir, With great respect,
Your Obt. Servt.

O. H. PERRY.

The HONORABLE B. W. CROWINSHIELD,
Secretary of the Navy.

U. S. FRIGATE JAVA,
March 3, 1817.

SIR: Agreeable to your request I here state the particulars of the commencement and consequence of the smallpox in this ship.

The day following our departure from Gibraltar, and eleven days after our separation from the Squadron at Mahon, a seaman was attacked with this disease in its most malignant form. This man was among those whose term of service had expired and who were transferred to this ship to be discharged on their arrival in the U. States. On mustering the others, eighteen reported themselves to have never had either the small or kine pox. By your order they were immediately vaccinated, but with matter that I had brought from the U. States a year previous, and its age had rendered it inert. As soon as it was ascertained that the vaccination would fail, I innoculated them and by the use of medicine with strict attention to diet and regimen, they all underwent the small pox in its most benign form, none of them being confined more than two or three days.

Unfortunately for others, who failed to report themselves for innoculation, eighteen men were attacked with the disease the natural way. Four of them died, and the recovery of many of the other was long dispaired of. I am, however, happy to inform you, that only six now remain on the list, all of whom are convalescing.

Altho' the distress and loss of lives occasioned by this disease are much to be lamented, it must be a pleasing reflection to you, Sir, that you have prevented its spreading among our own crew by ordering their vaccination before we left the U. States. By a similar precaution on board the other ships in the Mediterranean, the serious calamity we have witnessed might have been prevented.

Besides those who died on our passage with the small pox, we have lost three with pulmonary consumption, making in all seven deaths; an unusual loss to be *seen* for one ship, but considering Sir, that in addition to our own sick, we had to take home all the incurable patients of the Squadron and hospital to the number of forty or fifty, and with a long winter passage, the number of deaths will seem as moderate as could have been expected.

I have the honor to be, Sir,
Your mo^s ob'

(Signed) USHER PARSONS, *Surgeon.*

O. H. PERRY, Esq.

The *Java* arrived at Newport on March 3, 1817. On May 13, 1817, Doctor Parsons addressed a letter to the department which reads as follows:

BOSTON, *May 13, 1817.*

SIR: By the order of Commodore Bainbridge I hereby report myself to the Navy Department.

If consistent with the good of the service, I would wish for orders to remain attached to the *Java*, or if this indulgence cannot be granted, I would like to be continued on this station in some other situation. My object in this is to avail myself of the advantages which the town of Boston affords for professional improvement.

It will appear in the following narrative, which is taken from the "Memoir," that his wish to remain in Boston was gratified, and as a result he was enabled to complete his medical education and receive his degree:

In July Doctor Parsons came to Providence, bringing introductions from Commodore Perry and other naval friends, and contemplating a settlement there in civil practice. He resided there four months, boarding at the house of Major McClellan.[12]

In November, he went to attend lectures at the medical school in Boston; and, in March, 1818, he received the degree of doctor of medicine from Harvard University. His dissertation in graduating was on "The epidemic pneumonia of 1812–13, as it appeared about Lake Erie." In that year, he published, in the New England Journal of Medicine and Surgery, a "Surgical account of the naval battle on Lake Erie," and a report of two cases of gunshot wounds of the thorax. He joined the Massachusetts Medical Society at that time. His mother died at Alfred, on the 4th of July.

In July, 1818, he sailed from Boston as surgeon of the frigate *Guerrière*, Capt. Thomas Macdonough, for St. Petersburg, carrying out Mr. George W. Campbell, minister to Russia. He spent about 10 days in St. Petersburg and wrote very full accounts of remarkable objects in that city and of peculiar customs. The frigate sailed thence to the Mediterranean. He was at Copenhagen October 14; off Cape Trafalgar November 4; reached Syracuse in December and spent several weeks at and near Messina. In April, 1819, the *Guerrière* left Messina for Palermo, and afterwards sailed for Naples. Detailed knowledge of this cruise is best obtained from letters to his correspondents in the United States. These show that he took an active and inquiring interest in a great variety of subjects.

[12] Maj. Samuel McClellan, a native of Woodstock, Conn., and a pensioner of the Revolutionary War, died in Providence, February 7, 1850, aged 90 years. His house was for many years a resort of the most prominent lawyers, judges, and politicians of Rhode Island, and was a scene of much original and entertaining talk. It stood on Benefit Street, opposite the present rectory of St. John's Church.

The following letter was addressed to Dr. Jacob Bigelow,[13] of Boston, then professor of materia medica in Harvard University:

PALERMO, *May 8, 1819.*

A few days since, I was favored with an introduction to the Professor of Botany and Materia Medica, and Director of the Royal Botanical Garden of Palermo. He took me through the college and botanical garden, and favored me with a particular description of everything pertaining to them. The college is a superb edifice, enclosed within the walls of the garden, and is furnished with books, prints, herbariums, etc. in abundance. In short, everything about this, as well as the garden, bears the impress of royal munificence. On entering the library, he handed me a book and asked me if I knew the author. It was the *Flora Bostoniensis* (written by Dr. Bigelow). He was much gratified with my reply, as well as with one of your papers on the comparative forwardness of the seasons, which I had taken care to have in my pocket. He observed that he had hitherto been obliged to depend on the botanical gardens of England for all his American plants, but was now desirous of obtaining them direct from America, and asked if I would name his wishes to you.

For the last six weeks our squadron has been in the harbor of Messina about one hundred miles from this. My opportunity for acquiring information of this sea has therefore been very limited. I have seen the other medical school of Sicily, at Catania, which is about as large and well conducted as the one at Palermo, there being about eighty students in each. We sail to-morrow for Naples, from which I shall visit Rome and Florence, and return home through France and England.

At Palermo, he saw the telescope with which the first of the planetoids, Ceres, was discovered by Piazzi,[14] on the first day of the century. He remained at Naples a few weeks, and writes from there a long letter to Mr. John Pickering,[15] of Salem, Mass., in regard to books he had bought for his correspondent. He says:

A word respecting Pompeii, which I have visited four times, with increasing interest each time. Excavations are still carried on, and of all the disclosures of the city, about one-eighth have been made since I saw it in 1816. Then there had been three large excavations, each something more than an acre in extent, ranging in a direction obliquely across the city, and distant from each other

[13] Jacob Bigelow (1787–1879), of Massachusetts, was one of the greatest of American botanists, the three volumes of his American Medical Botany (1817–1820), illustrated with 60 plates and 6,000 colored engravings, technically devised by himself, being a work of international reputation, and, in America, approached only by the writings of Barton, Rafinesque, Porcher, and Asa Gray. Bigelow was visiting physician to the Massachusetts General Hospital, professor of materia medica at Harvard, and a great medical reformer. During the cholera epidemic of 1832 his wise sanitary rulings limited the mortality in Boston to 100, as against 3,000 in New York City. His discourse On Self-limited Diseases (1835) exerted a powerful influence upon medical practice in the United States, and, in the words of Doctor Holmes, did "more than any other work or essay in our own language to rescue the practice of medicine from the slavery to the drugging system which was a part of the inheritance of the profession." In 1855 Bigelow published an anonymous volume of clever poetical travesties entitled "Eolopoesis." (Garrison.)

[14] Giuseppe Piazzi (1746–1826), an Italian astronomer. He became professor of astronomy and mathematics at Palermo in 1781, director of the new observatory there in 1791, and director of the observatory at Naples in 1817. He discovered Ceres in January 1, 1801, and published star catalogues in 1803 and 1814.

[15] Pickering, John (1777–1846). An American philologist, son of Timothy Pickering. He published "Vocabulary of Americanisms" (1816), a Greek-English lexicon (1826), and "Remarks on the Indian Languages of North America," 1836.

about ten or twelve rods. Since that year, streets leading from one excavation to the other have been cleared out, with the houses on each side of them, so that you can now walk through the ancient city and suburbs a distance of three-quarters of a mile, on the same pavements that the inhabitants did two thousands years since.

From Naples, the cruise was continued along the Barbary coast to Gibraltar, arriving there in the middle of June. He there received permission from Commodore Charles Stewart, dated United States ship *Franklin*, Gibraltar, July 15, 1819, to leave the *Guerriere*, on account of ill health, and "return to America, or make a trial of the air of the north of Europe." He thus writes:

My reasons for leaving the squadron are, that the Mediterranean climate disagrees with my health, on account of the heat and confined air of a berth-deck; and secondly, because I am very desirous of making the tour of Europe for the purpose of professional improvement, and do not expect to meet with another opportunity so favorable as the present; lastly, I am so exceedingly tired of the monotonous scenery of a man-o'-war, of the perpetual jarrings that occur, and of the restrictions that are imposed on officers, that a change seemed desirable for the health of the mind as well as body.

He left Gibraltar July 20, and went as passenger to Leghorn. He then visited Pisa, in company with Captain Macdonough. He journeyed thence to Lucca and Florence. He examined the medical institution in the University of Pisa, and took great delight in anatomical preparations in wax at Florence. He thence went by carriage to Rome, and there passed some days, visiting the hospitals as well as the objects of general interest.[16] From Rome he embarked, September 6, in a small schooner for Leghorn, having only "the hard deck for a feather bed and without any covering; nor would any other have been of service, on account of the millions of fleas in the vessel." The voyage along the Tuscan shore was very uncomfortable. At a small unnamed port, "was called on to see an aged female afflicted with partial blindness, and another with fever. A jolly old bacchanalian is physician to about twenty soldiers who are stationed here, and to the few inhabitants. He professed great veneration for the Brunonian system of medicine, and his bloated face indicated the sincerity of his faith, though his apparel gave him the appearance of a Shakspeare's apothecary." He arrived in Leghorn September 10.

He then journeyed through Genoa, Nice, Aix, Avignon, and Lyons to Paris, arriving there September 29. He thus writes to Dr. Lyman Spalding:[17]

[16] Little of interest appears in his notes written at Rome, except the following: "The present season a steamboat, with appropriate machinery, was ploughing up the bed of the Tiber, but I did not learn that anything was found."

[17] Spalding, Lyman (1775–1821). Originator of the U. S. Pharmacopœia.

PARIS, *November 29.*

Having been pretty busily engaged for two or three months in attending hospitals and medical schools, I have thought it probable you might feel some curiosity to know how I have found them. These establishments are so numerous and employ so many lecturers and professors that a stranger at first sight would believe the attention of the whole city is directed toward them. I have attended the lectures of some whose names are familiar to you, particularly Dubois, Boyer, Dupuytren, Richerand, Alibert and Larrey on surgery,—Vauquelin, Chaptal, Gay Lussac, Thenard and Abbé Hauy on chemistry. It is difficult to determine which surgeon to rank first, Dubois, Boyer or Dupuytren. The two first are older and consequently more experienced, but Dupuytren has been at the head of Hotel Dieu for several years, and during the time has performed more operations than all the other surgeons in Paris. I am willing to acknowledge him the best operator I have yet seen, although I think very highly of the other two and of Larrey. * * * Larrey is surgeon of the hospital of the king's guards, which is but a small establishment. An opinion prejudicial to him prevails, that he is too fond of cutting—that he has frequently amputated where it was not necessary. Medical gentlemen are permitted to see his patients every Thursday, when he gives a particular history of every case, and performs some operations. The last time I was there, I took the liberty of introducing myself to him, which he gave me no reason to regret doing; he inquired about hospitals in the United States. I have found the people here very ignorant of the state of medical science with us, and yet very desirous to be better informed. This circumstance has induced me to supply one of the journals with a short description of our contemplated Dispensatory. I have had the honor of becoming acquainted with Drs. Swediaur, Pinel and Cuvier. The two former are very advanced in life, and the latter is now turning politician.

In another place he writes:

Cuvier has exchanged natural history for politics; he has lately been erected a peer, and is a leading ultra royalist, as well as a noisy one. The liberals have enrolled his name in the list of political weathercocks, or among those who have turned at every change of government in France. Cuvier still holds a professorship, and continues his residence in the Garden of Plants, and gives a weekly levee in imitation of Sir Joseph Banks, to which all strangers are invited.

Sir Humphrey Davy passed through here not long since, on his way to Naples, to unroll the Herculaneum manuscripts. While here he examined the chemical laboratory, with other things connected with his scientific pursuits; but Englishmanlike, as the French say, he turned up his nose at everything. Every object they offered for his inspection, he considered as unimportant, or said it was borrowed from England.

The following are extracts from his notebook, entitled, "Surgical notes and observations made in different cities in Europe, particularly in Paris and London," in which he gives short accounts of hospitals and medical schools in Palermo, Messina, Naples, Florence, Pisa, Genoa and Nice:

La Charite (Paris; October 13). Went through the wards with Boyer, his son-in-law, Roux, and about thirty students. Saw nothing but bad ulcers and those badly managed. The French surgeons are neither neat, scientific nor successful in their treatment of ulcers, wounds, etc. They rarely attempt to heal by the first intention; even in amputations below the knee, the first surgeons are in the habit of stuffing the stump with lint to prevent its closing by the approximation of the skin of the sides. This practice is condemned in England and must ere long be in France. In regard to inhumanity and disregard of life, and the practice of poulticing inflamed limbs, he also severely criticises the hospital surgeons of Paris.

Larrey's manner of operating is pleasing. He uses the knife adroitly and gracefully, and is neat in his dressings. He is humane and solacing in his behavior to the patients, differing in this respect very much from Dupuytren, whose behavior to them is savage. This is the more remarkable when it is considered that D. has always been in civil life, while L. has always been in military practice where sympathy and fine sensibilities are less known. Their stature is much alike, both being very stout and very stately in their appearance. Larrey is very ready and pertinent in his remarks.

November 11. Went early to the hospital Salpêtrière to attend the physician in his rounds. Enquired for M. Pinel, who is physician-in-chief and at the head of the institution, and sent in to him my address, with a request that I might accompany him through the hospital. He invited me into his study, and after some enquiries about American hospitals, etc. we made a tour first through three large wards full of women past sixty years of age, and who were ill. After prescribing for these, we visited the lunatic apartments in which are women in every state of mental disorder, from slight melancholy to furious mania. Those of the latter description were many of them chained, and others shut up in prisons. * * * I found in this instance, that introducing myself to the professor had as good if not better effect than a letter would have had.

He bought many medical books and instruments in Paris. Among these was Laennec's treatise on auscultation, with a stethoscope of the original pattern, now a curiosity of medical history, and certified to have been "examined and used by Laennec."

Among other acquaintances formed in Paris was that of a genial and accomplished Englishman, Mr. William Clift, a pupil and connection of the great British physiologist and surgeon, John Hunter. This acquaintance, renewed in London, ripened into a lifelong friendship with Mr. Clift and his family, including his son-in-law, Prof. Richard Owen, the eminent comparative anatomist. These friends corresponded with Doctor Parsons for many years, and their kindness was continued to his relatives and to visitors whom he sometimes introduced to them by letter.

He went from Paris to London, arriving there December 4, and remaining till Christmas. In those three weeks he became acquainted with many of the most eminent surgeons and savants of London—Sir Astley Cooper, Abernethy, and others. He attended the levee of Sir Joseph Banks. He breakfasted with Sir Astley Cooper, but found him pressed with business. He gave considerable attention to the Hunterian Museum at the college of surgeons and contemplated the formation of a museum of anatomy founded on a principle suggested to him there, viz, that of bringing together specimens of corresponding organs and sets of organs from as many as possible of the different classes and orders of the animal kingdom. He attended two meetings of the Royal Society. Besides the usual sightseeing, he saw Kean play Hamlet at Drury Lane and heard a debate in the House of Lords, by Russell, Castlereagh, and others, on the subject of "rotten boroughs" and the expediency of admitting representation from large manufacturing towns in the House of Commons. The following extracts are from his diary in London:

December 9. Examined the Museum of the College of Surgeons. This collection is calculated for physiological purposes alone. Every organ of the animal machine is exhibited in as great a variety of animals as they have hitherto been able to collect. The separate organs are preserved in spirit and are arranged from those of the most simple to those of the most complex structure. The museum begins with the simple muscular fibre, rectilinear; then follow single and double penniform muscles, sphincters, etc. Then the organs of digestion and assimilation, beginning with the stomachs of all sorts of animals; then the various organs of mastication, etc. etc.

20. Went to St. Bartholomew's, and heard Mr. Abernethy lecture on organic diseases of the heart to about three hundred pupils, the most interesting lecture I almost ever heard. His manner is peculiar, and the most engaging and amusing as well as impressive I ever heard. Dr. Mason, of New York, makes somewhat such a figure in the pulpit as Mr. Abernethy does here. He is full of illustrative anecdotes which he tells with such a quaintness as to make one laugh. He is about fifty years old, of middle stature, head powdered, dressed in black.

He sailed from Liverpool December 28, in a merchant vessel, and reached Boston early in 1820. He was ordered in May to service at the Marine Barracks in Charlestown. While holding this appointment, he resided much of the time at Cambridge, enjoying opportunities of study and mingling in the learned society of that place. It was at this time, and through the influence of acquaintances gained in Cambridge, that he realized his youthful dream of being appointed teacher of anatomy, which he appears never to have given up since the year 1809. In August, 1820, he was chosen professor of anatomy and surgery in Dartmouth College. He wrote at the time: "Dr. Parsons's motive for engaging in lecturing is a desire to establish a museum of anatomy, human and comparative, on the plan of the late John Hunter's." He contributed a number of preparations, some of them in wax, which he had bought in his last visit to Europe. But he lectured there only one year.[18]

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[18] MARINE BARRACKS,
Charleston, Mass., October 9th, 1820.

SIR: In reply to the enquiry whether it be my determination to resign my commission as surgeon in the Navy, in consequence of having received an appointment as professor in Dartmouth College, I have to observe; that said appointment has not yet been accepted, and that it is my purpose (the department being willing) to continue in duty in my present situation another year, or till one attempt more shall have been made in Congress to improve the Condition of Navy Surgeons.

I have the honor to be,
Very respect.y Your obedt servant,

USHER PARSONS.

HON.e SECRETARY OF THE NAVY.

At this time, he published at Cambridge the Sailor's Physician, a medical guide for use on merchant vessels. This was extensively sold; changed its name to that of Physician for Ships, and passed through five editions, undergoing various revisions and improvements. The four subsequent editions appeared in the years 1824, 1842, 1851, and 1867.[19]

In December, 1820, he left Boston to visit the medical schools of New York, Philadelphia, and Baltimore. He heard lectures from Doctors Hosack, Post, Francis, and Mott in New York, and Physick, Chapman, and others in Philadelphia. A fragment of diary still preserved shows his views of these eminent professors. He introduced himself to them as surgeon in the Navy. His observations show that he was intent on preparing himself for anatomical teaching. The following extract may be worth presenting:

> December 31. Breakfasted with Dr. Hosack. Examined his anatomical museum, which is small. His study is an octagon with a dome of light, and is filled with a choice and very large collection of books. He has a very small private study for the reception of patients. In this he has a small library. On one of the shelves is an elegant volume of Thomas's Practice, dedicated to Hosack, which I had heard he always took pleasure in showing; and to gratify his humor, I anticipated his putting it into my hands by taking it down and asking what work it was. I at once saw what I had often heard, that he took a heartfelt satisfaction in perching upon this book to crow.

In April, 1822, Doctor Parsons began his long residence in Providence. He was for a while partner in medical practice with Dr. Levi Wheaton. He married, September 23, Mary Jackson Holmes, daughter of Rev. Abiel Holmes, D. D., of Cambridge, Mass., author of The Annals of America. She died June 14, 1825, leaving one son. In April, 1823, he resigned his commission in the Navy.

A plan of giving lectures in Brown University, which had failed in 1817, was resumed in 1822. A medical school then existed at this institution, and Doctor Parsons was appointed professor of anatomy and surgery.[20] Beside lecturing to the medical students, he gave a

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[19] Two editions of this work have been found in the Naval Medical School Library, with titles as follows:

Parsons, Usher, M. D. Fellow of the Massachusetts and Rhode Island Medical Societies, and formerly Surgeon of the U. S. Navy.

The Sailor's Physician, containing Advice for Seamen and Other Persons at Sea, on the Treatment of Disease and on the Preservation of Health in Sickly Climates. Second Edition. Providence: Printed by Barnum Field & Co. 1824.

Parsons, Usher, M. D. Late Surgeon in the U. S. Navy, and President of the Rhode Island Medical Society; Honorary member of the Massachusetts, New Jersey, Philadelphia and South Carolina Medical Societies.

Physician for Ships, containing medical advice for seamen and Other Persons at Sea, on the Treatment of Diseases, and on the Preservation of Health in Sickly Climates, and also in California. Boston: Printed by Damrell & Moor, No. 16 Devonshire St., 1851.

[20] His associates were Drs. Levi Wheaton, professor of theory and practice of physic and obstetrics; John De Wolf, professor of chemistry; Solomon Drowne, professor of materia medica and botany. Wheaton was a pioneer physician of Providence, born there in 1761.

short annual course to the higher classes of undergraduates. In 1826 he published an introductory lecture on anatomy and physiology as branches of general education. The policy of President Wayland requiring the officers of instruction to be also officers of discipline and give their whole time to collegiate duties necessarily severed his connection with the university. His special interest in anatomy, awakened in his youth by the lectures of Doctor Ramsay, continued through his whole active life. In 1831 he published at Philadelphia a volume, mostly compiled, on the Art of Making Anatomical Preparations.

From the time of the death of his wife until the year 1831 he boarded at McClellan's. In 1832 he built a one-story office of three rooms on President, now Waterman Street. This he afterwards enlarged and occupied until his death. Until the marriage of his son in 1853 he had no home establishment, but took his meals at hotels or boarding houses, and generally slept in his office. He liked the freedom of this way of living. During the last 15 years of his life he had a home with his son.

He rose gradually to a very prominent rank in his profession. Besides his varied opportunities, which brought him to the beginning of civil practice with more than usual experience and resources, he had many qualities of body and mind that fitted him for medical life. He was robust, with uncommon powers of endurance, and a frame strengthened by labor in early life. He was industrious, persevering, ambitious, and social; faithful in attendance, and considerate in his charges. His early training in naval service, and the predominance of the reflective powers, fitted him rather for the office of consulting physician, and for cases of exceptional difficulty, than for the ordinary run of daily medical practice. He had not that easy tact, that quickness of thought and command of language and features which were conspicuous in some of his contemporaries. Yet in many families of refinement and education his acquirements were appreciated and his ready sympathies and sound judgment made him a trusted adviser and friend. As consulting physican and surgeon he was very widely known in Rhode Island and in neighboring parts of other States. For many years a large part of his practice was out of Providence. He was a fast driver; and, before the railroads were multiplied, his sulky was well known on the roads leading from Providence in all directions.

He served as a surgeon of a privateer in 1782, and being captured by the British was detained a prisoner in New York, where he was put in charge of the prison ship *Falmouth*. When the Brown University Medical School was organized in 1812, Doctor Wheaton became professor of medicine in that institution. He was a sound practical physician, a fine classical scholar, and a writer of ability. He died in Providence in the year 1851.

His naval experience had turned his attention particularly to surgery. In European hospitals he appears to have observed surgical cases almost exclusively. As an operator he was more marked for caution than dexterity, and was particularly methodical in the preparation and arrangement of instruments and dressings. He used to point out a house in Smithfield where he first operated for strangulated hernia in 1823. Being little acquainted with the operation, he studied it up, perhaps, in Scarpa's treatise, which he had bought in Paris, while the messenger was conveying him to the house. In the American Journal of Medical Sciences, 1848, he published a summary of his large surgical operations. He reports 15 cases of herniotomy, with 11 recoveries. He performed lithotomy only once and successfully on a patient in Apponaug, aged 74 years. He tied the common carotid artery for a supposed tumor in the brain, producing intense headache and total blindness; the symptoms were relieved, but returned and ended in death. He extirpated the eyeball, with the lachrymal gland and much of the other textures in the orbit, as was then the common practice, instead of the milder process of enucleation. He operated frequently for cataract. He was at one time much interested in the surgical treatment of deformities and performed tenotomy often. He contrived and used with fair success an apparatus for securing a union in cases of cleft palate.

It was only in the latter part of his professional career that he enjoyed the advantages of etherization in surgery. He never became so fully at home with it as the later generation of surgeons. In the greater part of his operations the only anæsthetics at his command were such as laudanum and brandy and words of encouragement and sympathy. While in active practice he gave a great deal of attention to private pupils in medicine, having often several at a time and more than 50 in all. He very commonly had private dissecting classes in the winter.

After becoming well established in practice, Doctor Parsons allowed himself more liberty in regard to absence from Providence than is usual with equally busy physicians. In the autumn of 1843 he visited Europe for the third time, contemplating a journey to Egypt, but going no farther than Paris, where his son was studying medicine. He spent some days in London on his outward journey, renewing his acquaintance with Mr. Clift and attending a meeting of the Geological Society, where he saw Doctor Buckland, whose Bridgewater Treatise he had read with great interest. In Paris he frequented the hospitals and took copious notes of surgical cases, as he had done 24 years earlier. A few extracts from his diary show the character of his observations:

There is to my mind an unaccountable aversion on the part of French surgeons to attempt uniting wounds after operations, by the first intention. To-day, the flaps made in the amputation might have been brought together, a depending opening left, and the whole or nearly all the wound closed; instead of which the old system in vogue twenty-three years ago is continued, of stuffing the wound with charpie or lint.

There is in French surgeons an indifference to life that seems inhuman. They operate when they should not; when they must know that the advantages to be gained are not to be compared with the risk of life, and the certain amount of severe pain that must be suffered from the operation.

He bought several valuable instruments and anatomical preparations in Paris. He also bought a copy of Josephus, printed by Schussler at Augsburg, 1470;[21] and the Annals of the World's History, printed by Walch at Venice, 1479, and adorned with woodcuts representing the Tower of Babel, Nineveh, Solomon's Temple, etc. He was in Paris from November 19, 1843, till February 19, 1844, when he set out for London. He there received polite attentions from Mr. Richard Owen, Bransby Cooper, Mr. South, Dr. John Forbes, and other distinguished surgeons and men of science; visited the largest hospitals, and attended a meeting of the Royal Society. He left London March 8 for Liverpool, Glasgow, and Edinburgh. Returning to Liverpool he there passed several days in the agreeable society of some old American friends and sailed April 4, bearing dispatches from the minister, Mr. Everett. He arrived in Providence April 22, 1844.

Doctor Parsons joined the Rhode Island Medical Society in 1823. In 1837 he was elected president of the society for three years, without having passed through the usual stages of vice presidency. He was a constant attendant at its meetings, and contributed several papers to its transactions. These were mostly on strictly medical subjects. One had a semihistorical character. In 1859 a committee was appointed to prepare sketches of eminent deceased physicians of Rhode Island; and Doctor Parsons, as its chairman, compiled from various sources a pamphlet on this subject. It contains notices of nearly 40 physicians who lived on the island of Rhode Island, mostly in Newport; of the Bowens and others in Providence, and the north part of the State; and longer articles, contributed by other writers to the chairman, on Doctors Levi Wheaton, Solomon Drowne, Peter and William Turner, Charles Eldredge, Edmund T. Waring, and David King, all deceased.

His latest printed communication to this society was a "Letter on some points of military surgery," read December 19, 1860; and reciting some of his experience on the Great Lakes. This paper would appear to have been suggested by anticipation of the Civil War.

[21] Beloe, William: Anecdotes of Literature and Scarce Books, 1810, Vol. IV, p. 109. "This is a very rare and very curious book * * * in Gothic characters * * * the first printed by Schussler. (F. L. P.)

When the American Medical Association was organized in Philadelphia in 1847, Doctor Parsons was present as delegate, and took an active part. In writing of the receptions then held, he says: "It was gratifying to me to find whenever I introduced myself to any stranger,—which I did a dozen times this evening,—as Dr. Parsons of Rhode Island, they all called me at once by my christian name, having read of my writings through journals." For many years he attended the annual meetings of this association, successively in Baltimore, Boston, Cincinnati, Charleston, Richmond, New York, St. Louis, and Philadelphia. In 1848 he was appointed chairman of a committee on adulterated drugs; and, in 1849, chairman of the committee on medical sciences. His report on this last subject contains a summary of the "progress of American medicine during the year." In 1853, at New York, he was elected first vice president. In 1854, at St. Louis, he acted in the place of president at the early part of the meeting, and as such delivered the opening address; the president, Dr. Jonathan Knight, of New Haven, being unable to attend.

He was honorary member of the medical societies of Massachusetts, Connecticut, New Jersey, and South Carolina.

Doctor Parsons was an industrious writer on professional subjects. He wrote frequently for the premiums instituted by Ward N. Boylston, Esq., of Massachusetts, and awarded by a committee appointed by the corporation of Harvard University for dissertations on "medical, anatomical, physiological, and chymical subjects." Four of these prizes were awarded to him, viz, for dissertations on periostitis, 1827; on eneuresis irritata, 1828; on "The connection between cutaneous diseases which are not contagious and the internal organs," 1830; and on cancer of the breast, 1835.

The other subject proposed for the year 1830 was the comparative influence of animal and vegetable decomposition in producing fever. The premium for the best dissertation on this subject was awarded to Dr. Charles Caldwell, of Kentucky; but Doctor Parsons's essay on the subject was highly praised by the committee, with a wish that it might be published and its author's name made known. He also received the Fiske Fund premium in Rhode Island in 1842 for an essay on spinal diseases. These six papers were published in a volume. He contributed numerous articles to different medical journals.

In 1831 he was appointed professor of obstetrics in Jefferson Medical College, Philadelphia, and lectured there the following winter. Some valuable models for illustrating these lectures were lost at sea, on their way to Philadelphia. The subject was one for which his experience had not particularly qualified him. He did not afterward accept any appointment which would require him to reside away from Providence.

Doctor Parsons had long been impressed with the need of a general hospital in Providence and he played a prominent part in securing a State charter for this institution and in obtaining bequests for its support.

When the Rhode Island Hospital was organized he gave $1,000 to it. He followed the progress of the undertaking with great interest, though he had then withdrawn from medical practice. He gave about 300 volumes to its library and bequeathed it $100 by will. He was at first appointed at the head of its consulting staff.

Doctor Parsons had too active a mind to rest satisfied with the knowledge required for everyday medical practice. He investigated many subjects more or less connected with his professional studies. When the doctrine called phrenology was presented in Boston, graced by the zeal and eloquence of Spurzheim, Doctor Parsons gave much attention to it. Dr. Jonathan Barber gave a course of phrenological lectures in Providence; and Doctor Parsons followed him in a short course, illustrated by many crania and models, describing the anatomy of the brain and concurring in the general principles of phrenology, but opposing the extravagant claims of the so-called science.

In 1837 he obtained a charter for the Rhode Island Natural History Society, of which he was chosen the first president. It held several meetings and made some collections, but never attained the position of a working scientific society. He kept up the practice of collecting specimens. He purchased and read the geological works of Buckland, Hitchcock, and others. He had some knowledge of field botany, and occasionally gave private courses of botanical lectures to classes of young ladies.

In 1831 he prepared an address on temperance, which he delivered in Providence and other places, and which was afterwards published. In 1840 he lectured before the American Institute of Instruction, at its meeting in Providence, on the connection and reciprocal influence of the brain and stomach. In this as in other addresses partaking of a physiological character, he dwelt much on the doctrines of Bichat, whose treatise, "Sur la Vie et la Mort," had made a great impression on his mind, and was habitually recommended by him to his medical pupils.

His reading on subjects not connected with physical science was mostly in works of history and travel. He took little interest in purely imaginative literature. He read few of the classical novels. A special interest in the remains of Pompeii, which he had carefully examined when cruising on the Mediterranean, led him to buy and read Bulwer's Last Days of Pompeii. In poetry, his favorites were Thomson and Young. He often read through the "Seasons" as the seasons came around, and was equally familiar with the "Night Thoughts." He selected the opening lines of this poem for his son to speak at a school declamation when less than 10 years old; and it will be readily believed that they were not very intelligently or impressively uttered. He was also a regular reader of the Bible. Besides frequent recurrence to certain favorite parts, especially in the Psalms, he read through the Bible, with probably some omissions, four times in the last 30 years of his life. He thus wrote in his notebook November, 1837:

I have this day finished the Old Testament, which I began in June 1837. I cannot but think that the Christian religion would gain by excluding some of the books. Two-thirds of what follows the first chapter of Jeremiah might be omitted, and all of Solomon's Song. These writings of the Prophets might be transferred to the Apocrypha, or incorporated into a separate division of the Bible, and considered as elegies on the woes prepared by Divine Power to bring upon this ill-fated people the Jews. The Bible, after such an exclusion, would be read more generally, intelligibly and thoroughly,, than it is while encumbered with such a mass of matter so irrelevant to subsequent ages of the world. As a rule of life, and a history of God's government and the plan of salvation, an abridged volume might be formed for general circulation, which would embrace all that is essential. I shall now commence reading Tyndall's New Testament with notes.

His ecclesiastical relations were peculiar. He was brought up in congregational worship and the faith of the Puritans.[22] Soon after his marriage he was admitted to the Episcopal communion at St. John's Church. In later years he had a seat in one place of worship after another—St. John's, the First Baptist, St. Stephen's (now Church of the Saviour), and the Central Congregational Church. For the last 12 years of his life the latter was his usual place of attendance on Sundays and the only one where he owned a pew, though he frequently partook of the communion of the Episcopal Church. He often went to other churches, especially the Unitarian, under the ministry of Dr. Edward B. Hall, whose preaching he much admired. After hearing him on Thanksgiving Day, 1853, he wrote in his notebook: "I wish he and other Unitarians would follow after St. Paul's example and preach a little more about Christ and Him crucified. At the same time, I wish orthodox would preach more practical sermons and not be forever harping on particular doctrines of the Calvinistic order." In his busiest years of practice he was remarkably regular in attending church once or twice on Sunday.

He seldom took an active part in politics. He voted with the Whig Party in its day. The nomination of General Harrison for President awakened a special interest in him on account of the general's con-

[22] His grandfather, the minister of Bradford, was suspected of Arminianism. Whether any traditionary influence inherited from him softened the rigor of Calvinistic belief in the family of his son William is not known.

nection with Commodore Perry and the service on Lake Erie. Doctor Parsons wrote several newspaper articles in favor of Harrison which were widely reprinted and spoke on the same subject in the old town house October 19, 1840. He was appointed messenger to carry the electoral vote of Rhode Island to Washington and handed the package of votes to Vice President Richard M. Johnson. When the suffrage troubles arose in Rhode Island he did not share in the attachment felt by many natives of this State to the charter of 1663, and his sympathies were with the movement for enlarged suffrage. Mr. Thomas W. Dorr[23] was his intimate friend. But when the affair took on a revolutionary character he rallied to the support of the existing government. He acted as volunteer surgeon of the marine artillery. The subsequent imprisonment of Mr. Dorr was exceedingly distasteful to him. He exerted himself to procure his release by circulating petitions, etc.; but his course did not suit the uncompromising views of Mr. Dorr, and was unavailing. Immediately after the passage of the act of liberation he visited Mr. Dorr as physician and friend.

On the outbreak of Civil War, in 1861, he offered his services as surgeon, in a letter to Governor Sprague. He was commissioned, in June, 1861, surgeon of the Providence Horse Guards. He followed the various fortunes of the conflict with intense interest. At the time of the presidential election in 1868, his last illness had begun; he had been confined to the house 16 days, and walked with difficulty. The warden came down from the wardroom, and met him in the lower entry, where a chair had been arranged, and he gave his last vote for Grant and Colfax.

From an early age he was interested in tracing the history and genealogy of his family. Till the year 1834 he did not correctly follow up the line beyond his great-grandfather, Rev. Joseph Parsons, of Salisbury. In that year, he carried on a lively correspondence with the eminent antiquary of Northampton, Sylvester Judd, Esq. Mr. Judd's valuable letters helped him to connect Joseph Parsons, of Salisbury, with the first Joseph, of Springfield, and the second Joseph, of Northampton. He explored old graveyards, old records, and all written sources of genealogical lore. He visited the towns where his ancestors had lived, talked with the old men of those places, and treasured up the knowledge he had learned from their trembling lips. A manuscript book is still preserved, in which he wrote out the history of the families of Parsons, Frost, Usher, etc., with sketches of the lives of individuals, and preserved autographs of many. In 1838, he printed on a sheet an outline of the "Genealogy of the family of Joseph Parsons."

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[23] The leader of the so-called Dorr's rebellion, in the year 1842.

In 1849, he prepared a somewhat elaborate memoir of Maj. Charles Frost, his great-great-grandfather, who was a man of some importance in civil and military affairs, and was killed by the Indians in Kittery, now Elliot, July 4, 1697. This was published in the New England Historical and Genealogical Register, July, 1849. It was founded on materials drawn from old manuscripts obtained in Maine, especially the voluminous papers left by Frost's son-in-law, Capt. John Hill, who commanded Fort Mary, at Saco, from 1693 to 1700. It contains, from the original in his possession, the account of Major Frost's death, written to Captain Hill by Joseph Storer, who was another son-in-law of Major Frost. Doctor Parsons afterwards prepared a genealogy of the Frost family, and an account of "the descendants of Peter Hill, of York County, Maine, with some incidents relating to the French and Indian wars," founded on the same Hill papers.

His most important literary undertaking, the "Life of Sir William Pepperrell," sprang originally out of his genealogical studies. He began to prepare for this task in the year 1846, but suspended it on learning that Pepperrell's life would be written by others. The principal exploit of Pepperrell, in heading the attack on the French fortified town of Louisburg, in 1745, and reducing it after a siege of 48 days, had been fully described by Belknap and other historians. But no extended memoir of Pepperrell had been published. Rev. Dr. Charles Burroughs, of Portsmouth, N. H., and Hon. Lorenzo Sabine, of Framingham, Mass., had both prepared sketches of his life. A connection of the family, Col. George Sparhawk, of Kittery, where Pepperrell's mansion still stood, had talked of writing his biography, and was known to have a great many of his papers, which had lain neglected in a shed or fish house on the estate, till Colonel Sparhawk selected and arranged the more valuable documents. It was after correspondence with these gentlemen and many others that Doctor Parsons determined to carry out the undertaking. He read the State and local histories bearing on his subject, examined the papers in the Massachusetts Historical Society and other public places of deposit, and procured documents from all available sources. The Sparhawk papers, after some negotiation, reached his hands in January, 1851, through the kind offices of Mr. John Blunt, of New York. For four years after that he gave much of his leisure to this work.

Not satisfied with studying the details of Pepperrell's career in its written and printed records, Doctor Parsons visited the harbor and ruins of Louisburg in August, 1852, in company with his nephew, Edwin Parsons, Esq., of New York. They took the English steamer from Boston to Halifax, and then a small steamboat to Sidney, driving thence to Louisburg. An account of his observations there is given in the Life of Pepperrell.

At the beginning of the year 1855, his book was essentially completed, and had been submitted to the friendly criticism of several historical scholars, especially Hon. Mr. Sabine, before mentioned, and J. Wingate Thornton, Esq., of Boston. It was published in May. It was very favorably received by students of colonial history, both in America and England, and was kindly noticed and somewhat copiously analyzed in the leading newspapers and magazines of this country, and in the London Athenæum. The subject being, ante-revolutionary, was interesting both in the mother country, where several descendants of Pepperrell still lived, and in America. It was republished in London in 1856.

Most of the reviews of this book consist mainly of an analysis of its contents, and are hardly fitted for mention here. The following few sentences from a discourse delivered before the Rhode Island Historical Society, by its president, Hon. Samuel G. Arnold, the author of the History of Rhode Island, give one a very good idea of contemporary opinion on this work:

> This work is a very important contribution to our colonial history. The conqueror of Louisburg was one of the foremost men that America has produced. A merchant of vast wealth, whose landed possessions alone extended thirty miles from the Piscataqua to Saco, acquired by his own skill and industry; a soldier whose genius was attested by success in capturing the stronghold of France from its powerful defenders; a civilian whose talents were everywhere admitted to be of the highest order. Sir William Pepperrell was the only native of New England who was created a baronet during our colonial period. The éclat of the war of Independence, has dimmed the fame of the great names of ante-revolutionary days, and whoever aids to rescue from oblivion the achievements and the characters of the mighty men of the past, confers a favor upon humanity, and adds an enduring page to the volume of history. This Dr. Parsons has done in the memoir of his illustrious ancestor. * * * To revive the memory of these school-days of the republic, and to bring before us the men who led in that era of our national pupilage, and who formed the mind and trained the muscle of the growing state, is a pious duty which Dr. Parsons has well performed.

He left in manuscript a history of his native town of Alfred. When a celebration of the hundredth anniversary of the settlement of that town was contemplated, in 1860, he was asked to prepare a historical discourse, but declined on account of impaired health.

For many years, he interested himself in studying the remains, language, and customs of the aborigines of this part of our country. The first record of his meeting with Indians is in the diary of his march from Albany to Buffalo, in 1812. He there writes, October 7, being on the route between Vernon and Whitestown:

> Passed by the Oneida tribe of Indians, consisting of about two thousand souls. The warriors have volunteered their services to assist in prosecuting the war against Canada. Their dress is a shirt which does not extend the length

of the trunk, a cloth pinned around the waist, and extending over perhaps a fourth part of the lower extremities, a pair of broadcloth leggins, moccasons, and a blanket thrown over the body. Their huts are one room, in which are one bench, kettle, pail, dish and samp-mortar. The tribe have two schools attended by all the children, and a church. The conversation of the warriors I could understand, but not of the squaws. This difference may be imputed to the circumstance that the warriors have more intercourse with the white people.

In his rides extending many miles around Providence, he examined the Indian burying grounds, and gradually made a collection of bones, and various utensils, such as hatchets, arrowheads, pots of soapstone, etc. He recorded the Indian names of localities, with the meanings that had been assigned them by tradition or by guess. In 1840, he furnished a barrelful of skulls, from an aboriginal burying place in Washington County, to Dr. Samuel G. Morton, of Philadelphia, author of Crania Americana.

After his principal historical work was published, and when he was about 70 years old, he began to collate and arrange his notes on Indian localities in Rhode Island. He made new researches on this subject, and by examination of various maps, of historical works relating to Rhode Island, and old records, collected many new names, with supposed explanations of some. At length, in 1861 he published a pamphlet of 32 pages, entitled "Indian Names of Places in Rhode Island." It contains more than 300 titles; but some of the names are repeated in different applications; thus, the name Pettaquamscot recurs as given to a river, a tract of land, and a rock. There are a few repetitions from inadvertence, sometimes concealed by an unimportant variation in spelling. In a preface he says:

No attempt is herein made, by the author, to examine Indian names of places as a philologist, or grammarian, but merely to gather such as were in existence when civilization commenced within the State of Rhode Island, according to its present boundary; and, in a few instances, give the meaning or derivation of the word used. I was led to this enterprise, partly for the amusement it might afford in my leisure hours, but more for the purpose of rescuing from oblivion names of places in use among the aborigines, and for the convenience of those who may hereafter wish to apply them to their country villas, factories, or institutions, as has often been done in this and other states.

As early as the year 1841 he visited the Indian burying ground and old fort in Charlestown, R. I., and made some examination of Indian graves. He went there several times in subsequent years, procured various Indian relics, wrote out descriptions of the places, and took part in some attempts at disinterment. In 1860, and again in 1861, he made these entries in his diary:

Saw the old Indian burying-ground and fort, and the articles lately dug up from Indian graves, as coins, wampum-peag, kitchen utensils, chains, iron and silver. * * *

Six of us went to the place and worked with spade till near midnight. Took up a well preserved skeleton, eight feet deep.

When some Indian graves were afterwards opened by another party, Doctor Parsons bought many of the bones and articles found with them, and retained some in his possession at his death. He prepared a paper on this subject, which he read, exhibiting many of the relics, before the historical societies of Rhode Island and New York. This paper was published in the Historical Magazine, February, 1863. It describes the customs of the Indians in regard to burial, sketches the history of the Narragansett Tribes, and their intercourse with the Dutch, and particularly of Sachem Ninigret and his descendants, and gives a minute account of the discoveries made in the ancient Indian burying ground, believed to have been the sachem's cemetery. He states the reasons for supposing that the grave in which the most curious articles were found was that of Sachem Ninigret's daughter; and that the adjoining grave was that of the sachem himself, who was living when the country he inhabited was first settled by the English.

Doctor Parson's various labors were recognized by his election to many literary and historical societies. He was a corresponding member of the historical societies of Maine, Massachusetts, New York, New Jersey, Georgia, and Wisconsin, the American Antiquarian Society, The Academy of Natural Sciences, etc. He was an active member of the New England Historical Genealogical Society and was its vice president for Rhode Island from September, 1864, till his death. He joined the Rhode Island Historical Society in 1825 and was a useful member of it, making many contributions to its collections and reading several papers at its meetings.

It is well known that a controversy arose between Commodores Oliver H. Perry and Jesse D. Elliott in relation to the conduct of the latter in the naval battle of September 10, 1813, and that long after Perry's early death the credit of victory was claimed for Elliott by himself and his friends. Doctor Parsons took a warm and active interest in this dispute. He was strongly attached to Perry and convinced that Elliott's conduct was disgraceful. In conversation, by newspaper articles, by contributions to writings published by others, and lastly in a public historical address he vindicated the claims of Perry and the truth of history as he understood it, often in terms reflecting severely on Elliott and his defenders.

In January, 1836, Tristam Burges read a discourse before the Rhode Island Historical Society in which he gave a vigorous account of the battle. In 1839 this was published with copious notes and diagrams of the battle in different positions. Some of these notes were furnished by Doctor Parsons. The "extract from the log book of the *Lawrence*" was taken from his diary. He contributed many notes to the "Life of Commodore Perry," published in 1840 by Alexander Slidell Mackenzie.

646—22——6

In 1852, having been invited to deliver the stated annual discourse before the Rhode Island Historical Society, he chose for his subject "The history of the battle of Lake Erie." "I have made this choice," he says, "first, because this battle is a part of Rhode Island history, and therefore appropriate to the occasion; secondly, because I could speak of it from personal knowledge; and thirdly, because a very inaccurate and perverted account of it has been written and imposed upon the public by the late J. Fenimore Cooper, esquire." He narrates the circumstances which led to the formation of a fleet on Lake Erie, the difficulties under which it was created and got afloat, and the reasons why it is regarded as belonging to Rhode Island history. He relates the incidents of the battle quite fully and then attacks Elliott and Cooper in a style of indignant sarcasm. In the words of Mr. Arnold, "He has done this in a style that leaves nothing to be said upon the points in dispute. His own testimony is direct and incontrovertible. His reply to the assaults of Cooper is comprehensive and complete. A certain irony pervades this portion of the address, which is the appropriate weapon wherewith to treat mendacity of statement when brought to the support of cowardice of conduct and infamy of character." Doctor Parsons had always a fondness for written controversy and could handle the caustic pen as well as the scalpel or saw.

In his more advanced life he became well known in the growing cities along the southern shore of Lake Erie. He often visited that region after his retirement from active practice. Those cities appreciated more and more the importance of Perry's victory, and commemorated its anniversary by yearly gatherings, and occasionally by special observations and various plans for the erection of monuments. Doctor Parsons was the only surviving officer of the battle who had cultivated historical tastes and possessed the powers of writing and oratory.

In 1858, the anniversary was celebrated at Put in Bay Island, near Sandusky, where Perry's fleet had anchored the night before the battle. There was a very large assemblage, and a brilliant display of yachts and steamers. Hon. Salmon P. Chase presided at the ceremonies on the island. Eloquent addresses were made, and three surviving officers appeared on the platform, Captains Champlin and Brownell speaking briefly, while Doctor Parsons read an elaborate narrative discourse. This was received with a great deal of interest by the large audience, and was afterwards printed in all the principal newspapers of Buffalo, Erie, Sandusky, Cleveland, etc. He afterwards wrote in his notebook, "this anniversary was among the most delightful of my life, as well as most interesting."

Two years later the forty-seventh anniversary was celebrated at Cleveland. That city alone successfully carried out the plan of

The Battle of Lake Erie.

From a painting in the Capitol at Washington, by W. H. Powell.

erecting a monument to Perry, which on that day was dedicated. It stands in the park at Cleveland, and consists of a statue of Perry, and of other appropriate sculptures. The dedication, September 10, 1860, was very largely attended. The governor of Rhode Island, with many of her civil and military officers, were present by special invitation. The two most important features of the literary exercises on that day were the oration by Hon. George Bancroft and a historical address by Doctor Parsons.

These three discourses relating to the battle of Lake Erie all give the story in essentially the same way, and show some unavoidable repetition. The two delivered at Put in Bay and Cleveland were not, however, controversial.

In his later journeys along Lake Erie, Doctor Parsons was regarded as a guest of the public, and was passed and entertained as such on the steamboats and railroads. These various acknowledgments of his early services, and the kind reception of his historical discourses, after he had passed the age of 70, gave him the keenest pleasure.

Some other published writings, less known than those before mentioned, attest his permanent interest in his naval reminiscences. In 1836 he contributed to the Naval Lyceum, New York, an article on quarantine. In 1840 he published in the Knickerbocker Magazine, a story, "The Avenger of Blood," founded on an incident that occurred on board the *Guerriere* in 1818. In 1850 he helped to agitate the question of the abolition of flogging in the Navy, and wrote a pungent article on the subject for a New York newspaper. In 1862 he contributed to the New England Historical and Genealogical Register "Brief Sketches of the Officers who were in the Battle of Lake Erie."

A sketch of Doctor Parsons's career would be very incomplete if it did not allude to the tenacity with which he clung to early attachments, and the pleasure he took, during his mature and declining years, in revisiting the scenes of his boyhood and youth. Almost every summer, after he had gained an established position in Providence, he went to his native place and the neighboring towns, where he had struggled with poverty and youthful ambition. No recreation gave him greater pleasure. He kept up intimate intercourse and correspondence with the relatives who still lived there.

He also reverted with the deepest interest to the region about Lake Erie, where he had laid the foundations of success. He revisited this region several times, beside the occasions already referred to, when he delivered historical discourses. In 1835 he made a tour to Lake Erie, in company with Capt. Daniel Turner, who commanded the *Caledonia* in the battle of September 10, 1813. They went from New York to Albany by steamboat, and thence to Black

Rock by canal. The journey by canal occupied three days. Doctor Parsons minutely describes, in his diary, the localities at Black Rock, and enumerates the houses that were standing there in 1812, most of which were destroyed by fire in December, 1813. He could not determine the exact location of the barracks where he had been lodged in 1812. He was joined at Buffalo by Capt. Stephen Champlin, who commanded the *Scorpion* in the Battle of Lake Erie.[24] They visited the *Queen Charlotte*, captured from the British in that battle, and afterwards sunk in the lake. "A company of merchants lately bought the ships, and have raised the *Queen* and refitted her. The captain received us politely, and gave us some pieces of oak from her to make walking canes. Captains Turner and Champlin and myself made out an inscription to be put on a gilded cannon ball that is to be slung in her cabin. Said ball was taken from among her timbers; and, as we stated, was fired by the *Tigris*."

In 1836 Doctor Parsons went to the West in behalf of the "Smithfield Emigrating Land Company." He thus writes, September 4, 1836: "About three weeks since, I caught the western land-fever for speculation, which has ever since occupied my thoughts. Two weeks yesterday I attended a meeting at Scott's pond, and bought four shares. I was chosen member of the purchasing committee, to have my expenses paid." He was absent about seven weeks, went from Buffalo to Detroit, thence to Toledo, where he bought a horse for $60, a saddle, bridle, and blanket for $12. He then traveled horseback to Fort Wayne, Laporte, Chicago, Danville, and Indianapolis. His expenses on this journey, as charged to the company, were $311.25, including the purchase of horse and outfit, which were sold for $41. He then and subsequently bought land at different points in Western States; and some of these investments, after entailing a long-continued burden of taxation and other expenses, became profitable many years later.

In 1838 he revisited Erie, after an absence of nearly 24 years. In his diary he mentions Cayuga Lake as almost the only place on his route to Buffalo which he recognized as having seen on his early march. He arrived in Erie late in the evening of July 5. "Friday, 6th, visited the court house at seven o'clock. Here I received my wounded of the fleet about the 20th (24th) of September 1813." He called on many persons with whom he had been very well acquainted for two years; only one recognized him without aid, though many expressed great joy in meeting him. In the burying ground he

[24] Capt. Daniel Turner, born at Staten Island, N. Y., Aug. 8, 1792, died in Philadelphia, Feb. 4, 1850. Capt. Stephen Champlin, born in South Kingstown, R. I., Nov. 17, 1789, a cousin of Commodore Perry, died at his residence in Buffalo Feb. 20, 1870.

looked for the graves of Claxton, who died of a wound received in battle, and of other naval comrades. He writes:

I called on Captain Dobbins, who was a sailing-master in the war, now commander of the revenue cutter. I went with him to the Peninsula, (Erie was formerly called Presqu'isle,) and trod once more the deck of the *Lawrence*, now a hulk resting about east a quarter of a mile from the old blockhouse. Her deck is in a sound state; but the water comes nearly up to it, so that I could not see her hold. In this vessel I sailed in 1813, and was in battle. She was repaired the following year, and I went in her to Mackinac with troops under Colonel Croghan. She was sunk and remained so till within the last two or three years, when she was raised and proved to be perfectly sound. Took some pieces from her to make canes of.

The following day he visited James Miles, whose arm he had amputated the day after the battle on Lake Erie. "He did not recollect me, but on learning who I was shed tears of joy." His diary concludes thus:

This visit to Erie gave me indescribable pleasure. The thousand associations of pleasure and of pain; the fresh recollections of events, as if they transpired but yesterday, which a thousand objects served to call up, and many of which would but for this visit never have been revived; the pleasure afforded in taking old friends by the hand, after a separation of twenty-four years; the changes in looks; the changes in worldly condition for better and for worse; the grave-yard where lie the bodies of great numbers of early friends; the changes and vast improvements about the city,—elegant houses and churches where there were then but a few humble dwellings,—all, all tended to render my stay here one of the most intense interest, on many occasions so powerful as to take from me the power of speech. But what shall I say of the protecting mercy of Him who through dangers seen and unseen, perils by land perils in the deep, has surrounded my path, and preserved me to the present moment? May the remainder of my days be more devoted to His Service.

In 1854, after attending the meeting of the American Medical Association at St. Louis, he journeyed to Chicago and St. Paul, visited the Falls of St. Anthony, and returned by the way of Buffalo, Montreal, and Quebec. The next year he went to Lake Superior with his nephew, Edwin. On his way he rehearsed on the spot his adventure in the capture of Fort Erie in 1813. He stopped at Mackinac and Sault Ste. Marie, and examined and described the copper mines at Lake Superior.

For several years before his death Doctor Parsons was almost wholly withdrawn from active practice, though he sometimes visited in consultation and even performed some surgical operations. His last amputation was of the forearm, performed when he was 74 years old in Rehoboth. His sturdy health of body and mind gradually failed, but with very little suffering, and with many circumstances fitted to make old age happy. An increasing forgetfulness in regard to business matters, and hesitancy in speech and uncertainty in locomotion showed that his powerful brain was yielding to the natural changes in its texture; but he still enjoyed reading, frequented the Athenæum, called at the houses of a few familiar friends, kept up a rather extensive correspondence, visited his near relatives in Maine and New York City, and interested himself in watching the progress of the Rhode Island Hospital. The exercises at the opening of this hospital took place October 1, 1868. He was conducted to a seat on the platform, and was kindly referred to in Professor Gammell's eloquent discourse. This compliment, the last he was ever to receive on any public occasion, gratified him very much. He wrote in his diary the next day with a trembling hand, "I feel very happy for yesterday's doings." He was present at the first important surgical operation performed there October 10.

On the evening of October 17, after exposure to cold, he had a severe, acute attack, involving the brain, and followed by persistent nausea, headache, and confusion of mind. He first left the house after this, November 3, when he voted at the presidential election. He continued to go out almost every day for a month more, but with feeble and uncertain steps and a degree of mental disorder that gave his family great anxiety. From December 4 he was again confined to the house, and mostly to his chamber, and died on the morning of December 19, 1868, aged 80 years and 4 months. He was very faithfully attended on the last sickness by his friend Dr. Stephen S. Keene. An autopsy showed chronic degeneration in the arteries and membranes of the brain and acute inflammatory disease in the cerebellum. This last probably dated from the 17th of October, and was the immediate cause of death. His funeral was kindly attended by Rev. J. G. Vose, of the Beneficent Congregational Church. He was buried in Swan Point Cemetery. On the 1st of June, 1869, Hon. Samuel G. Arnold, President of the Rhode Island Historical Society, read before that body, in accordance with previous appointment, a discourse "On the services of three distinguished members of the society who died during the year 1868," Albert Gorton Greene, William Read Staples, and Usher Parsons. The portion of it referring to Doctor Parsons closes with the following sentences:

Probably no man now living has so complete a knowledge of Indian traditions and history or is so competent to interpret their meaning as was Dr. Parsons. In his later years he retired from practice and devoted his time to these favorite pursuits, often making long journeys, even beyond the Mississippi River, always returning with some new discovery in Indian lore and some vivid impressions of the growing greatness of our country. He was a man in whom the love of country was strongly marked and whose fidelity to the flag never faltered in the darkest hour. His was a genial temperament and a kindly heart, with much of the jovial spirit of the seas in his hours of relaxation. We miss his familiar form in these seats at our stated meetings, and we miss his cordial greeting and his honest smile in the daily intercourse of life, for there are few families in this city where he was not a welcome guest and where during his long residence of nearly half a century among us his name had not become as a household word. Loved in life and honored in death, his memory will be revered by all who value those high qualities of manhood which were united in his character.

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EDITORIAL.

ON THE TREATMENT OF SYPHILIS WITH BISMUTH SALTS.

Sazerac and Levaditi, of the Pasteur Institut, Paris, have recently proposed the use of tartrobismuthate of potassium and sodium, containing approximately 50 per cent of bismuth, for the treatment of syphilis. In their preliminary work on rabbits (infected with *Spirochaeta pallida* and *S. cuniculi*) they found that the only safe and efficient method of administration was by the subcutaneous or intramuscular route. Intravenous injections were shown to be dangerous on account of the markedly toxic action of the drug. In order to decrease this danger as far as possible they substituted a suspension in oil of the drug for the watery solution. This was found to be the method of choice in the treatment of human cases on account of increased tolerance and less local reaction.

Fournier and Guénot have tested the value of this treatment of syphilis on a comparatively large scale and report the results of the treatment in about 200 cases.

In cases of primary sores the treponema disappeared as a rule after the second injection; in some cases even after the first. The small erosive chancres healed completely in a few days; the medium-sized chancres in one to two weeks. The large or ulcerative chancres persisted about three weeks, but they lost rapidly their specific characters and soon appeared as ordinary lesions, the time of healing depending on the size of the individual ulcer.

The local induration and the adenopathy were influenced more rapidly by bismuth than by any other treatment and disappeared often completely within a few weeks. In no cases where the treatment was regular did secondaries appear. The Wassermann reaction became negative and remained so for the period of observation.

In cases of secondary syphilis the mucous patches disappeared after the first or second injection. The hypertrophic patches dried up in a few days, faded and were resorbed in 10 to 25 days, according to the amount of new tissue formation. If the treatment was commenced during the appearance of the roseolar rash this was arrested in its development, sometimes after an exacerbation of 24 hours. Herxheimer's reaction might also appear near the papular syphilides. The simple roseolar rash usually disappeared in 5 to 10 days; the papules took a little longer to be absorbed. The authors have seen a generalized miliary eruption and palmar syphilides, manifestations which as is well known are rebellious to specific treatment, disappear in two weeks.

The general secondary manifestations — headache, bone pains, etc.—always yielded to the first injection.

The authors mention eight cases which had not yielded to arsenical and mercurial treatment, but which readily responded to the bismuth treatment. They also had a case of acute syphilitic meningitis with all the characteristic symptoms. After four injections the clinical improvement was complete. After two weeks of treatment the lymphocytes in the spinal fluid had been reduced from 400 to 7 per cubic millimeter.

Lesions of tertiary syphilis, gummata, osteoperiostitis, and ulcers yielded, as a rule, very rapidly to treatment. In cases of visceral and nervous lesions the time allotted to treatment has been too short to enable the authors to express an opinion.

In their discussion of the effect of the bismuth treatment on the Wassermann reaction, Fournier and Guénot show that the clinical improvement of the cases is accompanied by a marked change in the serological test. Seventeen primary cases received their first injection while the Wassermann was still only partially positive. In 10 of these cases the Wassermann became actually negative; in the others it weakened markedly. In 18 other primary cases with frankly positive Wassermann, 6 became completely negative, while the others were weakened. The authors found it to be rare for the Wassermann to become negative after the first series of injections; as a rule it gradually grew weaker and finally became negative from the second to the fourth month.

Fournier and Guénot used a 10 per cent suspension in olive oil of the tartrobismuthate of sodium and potassium. As the subcutaneous method was found to be painful, they always administered the drug intramuscularly.

Due to the tendency of the drug to produce stomatitis when large doses were given, the authors recommend that a single dose never exceed 0.30 gram, and in aged and debilitated patients not over 0.10 to 0.20 gram.

After the first two or three injections of 0.20 gram, a biweekly injection of 0.30 gram seems to be good practice. Two to three grams should be injected during a month.

After the first series of injections the treatment could be continued with a single weekly injection of 0.20 to 0.30 gram, or be suspended for a month to be recommenced again in the same manner as described above.

One should follow the progress of the treatment by repeated examinations of the blood and check up every case at subsequent regular intervals.

With regard to untoward effects of this treatment the authors state that they have given over 1,500 injections without having experienced any really important mishap.

In cases of grave visceral lesions, and especially where the renal function is impaired, one should proceed with caution. A slight elevation of the temperature was seen in some cases the day after injection, accompanied with pain in the back, but no general reaction was observed. After the first four injections a moderate polyuria occurred in a few instances. The only two manifestations that might cause some trouble are local reactions and the stomatitis. The former were seen in a few patients who walked too much immediately after the treatment. The tendency to stomatitis can be very well controlled by hygienic measures of the mouth. In a few cases dark spots of bismuth impregnation were seen on the mucous membrane of the mouth.

The bismuth has been recovered from the blood and cerebrospinal fluid and has been shown to be eliminated through the saliva, bile, feces, sweat, and urine.

The authors state that bismuth undoubtedly is a most energetic antisyphilitic agent, having particularly marked effect not only on the infectious manifestations of the disease but also on the Wassermann reaction. They conclude, however, that time only will tell if this drug will prove to be of value in the *radical* cure of syphilis.

(EP.)

ON THE CHANCES FOR SUCCESS.

Edward Bok, who for 30 years so ably edited the Ladies Home Journal, is a man with a keen insight into human nature. The success he attained in life was not achieved without hard work, and what he has to say on a young man's chances for success is worth reading.

As a young man, so he states in his autobiography, which was published last year under the title of "The Americanization of Edward Bok," he was possessed of the idea, as are so many young men entering business, that the path which led to success was very difficult;

that it was overfilled with a jostling, bustling, panting crowd, each eager to reach the goal; and all ready to dispute every step that a young man should take; and that favoritism only could bring one to the top.

After Bok had been in the world of affairs, he wondered where were these choked avenues, these struggling masses, these competitors for every inch of vantage. Then he gradually discovered that they did not exist.

In the first place, he found every avenue leading to success wide open and certainly not overpeopled. He was surprised how few there were who really stood in a young man's way. He found that favoritism was not the factor that he had been led to suppose. He realized it existed in a few isolated cases, but to these everyone had pointed and about these everyone had talked until, in the public mind, they had multiplied in number and assumed a proportion that the facts did not bear out.

Here and there a relative "played a favorite," but even with the push and influence behind him "the lucky one," as he was termed, did not seem to make progress, unless he had merit. It was not long before Bok discovered that the possession of sheer merit was the only real factor that actually counted in any of the places where he had been employed or in others which he had watched; that business was so constructed and conducted that nothing else, in the face of competition, could act as current coin. And the amazing part of it all to Bok was how little merit there was. Nothing astonished him more than the low average ability of those with whom he worked or came into contact.

He looked at the top, and instead of finding it overcrowded, he was surprised at the few who had reached there; the top fairly begged for more to climb its heights.

For every young man, earnest, eager to serve, willing to do more than he was paid for, he found ten trying to solve the problem of how little they could actually do for the pay received.

It interested Bok to listen to the talk of his fellow workers during luncheon hours and at all other times outside of office hours. When the talk did turn on the business with which they were concerned, it consisted almost entirely of wages; and he soon found that with scarcely an exception, every young man was terribly underpaid, and that his employer absolutely failed to appreciate his work. It was interesting, later, when Bok happened to get the angle of the employer, to discover that invariably these same lamenting young men were those who, from the employer's point of view, were either greatly overpaid or so entirely worthless as to be marked for early decapitation.

Bok felt that this constant thought of the wages earned or deserved was putting the cart before the horse; he had schooled himself into the belief that if he did his work well, and accomplished more than was expected of him, the question of wages would take care of itself. But according to the talk on every side, it was he who had the cart before the horse. Bok had not only tried always to fill the particular job set for him, but had made it a rule at the same time to study the position just ahead, to see what it was like, what it demanded; and then, as the opportunity presented itself, do a part of that job in addition to his own. As a stenographer, he tried always to clear off the day's work before he closed his desk. This was not always possible, but he kept it before him as a rule to be followed rather than violated.

One morning Bok's employer happened to come to the office earlier than usual, to find the letters he had dictated late in the afternoon before lying on his desk ready to be signed.

"These are the letters I gave you late yesterday afternoon, are they not?" asked the employer.

"Yes, sir."

"Must have started early this morning, didn't you?"

"No, sir," answered Bok. "I wrote them out last evening before I left."

"Like to get your notes written out before they get stale?"

"Yes, sir."

"Good idea," said the employer.

"Yes, sir," answered Bok, "and I think it is even a better idea to get a day's work off before I take my apron off."

"Well said," answered the employer, and the following pay day Bok found an increase in his weekly envelope.

It is only fair, however, to add here, parenthetically, that it is neither just nor considerate to a conscientious stenographer for an employer to delay his dictation until the end of the day's work, when, merely by judicious management of his affairs and time, he can give his dictation directly after opening his morning mail. There are two sides to every question; but sometimes the side of the stenographer is not kept in mind by the employer.

Bok found it a uniform rule among his fellow workers to do exactly the opposite to his own idea; there was an astonishing unanimity in working by the clock; where the hour of closing was 5 o'clock the preparations began five minutes before, with the hat and overcoat over the back of the chair ready for the stroke of the hour. This concert of action was curiously universal, no "overtime" was ever to be thought of, and, as occasionally happened when the work did go over the hour, it was not, to use the mildest term, done with care, neatness, or accuracy; it was, to use a current phrase, "slammed off." Every moment beyond 5 o'clock in which the worker was asked to do anything was by just so much an imposition on the part of the employer, and so far as it could be safely shown, this impression was gotten over to him.

There was an entire unwillingness to let business interfere with any anticipated pleasure or personal engagement. The office was all right between 9 and 5. One had to be there to earn a living; but after 5 it was not to be thought of for one moment. The elevators which ran on the stroke of 5 were never large enough to hold the throng which besieged them. The talk during lunch hour rarely, if ever, turned toward business, except as said before, when it dealt with underpaid services. In the spring and summer it was invariably of baseball, and scores of young men knew the batting averages of the different players and the standing of the clubs with far greater accuracy than they knew the standing or the discounts of the customers of their employers. In the winter the talk was all of dancing, boxing, or plays.

It soon became evident to Bok why scarcely five out of every hundred of the young men whom he knew made any business progress. They were not interested; it was a case of a day's work and a day's pay; it was not a question of how much one could do but how little one could get away with. The thought of how well one might do a given thing never seemed to occur to the average mind.

"Oh, what do you care?" was the favorite expression. "The boss won't notice it if you break your back over his work; you won't get any more pay."

And there the subject was dismissed, and thoroughly dismissed, too.

Eventually, then, Bok learned that the path that led to success was wide open; the competition was negligible. There was no jostling. In fact, travel on it was just a trifle lonely. One's fellow travelers were excellent company, but they were few. It was one of Edward Bok's greatest surprises, but it was also one of his greatest stimulants. To go where others could not go or were loath to go, where, at least, they were not, had a tang that savored of the freshest kind of adventure. And the way was so simple, so much simpler, in fact, than its avoidance, which called for so much argument, explanation, and discussion. One had merely to do all that one could do, a little more than one was asked or expected to do, and immediately one's head rose above the crowd and one was in an employer's eye, where it is always so satisfying for an employee to be. And as so few heads lifted themselves above the many, there was never any danger that they would not be seen.

Of course, Edward Bok had to prove to himself that his conception of conditions was right. He felt instinctively that it was, however, and with this stimulus he bucked the line hard. When others played, he worked, fully convinced that his playtime would come later. Where others shirked, he assumed. Where others lagged, he accelerated his pace. Where others were indifferent to things around them, he observed and put away the results for possible use later. He did not make of himself a pack horse; what he undertook he did from interest in it, and that made it a pleasure to him when to others it was a burden. He instinctively reasoned it out that an unpleasant task is never accomplished by stepping aside from it, but that, unerringly, it will return later to be met and done.

Obstacles, to Edward Bok, soon became merely difficulties to be overcome, and he trusted to his instinct to show him the best way to overcome them. He soon learned that the hardest kind of work was back of every success; that nothing in the world of business just happened, but that everything was brought about, and only in one way—by a willingness of spirit and a determination to carry through. He soon exploded for himself the misleading and comfortable theory of luck; the only lucky people, he found, were those who worked hard. To them luck came in the shape of what they had earned. There were exceptions here and there, as there are to every rule; but the majority of these, he soon found, were more in the seeming than in the reality. Generally speaking—and, of course, to this rule there are likewise exceptions, or as the Frenchman said, "All generalizations are false, including this one"—a man got in this world about what he worked for.

And that became, for himself, the rule of Edward Bok's life.

(W. M. K.)

ON THE ELIMINATION OF DIPHTHERIA.

During the year 1921 in the Navy there were 372 original admissions to the sick list for diphtheria which, combined with 18 cases remaining under treatment from the previous year, resulted in 11,669 sick days and 20 deaths. These figures probably represent the average morbidity for this disease in the Navy, as it was not present in epidemic form during the year. The case mortality of 5 per cent compares favorably with the average death rate of 8 per cent existing among civil communities. However, the diphtheria morbidity and mortality should be lower, as the medical profession probably knows more about this disease than almost any other infection, and yet no great inroads have been made either on the morbidity or mortality beyond what occurred after the introduction of antitoxin.

We have seen yellow fever and typhoid fever cease to be a morbidity and mortality factor in the vital statistics of the Navy, and when the Schick test and the toxin antitoxin immunization became available we had hopes of the eradication of diphtheria. Unfortunately, up to the present time, the use of toxin-antitoxin in producing active immunity in recruits in the Navy is attended with considerable difficulties and has not been considered practicable, principally because of the severe reaction which the toxin-antitoxin injection produces in adults. So naval medical officers still have to depend on early diagnosis, prompt isolation, and the detection of carriers to keep down the incidence of this disease.

However, we have not given up hope of the eradication of diphtheria. We may not live to see it, but we believe that the day will come when diphtheria will be under control.

Much has been written recently about the value of the Schick test and the active immunization against diphtheria by means of the toxin-antitoxin mixture.

Julius Blum, writing in the American Journal of Diseases of Children (1920, 20, p. 22), reports the results obtained by immunizing children, and demonstrates the fact that it is possible to render a child-caring institution diphtheria free. This has been accomplished for a period of seven years at the Home for Hebrew Infants, New York, as well as in other institutions, by injecting all susceptibles with toxin-antitoxin mixtures.

Abraham Zingher, who has devoted much study to the problem of active immunization, believes that all children from 6 months to 5 years should be injected with the toxin-antitoxin, and he believes that the Schick test can be omitted in this age group, as most of the children give a positive reaction. He believes that to place the diphtheria preventive work on a practical basis, it is advisable at present to simplify it for the school physician by omitting the Schick test in younger children and by immunizing all children on their entrance into school.

Schick testing and immunization on a fairly large scale has been carried out in the schools of New York City, and the results of this work are being watched with interest. During this procedure some interesting observations were made. It was noted that children from the homes of the more well-to-do have a much higher percentage of positive Schick reactions than those from the homes of the poorer classes who live in closely crowded neighborhoods. The highest number of positive reactions found was 67 per cent, and the percentage decreased until it was found that in the schools of densely congested districts the number of positive reactions was as low as 16 per cent, and in one instance 13.6 per cent.

Repeated exposures to the diphtheria bacillus in the congested sections of the city probably produce mild infections in the membranes which are not recognized as diphtheria but which may lead to the development of an antitoxic immunity.

Compared with these figures are those of two private schools. In one, 79 per cent of the pupils gave positive reactions, and in a second, 85 per cent, showing that segregation of the children either in rural or well-to-do and sparsely settled sections plays an important part in the nondevelopment of natural immunity to diphtheria. This fact has an important bearing in the Navy as the majority of our recruits come from rural communities.

Standardization of the diphtheria toxin for the Schick test and of heated diphtheria toxin for the control test is being advocated. Improvements in the method of immunization are possible, according to Zingher, and further work is being carried out at present to see especially whether two doses of toxin-antitoxin will give, in a considerable number of children, results as good as those obtained with the three doses used at present. This would simplify the process and make it very convenient for general use, and it is not at all improbable that a means of preventing the severe reactions in adults will be attained.

The problem to-day is one for the civil community rather than for the Navy. Zingher intimates that the active immunization against diphtheria should be carried out first of all by the private physicians in the different homes where the majority of young children can be reached. In large cities the milk stations, day nurseries, children's dispensary, infant and orphan asylums furnish large groups of children suitable for immunization. The children of preschool age found in kindergartens and those of school age should be actively immunized. The success of such a procedure depends upon the development of a public health conscience in the people of the country.

Zingher[1] believes that the diphtheria problem seems nearer a solution by the thorough application of these newer diagnostic and immunizing procedures which should be encouraged by the various departments of health.

On the other hand, J. G. Cumming, writing on the question, "Is the control of diphtheria leading to eradication?" in the Journal of the American Medical Association for March 4, 1922, states that the present procedures for the control of diphtheria do not seem to be leading toward the complete eradication of the disease, since the case rate is approximately the same as that of 30 years ago. By eradication he means such perfect control of the factors concerned in diphtheria that epidemic spread of the disease becomes impossible.

The factors underlying present-day procedures for the control of diphtheria are: (1) Early clinical and laboratory diagnosis of the disease and the isolation of the patient; (2) laboratory identifica-

[1] Collected Studies from the Bureau of Laboratories, City of New York, vol. 9.

tion of the healthy carrier and his isolation; (3) the Schick test and immunization; and (4) the use of antitoxin as a curative measure.

Only the first two of these factors are useful in the prevention of infection distribution; the other two are of value in the reduction of mortality.

The correct diagnosis, followed by quarantine of the patient and of the carrier, has for about a quarter of a century been the accepted procedure for the prevention of distribution, yet we still have epidemics, and the few deaths in each endemic and epidemic focus throughout the United States amount to an annual toll of more than 15,000 lives. So Doctor Cumming asks the questions: "Is not the gradual accumulation during the interepidemic times of unrecognized carriers associated with oncoming susceptibles responsible for our periodic epidemics? Can such interepidemic carriers be prevented by the activities of health departments, or is it a question of educating the people relative to the major avenues of disease distribution?"

There seems to be no argument as to the value of the Schick test and immunization for morbidity and mortality reduction, but, asks Doctor Cumming, "Is it useful in the control of distribution?" The injection of the antitoxin for the cure of the disease does not relieve the patient from the carrier state, and presumably the immunization by the injection of toxin-antitoxin mixture has no effect on the carrier state. If this immunization neither eliminates nor prevents the carrier state, and at the same time removes the danger signal (the manifestation of symptoms in those who have become infected as a result of transmission), there is developed a false sense of security—security against immediate mortality, but not against an increasing healthy carrier rate.

If the control of diphtheria through the Schick test alone is to become as perfect in the prevention of diphtheria mortality as has the procedure for the prevention of typhoid fever, it will be necessary that 31,000,000 children now living be immunized and that 2,000,000 born each successive year be immunized. "Presumably," says Doctor Cumming, "the accomplishment of this is not possible, and if it were, since there is neither elimination nor a reduction of carriers, is it worth while?"

As the four factors mentioned above have not proven adequate to eliminate diphtheria, resource must be made to a fifth factor—that of transmission prevention.

The case rate can only be reduced by the blocking of transmission from the mild, unrecognized case and from the unidentified carrier. A reduction in the endemic carrier index seems to be the end desired. The epidemiologists must determine the avenues of distribution and devise practical methods for blocking them. "Only when these methods are inculcated into the habits and customs of the people will there appear a reduction in the endemic index, and the successful control of diphtheria leading to eradication."

In a paper on the "Application of bacteriological studies to the prevention of diphtheria," read at a meeting of the Society of Medical Officers of Health held in London on February 17, 1922, Sir Frederick W. Andrews considered the means at the disposal of public health officials in combating the disease. To him mere sanitation appeared to offer no solution to the diphtheria problem, the proportion of immunes being actually least in those individuals higher in the social scale. At present the means at our disposal are inadequate for the discovery of virulent carriers in the community as a whole, for their isolation, and for the cure of the condition in all cases. It seemed to him that the problem of the undiagnosed case called for better education both of the public and the doctor.

"From the point of view of prevention by immunization rather than by the prevention of the spread of infection we now have an effective method, so far as concerned the individual, in the injection of toxin-antitoxin. Up to the level of the institution the problem of the prevention of diphtheria was solved if we chose to use the means at our command, but this was not true in dealing with the community as a whole. Prevention by the removal of infection only might defeat itself by the production of a population having no resistance to diphtheria. The method of active immunization would involve the Schick testing of young children and injection of the positives. The immunity conferred is found to be fairly lasting and probably persisted after antitoxin had disappeared from the blood, the earliest stimulus of a commencing infection reawakening the dormant machinery of antitoxin." Sir Frederick set forth an interesting speculation "whether, if the whole community were made immune, the bacillus, condemned to an existence of helpless saprophytism, might not degenerate into a relatively harmless atoxic form."

Writing on "Active immunization with diphtheria toxin-antitoxic" in the Journal of the American Medical Association for March 11, 1922, Dr. Jacob Meyer, of Chicago, states that in 108 children the duration of immunity conferred by injection of diphtheria toxin-antitoxin mixture as determined by the Schick test extended for a period of 44 months in 94.4 per cent of the cases.

In Chicago the incidence of diphtheria has decidedly diminished since injection of diphtheria toxin-antitoxin was adopted as a routine measure. This coincides with the experience in New York, where the efforts of the department of health to immunize the school children have been so successful as to prompt the State board of health to immunize children throughout the State. (W. M. K.)

ON SYSTEMIC INFECTION DUE TO ORAL SEPSIS.

It was as recently as 1911 that Dr. William Hunter, of London, first brought to international attention in such a forcible manner his condemnation of certain methods of dentistry, as then practiced, which observation and investigation had convinced him so frequently resulted in pathology of the oral tissues or oral sepsis. While Doctor Hunter's observations lead to an awakening of the medical and dental professions, his work, as well as that of many others, was not based upon scientific evidence. Dr. C. E. Bentley, writing in the Illinois Medical Journal for February, 1922, on systemic infections due to oral sepsis says: "The work of Doctor Hunter and many others could be summed up by saying that clinically they noted the improvement which followed the extraction of teeth in hundreds of cases." Incidentally it also might be stated that hundreds of cases showed no clinical improvements as the result of extraction of teeth.

That serious systemic infections occur as a result of suppurations in the mouth is a view which, starting as a small wave of progress, has increased to overwhelming dimensions as is shown by many notable papers and laboratory experiments in recent years.

Bentley cites the laboratory experiments of Rosenow, demonstrating the selective affinity of organisms, and of which he remarks: "These experiments seem to have established beyond question the importance of the blood stream as a carrier of infection and also the very peculiar and as yet unexplained tendency for the organisms to have what might be termed a selective affinity for the same tissues in animals as in the individuals from whom cultures were obtained." Experiments in animal inoculations have opened new fields of investigation, the exploration of which are becoming of particular value in reference to diagnosis. Chronic arthritis, endocarditis, nephritis, cholecystitis, ulcers of the stomach, and appendicitis are given as the most frequent definite secondary effects to oral foci of infection, "while general impairment of health and vigor, with or without recognizable lesions, is common."

In regard to arthritis, attention is invited to the fact that in young persons, say up to 20 years of age, the condition is due to secondary infection of the tonsils, adenoid tissue, or infections of the paranasal sinuses and not to oral infection, but in middle and later life very few cases are due to these causes; arthritis then being largely due to periapical infections of the teeth. Early dental diagnosis is desirable and imperative if preventive medicine is the aim, as the progress of the disease tends to metastatic infection of the joints, manifestly a much more difficult situation to meet than the eradication of the primary periapical infections of the teeth.

Endocarditis, like arthritis, is due to infection, and its most dangerous symptoms are shown in the old patient and not in the young. Doctor Barker, of Johns Hopkins, says: "It is not at all uncommon to have viridans endocarditis arising from infected teeth. I have personally observed over 20 cases, and every one of the patients is dead." It was possible for Doctor Barker to demonstrate, in several of these patients, the presence of *Streptococcus viridans* in granulomata in the mouth.

To quote Doctor Barker further, "The method of procedure at Johns Hopkins Hospital is to study the mouth in all cases of arteriosclerosis and of arterial hypertension in order to detect there any source of infection that may signify danger. They do that not only in the cases here mentioned, but in every patient who comes for diagnostic study. Suspicious gums are carefully examined and every pulpless tooth is X-rayed. A report from an expert dental diagnostician is considered, with other accumulated data, before the final diagnosis is made."

Due to the natural vigorous resistance of the oral tissues, the presence of chronic foci does not indicate by any means that an individual is suffering from systemic effects, but it does indicate a constantly lurking danger. A most important point in this connection is that the development of definite lesions from these foci is so gradual that they are generally not recognized by the patient, consequently a physician is not consulted until the disease has made such progress as to offer obstinate resistance to treatment and in many cases to be incurable.

The opportunity for the dental profession exists, first, of course, in periodical dental prophylaxis as a preventive to the development of oral pathological conditions and, second, in the early recognition of dental foci of infection before the patient is aware of the existing conditions, or the appearance of symptoms indicative of secondary lesions.

In viewing foci of infection the all-important fact must not be overlooked that these embrace many sources from which similar infections and results may come, prominent among these being the tonsils, paranasal sinuses, gall duct, intestines, Fallopian tubes in the female, prostate gland in the male; in short, wherever in the body the conditions are favorable for the growth and distribution of pathogenic organisms.

The practice of extracting all nonvital teeth, recommended by some physicians, is in the light of results obtained by skillful conservative dentists being abandoned by the leaders in both professions. The conservative dentist pleads for the retention of inadequately filled pulp chambers about which no rarefied areas are shown by the X ray, but always with the reservation that they be constantly watched for untoward symptoms.

In connection with accessory foramina remaining unfilled by virtue of size and inaccessibility, Bentley, in common with others investigating this condition, believes that they should be given the benefit of the doubt in view of the evidence tending to the conclusion that their contents, under favorable conditions, become organized and their openings finally covered with cementum, thereby preventing infection at these points. Dental diagnosis should always be based upon clinical examination, as well as X-ray findings, and in general the internist, the dentist, and radiographer should be in consultation.

To Dr. Frank Billings we are indebted for the following statement: "To investigate and manage these patients requires the teamwork of the clinical and laboratory workers. The clinician must carefully examine the patient, exhausting every detail in personal history. The skill of the dentist, the nose and throat specialist, the gynecologist, the genito-urinary expert, and others may be necessary to locate the foci of infection. Each focus must be destroyed."

Bentley agrees in principle with many when he states in his paper: "It can not be too strongly said that a tooth which can not be made healthy should be extracted, but all of us who have looked into this matter know that many teeth to-day are being cast out when they could be made things of use and beauty by modern methods of treatment."

In reference to the subject of systemic infection due to oral sepsis, it might be of interest to quote Doctor Gardner, of the Mayo clinic: "We have come to the conclusion some time ago that all teeth showing definite pathology should be sacrificed," which is a positive statement from a recognized medical center and indicates the value placed upon dental diagnosis. (H. E. H.)

HAND INJURIES.

During the calendar year 1920 injuries of the hand and fingers caused 27,689 sick days in the Navy, and 18 men were invalided from the service in consequence of such injuries.

Proper management of these cases is one of the most difficult problems that the naval medical officer is called upon to solve. The responsibility is great, not only to the patient, because good function is necessary to enable him to earn his living, but also to the Government, because sick days with full pay and lifelong compensation for disability are tremendously expensive.

The first treatment is most important and is never to be slighted for minor injuries may develop into severe infections, tenosynovitis, or ankylosis if they are not properly treated. Tetanus is a danger that must be always in mind, especially in the motorcycle accidents which are now so prevalent. Conservation of all possible tissue is an excellent rule, for one is frequently surprised by the recuperative ability of tissues apparently without circulation.

Accurate adjustment of fractures is essential because thus the smallest amount of callus is produced. Excessive callus leads to involvement of the tendons and their sheaths, with ankylosis as a result. To avoid ankylosis early massage and manipulation are important. Manipulation begun too early produces nonunion; if delayed too long ankylosis results. Experience and frequent X-ray examinations are necessary to determine when to start manipulation.

If infection occurs the first incision should be radical in order to avoid the necessity of repeating it later. There is no place where the Carrell-Dakin technique produces more strikingly beneficial results than in the infections of the hand or fingers. Proper preparation of the wound so as to allow access of the solution to every part is essential. Willems has taught us the importance of open treatment and frequent motion in infected joints, and these principles are of equal importance when the tendons of the hand are the seat of infection.

Reconstructive surgery of the hand is one of the most difficult, delicate, and uncertain branches of the surgical art. The necessity for it will be lessened by proper care of injuries in their early stages. Careful checking of the diagnoses made by experienced men against the X-ray picture shows almost 50 per cent of failure in diagnosis of fractures of the bones of the hand without the use of the X ray. This difficulty of diagnosis and the serious results of failure to make the proper diagnosis make the serious injuries of the hand or fingers essentially hospital cases. (L. W. J.)

SYSTOLIC MITRAL MURMURS.

Examination of recruits and men prior to discharge often brings to light systolic mitral murmurs about which there is always some uncertainty regarding their significance. Much has been written recently about these findings, and the conclusions of the writers seem to be that a systolic murmur by itself is no evidence of heart disease.

In the Journal of the Royal Army Medical Corps for March, 1922, Dr. K. R. Smith discusses cases of disordered action of the heart whose usual symptom is distress upon exertion, which subsides slowly and is accompanied by an increase in the pulse and respiration rate. These evidences of distress on exertion have become known to examiners as the *effort syndrome* and they indicate an incapacity but not necessarily a disease of the heart. The patient usually complains of shortness of breath, pain in the precordia, fatigue, and sometimes of dizziness. These symptoms generally disappear following graduated exercises. From a military point of view, men exhibiting the effort syndrome should be considered unfit for the service if their attacks are accompanied or have followed acute rheumatic fever, and present precordial pain, with tachycardia over 120 when recumbent, and severe dyspnœa on exertion. Systolic mitral murmurs are of little account. Men, according to Doctor Smith, if invalided from the service for systolic murmurs, per se, are subsequently nearly always found fit for active service, and it is a well-known fact that during the war such men stood the severest strains of active service without accident. If the mitral systolic murmur is accompanied by cardiac hypertrophy, however, the man should be pronounced unfit for military service.

In the Military Surgeon for March, 1922, Lieut. Col. Roger Brooke, Medical Corps, United States Army, discusses 2,400 recorded cases of men who were drafted into the service with cardio-vascular symptoms. When they were examined on discharge it was found that of 459 men accepted with functional systolic murmur, and 687 with mitral regurgitation without hypertrophy, 9 were discharged as with valvular disease of the heart, and it has been noted that of these 9 men only 3 have applied to the Veterans' Bureau for disability compensation. Of the 2,400 men enlisted, 90 were discharged, but Colonel Brooke believes that 60 were discharged through lack of appreciation of the effort syndrome. He, like other writers on this subject, is of the opinion that a mitral systolic murmur is functional unless it is associated with cardiac hypertrophy, with acute rheumatic fever, or diseased tonsils, and with an accentuated pulmonic second sound or with the effort syndrome. (W. M. K.)

RECENT STUDIES IN THE BIONOMICS OF THE HOOKWORM.

The investigations of the control of hook worm disease carried on by Cort and his coworkers in Trinidad under the auspices of the International Health Board and Johns Hopkins University, have added a large amount of information to our knowledge of this problem. The control of hookworm disease centers around two main points: Prevention and cure. In these investigations particular attention was paid to the preventive phase, and with this end in view the investigators concentrated their attention on the biological aspect of the problem. The commission studied hookworm eggs and young larvæ, the distribution of the eggs over the soil by man, other animals, and physical agencies, conditions necessary for the development of the hookworm in the soil, the length of life of the infective larvæ, conditions necessary for their life, active migrations and passive spread of the larvæ.

The one thing that made the investigation of these various phases of hookworm life possible was the recent introduction of the "isolation apparatus" by Baermann in Sumatra, which was slightly modified for use in Trinidad. A description of the apparatus and the technic of using it follows:

"The apparatus for the isolation of hookworm larvæ from the soil, works by bringing the lower surface of a soil sample into contact with water of a considerably higher temperature. Under these conditions a large proportion of the nematodes in the sample will pass into the water and can be collected and counted. This isolating apparatus consists of a glass funnel almost filled with water, which has the outlet closed by a clamped piece of rubber tubing. The soil sample is placed in a sieve, which is then fitted down into the funnel so that the level of the water is above the lower surface of the soil. For the examination of soil samples of half a pint or more there were used large glass funnels 8 inches in diameter and specially prepared brass sieves 7 inches in diameter and 3 inches in height, with a 1-millimeter mesh. To prevent small particles of soil from sifting through into the funnels, the sieves were lined with one or two thicknesses of cloth. Tightly fitting rubber tubes closed with Hoffman clamps are placed on the stem of the funnels. * * * It is possible to substitute for the sieve a piece of wire screen covered with cloth, of such a size that it can be fitted down into the funnel. The sieves have the advantage of being more easily handled in the transfer of soil."

In using the apparatus this sieve is lined with one or two thicknesses of cloth. The soil is broken up thoroughly before placed in sieve. Water heated to 115° F. is placed in funnel to within 1½ inches of rim. The sieve is now put in place, care being taken that no contact occurs between water and bottom of sieve. Water of above temperature is now added until level is 1 inch above bottom of sieve. The apparatus should be set up during the day, to be examined the following day, at which time the clamp on the rubber tube is slightly opened, the water run into a centrifuge tube, centrifuged, and the supernatant water withdrawn. The residue is spread on a 2 by 3 inch slide for microscopical examination.

The identification of mature hookworm larvæ is somewhat difficult at first, but if practiced for some time the difficulties will soon disappear. The authors recommend that the structure and movements of cultured larvæ be studied until their characteristics are familiar. In this connection the authors recommend a new method of culturing human fæces to secure hookworm larvæ. The animal charcoal method of Loos was deemed not to be quite satisfactory, and Ackert developed another method that the commission found to be superior. The following points are of importance:

(1) If possible fæces from individuals heavily infested with hookworms is obtained.

(2) The culture medium consists of ordinary soil first heated to 150° F. to insure killing of all nematodes. This soil is placed 2 inches deep in shallow tin pans, 11 inches in diameter, with holes punched in their bottom to permit drainage.

(3) One-fourth inch layer of stool is spread on surface of soil.

(4) Cover with 1 millimeter of wood or charcoal ashes to inhibit growth of mold and prevent formation of hard crust.

(5) Keep culture in screened place from rats and other animals.

(6) Keep cultures well moistened.

The isolation apparatus has a large range of use in investigations and hookworm control work, such as examination of soil samples from various situations in areas where hookworm disease is prevalent to determine the exact sources of infestation of the people, to follow the reduction of soil infectivity after the elimination of soil pollution, to study the extent of migrations of larvæ in different situations. Experiments designed to standardize the isolating apparatus showed that to isolate a satisfactory percentage of the larvæ the water must be at least 10° warmer than the soil, that a slightly higher percentage of larvæ can be isolated from moist than saturated soil, that in soil with very finely divided particles the percentage of larvæ which can be isolated is less than in coarser soils, and that while most of the larvæ escape from the soil into the water in the first six hours, an appreciable number come out after this time.

Up to the present time the conception has been prevalent that the hookworm larvæ during their free existence were surrounded by the detached skin of the second larval stage, which acted as a protective covering and was thrown off in the normal course of events when the worms pass into a suitable host. Cort and his coworkers found that in a series of soil samples examined from places polluted by people infested with hookworms a large proportion of the mature larvæ were without a sheath, suggesting that it is a common thing for mature larvæ to lose their sheaths and continue to live in soil. The fact that mature hookworm larvæ lose their sheaths under certain conditions has been noted by previous investigators, but the general opinion has always prevailed that they live normally inclosed in sheaths.

With regard to the relation of the domestic chicken and pig to hookworm dissemination, Ackert and F. K. Payne, members of the commission, have contributed some valuable information. The former showed that hookworm eggs swallowed by chickens produce infective hookworm larvæ when the fowl fæces are mixed with animal charcoal or with soil, but that the majority of eggs failed to do so, this failure being attributed in part to breaking of eggs in the gizzard, injury from urine in the fæces, and to malnutrition of the larvæ in the excrement. Ackert concluded that chickens are more beneficial than harmful in the control of hookworm disease, at least in Trinidad. Ackert and F. K. Payne consider the free-range pig as an important factor in the dissemination of human hookworm eggs, having shown that eggs swallowed by this animal produce infective larvæ in five days.

They also found a new species of hookworm, *Necator suillus*, to be of common occurrence in the domestic pigs in Trinidad.

Cort and G. C. Payne studied the effect of hookworm control measures on soil pollution and infestation on a sugar establishment and found the same conditions that Baermann had found in Sumatra. The hookworm larvæ in the soil were not diffused over wide areas but were concentrated in the areas where soil pollution took place, in this instance in certain places in the cane field where many of the people were in the habit of visiting for purpose of defecation.

After building an adequate number of latrines and the carrying on of an educational campaign, coupled with treatment of the people of the area, the soil pollution was reduced to a minimum. A subsequent examination of soil samples taken at intervals showed a rapid dying out of the infective hookworm larvæ, so that in about six weeks soil infestation was practically eliminated. Practically the same findings were noted after proper treatment of a cacao estate.

Baermann's isolating apparatus enabled Augustine to carry out some definite experiments with regard to the migration of hookworm larvæ. The field studies of Baermann in Sumatra and those of the commission in Trinidad were verified. Experiments showed that infective hookworm larvæ placed on moist soils did not migrate during periods of observation from 15 hours to 42 days, but that hookworm larvæ may be carried out from centers of soil infestation by surface water and thus establish themselves in new locations. They were not found to migrate to more favorable situation when their original environments became unfavorable. The larvæ under optimum conditions of moisture and temperature were found to remain on and within the upper surface of the soil.

The conception has been prevalent that the infective larvæ can remain alive for one to two years in their natural environment. This has been based on observations made in the laboratory where some investigators kept the larvæ alive for 18 months.

The commission showed, however, at least so far as conditions in Trinidad went, that the life of the larvæ in nature is limited to about six weeks. Augustine found that the loss of sheath under favorable conditions did not tend to shorten their lives, but rendered them more susceptible when in unfavorable environment. He believes that the conclusion can be drawn that environmental conditions, such as tropical temperatures which tend to increase the activity of the mature hookworm larvæ, will shorten their lives by the more rapid using up of stored food material. (E. P.)

ON THE CHOICE OF OPERATION IN INGUINAL HERNIA.

Most authorities agree that in infancy high ligation alone suffices, little or no deliberate effort at reconstruction being made, and practically all agree that in adults not only must high ligation be done but the canal must be reconstructed with care to form a strong bulwark against recurrence.

The type of sac is a determining factor as to whether the posterior wall need be reconstructed. The stalked sac, when long, narrow thin, nonadherent, and representing an unobliterated funicular process, such as is encountered in early life, adolescence, or in a recent hernia in well-muscled adults, calls for high ligation without reconstruction of the posterior wall, the internal oblique muscle usually being well developed and capable of withstanding strain. The sessile sac, on the other hand, such as is found in direct hernia, need not be ligated, merely turned in, but reconstruction of the defective posterior wall is the essential factor in this type. In old, indirect herniæ the canal musculature has been overstretched and weakened by long-continued drag of the sac with its heavy contents. The sac, though still stalked, approaches the sessile type, must be ligated high, and the posterior wall must be carefully and stoutly reconstructed. A "pantaloon" sac must not be overlooked in any hernia operation.

The essential features of the operation practiced by P. G. Skillern, jr., as described in a recent number of Surgery, Gynecology, and Obstetrics, are free exposure and thorough cleaning of Poupart's ligament, Gimbernat's ligament, the triangular fascia, the pubic head of the rectus inclosed in the linea semilunaris, the linea semilunaris itself, and the aponeurosis extending laterally from it; firm reconstruction obtained by developing a fingerlike cylinder of the musculo-aponeurotic tissue just mesial to and above the thinned-out conjoined tendon and internal oblique muscle fibers, suturing this cylinder to Gimbernat's and Poupart's ligaments from the pubic bone to beyond the internal ring, fastening the lower flap of external oblique aponeurosis down upon the cylinder and the upper flap down upon the lower, thus imbricating the two flaps and taking the strain away from the first row of sutures; bringing the cord out somewhat lateral to the internal ring, preventing constriction of it, and transposing it to the surface of the imbricated external oblique flaps; and finally obliteration of dead spaces by suturing the edges of the fibrous deep layer of the superficial fascia to each other and down upon the imbricated external oblique aponeurosis. The postural method advocated by Lyle, which relieves tension both during and after the operation, should be practiced. (C. M. O.)

IN MEMORIAM.

REAR ADMIRAL FRANCIS M. GUNNELL, MEDICAL CORPS, UNITED STATES NAVY, RETIRED, 1827–1922.

Rear Admiral Francis M. Gunnell, Medical Corps, United States Navy, retired, died at his residence in Washington, D. C., on June 10, 1922. He was in his ninety-fifth year, and at the time of his death was, with one exception, the oldest commissioned officer of the Navy. He was born in Washington on the 27th of November, 1827, and except for nearly 17 years spent at sea, passed his entire life in that city.

Graduating from the medical department of Columbian University, which in later years became the George Washington University, he entered the Navy in 1849 as an assistant surgeon, and was promoted through all the grades to medical director, in which grade he was serving when he was placed on the retired list for age on November 27, 1889. He served as Surgeon General of the Navy, with the relative rank of commodore, from April 1, 1884, to April 1, 1888.

After his retirement he maintained an active interest in Washington affairs and on several occasions served on special duty at the Bureau of Medicine and Surgery.

Admiral Gunnell's first duty was on board the U. S. S. *Falmouth* on which vessel and on the store ship *Supply*, he served in the Pacific from April, 1849, to January, 1852. On his return home he was stationed at the navy yard, Washington, and in September, 1854, he was detailed to the U. S. S. *Independence*, on which he again served in the Pacific until 1857.

In August, 1857, an attempt was made to lay a cable across the Atlantic by the American frigate *Niagara* and the British ship of war *Agamemnon*, but about 300 miles from the Irish coast the cable parted, owing to a strain caused by a sudden dip of the sea bottom. Admiral Gunnell was attached to the *Niagara* in 1858, in which year the same two ships, each with half the cable on board, steamed to a point in the Atlantic midway between Valencia, Ireland, and Hearts Content, Trinity Bay, Newfoundland, spliced the cable, and steering in oppositie directions, safely landed the ends at their destination on August 5.

After a short tour of duty at the receiving ship at New York he joined the U. S. S. *Fulton*, and was medical officer of that vessel when she was wrecked in 1859. During the Civil War he was attached to the U. S. S. *Pawnee* and participated in many naval activities.

From January, 1863, until October, 1865, Doctor Gunnell was attached to the naval hospital at Washington. His next tour of sea duty took him to the European station, where he served on the U. S. S. *Ticonderoga*, from 1865 to 1868. At the end of this cruise he returned to the naval hospital, Washington, where he remained until 1872. After a short period of service on the U. S. S. *Frolic* he served as fleet surgeon of the North Atlantic Fleet on board the *Franklin* and *Wabash*. In 1875 he was a member of the Medical Examining Board in Washington, and served once more in the naval hospital at Washington until 1879. In that year he was ordered to the U. S. S. *Richmond* as fleet surgeon of the Asiatic Fleet.

Returning to Washington in 1881, he served as a member of the retiring board until he was appointed Surgeon General and Chief of the Bureau of Medicine and Surgery. His last duty on the active list was as president of the Medical Examining Board, which service was terminated, as has been mentioned, by his retirement on November 27, 1889.

Professionally, Admiral Gunnell was very active. He repeatedly represented the Medical Department of the Navy at the meetings of the American Medical Association, and was a delegate to the International Medical Congress in 1876. Connected more or less intimately with St. Elizabeths Hospital for 43 years, he was a member of its board of visitors for a quarter of a century and its chairman for a decade.

Admiral Gunnell was a courtly gentleman of the old school and will be remembered by the older medical officers of the service as a man of pleasing personality, punctilious in the performance of his duties, and immaculate in dress. It is interesting to note that he was the last surgeon general to employ quill pens when signing his correspondence.

After his retirement, he married Mrs. Harriet Chew Barnes, the widow of a former surgeon general of the Army, who, with her two children, Lieut. Col. Joseph T. Barnes, United States Army, and Mrs. Mark Brooke, survive him. Admiral Gunnell was buried in the National Cemetery at Arlington.

COMMODORE JOHN CROPPER WISE, MEDICAL CORPS, UNITED STATES NAVY, RETIRED, 1848–1922.

Medical Director John Cropper Wise, United States Navy, died at the United States Naval Hospital, Washington, D. C., on June 12, 1922. Born in Virginia, October 7, 1848, he was commissioned an assistant surgeon in the Navy April 28, 1870. During his first cruise he served on the *Savannah*, *Guerriere*, *New Hampshire*, *Tallapoosa*, and *Gettysburg*. He was promoted to the grade of passed assistant surgeon June 8, 1874, while he was on duty at the naval hospital, Philadelphia.

During his second cruise he was attached to the U. S. S. *Despatch* from May, 1875, to July, 1878. After a short tour of duty at the navy yard, Norfolk, he returned to the naval hospital, Philadelphia, where he remained until March, 1881. He was attached to the U. S. S. *New Hampshire* from August, 1881, till April, 1884, during which time he was commissioned as surgeon. From September, 1884, until May, 1887, he was medical officer of the U. S. S. *Jamestown*.

On leaving this vessel he was ordered to the torpedo station, Newport, R. I., where he served until September, 1890. He then went to sea on the U. S. S. *Alliance*, on which vessel he served until April, 1893. Various duties in Washington occupied his attention until June, 1897, when he went to sea for the last time. During this cruise he was attached to the U. S. S. *Philadelphia* and to the U. S. S. *Baltimore* until March, 1899.

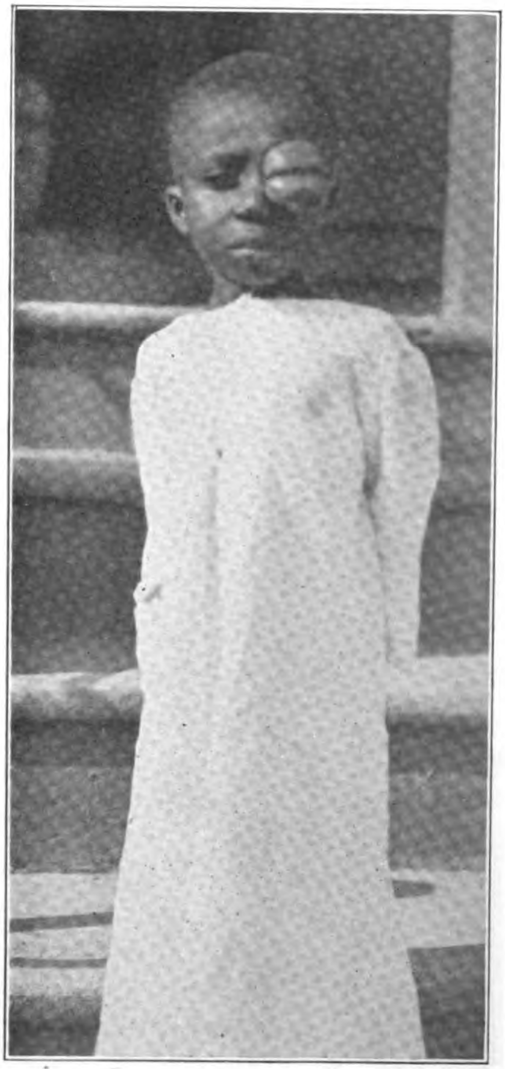
He was promoted to the grade of medical inspector March 20, 1896, and to that of medical director February 7, 1900.

After his last cruise he returned to Washington and served on various boards until August, 1905, when he was ordered to the command of the United States Naval Medical School in Washington, in which capacity he served until September, 1908. He was a member of the Naval Retiring Board and of the Naval Examining and Naval Medical Examining Boards until September, 1910. He was placed on the retired list at the age of 62, on October 7, 1910.

Doctor Wise was noted for his professional attainments. During the later years of his active service he represented the Medical Department of the Navy at many conventions of medical and scientific men. He was a delegate to the Tuberculosis Congress held in Baltimore during January, 1904, and to the meeting of the Association of Military Surgeons held at St. Louis, Mo., in October of the same year. He was a delegate to the International Medical Congress which met in Lisbon, Portugal, in April, 1906, and to the Red Cross Conference which was held in London in June, 1907.

Doctor Wise took an active interest in the Association of Military Surgeons of the United States, and was president of that organization during the years 1903 and 1904. For years he was an active contributor to its work and literature. A fluent and interesting writer, his contributions to medical literature embraced essays on a wide range of subjects.

Doctor Wise was of distinguished appearance, sympathetic and broad minded. He will be held in affectionate memory by his associates.



Sarcoma of the orbit.

CLINICAL NOTES.

REPORT OF A CASE OF SARCOMA OF THE ORBIT.

By O. Davis, Lieutenant, Medical Corps, United States Navy.

A boy (T. F.), aged 5 years, was admitted to the municipal hospital, St. Thomas, Virgin Islands, with a tumor of considerable size protruding from his left orbital cavity. The history as secured from the mother was indefinite, she stating that the tumor had appeared overnight about two weeks previous to admission to the hospital, had not increased in size during the intervening time, and had not caused pain nor any other symptom. No subjective symptoms could be obtained from the patient.

On admission, temperature, 100; pulse, 88. Physical examination negative, except for a mass protruding from left orbit. The eyelids were edematous, their ciliary margins covered with pus, and protruding between them was a red edematous mass of conjunctiva. On separating the eyelids farther the globe of the eye was found to be of normal size, but pushed into the upper inner quadrant of the orbit by a rather firm mass, occupying approximately three-fourths of the orbital cavity. Pupillary reflexes were absent and no vision could be demonstrated. The mass was not adherent to the orbit and no fluctuation was present.

Laboratory findings: Urine and feces negative. W. B. C., 8,000. Wassermann (Nogouchi), negative.

In view of the rapid growth of the mass, loss of function of the eye, and open exposure of the conjunctiva to infection, it was decided to operate. At operation the mass was found to be a rather firm white tumor, poorly vascularized, and not firmly attached to the globe of the eye nor the orbital walls, but growing from the apex of the orbit and completely filling the orbital cavity. The tumor tissue was rather firmly attached to the periosteum at the sphenoidal fissure, its origin as far as could be determined. The periosteum at this point was cleaned from the bone, and the orbit cleaned of all tissues, leaving only the periosteum of the orbital walls, packed with gauze, and the conjunctiva closed with openings for drainage. Sloughing followed, with foul-smelling discharge, and within six weeks after operation the tumor had again filled the orbital cavity and was protruding between the eyelids as a raw bleeding mass. Pathological examination of the tumor at the naval medical school showed a round cell sarcoma with numerous mitotic figures. No further operative procedures were attempted, and at the parent's request the patient was sent home, where he died three days after leaving the hospital. No autopsy could be obtained.

REPORT OF A CASE OF ACUTE RETROBULLAR NEURITIS.

By L. G. JORDAN, Lieutenant, Medical Corps, United States Navy.

The patient, aged 29, first appeared at the clinic late in the afternoon of August 9. His history was negative for any previous ophthalmological trouble. He stated that in the morning of August 7 he first noticed a coryza associated with considerable congestion of the nasal mucous membranes, headache, and lachrymation. Though feeling unwell, he attended to his duties that day.

The following day in the morning he commenced to experience pain behind the right eye of a dull constant character, but of only moderate severity. The headache and nasal congestion had abated considerably. During the afternoon he noticed a slight haziness of vision in the right eye, while the pain behind the eye increased somewhat and movement of the globe itself became painful. The loss of vision was more marked on August 9, and had increased progressively to such an extent that the man became alarmed and came to the hospital for treatment.

There was no evidence of venereal disease, alcoholism, or other poison. The teeth were in good condition. Examination of the affected eye showed the following conditions: Right eye: There was a slight congestion of the conjunctiva. The pupil was of the same size as that of the left eye; it reacted to light and accommodation (?), possibly a little sluggishly. The outline was regular. Vision was 20/200. (Snellen test type), and that only by peripheral vision, i. e., when the visual axis was directed to a point on the wall below the chart. The mobility of the globe was of normal amplitude in all directions. Ophthalmoscopic examination of the fundus showed all media clear, the only appreciable pathology being a slight distension of the veins of the retina. Left eye: Normal in every respect; vision 20/20. Muscle balance was not obtainable.

When the patient was tested with lenses it was impossible to improve the vision of the right eye. The left accepted a sphere, plus .75 (20/20).

A nasal examination disclosed a marked deviation of the nasal septum to the right, superiorly, and a heavy ridge of the vomer to the left inferiorly. The right middle turbinate was hypertrophied and undergoing cystic degeneration. A small amount of purulent discharge was seeping down between the septum and the right middle turbinate.

August 10.—The X-ray examination showed that the right ethmoidal cells and the right sphenoidal sinus were slightly clouded. The dental officer reported that the teeth were negative. The patient was symptomatically and objectively about the same. Vision right 10/200 indirect; left 20/20. Ophthalmoscopic; no change noted.

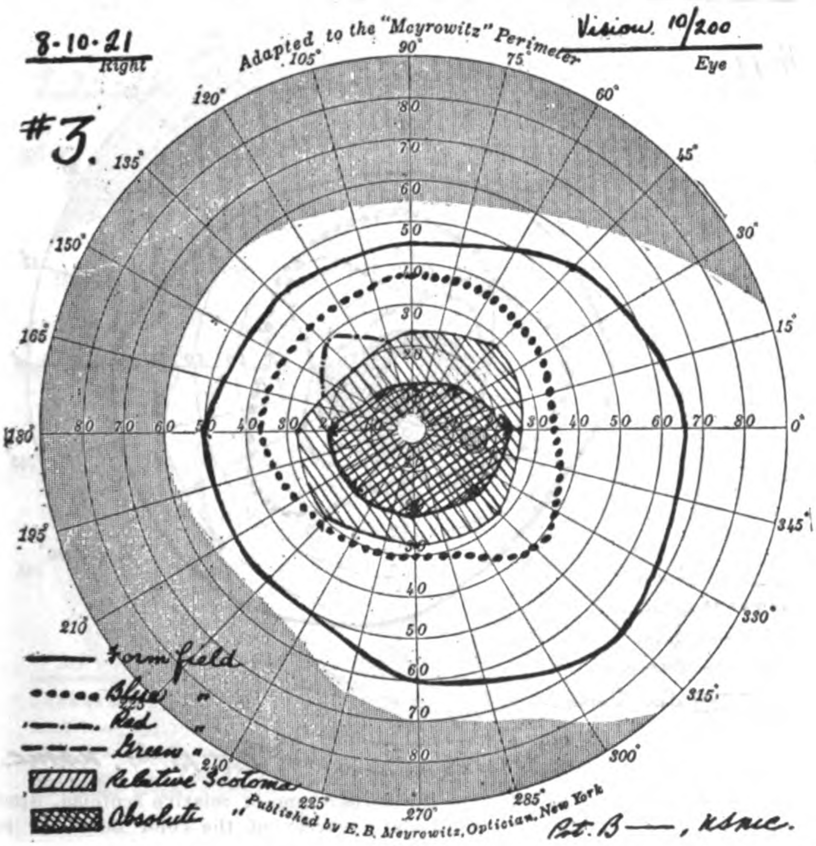


Chart of field of vision showing a large central scotoma, the central portion of which was absolute, the outer edge being only partial, for although the colors were obliterated, there was some perception of movement.

Perimeter examination was made (fig. No. 3.). There was a large central scotoma, the central portion of which was absolute, the outer edge being only partial, for although the colors were obliterated, there was some perception of the moving object. The green field and also the red was lost, except in one direction as indicated. The blue, white, and form fields at the periphery were unaffected. This syndrome is indicative of disease of the optic nerve.

Under local anæsthesia, a submucous resection, a right middle turbinectomy, and a partial exenteration of the posterior right ethmoidal cells were done. Profuse hemorrhage prevented further operative procedure. The nares were packed. The turbinate removed was hypertrophied, cystic, and filled with polypoïd granulations and pus.

August 11.—The eyes were somewhat suffused and the right eye a little painful. His vision was not tested. The ophthalmoscopic picture was unchanged. The Wassermann reaction was reported negative.

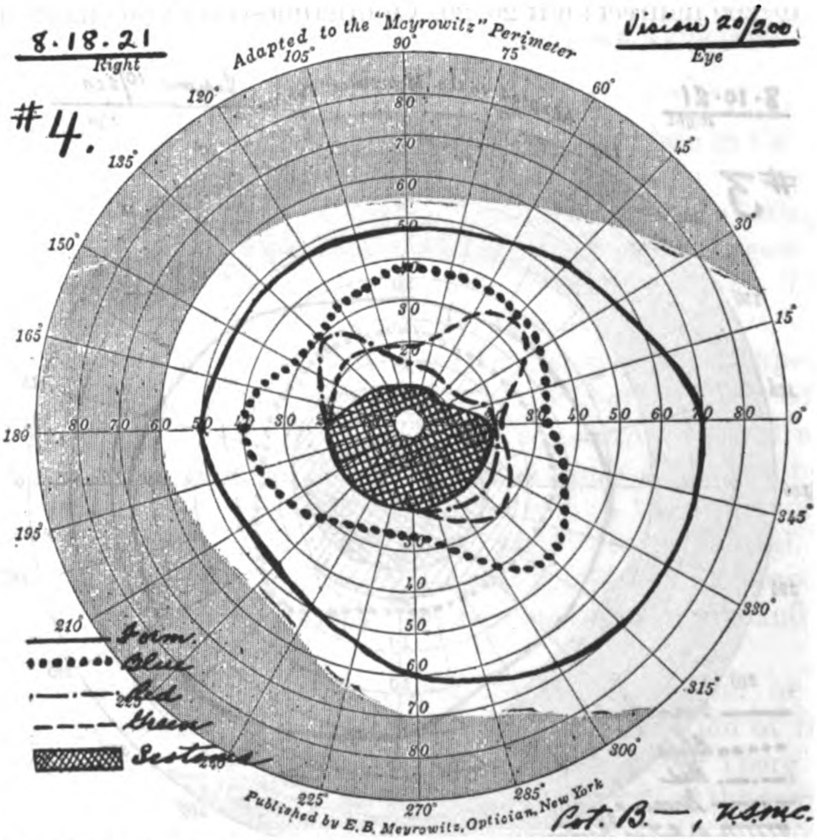


Chart of field of vision showing a loss of the border zone of relative scotoma, diminished size of the absolute scotoma, and a partial recovery of the color fields for red and green.

August 12.—The nasal packing was removed, but due to sharp hemorrhage, it was necessary to reintroduce the packing on the right side. Both eyes were quite injected. The patient claimed his sight was unchanged, and that pain behind the right eye was still present.

August 13.—The packing was again removed, but profuse bleeding a second time necessitated reinsertion on the right side. Ophthalmoscopic examination disclosed a hyperemia of the right nerve head, a slight blurring of its margin, and some slight increase in the venous engorgement. The level of the disk was apparently normal. The conjunctiva of both eyes were quite injected. Vision 10/200 (indirect). T. P. R. normal.

August 15.—The packing was removed; there was no bleeding. The subjective relief was considerable. By afternoon the conjunctival congestion and pain behind right eye had markedly diminished. The fundi showed no change.

August 17.—Externally both eyes were normal. The vision of the right eye had improved to 20/200. The hyperemia of the right disk had disappeared and the venous enlargement subsided somewhat. The margins were still slightly hazy. The level was normal. The mucous membranes of the nose were in good condition and there

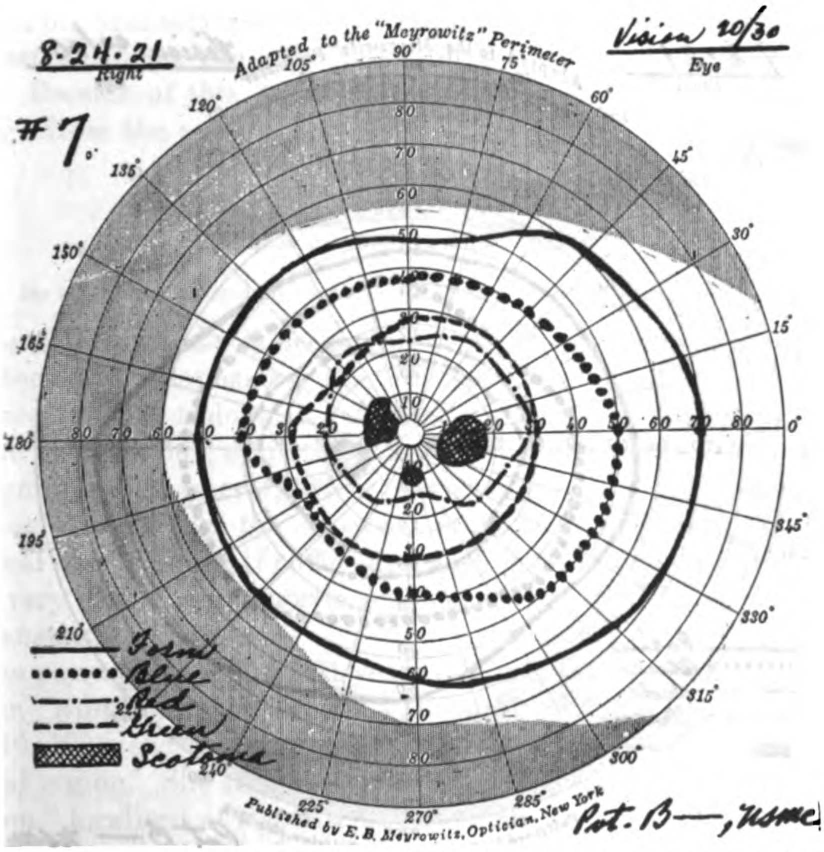


Chart of field of vision showing that the central scotoma has almost disappeared and that the color fields are being restored.

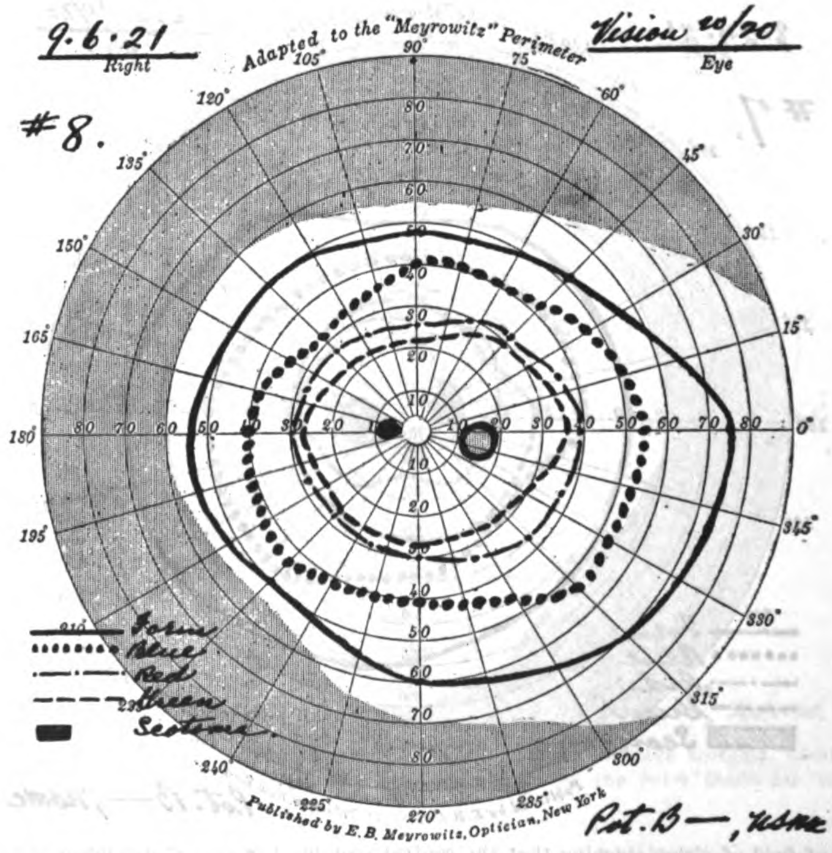
was only a small amount purulent discharge from the operative site and the cells in that vicinity, even when the Sonderman suction apparatus was used.

August 18.—Vision 20/200. A second perimetric examination (fig. No. 4) showed: (*a*) A loss of border zone of relative scotoma; (*b*) diminished size of absolute scotoma; (*c*) a partial recovery in a somewhat irregular manner of the color fields for green and red. The right fundus was normal except for the persisting haziness of the disk margins. The nasal mucous membranes were healing rapidly, with practically no discharge observed from the operative site.

August 20.—Vision 20/100. X-ray of ethmoids and sphenoids reported negative.

August 22.—Vision 20/50.

August 24.—Vision 20/30 plus. Another perimeter examination (fig. No. 7) showed that the central scotoma had disappeared with the following exceptions: (*a*) Slight enlargement of the "blind spot"; (*b*) two small areas one in the nasal and the other in the infra-orbital fields. The color fields were restored, except that at one position the field for red was much smaller than the field for green.



Normal chart of field of vision with form and color fields in their proper relationship and extent.

Nasal examination showed that the mucous membranes had covered the denuded operative site, and there was no further discharge observable. Ophthalmoscopic examination of the fundi disclosed both to be apparently normal, with the exception that the margins of the right disk were slightly blurred.

September 6.—Vision 20/20. The nose had thoroughly healed. A perimeter examination (fig. No. 8) showed a perfectly normal chart with form and color fields in their proper relationship and extent, with the exception of a pin-point scotoma in the nasal field and a slight enlargement of the "blind spot." Ophthalmoscopic examination revealed the following findings: The disk outlines were not sharply defined, but the level and color were apparently normal; the vessels were normal; the balance of the fundus did not show any apparent pathological variations. All media were clear.

The case was kept under observation for a period of three months, and the end examination showed no variation from that noted under the date of September 6, when he was sent to duty on the hospital reservation. The vision of the affected eye was 20/20. The small central scotoma is apparently permanent. While it does not annoy him in his ordinary pursuits, it renders him unable to sight a rifle, his last scores on the rifle range being conclusive evidence of this fact. Because of this defect it was necessary to recommend his discharge from the service.

A CASE OF CEREBELLAR TUMOR.

By H. BUTTS, Lieutenant Commander, Medical Corps, United States Navy.

The following case is deemed of interest, not because of its rarity, but because it emphasizes the importance of complete and careful physical and neurological examinations, including an examination of the eye grounds, of patients who present no apparent neurological symptoms in general, before operative procedures are undertaken. It goes to show that the apparent cause of symptoms is not always the real one, and that if sufficient search is made one will often arrive at a very different diagnostic conclusion from the seemingly obvious explanation of symptoms.

The patient, Mrs. D. S., 31 years old, was the wife of a chief petty officer. Admitted to St. Joseph's Hospital, San Diego, Calif., November 10, 1921, she complained of very severe headache in the suboccipital region. She stated that she had suffered with headaches, "off and on," localized at the base of the brain, since childhood, but they had been much worse during the last four years, and for the two months prior to her admission to hospital she had suffered with headaches constantly. They were said to be worse before, during, and just after menstruation. She also complained of severe sacral backache and profuse leucorrhœa.

Physical examination showed the uterus to be retroverted and immovable, and the right ovary large and hard. The following laboratory data were obtained: Blood examination: 4,390,000 erythrocytes; leucocytes, 10,200; large and small lymphocytes, 12 per cent; polymorphonuclears, 88 per cent. Urinalysis: Specific gravity 1.011; heavy trace of albumin present, sugar absent, few urates, large amount of mucus, and few bacteria present. Blood pressure: Systolic, 100; diastolic, 70. Blood serum and two spinal fluid Wassermann tests were all negative.

On November 28 the uterus was curetted, suspended by the round ligament, and a cyst of the left Fallopian tube, as well as the appendix, removed. The uterus was enlarged and retroflexed, and the appendix was enlarged, kinked, and acutely inflamed. During operation the patient showed a decided hemorrhagic tendency.

The patient made an uneventful recovery from the abdominal operation, but continued to complain of headache, "sour stomach," and occasional emesis, which had no relation to the taking of food, and which afforded no relief of headache.

On December 11 she complained of difficulty in remembering, defective vision, and of arms feeling numb. Temperature, pulse, and respiration were normal at this time. The next day she talked irrationally, had difficulty in voiding urine, and complained of pain in the back of her neck. Two days later she had a fairly comfortable day, and on December 17 she left the hospital.

On December 30 she was readmitted to the hospital in an ambulance, screaming with severe pain in her head, which morphine relieved to some extent. The next day she was nauseated at times and pain in head continued, somewhat relieved by morphine. She would cry out while sleeping and would awaken as the result of the pain.

At this time the case was referred to me, after a diagnosis of "brain tumor" had been made, and I was requested to attempt to localize the tumor with a view to operation. On January 4, 1922, I made a complete neurological and mental examination of the patient. Her mentality was unimpaired, and she lent as good cooperation in her neurological examination as I could desire. She stated that her head had not been entirely free from pain for the past four years, and upon closely questioning her husband I learned that he had noticed when she walked with him she tended to bear to the left and would sometimes crowd him off the left side of the sidewalk. She could give no explanation for this peculiarity, and her husband did not attach any significance to it and would not have mentioned it to me had I not specifically asked him about it.

Her neurological examination revealed the following: She could not read or tell time from a clock, but could count fingers. Both eyes contained markedly choked disks, the left one more than the right. Nystagmus was present in all directions, but coarser when her eyes were turned to the left. There was no paralysis of the eye muscles. The pupils reacted very sluggishly to light and accommodation; they were round in outline, and the left one was slightly more dilated than the right. Diplopia was present. The position of the eyeballs was normal. When questioned, she complained of scotomata, tinnitus, and vertigo. In smiling the left labial fold was less distinct than the right. She could whistle, wrinkle forehead, and expose her teeth well. Her hearing (watch) was 6 inches for right ear and 2 inches for the left ear. Speech showed no defect, and her senses of taste and smell were apparently normal. Her muscular apparatus showed diminished tonus of muscles, but no atrophy or hypertrophy of same. Hand grips were equal and strong. Stereognosis was normal. Adiadokokinesis was absent. Her deep reflexes were all plus. Finger-nose and finger-finger tests were poorly done with the left hand; well done with the right. Localization of touch and pain sensations was well done, and thermo-anesthesia was absent, except on the anterior surface of the right side of her abdomen, where she apparently could not distinguish heat from cold. Romberg's sign was present, and she showed an inclination to fall to the right. She had a somewhat ataxic gait, and would invariably bear to the left in attempting to walk on a straight line. Oppenheim's, Gordon's, and Babinski's signs were absent. A clonus of both feet was present, but the clonus was not sustained.

The point of maximum pain was suboccipital, and more marked on the left side. Moderate pressure on this point elicited pain. Cranial percussion was not attempted.

In view of the history obtained and the above neurological findings, I made a diagnosis of cerebellar tumor, located in the left half of the cerebellum, and advised operation. Before preparation for operation had been completed the patient suddenly died January 6, 1922.

The following post-mortem notes on the brain were made at autopsy:

"The calvarium is normal. The dura mater over the vertex is normal. The external appearance of the cerebellum shows indentations and impressions from the parts having been under pressure against the brain and tentorium. The left lobe of the cerebellum is largest, and in the upper inner segment of the left cerebellum there is what appears to be blood extravasation, extending over to the upper aspect. Part of the substance of the central lobe of the cerebellum has been forced into the foramen magnum by excessive pressure, and there is an imprint of the edge of the foramen magnum. There is an annular-shaped depression surrounding this dislocated portion of the central lobe of the cerebellum. The convolutions of the cerebellum have been obliterated by the excessive pressure under which the organ has been ante mortem.

"The cause of sudden death was probably due to pressure on the vital centers of the medulla from the dislocation of the middle lobe and downward pressure.

The left lobe of the cerebellum is softer than the right, and has fluctuation, indicating the presence of fluid in the interior of the same lobe. The floor of the fourth ventricle showed indentations from the pressure exerted by contiguous parts.

The left lobe of the cerebellum was practically excavated by an encapsulated cyst containing straw-colored fluid, in quantity about an ounce (estimated). The cyst wall was thick, and composed of white scar formation.

What appears to be a sarcomatous mass about the size of a hazelnut is found at the upper part of the left lobe at the site of the extravasation previously referred to. In the outer aspect of the right lobe is found a tumor formation exactly similar in gross appearance to that in the upper part of the opposite lobe. This one is about the size of a grain of barley. A similar formation is found in the roof of the cyst about the size of a grain of barley.

There were adhesions between the under surface of the dislocated portion of the middle lobe of the cerebrum and the cerebellar peduncles.

Microscopical examination of the tumors showed them to be benign hæmangiomas, and the cyst had no definite limiting membrane.

Comment.—It is believed that these tumors were operable, and that if an operation had been done earlier death might have been averted, and partial, if not complete, relief of symptoms obtained. During the last few days of the patient's life her vision was rapidly growing worse, and head pains more severe and frequent.

It is common practice in cases presented to the surgeon suffering with headaches, constipation, and disorders resulting from malposition of the uterus to proceed with the operation, with little consideration of possible neurological findings. This, I believe, is a mistake. An examination of the eye grounds, which, in this case, would probably have cleared up the entire condition in the beginning, would have excluded the gynecological operation.

Spinal puncture is not without its dangers, and great care should be exercised, not only in the selection of appropriate cases, but also in the method of doing the puncture. Where an examination of the eye grounds reveals a choked disk, spinal puncture should be undertaken with great caution, if done at all. According to Lewandowsky, without continuous measuring of the pressure during the withdrawal of the fluid, spinal puncture is a dangerous procedure in cases of suspected intracranial neoplasm, as death may occur by the lowering of the blood pressure so that the brain is to a certain extent drawn down, and the cerebellum and the medulla oblongata are pressed against the foramen magnum. Though spinal puncture was done twice in this case, in view of the post-mortem findings it is believed that the life of the patient was greatly jeopardized each time it was done, and these punctures may have hastened her death.

REPORT OF A CASE OF DEATH FROM EMBOLISM FOLLOWING THE ADMINISTRATION OF SALICYLATE OF MERCURY BY INTRAMUSCULAR INJECTION.

By S. R. MILLS, Lieutenant, Medical Corps, United States Navy.

The following case is reported on account of its unusual features:

S. F., corporal, U. S. M. C., age 34, reported to the sick bay, First Air Squadron, Santo Domingo City, Dominican Republic, complaining of general pains without apparent cause. He had had what was considered a venereal wart on the penis some three months previous and presented general adenopathy. Denied intercourse within the last six months. The day following there appeared a maculo-papular eruption, copper colored, over the chest and characteristically specific in appearance.

The Wassermann test was strongly positive and the patient was transferred to the base hospital at Santo Domingo City, where he received three intravenous injections of neoarsphenamine 0.9 gram, at weekly intervals, returning to his station for further treatment.

On arrival at the First Air Squadron he received, on Friday, January 27, 1922, neoarsphenamine, followed on January 30, 1922, by an intramuscular injection of mercury salicylate, 1 grain, which were repeated on February 3 and February 6, respectively. There was no reaction following the arsenic, but there was slight headache and diarrhœa following the mercury on January 30. No report was made of this by the patient until after his second injection of mercury on February 6. Several hours after this injection he returned to the sick bay on account of chilliness, headache, and painful, sensitive, bilateral, and symmetrical swelling under the jaw. Examination showed the submaxiliary and sublingual salivary glands, on both sides, to be enlarged and very painful. The teeth were very sensitive, slightly loosened, and the gums showed the typical lesions of mercurial stomatitis with ptyalism.

The patient was readmitted to the base hospital February 8, 1922, at 10.30 a. m., with diagnosis of poison, mercurial, acute, with the symptoms mentioned above; the salivary glands were markedly swollen and painful; gastrointestinal symptoms were absent. The urine showed a slight trace of albumin without casts or blood.

February 9, 1922: The patient felt no discomfort except for pain in glands and teeth, but that evening he had a sudden sharp pain in the great toe of the left foot, which he said he had "stubbed" a few days previously. Examination showed only slight blackish discoloration of the nail. An hour later the pain in the toe was excruciating and the discoloration was found to extend up in a wedge-shaped area over the dorsum of foot to the ankle. This area was mottled red, involving almost the entire dorsum of the foot and great toe. Hot fomentations furnished some relief.

Early the next morning the patient had a sudden severe pain in the chest (substernal) without cough, but accompanied by dyspnœa, marked cyanosis, and very feeble rapid pulse. The area of discoloration, as above noted, was found to be sharply defined, wedge-shaped, apex upward at ankle, and blue-black in appearance. The lungs showed beginning edema, which accumulated rapidly, with death resulting at 9.05 a. m., the patient remaining conscious to the end.

Autopsy showed embolism of the anterior tibial artery at left ankle, pericardial exudate, thrombus filling entire right ventricle, and edema of the lungs. The gall bladder was markedly dilated. The liver, kidneys, spleen, stomach, and intestines showed no macroscopic lesions. Owing to the lack of facilities, no pathologic sections were made.

The mercurial injection consisted of 1 grain of the salicylate in oil injected deeply into the buttock. The medical officer reported that on both occasions the syringe was removed from the needle and the latter inspected for bleeding. There was no sign of a vessel having been punctured in either case. No incision was made at the site to determine the amount of absorption.

It is interesting to note that the deceased was one of several who received mercury on the respective days. He was second of four on the first occasion, and third of four on the second and last. None of the others so injected had reactions of any sort.

A CASE OF EPIDEMIC ENCEPHALITIS.[1]

Patient: L. C. U., seaman, United States Navy.—Encephalitis, epidemic (lethargic).

Previous history.—Patient 20 years old; had been in naval service since February, 1917. His family history is negative, his father being a coal miner and the patient himself having worked at times in the coal mines. On December 19, 1919, patient had lobar pneumonia in lower left lobe. He was sick at that time until July 15, 1920, the pneumonia being very slow in resolving. Tuberculosis was strongly suspected, but no definite signs of this could be found. His sputum was examined nearly every day from February to July, 1920,

[1] From the Annual Sanitary Report of the United States Naval Hospital, Portsmouth, N. H.

and no tubercle bacilli were found. On July 15, 1920, he left the hospital after a month's sick leave in apparently good condition. On December 27, 1920, he was readmitted with bronchitis, acute, and on January 14, 1921, tubercle bacilli were found in the sputum and the diagnosis changed to tuberculosis, chronic pulmonary. From that time on tubercle bacilli have been found in his sputum at frequent intervals. X rays of his chest show areas of consolidation in his left lower lobe.

Subsequent illness.—Patient was admitted to this hospital December 27, 1920, with a diagnosis of bronchitis acute, this proving on January 14, 1921, to be tuberculosis, chronic pulmonary. On admission patient had temperature of 101° and complained of double vision, which he states he had had for previous week. Blood count at that time was 86,000 whites and 59 per cent polynuclears, hæmoglobin 82 per cent. His temperature varied between 100° and 102° on December 28 and between 99° and 100.4° on December 28, 1920. On December 30 he had an evening rise to 99°; on December 31 it was normal all day; and on January 1, 1921, an evening rise to 99.5° occurred. From that time on his temperature was normal until January 18, 1921, when he had a midday rise to 100.8°. From then on the temperature stayed between 98° and 100° until January 28, from which time his temperature was normal.

On December 31, 1920, it was noticed that his left pupil was smaller than his right, both being rather small and reacting poorly to light. On this day he complained of a slight frontal headache for the first time. A complete examination of his reflexes showed both knee jerks marked but equal, no ankle clonus and no Rhomberg. Blood examination showed 10,800 whites and 67 per cent polynuclears, 5,100,000 reds and 90 per cent hæmoglobin. At this time the patient began to develop a marked apathy, which daily increased. He would lie for hours without speaking and with closed eyes, but he was not sleeping, and upon being spoken to would answer. By January 18, 1921, this apathy had increased to such an extent that the patient was reported dangerously ill. This day also for the first time weakness of his facial muscles was definitely noticed, this being especially shown in his inability to show his teeth or smile or frown. He could, however, wrinkle his forehead. Wassermann, of January 13, was reported negative. On January 19 a spinal puncture was made and 15 cubic centimeters of perfectly clear fluid, flowing at the rate of two drops per second, was obtained. The laboratory reported that this fluid contained 37 cells per cubic millimeter, was positive for globulin, that no tubercle bacilli were found, and that the colloidal gold curve was 1–5–5–5–5–5–5. On January 23 blood had 5,800 whites, with 60 per cent polynuclears, 34 per cent mononuclears, and 16 per cent lymphocytes, 4,650,000 reds, and 80 per cent hæmoglobin. The apathy, which reached its height on January 18, continued unchanged until this date, the patient having incontinence of both urine and fæces, and never making the slightest movement unless urged. He was fed by a spoon by a hospital corpsman, liquid diet only being taken. On January 30 patient was observed to be a little brighter mentally. On February 3 he had improved sufficiently to answer questions, and said that his double vision had gone. His facial muscles also showed marked improvement, and he was able to show his teeth and smile. He improved rapidly from this time on and was up in a wheel chair for 20 minutes on February 19, and by February 25 he was up for 3 hours a day. In view of the fact that this patient had chronic pulmonary tuberculosis the diagnosis of encephalitis, epidemic, was not made until all nervous symptoms had entirely disappeared, because of the danger of mistaking a possible tubercular meningitis for encephalitis, epidemic. He was seen by the entire staff from the first, and the opinion of all was that it was a case of encephalitis lethargica as early as January 30, but because of the presence of the tuberculosis in his illness the definite diagnosis was not made until March 22, 1921. The patient continued under treatment for chronic pulmonary tuberculosis and was transferred to the United States Naval Hospital, Fort Lyon, Colo., May 28, 1921, for further treatment.

SPECIFIC TREATMENT OF PULP GANGRENE AND ITS SEQUELÆ.

By F. S. Tichy, Lieutenant, Dental Corps, United States Navy.

When Dr. John Buckley gave the dental profession his "formocresol" (cresolis et liquoris formaldehydi, equal parts) for the treatment of pulp gangrene and its sequelæ, he gave a treatment which, from a rational therapeutic standpoint, is a specific. In fact, it is as much a specific for pulp gangrene as Ehrlich's salvarsan is for syphilis, or quinine is for malarial fevers.

But alas, there often comes a patient who desires immediate relief from pain which is the result of a gangrenous pulp. We try to relieve the pain by opening into the pulp chamber and releasing the pressure, but some of the liquids and gases of putrefaction have already been forced through the apical openings, setting up an acute septic pericementitis. It is then that a great number of us find ourselves in a dilemma. We try anodynes, local and general, anything to relieve congestion; saline cathartics, hot foot baths, and what not, possibly the seemingly inevitable extraction and curettage.

We know that if it were not for the irritating property of formocresol we would not hesitate a second to seal it in the most troublesome tooth, because we know the physiologic action of cresol—it acts as an analgesic locally; it is a good disinfectant and cauterant. The other constituent of formo-cresol is liquor formaldehyde—a 37 per cent aqueous solution of formaldehyde gas—a powerful and highly irritating gas, which will readily combine with the fetid gasses of putrefaction, and these form nonodorous compounds. It is a gas which one would hesitate to confine near a tissue which is already hyperemic. Doctor Buckley claims that the irritating effects of formaldehyde can be controlled by mixing it with cresol. This is true, but, on the other hand, I have found that the cresol-formalin combination as recommended by Doctor Buckley, very often proves to be highly irritating.

As I have stated before, cresol acts as an anodyne, disinfectant, and cauterant. The ratio of each of these properties differ considerably, and I take it that the disinfectant property exceeds by far the other two. We have an irritation set up by all disinfectants; hence the pain set up by the disinfectant property of cresol is not offset by its anodyne property, and the result is that we have produced to some extent an irritation by the application of cresol. I will not discuss the formalin of the combination because its irritating property is acknowledged by all. I agree with Doctor Buckley when he says that the irritating effects of formalin can be controlled by mixing it with cresol.

In my study of the two constituents of Buckley's treatment, I have found both to be irritants. The irritating effect of one (formalin) is controlled by the other (cresol), but formalin has not a countereffect upon the irritating property of cresol. To overcome this irritation I have used liquor cresolis compositus instead of the cresol. I have found that this compound solution of cresol has not the irritating property of cresol alone, and its action, when combined with formalin, in proportion of 3 to 1, is most admirable when sealed in the root canals of teeth with dead pulps.

I believe that its action upon the ptomaines, fats, and fatty acids of pulp decomposition is not so violent, since the cresol of the compound is predigested (if you please) by the potassium hydroxide of the compound. It is not so antagonistic (the cresol compound) in its neutralizing action, but still the action is there. So then we have the deodorizing and neutralizing effect of the formalin upon the gases, and its irritating property reduced to a minimum by the cresol of the compound, and the irritating property of cresol controlled by the potassium hydroxide of the compound solution of cresol.

Along with the linseed oil of the compound plus the fats, fatty acids, and potassium hydroxide, we have an ideal cleansing solution—soft soap. The liquor cresolis compositus et liquor formaldehydi combination is an ideal remedy for cases in the naval service, because we have to treat not only patients that can present themselves for two or more sittings, but patients who are able to report for treatment only once. Then, too, I have experienced considerable trouble in having an ordinary combination of formalin and cresol made up at the dispensary (cresol will not mix with the aqueous formalin solution), whereas not so with the liquor cresol compound and formalin combination, since the latter two mix well and form a clear solution.

The following is a good example of many similar cases, in all of which the action of the cresol compound and formalin combination proved to be superior to that of plain formo-cresol or modified formo-cresol:

Patient, male, age about 42; physical condition good. Case presented two weeks ago. Suffered greatly from pain and lack of sleep. A considerable swelling in the apical area of right central incisor. Treatment (impossible to get radiograph): Made opening through internal surface of crown of tooth, generous flow of thick greenish pus. Canal washed out and formo-cresol dressing inserted. Patient instructed to take a good "dose of salts." Boric acid solution compress to mouth and lip.

Patient returned in a couple of hours suffering from acute septic pericementitis; dressing removed and formo-cresol dressing replaced by combination of cresol compound and formalin. Next morning patient returned, very grateful, relieved of all pain; changed dressing. After the sixth treatment the tooth had become firm in socket, canal clean and dry; followed treatment with strong root canal germicide, and filled with chloropercha plus thymol and root canal points.

CATHETERIZATION OF WHARTON'S DUCT.

By T. L. Sampsell, Lieutenant, Dental Corps, United States Navy.

Although cysts in the floor of the mouth and ranulæ of one kind or another are not frequently encountered in the practice of dentistry, yet, now and then, one is encountered when least expected and, unless promptly recognized and successfully treated, gives rise to disturbances of a severe character.

Inspection of the literature on the subject shows that this ground has been fairly well covered, and its repetition would be superfluous here but for the fact that no authority which I have been able to consult thus far mentions that method of treatment which, in my opinion, is the simplest and most satisfactory for these conditions, i. e., the simple catheterization of the duct.

To avoid encroaching upon that which has already been written, this report is confined to the actual treatment of three cases which occurred in my own practice, the last quite recently, all of which were clinically the same and treated alike.

Upon examination in each case the caruncula sublingualis was seen to be engorged and pointing upward toward the elevated tongue instead of lying parallel to it and flush with the floor of the mouth. The submaxillary gland was distended but did not pit on pressure and was slightly tender to the touch.

The ducts of Stenson were occluded with cotton rolls to prevent their discharge of saliva during the examination, and the floor of the mouth was evacuated with the saliva ejector. The floor of the mouth was then swabbed dry, the tongue elevated, and the action of Wharton's ducts observed for several minutes.

The duct on the unaffected side continued to discharge its saliva normally, while the floor of the mouth on the affected side remained dry.

A strand of ligature wire, thin gauge, was bent double, leaving a very small loop at the end which would distend but not injure the duct. The loop was then passed through the meatus into the duct and gently maneuvered backward into the gland, the fingers of the left hand manipulating the floor of the mouth from outside and below, thus assisting in overcoming the duct curvatures.

The gland in each instance began to empty itself immediately, and numerous small bits of caseous material could be observed in the discharged saliva. In two or three minutes the duct appeared to be functioning normally, and the wire was withdrawn.

The patient was then instructed to massage the gland from time to time, chew gum, and exercise the neck muscles periodically until the condition had completely subsided. This usually occurs in a few days, but the patient should be observed for a week or two longer for a recurrence of the obstruction.

The writer firmly believes that this method of catheterizing the duct is the specific treatment for all simple duct obstructions and, in all cases, should precede any decision to intervene surgically.

No especial skill is required in catheterizing the duct, though great care should be taken not to injure the walls.

646—22——9

NOTES AND COMMENTS.

The death of Charles Louis Alfonse Laveran at the age of 76, on May 18, following so closely that of Sir Patrick Manson, removes another of the great pioneers of tropical medicine. Laveran was the actual discoverer of the malarial parasite of man, and both he and Manson conjectured that the mosquito would be found to play a part in its transmission, a theory which obtained final proof from the researches of Ross in India, and Grassi, Bignami, and Bastianelli in Italy. Laveran's researches covered a wide field in the realms of parasitology. He was an indefatigable writer, and a complete list of his publications would cover many pages.

The following sketch of his life appeared in the Lancet for May 27, 1922:

Alfonse Laveran was born on June 18, 1845. He commenced his medical studies at the civil hospital in Strasburg, where he graduated doctor of medicine in 1867, with a thesis entitled "Recherches experimentales sur la régénération des nerfs." In 1874 he was appointed to the staff of Val-de-Grâce School of Military Medicine in Paris. He served in north Africa from 1878 to 1883, and there conducted the researches on malaria which have made his name famous. Returning to France in 1884 he occupied the chairs of military hygiene and clinical medicine at Val-de-Grâce for 10 years. For a short period after this he held the post of medecin chef of the Hôpital Militaire at Lille and director of the Service de Santé at Nantes, and during this period his brilliant observations on the parasite of malaria received confirmation at the hands of Italian workers. Honors commenced to shower upon him. He became a member of the Académie de Médecine in 1893, and member of the Académie des Sciences in 1895, while various other medical and scientific bodies felt it an honor to include him on their roll of fellows. He was elected an honorary Fellow of the Imperial Military Academy of Medicine of St. Petersburg, a foreign member of the Royal Society of London, a Fellow of the Medical and Chirurgical Society, and honorary Fellow of the Royal Society of Tropical Medicine and Hygiene. In 1889 the Académie des Sciences awarded him the Bréaut prize and the Cothenius gold medal. In 1905 he was awarded the Mary Kingsley medal by the Liverpool School of Tropical Medicine. He became a "médecin principal" of the army, an officer of the Legion of Honor, and was universally recognized as the highest authority on military hygiene and sanitation.

There was opening up before him a public career of such brilliance that it would have attracted many a man of high scientific attainments. But not so Laveran. His early experience of microscopic investigation had so fascinated him that he longed for the quiet and seclusion of a laboratory where he could pursue his studies without interruption. Accordingly, in 1897, he suddenly abandoned his public career and retired to the Pasteur Institute of Paris, where he became professor, and, finding the atmosphere congenial, remained constantly for the next 25 years. His interest in malaria was first aroused in 1878 by the characteristic malarial pigment in the liver and brain of fatal cases. This pigment, of course, had been previously noticed, but it was Laveran who observed the same granules of pigment in the blood inclosed in crescent-shaped bodies or in spherical structures which exhibited amœboid movements. He regarded these bodies as parasites, but was not absolutely convinced till 1880, when at Constantine he observed for the first time the striking phenomenon known as flagellation of the crescents. His views were received with doubt in many quarters, but with that doggedness and determination which characterized all his subsequent work he remained true to his beliefs, which were finally recognized in 1889 by the Académie des Sciences, and in 1907 by the award of the Nobel prize for medicine, which he devoted to the establishment of laboratories of protozoology at the Pasteur Institute. In the same year he was elected first president of the Société Pathologie Exotique of Paris.

At the Pasteur Institute Laveran devoted himself to the study of protozoal parasites, especially those forms which occur in the blood and are pathogenic to man and animals. The discoveries of trypanosomes as the cause of nagana by Bruce and his coworkers in Zululand in 1896, and by Dutton in man in the Gambia in 1902, attracted his attention, with the result that he undertook the study of these organisms chiefly in collaboration with his colleague, Professor Mesnil. He carried out a long series of most intricate researches into the behavior of these organisms in experimental animals, in the hope of discovering a remedy for the dreaded sleeping sickness of Africa.

With the discovery of leishmania as a cause of disease in man, Laveran undertook the study of these organisms, and has published the most complete account of the diseases they produce that has yet appeared. Laveran was an acute observer and had absolute confidence in his own observations and opinions, to which he adhered with almost stubborn persistence. For example, most authorities now believe that there are three species of malarial parasite producing disease in man, but Laveran adhered to his original view that the variations observed were an indication of the polymorphism of the single species. Again, he devised an immunity test for the separation of trypanosomes, and concluded that any trypanosome which could be inoculated into a goat or other animal which had acquired an immunity to another trypanosome was a distinct species. Though the criterion is not generally accepted, Laveran maintained his opinion that it afforded a reliable means for distinguishing species. Since the views to which he clung so tenaciously were no mere dogmatic assertions, but were the outcome of personal observations, extending over many years, one could not but admire his refusal to relinquish them readily.

Those who have had the privilege of knowing Professor Laveran personally can well understand the admiration and respect with which this great man was regarded. Those who did not know him would find it hard to realize how complete was his absorption in his work. From 8 a. m. till 8 p. m., with only the usual break for déjeuner, he was to be found in his laboratory on six days in the week. Sunday afternoon alone was spent in recreation, which consisted frequently in reading at home or planning future researches. Laveran objected to interruptions in his work, not because of any harshness of temperament, but because he was reluctant to lose a moment of time. He was, however, always ready to listen to anyone who had serious matters to discuss, though he found it irksome to converse except in French. He found time to publish many comprehensive treatises. While in 1867 he wrote on the regeneration of nerves, in 1873 he published a treatise on tuberculosis. In 1875 appeared the Traité des Maladies et Épidémics des Armées, while in 1880 he published in the Proceedings of the Academy of Science his famous paper entitled "Note sur un Nouveau Parasite Trouvé dans le Sang de Plusieurs Malades Atteints de Fièvre Palustre." His observations on malaria appeared in book form in 1884 as the Traité de Fièvres Palustres, in 1891 as Du Paludisme et de son Hématozoaire, and in 1898 as his Traité de Paludisme, a new edition of which was issued in 1907. In 1894, in collaboration with Teissier, he published a book entitled "Nouveau Eléments de Pathologie Médicale," and in 1904 appeared the well-known Trypanosomes et Trypanosomiases, written in collaboration with Professor Mesnil. A new edition of this book, which had been translated into English, appeared in 1912, while in 1917 he reviewed the whole subject of kala-azar, oriental sore, and allied diseases in his work entitled "Leishmaniases."

These form but a small part of the numerous papers issued by this remarkable worker, and almost everything he wrote was a practical record of facts observed by himself. Herein lies the immense value of his work. He was a man of iron constitution, stupendous energy, and quite unusual powers of mental application. Combined with these characteristics he had the true scientific mind, which entitles him to be remembered as one of the great leaders of scientific research.

We learn from the British Medical Journal for May 27, 1922, that the seventh centenary of the University of Padua was celebrated on May 14 to 17 in fortunate circumstances. The weather was fine, but not too hot, and over 200 foreign delegates attended, about 50 coming from the United States of America, about 30 from Great Britain, Ireland, and the Dominions, and a large number from the universities of Italy. On Sunday, May 14, the delegates met in the grand hall of the university at 2 p. m., under the presidency of the rettore magnifico, Prof. Luigi Lucatello; this preliminary ceremony was followed by a discussion on "Scientific synthesis and speculative science, the methods and aims of these researches, and their relation to philosophy." During the day the students organized a picturesque carnival and paraded the streets, as they did on the following Tuesday; in the evening there was a reception at the Casino Pedrocchi. Monday, May 15, was the chief day of the centenary, as the King of Italy arrived and presided at the solemn ceremony in the Sala Ragione, where, before an audience of 5,000 people, addresses were delivered by the rettore magnifico, the sindaco, and Prof. Nino Tamassia, and the students sang verses by Giovanni Bektacchi, set to music by Riccardo Zandonai. The foreign delegates and those from other universities and bodies in Italy handed in their congratulatory addresses, and short speeches were delivered by one representative of each of the nations. The British representative was Sir Archibald Garrod, an appropriate choice, for not only is he regius professor of medicine in Oxford—the oldest British university—but in that capacity a prominent figure in the subject matter of one of the chief faculties of the University of Padua, with which the honored names of Linacre, Caius, and Harvey are so closely connected. In the evening there was a gala performance of Arrigo Boito's Mefistofele, which was attended by the King of Italy. On Tuesday morning Prof. Augusto Bonome delivered an oration on Morgagni. and a large number of honorary degrees were conferred on the representatives of foreign universities, including those of this country. who were well represented in the list and most cordially received. This was followed by a visit to the Collegio Sacra, where more addresses were delivered; the company then made a special train journey to an open-air lunch in the beautiful grounds of the Istituto Idrotechnico (Villa Reale); in the evening a banquet was given to the delegates by the municipality of Padua. Wednesday, May 17, the last day of the celebration, was occupied by an excursion to Venice. The town of Padua was en fête and provided much of interest for the visitors, who were able to study the stemma of William Harvey in the court of the university.

Admiral Braisted, writing in The Nation's Health on the Gorgas Memorial Institute to be established at Panama, pays, indeed, a glowing tribute to the late master of tropical sanitation, Gen. William C. Gorgas, United States Army. "Formerly men memorialized their heroes in stone, with the result that the monuments of the world are for the most part retrospective, representing some peak of past achievement, but exerting no vital force of inspiration or restraint except as they are reinterpreted by successive generations. And yet, if civilization is to carry on, it is through uninterrupted cumulative achievement; and the most enduring memorial to any man is the provision of the means by which to perpetuate his work. Especially when a humanitarian achievement has been made possible by the unusual skill or the clear vision of one man does such perpetuation seem desirable. As this applies to the work of General Gorgas, he may well be considered as the personification of the public health era and the plant of the Gorgas Memorial Institute in Panama a truly representative enterprise. Established in a country unhappily known as the pesthole of the Tropics, which, by his efforts, was transformed into one of the healthiest places on the face of the globe, the institute will afford opportunities complete in every detail for trained research men and scientists from all over the world to work together upon the common problem of how best to prevent and eradicate disease.

"Anyone who has seen the old Panama at the time of the abandonment of the work of the first canal, involving so much wasted energy, life, and money, with its abandoned equipment and the evidences of unsuccessful labor, and the thousands of unknown and unnumbered graves of its workers, can not help but be struck with the present aspect of Panama, its splendid sanitation, its beautiful cities, its fine hospitals, and the magnificent accomplishment of the completion of the work of the canal, making it one of the most beautiful and salubrious spots in the world.

"The accomplishment of this great work and the sanitary regeneration of Panama are due to the efforts of the late William C. Gorgas, United States Army. To his efforts more than to any other agency the success of this work must be accredited. His earlier work in the Southern States and the West Indies, particularly Cuba, his later efforts in Ecuador and Peru, and his projected work in Africa, give one an idea of the vast field of splendid endeavor which he accomplished and would have continued had his life been prolonged. His reputation has gone forth to all the world, and he is loved and revered in every household. Perhaps no single life has ever made possible so much for the good and wellbeing of humanity as has that of General Gorgas.

"Many types of memorials were considered to do honor to this great man, but I feel sure that the establishment of this memorial, the Institute for Research in Tropical Diseases and the Study of Preventive Medicine, carrying with it not only a permanent monument to his memory, but one that will continue his work and be of greatest value to the welfare of the entire world, will be considered the ideal commemorative effort. Panama, situated in the heart of the Tropics and in the midst of the Central and South American States, which offer a splendid field of work of this kind, would seem to be the ideal location, furnishing a wealth of material for the institution which is brought into existence."

Prof. J. J. Van Loghem, director of the department of tropical hygiene at the Colonial Institute, Amsterdam, delivered a lecture in London recently, on the "Transmission of plague by rats." We learn from the British Medical Journal that in the lecture he dealt with the plague question as it affected Europe past and present. He confined himself to bubonic plague, which he regarded as being the plague of all the great historical epidemics, and his argument was that in the time of old Europe the domestic architecture, the habits of the people, and the sanitary conditions generally were such as to encourage the breeding of rats in much closer proximity to man than was the case anywhere in western Europe to-day. At the time of the plague outbreaks in London and Amsterdam in the seventeenth century the rat probably lived as near to the occupiers of dwelling houses as it did at the present time in the plague-stricken areas of the Tropics and sub-Tropics. In this connection he spoke of his recent investigations in Java, where he found the house rat—*Mus rattus*—making its nest inside the bamboo poles used for the beams of the houses and the supports of the beds. Plague infection, in his view, depended upon the distance between rat and man being sufficiently short to permit of the rat flea conveying the disease to man. The influence of climate and season upon the rat flea carrying the plague parasite accounted for the climatic and seasonal variations of rat-borne plague. He showed diagrams illustrating the fluctuations of the plague in London and in certain Dutch towns in the seventeenth century. In all these cases the highest point was reached in August and September, after which there was a sharp decline. He quoted Daniel Defoe's Journal to prove that in the winter and spring preceding the plague of 1665 in London isolated cases appeared within a few weeks of each other and traceable to the same neighborhood—Long Acre—although it was not until the summer that any epidemic arose. There was no difficulty in explaining these sporadic cases in the light of modern knowledge if it was remembered that the propagation of the plague depended not on contact between human beings but on the activity of the rat flea, for the supposition was that all through this epidemic-free period there was plague among the rats, and only when the seasonal conditions favored insect activity did the epidemic arise among human beings. His pupil, Doctor Dykstra, of Amsterdam, had made some interesting researches on the plague which occurred in that city is 1617, by studying the lists of the Carthusian burial ground. They gave full particulars of the persons interred, including their places of residence, and he found that for six weeks in the early summer the plague was strictly localized to two or three streets; later it spread over a large quarter of the town, but its spread was topographical, from house to house and street to street. There was no other explanation of such a picture than localized rat plague. The animal concerned was not the brown or gray rat now familiar, but the black house rat, the "big mouse," which was rarely seen in Europe to-day. Even in the time of Cuvier the black rat, though still common, was being ousted by the brown, but it was a rat of the same species as this former domesticated habitant of Europe which caused the recent outbreak of plague in Java. That the brown rat can carry plague in the same way is, of course, evident; it was the brown rat which was responsible for the small epidemic in Paris in 1920, when most of the 150 victims were rag dealers, who were compelled by their trade to live near to the haunts of the rats; but the point is that the brown rat is not a domesticated animal like its predecessor, and to that extent is less dangerous. In the old days, with dark house interiors, straw beds, and abundance of food and other stores kept in dwellings, the black rat had a fertile breeding ground.

We learn from the division of venereal diseases of the United States Public Health Service that G. Stura offers a modification of Fontana's method for the demonstration of *Treponema pallidum*. The modification concerns the staining stage of Fontana's method and should be carried out as follows: (1) Smears fixed by heat are kept for a few minutes in a solution consisting of formalin 50 cubic centimeters, acetic acid 2 cubic centimeters, distilled water 150 cubic centimeters. (2) After washing with distilled water pour on the slide a few drops of a mixture of 5 grains of tannic acid, 3 grains of carbolic acid, and 100 cubic centimeters of distilled water. Warm on a flame up to boiling point. (3) Wash repeatedly. Pour on the slide pure ammonia; after a few seconds pour it off and, without washing, allow a 0.5 per cent solution of $AgNO_3$ to pass from one side of the slide over the smear. As soon as this has become brown the staining is finished and there only remains washing the preparation and drying it over a flame.

Recent medical literature contains many expressions of opinion by syphilographers of this and other countries regarding the high incidence and early onset of neurosyphilis. Another condition cited by them is that an increasing number of patients in the infectious second stage are being observed in the clinics. Many of the writers claim that too rapid sterilization and inadequate treatment are regarded as important contributory factors. Because of the seriousness of the problem and the diversity of opinion regarding the cause, the United States Public Health Service recently addressed a communication to a few of the leading syphilographers of this country asking for an expression of opinion on this important subject. The general opinion of the men written to is expressed as follows:

While a certain amount of the apparent increase of neurosyphilis is due to the increasing use of spinal fluid examinations and other modern diagnosis methods, I think there is no question that the ineffective use of arsenicals plays a very important part in this most undesirable tendency * * * the physician or health officer who is unable or unwilling to follow a syphilitic patient through a period of years, if not for life, should not attempt to treat the disease. Relapse is certainly the great outstanding fact of syphilis, and the so-called modern treatment has certainly not entirely done away with it. In particular, relapse in the nervous system and infectious involvement of the mucous membranes and genitalia are so alarmingly frequent under the inadequate use of arsphenamine that every agency which employs this drug in the treatment of syphilis should be thoroughly on the alert and equipped to detect the earliest manifestations of relapse. (Stokes.)

It appears to us that among the factors mentioned as probable causes two are of paramount importance, viz, (1) the tendency to undertreat; (2) the failure to interpret pathologic findings in the light of the clinical picture. (Fraser and Duncan, British Journal of Dermatology and Syphilis, July, August, and September, 1921.) To these we would add another of almost equal importance—the tendency to interrupt treatment by periods of rest. To our minds the treatment of all syphilis ought logically to be continuous rather than intermittent. Early neurosyphilis in the form of neurorecurrences would be reduced to nil if this were done. Late clinical neurosyphilis might be equally easily avoided by the early routine use of spinal puncture and by adjustment of treatment to the pathological findings. We agree that the "sterilization" treatment of syphilis, as exemplified by Pollitzer's method, is distinctly dangerous from the point of view of neurosyphilis, and that treatment should be directed toward building up the patient's own resistance to the disease. Stokes's discussion of this problem in his paper, "The application and limitation of the arsphenamine in therapeutics" (Archives of Dermatology and Syphilology, September, 1920; see Venereal Disease Division Abstracts, March, 1921) deserves wider circulation than it has as yet obtained. The most crying present need of syphilotherapy is a standard treatment, sufficiently elastic to be adapted to all types of cases and sufficiently simple to be used by the average physician * * * unless a physician feels himself competent to carry out all the necessary procedures in the treatment of any given case, he should not attempt to treat it at all. Though many cases can be successfully dealt with by the general practitioner, he should realize that the appearance of any complicating features is sufficient to warrant the transfer of the patient to a competent syphilologist. (Keidel and Moore.)

Syphilis of the nervous system probably begins in the first year of the infection. The number of cases corresponds roughly with the total number of cases of so-called late neurosyphilis. These statements are based on the following observations:

(*a*) The number of early cases showing positive findings in the spinal fluid; (*b*) familial types of neurosyphilis; (*c*) biologic evidence of a neurotropic strain of the treponema; (*d*) persistence of the infection in loco, as in aortitis, interstitial keratitis, etc.; (*e*) observation of patients who developed signs of early syphilis of the nervous system and who after many years died of paresis or other late degenerations; (*f*) no serologic evidence as yet exists showing normal spinal fluid in the early stage and its infection at a later period.

Early neurosyphilis may manifest itself by obtrusive symptoms, by slight objective signs, or be asymptomatic. Unless they are properly and thoroughly treated these early infections may persist and cause late neurosyphilis.

Every case of early syphilis should be treated intensively with arsphenamine and mercury given systematically in courses consisting of not less than eight injections of arsphenamine or its equivalent, neoarsphenamine or silver arsphenamine, and 15 injections of mercury; a minimum of two courses of the former and three of the latter should be administered. The treatment should be controlled by frequent Wassermann tests and a lumbar puncture made about six months after infection or earlier if indications should exist. Complete neurological examination should be made in order to detect early involvement of the nervous system and as a control for future examinations.

The treatment outlined is not an insurance against the occurrence of neurosyphilis, which not infrequently takes place during the active administration of the drugs. In such cases intraspinal medication administered by one familiar with the proper technic may be a necessary adjunct. It is only by controlling early neurosyphilis that we can hope to prevent the later degenerations. (John A. Fordyce.)

In commenting on these opinions Asst. Surg. Gen. C. C. Pierce, United States Public Health Service, says:

"It is of extreme importance, therefore, that physicians engaged in the treatment of syphilis carefully consider these statements and direct treatment toward the avoidance of the dangers outlined.

"In inviting your attention to this matter the service is not unmindful that many clinicians are engaged in the control of venereal disease merely from the standpoint of health officers and that available funds do not admit of intensive or long-continued treatment and are often used for sterilization purposes for public health protection. That there is danger to the public health in dismissing patients from treatment too early is seen in the claims of some observers who state that as larger numbers of infected individuals are brought under surveillance opportunity is afforded to observe an increased number of patients in the infectious second stage, which condition they believe to be due to inadequate treatment.

"In the light of present knowledge regarding the subsequent danger to both the individual and community by ineffective and inadequate treatment the service urges that great care be exercised in recording case histories; in referring patients for intensive treatment to health centers or competent physicians to continue treatment when the clinic is unable to do so; and keeping cases of positive syphilis under proper observation until the period of danger for both the individual and the community has passed."

Writing on the principles in the treatment of empyema in Surgery, Gynecology, and Obstetrics for March, 1922, Dr. Carl A. Hedblom says:

"The aim of all forms of treatment of nontuberculous empyema is to evacuate the pus, combat sepsis, and restore the structures and functions to as nearly normal as possible, all without undue risk. Difficulties in accomplishing drainage may be due to interference with respiration resulting from a partial collapse of the lungs incident to opening the pleural cavity or there may be secondary encapsulated pockets. The virulence and metastatic nature of the infective organism may be beyond our powers to combat. In a chronic case structural changes in the lung and in the wall of the chest may be beyond repair.

"The data with regard to the treatment of empyema constitute one of the most interesting chapters in the history of medicine. It is a remarkable fact that while the condition was recognized and treated by the ancients and spasmodically treated throughout the centuries it is only 60 years since Walter, an American, first excised a segment of normal rib in order to establish drainage.

"Although numerous intercostal drainage devices continued to be rediscovered and reintroduced periodically, rib resection came to be the standard operation with or without one or another of the numerous valve-drainage devices. Most cases were of the frankly purulent type at operation, and the mortality, though on the average high, was considered unavoidably so. Then came the great pandemic of streptococcus pneumonia and empyema. The forbidding mortality resulting from simple rib resection and drainage in these cases and the prompt and great reduction in mortality following the institution of 'closed drainage' with irrigation seemed to indicate that the last word in the treatment of acute empyema after all had not been spoken. Physicians were forced to recognize the danger of pneumothorax in these cases. It was also discovered that it is possible to employ suction rather than gravity for the drainage of pus and that irrigation, particularly with Dakin's solution, was of distinct benefit.

"The assumption seems rational that the closed method is indicated in very ill patients with acute empyema of any type, particularly with pulmonary involvement. A to-and-fro suction sound is often heard following opening of the pleural cavity in these cases, indicating a partial collapse of both lungs. In a patient already critically ill this added insult may be the last straw. Air-tight aspiration, on the other hand, tends to increase respiratory capacity by expanding the lung an amount equal in volume to the pus aspirated, which may mean full expansion of the lung from almost complete collapse.

"In combating sepsis the most important consideration is the thorough evacuation of the pus. This can be accomplished probably more thoroughly by aspiration and flushing of the cavity with a cleansing solution than by rib resection and gravity drainage alone. The relative superiority of the hypochlorite solution is probably due not only to its germicidal properties, which are considerable when it is used copiously, but also to its characteristic property of separating all necrotic material and pus from the living tissue. Filling the cavity through one air-tight tube, besides being simpler and easier than rib resection, followed by an attempt to place a number of Carrel tubes, would seem to insure better contact between the fluid and all parts of the cavity. Such procedure also tends to dissolve the shelving partitions. It is probably important to use large amounts of fluid at frequent intervals during the first days to prevent walling off of any part of the cavity.

"The communication of bronchial fistulæ with empyema cavities may often be proved by injecting methylene blue into the cavity. Dakin's solution, generally speaking, is contraindicated in the presence of large fistulæ, but normal saline solution may be used.

"In a large proportion of cases of chronic nontuberculous empyema, very material reduction or complete obliteration of the cavities may be secured by irrigation with hypochlorite solution. An extensive plastic operation, besides the hazard it involves, is disabling, as pointed out by Graham, because of the marked reduction it may produce in vital capacity."

The department of health, city of New York, has called attention to the fact that of three cases of smallpox discovered in that city recently, which were of common origin, one was treated for several days as syphilis. Such a mistake is especially apt to occur in those cases of mild clinical symptoms nowadays so common, and when the opportunity for extended examination of an individual is limited.

NAVY NURSE CORPS.

MARIA ROBERTA: A TRIBUTE.

By D. V. Knight, Chief Nurse, United States Navy.

Somewhere, sometime, I hope to see published, where all the world may read, a fitting tribute to the Medical Department of the Navy for what it has done for the natives of Guam. The medical officers who were ordered to Guam immediately after this island became a possession of the United States found the natives in great need of medical and nursing care. Overcoming what seemed to be almost insurmountable difficulties, they established a hospital, and native women were instructed in the nursing care of the sick women and children. First among the women who received this instruction was Maria Roberta.

Maria Roberta was born on the island of Guam about 45 years ago. The world to Maria is the small island upon which she lives; and she being of a practical nature, I doubt whether she has ever strayed from this island, even in fancy. She has not had the advantage of a school education, but as a beautiful flower will sometimes be found growing in the most unexpected places amid the most unfavorable surroundings, so Maria Roberta grew, if not in physical beauty (though her tall, well-built, graceful form could be so considered), in beauty of character. Her keen mind, well-developed sense of honor, all the gentleness and lovableness of the native, with a great desire to do for others, have made her an outstanding and valuable person on the island.

When I reported for duty in Guam August 27, 1914, I found that the principal duty of the chief nurse of the Navy Nurse Corps at this station was the instruction of and the responsibility for the native nurses. In a short time it became evident that in order to give the necessary nursing care to the native women and children who were patients in the hospital and to provide a nurse for the dressing stations at villages distant from the hospital more native nurses were needed. It seemed impossible to supply this need with desirable material. Upon inquiry, I learned that many of the better class of native girls were willing, even anxious, to do this work, but there was an objection on the part of the parents. Guam having been a Spanish possession, some of the Spanish conventions were still adhered to by the better class natives, and parents would not allow their daughters to leave the confines of their homes unchaperoned. Not being able to, nor having a desire to, change these conventions, it became clear to me that to provide for what I knew to be a great need it would be necessary to first obtain a chaperon for the native nurses. Having heard much about Maria Roberta from the nurses, there was no doubt in my mind that she was just the person for this place. I sent for Maria. She came to see me at the hospital and told me that she could not accept my offer as she had an adopted child to care for and the pay was not sufficient. (She had left the hospital some years previous to make a home for this orphan child which she had adopted.) After discussing the matter with the commanding officer, he decided that out of the fund for the care of sick natives Maria was to be paid a sufficient amount for her needs and the needs of the child. Maria being well known on the island and the fact that she was engaged as "official chaperon" for the native nurses removed the objection of the parents to the extent that it became possible to get the required number of pupil nurses. Maria lived with the nurses; was with them constantly while in the hospital, and when they were off duty and wanted to go home she accompanied them to their homes, where she was relieved of her responsibility by their parents, who returned them to the hospital not later than 10 p. m. This constant supervision was accepted very gracefully by these girls, as they were accustomed to it and were very fond of Maria. They also knew that nothing stood between Maria and her duty.

One evening just as we were sitting down to dinner I heard footsteps on the walk at the entrance to the dining room, and looking out I saw Maria Roberta with two shrinking forms of men, one gripped firmly in each hand. One was a native policeman in full uniform, club "'n everything" except his shoes, which he was carrying in the hand not held by Maria. She, with her keen sense of duty predominating, gave the policeman a shove into the dining room, then she gave the other man a shove, placing them before me, and told me that she had found these two men just outside of the hospital wards talking to two of the native nurses, giving the names of the nurses. She realized that she had caught these two Romeos "red-handed" in a most glaring offense. I informed Maria that we would take them to the police station. The policeman very meekly asked permission to put on his shoes. This permission was granted, after which Maria and I proceeded with the two frightened, non-resisting offenders to the police station, where they were locked up for the night, and the next day they were tried and found gulity on a charge of trespassing. But in this South Sea island, with its balmy climate and its tropical beauty making it a veritable fairyland.

which seems to exude romance, and when the girl is young and beautiful, who can blame mere (native) man for trying to side-step even a Spanish convention? Oh, yes; it takes a Maria Roberta's sense of duty to hold this convention intact, as not only the men but the girls also are willing to do a bit of side-stepping on the matter of conventions. When little Francesca, who in appearance was like a bronze doll, was admonished for flirting, she responded with: "But, Miss Knight, it is my custom." If any doubt as to Maria's authority existed in the minds of the people prior to the above-mentioned episode, no doubt remained following it.

Maria's field of usefulness is not limited to being "official chaperon" to the native nurses. Her ability to understand and speak English makes her services as interpreter in the instruction of the nurses and in transmitting orders most valuable. The instruction of the nurses is adapted to their mentality and the needs of the people. A large part of their work is obstetrical nursing, in which Maria is most efficient; and, knowing the customs and living conditions of the people, she was most helpful in adjusting the work to their needs. The training of Maria Roberta and other native women, who became quite efficient in the care of obstetrical cases, was a great help to the medical officers in dealing with the question of the midwives of the island. When the commanding officer of the hospital ordered that all midwives pass an annual examination in order to keep their licenses to practice, there was much protest on the part of those who could not meet the requirements of the examination, which was entirely practical. This action on the part of the commanding officer resulted in a great decrease in infant mortality and blindness. Again Maria Roberta's usefulness became evident, in that she knew personally all the midwives, where they practiced, how they did their work, whether they were meeting the requirements set by the medical officers—and to Maria these requirements were unconditional. She had a way of appearing just at a time to get first-hand information, and well the midwives knew that—nothing stood between Maria and her duty. Knowing this, they respected her.

Not least among Maria's characteristics is her marked maternal instinct, which was demonstrated in her adoption of a child. This child has been the source of much happiness to Maria and is to her the one source of diversion from the routine duties of the hospital. As the years go by this child gives great promise of repaying her for her devotion and sacrifice. Other children have been fortunate enough to be the recipients of Maria's great generosity. Among them is Benadino. When I reported for duty in Guam, Benadino was nearly 3 years old and had been a patient in the hospital about two years, or so long that if he ever had any people who were interested in him no evidence of this interest remained. He apparently belonged to the hospital and was considered the hospital "mascot." He was a bright, cheery little fellow, a bit vain, and had the Chamorro love for bright colors. He objected to wearing the plain gowns provided by the hospital for other children and always found some one to encourage his vanity. On special occasions Maria Roberta could always produce Benadino in gala attire, and it would be difficult to say whether Benadino or Maria derived the greater happiness from the effect.

Service conditions make frequent changes in the Navy personnel at Guam. It is Maria Roberta who remains and who holds together the fabric of the work built up by the Navy nurses.

BOOK NOTICES.

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Lieut. L. J. ROBERTS, Medical Corps, United States Navy.
Lieut. E. J. CUMMINGS, Medical Corps, United States Navy.

"Thou fool! to seek companions in a crowd!
Into thy room and there upon thy knees,
Before thy book shelves humbly thank thy God.
That thou hast friends like these!"

MANAGEMENT OF THE SICK INFANT. by *Langley Porter, M. D., professor of clinical pediatrics, University of California Medical School; and William E. Carter, M. D., assistant in pediatrics and chief of outpatient department, University of California Medical School.* C. V. Mosby Co., St. Louis, Mo., 1922.

When sickness overtakes a baby, the management of its case demands many departures from those methods of treatment which are quite appropriate when we, as physicians, have to deal with older people. Many good books have been written on the diseases of children, but, so far as the reviewer is aware, until the appearance of this volume there existed no book in the English language which dealt with the peculiarities of disease as it occurs in infants, that is, during the first two years of life. This fact alone should give the book a place in medical literature. A perusal of the text reveals the fact that the book contains much of real value to the general practitioner, and it would appear to be of great use to the young physician whose professional reputation often is founded upon his successful management of the sick baby.

In this book the whole subject of the management of the sick infant is ably and concisely treated in three sections; the first of which deals with the predominate symptom noted in an infant's illness, such as vomiting, diarrhœa, constipation, nutrition, hemorrhage, pain and tenderness, convulsions and syncope, fever and cough. In the second part, the authors discuss the various disease entities which are met during infancy; and in the third, they consider some very practical methods of treatment which have been found to have stood the test of time in their practice in San Francisco. Each method is given in detail. Of special convenience are the chapters on formulas and recipes for infant's food, and on the employment of drugs in pediatric practice. The text covers 642 pages and is amply illustrated.

Although the naval medical officer at sea is rarely called upon to treat sick infants, pediatrics forms a considerable portion of one's practice at large naval stations, Marine Corps posts, and foreign shore stations, hence this book is recommended to medical officers serving in these situations, and especially to surgeons of transports, who will find in it the solution of many of the difficulties which the management of the sick infant presents at a time when pediatric specialists are not available for consultation. (W. M. K.)

THE THYROID GLAND. CLINICS OF GEORGE W. CRILE AND ASSOCIATES. *Edited by Amy F. Rowland.* W. B. Saunders Co., Philadelphia, Pa., 1922.

The number of cases of endemic goiter and hyperthyroidism encountered among recruits coming from the region of the Great Lakes and from the Northwest makes this volume on the thyroid gland of special interest to the naval medical officer. It is not a textbook on the subject, but rather a presentation of the Crile clinic at work, and aims to present in a series of papers the theoretic and practical viewpoints of Doctor Crile and his associates to-day.

Much new knowledge has been developed in the Crile clinic concerning the thyroid gland, and the discussions which comprise the text center about a number of important points. Endemic or simple goiter has been found to be a geologic deficiency disease due to a lack of iodine in the organism, and by the proper administration of iodine to the pregnant mother and to the child, up to and through the period of adolescence, endemic goiter may be prevented. These facts are brought out in a well-written paper on the "Prevention of simple goiter in man," by Dr. O. P. Kimball, dealing with the prophylactic work carried out by him in the public schools of Akron, Ohio.

The practical application of the principle of the prevention of simple or endemic goiter is now on such a firm basis that a few generations hence will see the end of this condition, as well as of cretinism in every civilized nation.

In the clinic it has been found that after the twenty-fifth year of age iodine exerts little or no beneficial effect on goiters; also that by the improper use of iodine or thyroid products many cases of quiescent goiter, especially of the adenomatous type, are converted into exophthalmic goiter or hyperthyroidism, and that this induced hyperthyroidism is essentially identical with spontaneous hyperthyroidism.

A practical point dealing with a paper by Dr. Allen Graham on the "Diseases and pathology of the thyroid gland," is the fact that about 90 per cent of all malignant tumors of the thyroid arise in the fetal adenomata. Therefore, iodine given the pregnant mother may prevent fetal adenomata, hence cancer of the thyroid in the offspring.

The relations between diseases of the thyroid gland and laryngeal function are discussed by Dr. J. M. Waugh, and the differential diagnosis of diseases of the thyroid gland by Dr. John Phillips.

In a short paper Dr. R. S. Dinsmore brings to our attention the advantages of the adrenalin sensitization test for hyperthyroidism which was first used by Goetsch to establish a differential diagnosis between hyperthyroidism and early tuberculosis in patients presenting the syndrome of loss of weight and strength, fatigue, and slight elevation of the temperature, in whom the physical signs and X-ray findings for tuberculosis were negative.

The rôle played by the radiologist in the diagnosis of goiter is discussed by Dr. B. H. Nichols, and the value of basal metabolism studies in exophthalmic goiter by Dr. C. D. Christie.

Basal metabolism estimations provide a valuable, but not a specific, test for the presence of hyperthyroidism. They are of value in the differential diagnosis of border-line cases, but are of little value in the determination of the operability or prognosis of cases of hyperthyroidism.

Any case of hyperthyroidism is operable, or may be made operable by a short period of active treatment involving a planned regimen of rest and diet; and in view of the surgical results obtained, Crile advises surgical treatment for all cases without regard to the degree of hyperthyroidism. Heretofore, the only valid objection to surgical treatment has been the mortality; but with modern methods the mortality is practically eliminated; much time is saved and a more certain cure is achieved than with the X-ray treatment or any of the medical treatments advocated.

About one-third of the volume is devoted to the consideration of the preoperative, the operative, and the postoperative management of exophthalmic goiter.

Apparently this book is the first of a series of clinical volumes which will present various subjects as handled at the Crile clinic in

Cleveland. The series promises to be so valuable that we trust the next volume will soon make its appearance.

The first volume of the series is recommended to any one wishing the latest information concerning the thyroid gland. (W. M. K.)

Collected Papers of the Mayo Clinic, Rochester, Minn., Volume XIII, 1921. Edited by *Mrs. M. H. Mellish.* W. B. Saunders Co., Philadelphia, 1922.

To those of us who are unable to visit the Mayo clinic the appearance of the collection of 118 scientific papers contributed by 76 of the physicians and surgeons connected with the clinic during 1921 will be most welcome. The papers cover a wide range of subjects, and each may be read with profit. Of these papers, 23 relate to conditions affecting the alimentary tract; 19 to the urogenital organs; 7 to the ductless glands; 8 to the blood; 6 to the skin and syphilis; 19 to the head, trunk, and extremities; 8 to the brain, spinal cord, and nerves; 4 to technic; and 24 to general subjects. (W. M. K.)

Surgical and Mechanical Treatment of Peripheral Nerves, by *Byron Stookey, A. M., M. D., associate in neurology, Columbia University.* W. B. Saunders Co., 1922.

This book is a most practical, modern, and especially scientific presentation of this subject. Throughout the book the author shows evidence of exhaustive study and careful analysis, with extensive reference to the writings of eminent scientists whose works have fallen within the scope of his subject. The book is systematically arranged; the opening chapter dealing with the anatomy of the spinal nerves, the second chapter with nerve degeneration and regeneration; two very important preliminary sections in preparation for a proper comprehension of the following chapters which follow in very logical sequence. While it would seem that the author devotes considerable attention in his chapter on "Methods of Nerve Repair," to the standardization of terms with reference to these methods, this is, indeed, essential in order that the terminology may properly express the type of operation. This chapter describes in a very clear manner various methods of nerve repair. The operative technique is very well described with its contiguous perplexities, and the drawings are sufficiently descriptive to get a good mental picture of the procedures. The chapters dealing with the mechanical and surgical treatment of special nerves is excellent. The anatomy is accurately presented, both descriptively and by splendid cuts, as well as surface projection pictures showing the relative position of the nerves to surface anatomy. The discussion of cervical ribs, in the chapter on the brachial plexus, is noteworthy and completes an excellent chapter. The nerves of the arm, so frequently subjected to injury, receive their proper apportionment of discussion and space, with sufficient attention devoted to the mechanical side, as well as the surgical side of the treatment. The closing chapters of the book deal with nerve tumors, causalgia, and amputation neuroma. (E. J. C.)

CLINICAL TUBERCULOSIS, by *Francis Marion Pottenger, A. M., M. D., LL. D., medical director, Pottenger Sanatorium for Diseases of the Lungs and Throat, Monrovia, Calif. With a chapter on laboratory methods, by Joseph Elbert Pottenger, A. B., M. D.* In two volumes. Second edition. C. V. Mosby Co., St. Louis, 1922.

The consideration of the subject of clinical tuberculosis as found in these two volumes is complete and thoroughgoing. As a work of reference the treatise fills a very definite and important place in medical literature. Practically every phase of the disease is discussed in considerable detail, the author's wide knowledge of the subject and his pleasing style combining to give a production which one is glad to sit down and read at length. The illustrations, which are numerous, are a distinct addition to the work. The author has taken advantage of the opportunity offered in a work of this scope to give the reasons, as they appear to him, for many of the signs and symptoms of the disease. His classification of symptoms according to their causation and his discussion of the part which the nervous system plays in bringing about the clinical manifestations of tuberculosis are very instructive. The greatest value of the work, however, lies in its more practical considerations. The author is more peculiarly fitted because of his experience to discuss the diagnosis and especially the treatment of the disease, and this he has done in a very clear, comprehensive, and forceful fashion. (L. J. R.)

QUERIES.

Medical officers are invited to submit queries and to present their problems to the BULLETIN, *which being in a position to draw on varied and extensive sources of information such as are not available elsewhere, will use every means of securing authoritative opinion.*

All queries will be answered by mail; and the replies, if of sufficient general interest, will also be published in this column.

TO THE EDITOR: Twice during my tour of duty as medical officer of this station recruits have been invalided from the service because of mental inferiority. These cases have impressed me with the unnecessary expense they have meant to the Government. In both cases the applicants falsified as to their education; and without facilities for carrying out a standard test to determine their mental age the mistake was made of considering their knowledge as an accurate index of their intelligence. The action of the Board of Medical Survey in these cases is based on the results obtained by the Stearns group test and the Stanford revision of the Binet-Simon test.

The value of these tests can not be overestimated, not only from the point of view of detecting applicants who are totally unfitted for the naval service, but in determining the adaptability of the recruit to any special duties which might be assigned him during his naval career. For this reason I have felt the need of facilities for making some test which could be considered standard and which would make it possible to grade our applicants in standard terms. In other words, is it practicable to advance the place for making these tests from the boards of medical survey at training stations to the recruiting stations?

LIEUTENANT, *Medical Corps.*

The question asked in this letter is similar to others that have been received by the bureau at intervals in the past. During January of this year a set of three or four simple psychometric tests were submitted, with the suggestion that they be used as a standard test at recruiting stations. After careful consideration of the subject at that time by a board appointed for that purpose, the opinion of the board was that the adoption of such tests was impracticable.[1]

The Stanford revision of the Binet-Simon test is possibly the most reliable and most generally used of the numerous psychometric tests. In a sense it is an intelligence test. "While the intelligence tests are important, and while taking them in a routine manner one can get a good deal of information from the patient (applicant), often

[1] U. S. NAVAL MEDICAL BULLETIN, June, 1922.

information of matters that lie deeper than mere questions of intelligence, still they are by no means all-sufficient. * * * These tests are valuable in skilled hands for the more pronounced degrees of defect, but as development proceeds they become progressively more unreliable in proportion to the increased psychic mass, the impossibility of standardization because of the wide individual differences, and the greater probability of distortion from unknown emotional sources." [2]

Psychological tests are of value only when conscientiously carried out and their findings correctly interpreted. Their impracticability with respect to their general adoption by the recruiting service of the Navy lies in the fact of the time required in each individual case, and in that their correct interpretation requires an examiner who is either a trained psychologist or psychiatrist, and preferably both. The Army conducted some very exhaustive tests [3] with regard to these matters, but in order to do so they developed an entirely separate corps of specially trained psychologists who were assigned to the recruit depot. Opinion was divided as to the ultimate result; and, as a matter of fact, we are in frequent contact with men who have successfully passed the Army tests and adapted themselves to their environment while in the Army, but who on subsequent enlistment in the Navy do not adapt themselves and eventually are surveyed because of mental deficiency or constitutional psychopathic tendencies.

White says, "No set of tests can be applied in a purely automatic way nor will such tests in any way take the place of knowledge and experience on the part of the examiner. In the most skilled hands the results, expressed in terms of psychological age, are but rough approximations. It has been well said that the only way to tell whether a person is feeble-minded or not is to live with him for six months. Reactions to life situations are immensely more valuable and illuminating than reactions to psychological tests." [4]

For the present it would seem that the best way of eliminating undesirables at the recruiting stations would be—

(*a*) By assigning to recruiting duty only such officers who have had sufficient experience in a cruising vessel to appreciate the type of recruit best suited for naval duty.

(*b*) By brief study of the personality of each applicant through a series of questions selected for the purpose of determining his previous activities, in an effort to elicit any abnormal, unstable, or asocial tendencies.

[2] Diseases of the Nervous System, Jelliffe and White, 2d edition.
[3] Memoirs of the National Academy of Sciences, vol. 15.
[4] Outlines of Psychiatry, White.

(*c*) By continued observance of each recruit during a period of probationary detention at a training station with its ideal of eliminating promptly such individuals as appear incapable of making a satisfactory adaptation and adjustment to the naval service required of them.

Some publications dealing with the subject of psychometrical tests are:

Memoirs of the National Academy of Sciences, vol. 15.
Terman, Lewis M.: The Measurements of Intelligence.
Whipple, G. M.: Manual of Mental and Physical Tests.

To the Editor: Kindly let me know the value of sodium fluoride as an exterminator of cockroaches, the method of application, and any precautions that should be employed when this chemical is distributed about a ship.

Phyllodromia.

Sodium fluoride is considered one of the most efficient roach exterminators. It is best used mixed with an equal part of powdered sugar. After thoroughly cleaning the locality which harbors the roach, the sodium fluoride mixture is liberally sprinkled or blown by means of a powder blower into corners, drawers, closets, behind pantry drain boards, and into other places of concealment. It must be distributed in such a way that it will not be swept up or removed. It should be allowed to remain and act for weeks at a time. It can be sprinkled along the back parts of shelves and out of the way in the recesses of drawers and in filing cases. This substance is not injurious to books or other materials nor to the crew. It forms the basis of most roach powders now on the market.

The use of sodium fluoride seems to be too slow a process of eradication when large numbers of roaches are in evidence, in which case a 5 per cent mixture of cresol in kerosene is very effective. The mixture should be sprayed freely by means of a powerful mechanical sprayer into any place harboring roaches. The process should be repeated once each week for several weeks, when very few roaches will be found. This mixture does not stain, although its odor is offensive to some.

In the eradication of cockroaches, one must keep in mind the necessity of keeping all pantries and storerooms free from crumbs or other food remnants which attract roaches.

All the apparatus required for use aboard ship packed in 2 cubic feet of space.

THE DIVISION OF PREVENTIVE MEDICINE.

Lieut. Commander R. F. JONES, Medical Corps, United States Navy, in charge.

Notes on Preventive Medicine for Medical Officers, United States Navy.

INSTRUCTIONS TO MEDICAL OFFICERS.

A SIMPLE TYPE OF PORTABLE STEAM DISINFECTOR.

By R. F. JONES, Lieutenant Commander, and P. RICHMOND, Lieutenant, Medical Corps, United States Navy.

During the World War, ships, particularly transports, were equipped with large steam sterilizers for the disinfection of clothing and bedding. Such sterilizers occupied considerable space and therefore were usually placed on "topside." Moreover, they were costly to install and operate, and when exposed to the weather required constant attention. Since it is still necessary to sterilize clothing and bedding occasionally, a suitable disinfecting apparatus should be provided, preferably one which could be stored in a small space and easily transported. Such a portable disinfector could also be used by landing parties and marines on shore duty.

The "sack" steam disinfector, invented by Col. P. S. Lelian, R. A. M. C., professor of hygiene, Royal Army Medical College, seems to meet these specifications. The British Army is said to have used the "sack" steam disinfector with success during the World War.

A series of experiments were carried out at the Naval Medical School, Washington, D. C., to determine the efficiency of this disinfector. Before describing the results of the experiments it might be well to give the reader an idea of the appearance and method of operation of the "sack" steam disinfector.

CONSTRUCTION AND WORKING PRINCIPLES.

The construction of the apparatus is very simple. It consists of a canvas bag, somewhat similar to the ordinary Navy hammock bag, 4 feet long and 2 feet in diameter, with a circular wooden bottom and a draw string to close the top.

The canvas of which the bag is made is impregnated with a heat and waterproof paint to make it impervious to steam. A 1-inch rubber hose is attached to the sack near its base. Steam may be obtained from a steam line or from a copper boiler by making the necessary connections. The copper boiler, with heating appliances, is part of the equipment. A metal disk from which coats, suits, or other clothing may be loosely hung to avoid creasing and rumpling is also provided. This is not used when clothes are tightly packed in the bag.

Clothing, bedding, etc., may be packed tightly into the sack or hung loosely to avoid rumpling. In the first instance the sack is packed as would be done with a sea bag; it is then inverted and suspended from a suitable support. When suits or other clothing are to be sterilized, the sack is first suspended in an inverted position and then the clothing hanging from the disk is pulled up into it by means of pulleys.

In either case the outlet of the sack is partially closed by means of a purse string. Steam obtained in one of the ways described above is now allowed to flow into the sack through the rubber hose. As steam enters its base an equal volume of air is expelled from its downturned mouth, which has been partially closed. Gravity forces each entering volume of steam to spread horizontally across the sack, displacing the heavier air downward from the interstices of the clothing. This stratum of steam immediately condenses and, by the intense latent heat thus liberated, heats to a high degree every fiber with which it comes in contact. A fresh wave of steam then enters the resultant partial vacuum, fills it, heats its contents to the condensation point, and sweeps onward to repeat the cycle in another layer of clothing immediately below. Heating of the contents thus progresses, layer by layer, until there is free escape of steam from the mouth of the sack, indicating that air has been entirely displaced from the sack and the contents heated throughout. However, complete sterilization is not effected until steam is allowed to flow from the mouth of the sack for from 15 to 30 minutes, depending on the volume of steam entering the sack. But in this connection it should be stated that insects and nonspore-bearing organisms are killed in a much shorter time.

EXPERIMENTS TO TEST EFFICIENCY OF SACK.

The sack was tested under varying conditions. The first tests consisted of packing bedding and clothing tightly into the sack and obtaining steam from a copper boiler which was heated by a pressure kerosene stove.

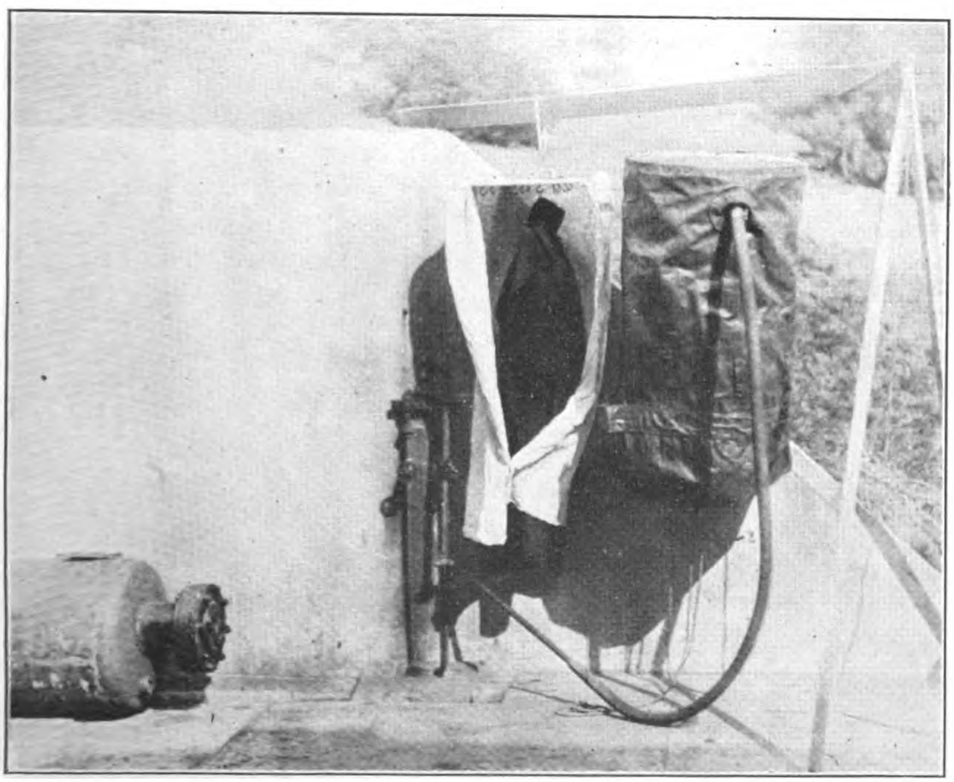
The accompanying diagram illustrates the locality of thermometer, culture media, eggs, or animal parasites which were used to determine the efficiency of the sack as a sterilizing agent. The numbers shown thereon were used constantly throughout all experiments. In every instance the thermometer, culture media, eggs, or animal parasites were placed in the center of tightly wrapped bundles of clothing.

The following table shows the results obtained:

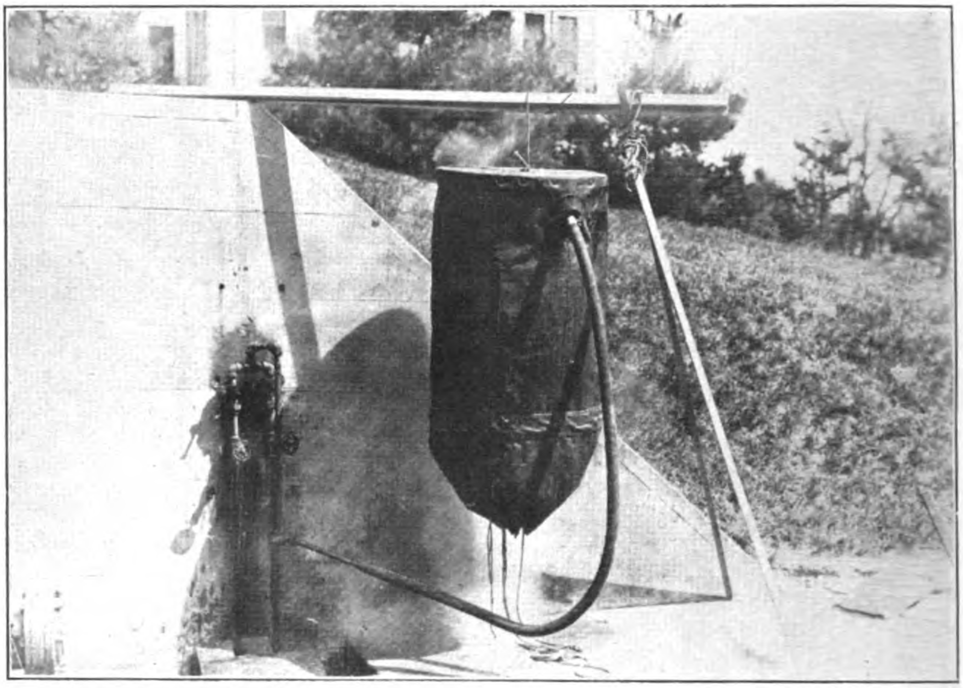
STEAM GENERATED BY OIL STOVE UNDER COPPER BOILER.

Time during which steam flowed freely from mouth of sack.	Temperature as recorded on thermometer in center of bundle at point No. 6 as marked on diagram.	Effect of exposure on eggs in center of bundle of clothing in varying positions as marked on diagram.		Effect upon cultures of *B. coli* and staphylococci in varying positions as marked on diagram.		Effect upon cultures of spore-bearing organisms (*B. subtilis*) in varying positions as marked on diagram.		Effect upon bedbugs in test tube wrapped in bundle of clothing at position No. 6.	Effect upon clothing.
		Position No.	Effect.	Position No.	Effect.	Position No.	Effect.		
Minutes.	° *C.*								
2	80	1	Soft boiled	1	Culture killed		Not tested	Actively moving when removed.	Centers of bundles of clothing not thoroughly heated; clothes slightly damp.
		3	Raw	2	do				
		6	do	3	Culture not killed				
				4	Culture killed				
				5	Culture not killed				
				6	do				
15	98–100	1	Hard boil	1	Culture killed	1	Culture not killed	Bedbugs killed	Bundles of clothing thoroughly heated throughout, slightly damp but dried readily when shaken in air.
		3	Slightly coagulated	3	do	3	Culture killed on one occasion.		
		6	do	6	do	6	Culture not killed		
30	100	6	Hard boiled	1	Culture killed	1	Culture killed		Clothing quite wet when removed and did not dry immediately when shaken in air.
				2	do	2	do		
				3	do	2	do		
				4	do	4	do		
				5	do	5	do		
				6	do	6	do		

The apparatus in operation with steam supplied from a copper boiler heated by a kerosene burner.



The sack inverted and ready for operation. Disk for suspending clothing hung alongside



The sack being operated on a steam line. Note white cloud of steam emerging.

Complete outfit for field use being transported in motor-cycle side car.

DISCUSSION OF THE FIRST SERIES OF EXPERIMENTS.

From an examination of the above table it will be noted that all material packed in the sack was not sterilized after steam had been allowed to flow from the mouth of the sack for 2 minutes, although the manufacturer of the apparatus in his descriptive pamphlet claims that complete sterilization should be obtained within 2 minutes after steam commenced to flow from the sack. This experiment was repeated several times and invariably the same results were obtained. Bedbugs, which are killed at a temperature of approximately 76° C., were not killed when placed at position No. 6 for this time. Here it might be stated that it required approximately 20 minutes to get a full flow of steam through the mouth of the sack.

All nonspore-bearing organisms and bedbugs were killed when steam was allowed to flow from the sack for 15 minutes, although spore-bearing organisms were not killed in this time. Therefore, this length of exposure is not deemed sufficient to sterilize. However, it would be perfectly safe to use the sack under similar circumstances to destroy vermin.

When steam was allowed to flow from the mouth of the sack for 30 minutes all organisms and parasites were killed. In our opinion, when steam is obtained from an improvised boiler or the boiler furnished with the apparatus, it would be safer to lengthen the time of operation to 30 minutes in order to be definitely certain of good results.

In an endeavor to simulate conditions under which the sack is to be used aboard ship, steam was obtained from a steam line by introducing a reducing valve between the sack and the steam line having a pressure of 75 pounds. The pressure of the steam entering the sack was approximately 5 pounds per square inch. The following table shows the results obtained:

STEAM-LINE CONNECTION (PRESSURE 5 TO 6 POUNDS PER SQUARE INCH.)

Time during which steam flowed freely from mouth of sack.	Manner in which material was placed in sack.	Temperature as recorded on thermometer in center of bundle at point No. 6 as marked on diagram.	Effect of exposure on eggs in center of bundle of clothing in varying positions as marked on diagram (position No. 6).	Effect in sterilizing bundle of gauze pads saturated with 24-hour boullion culture of staphylococci (position No. 6).	Effect in sterilizing bundle of gauze pads saturated with 24-hour boullion culture of spore-bearing organism (*B. subtilis*) (position No. 6).	Effect upon clothing.
Minutes.		°*C.*				
2	Clothing hung loosely	96	Raw	Gauze sterilized	Culture not killed	Clothing heated and only slightly damp.
	Clothes and bedding packed tightly.	98	do	do	do	Do.
5	Clothes hung loosely	100	Soft boiled	do	do	Clothing thoroughly heated and slightly damp.
	Clothes and bedding packed tightly.	100	do	do	do	Do.
10	Clothes hung loosely	100	Hard-boiled	do	do	Clothing thoroughly heated and damp, but dried quickly.
	Clothes and bedding packed tightly.	100	do	do	do	Do.
15	Clothes hung loosely	100	do	do	do	Do.
	Clothes and bedding packed tightly.	100	do	do	do	Do.

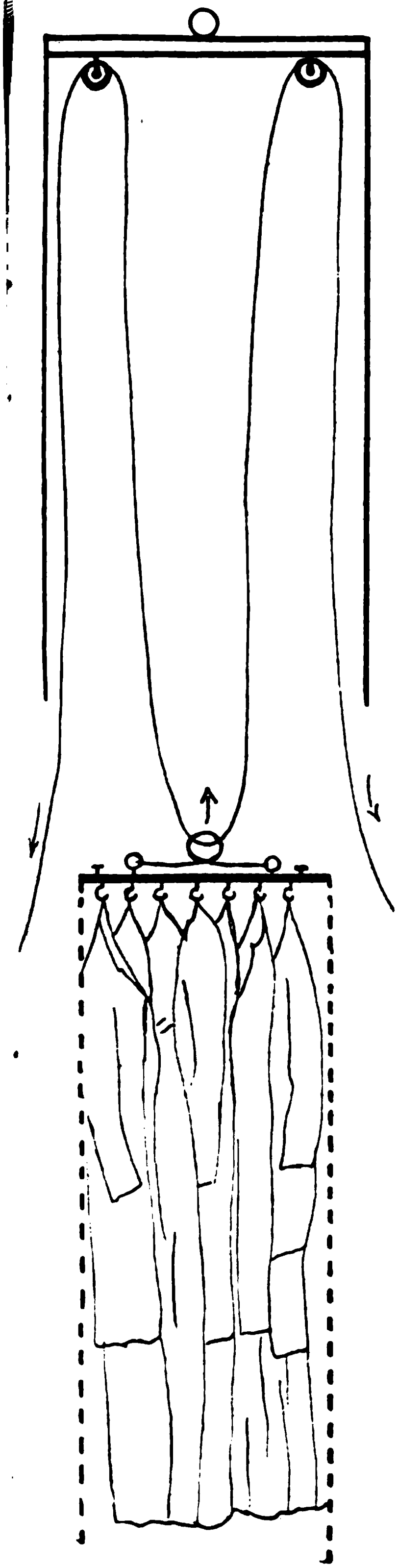


Diagram of sack, showing method by which clothing is raised into converted sack.

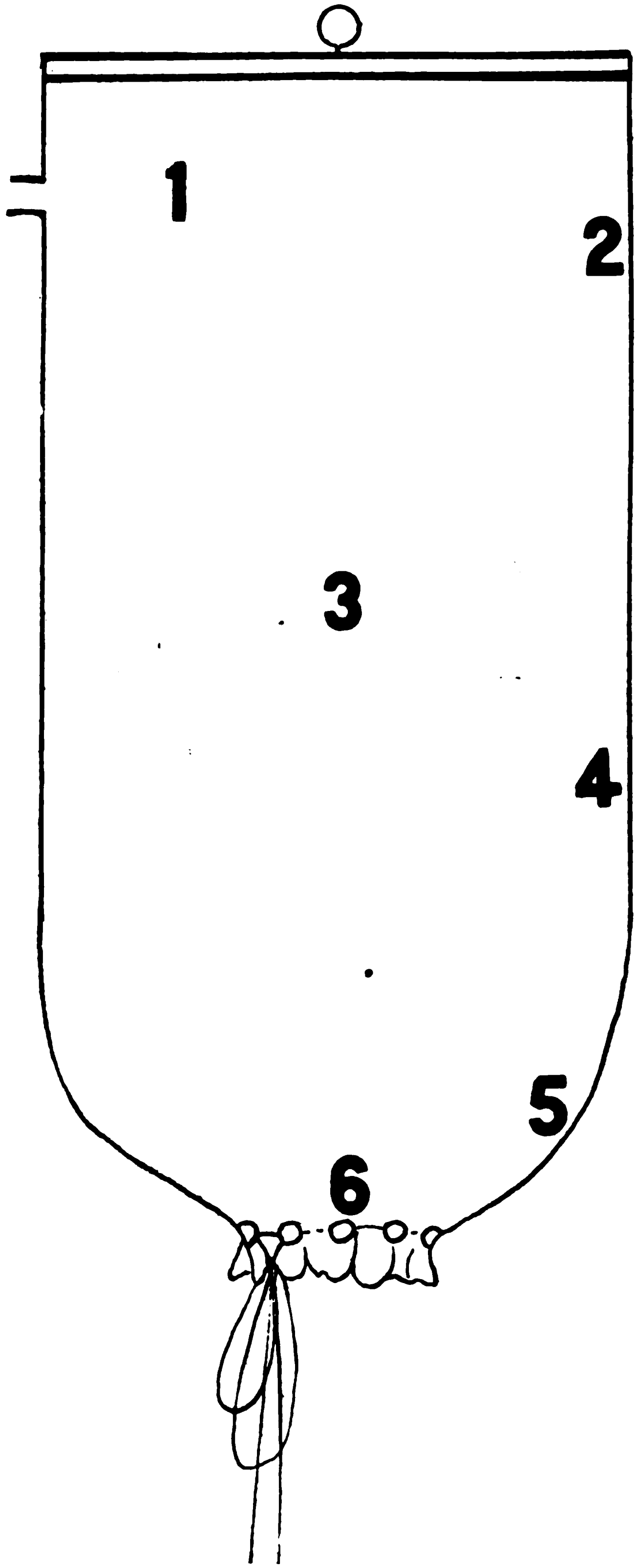
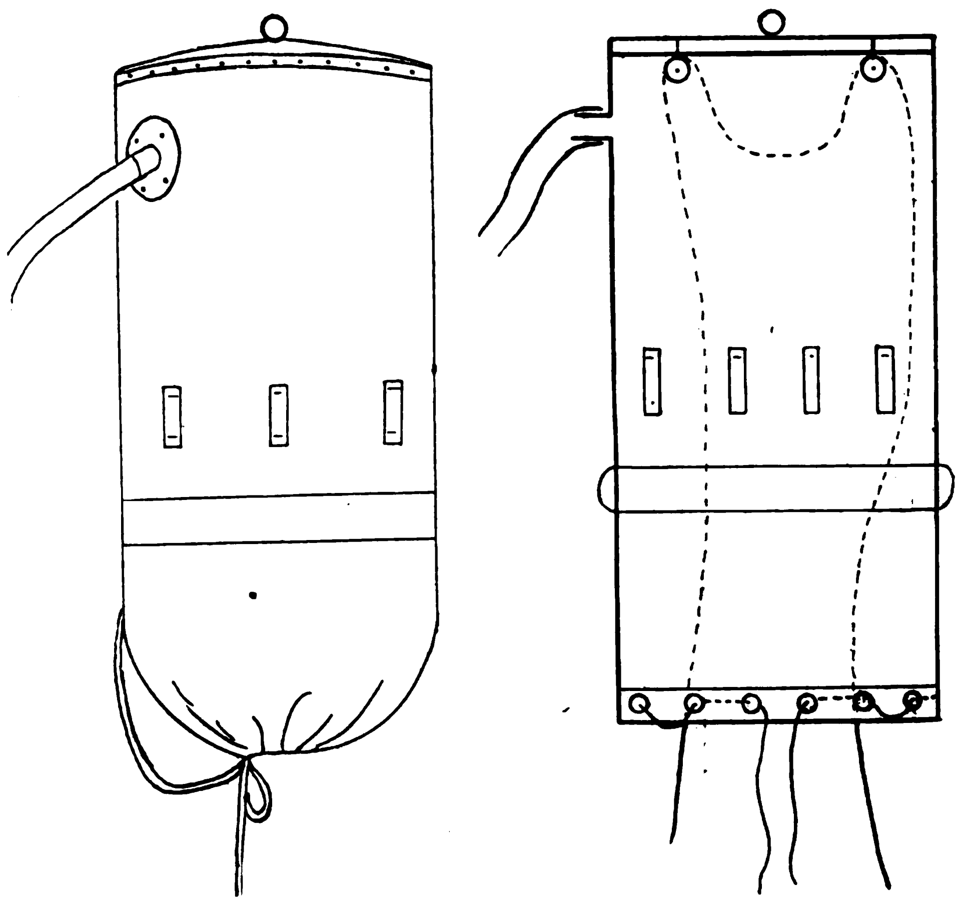


Diagram of sack to indicate positions in which cultures, etc., were placed.



Diagrams showing construction of sack.

DISCUSSION OF TABLE II.

By reference to Table II it will be seen that the sack is effective as a sterilizer for all organisms when the steam is allowd to flow *freely* out of the mouth for 15 minutes, but that only nonspore-bearing organisms will be killed after 2 minutes. The results were apparently the same whether the bag was packed tightly or the clothes hung loosely in the sack. It is obvious, from a comparison of the two tables, that it is desirable to have the steam entering the sack under slight pressure and in considerable volume. It may be possible to obtain some pressure and a considerable volume of steam with the heating appliance furnished with the apparatus, but we were unable to do so in a series of some 15 tests. It was never possible to get a flow of steam in any way comparable with the flow when the sack was connected with the steam line. Not only does steam sterilize more rapidly when under pressure, but there is also less condensation, which is evidenced by the drier condition of the clothing when removed. Furthermore, steam obtained from a steam line penetrated the clothing more rapidly.

PRACTICAL USES OF THE SACK DISINFECTOR.

The compactness and simplicity of this apparatus makes it especially suitable for use aboard ship where connection between the sack and a steam line can be easily made by interposing a reducing valve to reduce the pressure below 25 pounds. Whenever sterilization of clothing, bedding, or mattresses is required the "sack" can be rigged in a few minutes and can be safely used to disinfect clothing and bedding contaminated by bacteria and parasites. When not in use it can be stowed in approximately 2 cubic feet of space. The sterilizing power is approximately equal to that of an Arnold steam sterilizer, and in the event of the autoclave being out of order, large quantities of surgical dressings, especially bulky packages of shell-wound dressings, towels, gowns, etc., can be safely subjected to fractional sterilization with this apparatus.

An outfit with all the necessary appliances for use where boiler steam is not available will pack in about 4 cubic feet of space and does not weigh more than 60 pounds. Such an outfit could be used to advantage on expeditionary duty, particularly by marines, who can not readily transport heavier appliances. If necessary, supplies of surgical dressings for a temporary field hospital could be sterilized.

By utilizing the same principles aboard ship a small compartment capable of being made practically air-tight could be converted into a sterilizing chamber. Satisfactory results from such an arrangement are reported in the annual sanitary report of the U. S. S. *Wyoming*. The only alterations required would be the installation of two pipes, controlled by valves; one located above, and connected with a steam line, and the other below for exhausting the chamber of air or steam. As soon as steam flows freely from the lower pipe, the valve controlling this should be closed and steam allowed to flow into the room until there is slight bulging of the bulkheads, indicating that sufficient pressure has been obtained to permit thorough penetration. The efficiency of such a procedure can be tested by placing hens' eggs at various parts of the room. Live steam should be allowed to flow into the room for about 30 minutes. Under ordinary circumstances the eggs would be "hard boiled" in this time.

CONCLUSIONS.

1. The "sack" disinfector is particularly useful for the military services on account of its compactness and portability, and the writers are of the opinion that it should be adopted as permanent equipment of the Navy and Marine Corps.
2. When steam is obtained from an improvised boiler, sterilization should continue for 30 minutes after steam flows freely from the mouth of the sack; when connected with a steam line this time may be reduced to 15 minutes.
3. Bedbugs and other such insects may be destroyed in a third the time required for complete sterilization.
4. The time required for sterilization is the same when clothing is packed in the sack tightly as when hung loosely.

HEALTH CONDITIONS OF THE NAVY.

Health conditions of the Navy for the four-week period ending August 5 were not quite so good as for the previous month. The annual admission rate for all causes for the four-week period ending August 5 was 540 per 1,000 per annum as compared with 385 per 1,000 per annum for the four-week period ending July 8. However, the health conditions were better than they were at a similar period last year.

The morbidity rate for diseases only was 471 per 1,000 per annum and for accidents and injuries, 69 per 1,000 per annum.

The admission rate for the communicable diseases, exclusive of influenza and the venereal diseases, for the four-week period ending August 5, was 37 per 1,000 per annum. It will be seen in the following table that malaria caused approximately half of the admissions for the communicable diseases:

Annual admission rates per 1,000 for certain communicable diseases, current month of July, 1922, in comparison with the mean annual admission rates, month of July, for the four-year period 1918–1921, inclusive.

Disease.	July, 1918–1921.	July, 1922.
Cerebrospinal fever	0.15	0
Diphtheria	1.98	0.75
German measles	1.30	1.40
Influenza	23.79	10.01
Malaria	12.97	17.10
Measles	3.83	.97
Mumps	12.92	.75
Pneumonia	4.48	2.26
Scarlet fever	1.54	.11
Smallpox	.09	0
Tuberculosis	4.59	.65
Typhoid fever	.05	.22

There has been little change in the morbidity rates for the venereal diseases in the past three or four months. The progressive average rate for venereal disease for the year is now 108 per 1,000 per annum.

Although a considerable number of recruits have been received at training stations since about June 1, there have been few communicable diseases reported from any of the training stations.

Health conditions of the forces afloat are excellent. Few communicable diseases have been reported during the past month.

NOTES FROM THE NAVAL TRAINING STATION, HAMPTON ROADS, VA.

During the month of June there was a great deal of rainfall, resulting in many pools of water being present under houses and bungalows, and a consequent increase in the prevalence of mosquitoes. Oiling of all surface water has been continued, but inasmuch as it is difficult to use an oil spray in the confined space under buildings, no doubt, many pools of water were missed. Toward the end of the month the weather cleared and became dry, and the decrease in number of mosquitoes was quite noticeable to those who have occasion to be in the open in the early morning and evening.

Flies have apparently decreased in numbers, and can not be said to be present in undue proportion. Parts of the training station have been inspected every day, and it is believed that there are no breeding places for flies in this territory.

There have been no diseases contracted on the station during the month of June attributable to either mosquitoes or flies. Cases of malaria have come up from the Tropics, and some of them have had acute exacerbations while here, but no secondary cases have arisen. Until recently, no anopheles mosquitoes were found at this place, but they are here now; therefore, all men who have had malarial fever in the past are now required to sleep under nets.

The water supply of the station is obtained from the water mains of the city of Norfolk, from which it is pumped into a distributing reservoir on the base. This has been the cause of considerable concern during the month because our laboratory reports have shown that the colon bacillus has been persistently present in the water. Reports from the health department of the city of Norfolk early in June showed that the water was infected with that organism. The city water supply is chlorinated by the Wallace and Tiernan apparatus, using compressed chlorine gas. The amount of gas used was promptly increased by the city, and for a time it was found that the water received into the reservoir at the base was apparently free from harmful bacteria. However, toward the end of the month colon bacilli again appeared in the water. As soon as it was found that the organism was present in the water, the chlorinating apparatus installed at the power house at the naval operating base was put in operation and, on June 10, we began using 2 pounds of chlorine to the 2,000,000 gallons of water used each 24 hours. This is in the proportion of 0.26 part per 1,000,000. Our apparatus injects the chlorine into the water between the power house and the reservoir. The quantity of chlorine was gradually increased until the 16th, when 5 pounds of chlorine, corresponding to 0.3 part per 1,000,000, was used. Cultures were made every other day. On June 22, 6 pounds of chlorine, corresponding to 0.36 part per 1,000,000, were used in 24 hours, and the last report, dated June 23, showed an improvement; it being impossible to isolate colon bacilli in less than 10 c. c. of water. It was known that the station reservoir had an accumulation of dirt on the bottom, since it had not been cleaned for more than two years. Although it was believed that this reservoir did not form, at that time, a real menace to the personnel of the station, yet recommendation was made to the public-works officer that the reservoir be thoroughly cleaned.

Health conditions.—The total number of admissions to the sick list for the month of June was 206; this is against 87 for the month of May. This, however, does not indicate the actual amount of illness occurring among the personnel, inasmuch as the 206 admissions includes 54 recruits admitted for survey, 65 recruits in whom intestinal parasites were found, and 20 men, admitted with no disease, and placed under observation as measles contacts—total of 139, which leaves but 67 cases of routine illness to be compared with 87 cases that occurred in May. From this it would appear that the health of the command has been excellent.

Recruits.—From the time recruiting started, in May, to June 30, inclusive, 1,036 men were received at this station. Of these it was found necessary to hold out 70, or 6.75 per cent, because of various disqualifying disabilities, as listed below:

	Number.	Percentage.
Nephritis, chronic (interstitial and parenchymatous)	34	3. 20
Color blindness	11	1. 06
Otitis media, chronic	6	. 57
Valvular disease, chronic cardiac	6	. 57
Hypermetropia	3	. 28
Union of fracture, faulty	2	. 19
Astigmatism	2	. 19
Atrophy of muscle	1	. 09
Myopia	1	. 09
Arthritis, chronic	1	. 09
Paralysis of nerve	1	. 09
Sinusitis maxillary	1	. 09
Total surveyed	70	6. 75

Attention is invited to the large number of cases of chronic nephritis, 34, or 3.21 per cent of all recruits. It is our custom, at this station, to examine the urine of every recruit and when albumin is found to be present the urine is examined chemically and microscopically every day until it is determined whether the recruit has a transitory albuminuria or Bright's disease. Of the 34 men who were discharged, as reported above, all were shown conclusively, after repeated examinations, to have chronic Bright's disease. Aside from the 34 positive cases, 29 other men showed albumin on the first examination, followed by two or three negative tests. In practically all of these latter men there was a history of their having drunk corn whisky or other "bootleg" liquor within a day or so prior to their examination. It is also interesting to find that all of these men, in whom albumin was persistently found, denied absolutely that they had been drinking liquor of any sort. Many of them presented a blood pressure in excess of normal for their age and physique, and most of them gave a history of some acute infection. Aside from the 34 men who were finally discharged, 17 others were under observation as nephritis suspects for a period of several days, but were eventually outfitted and sent on through the training course. In the recruit-examining room the hospital corpsman, assigned to make the examination of urine of all these men, was on duty for six months in the naval hospital in Charleston, S. C., where a portion of his daily work was the routine urinalysis of all urine samples of patients in the hospital. His work was checked personally by the medical officer of the examining room, and the findings were later substantiated at the base laboratory. This corpsman states that, in his experience, the percentage of albuminurias in these recruits was much higher than in routine hospital patients. This experience raises the question whether it is not advisable for the medical officer in each recruiting station throughout the country to make a urinalysis of every man he is inclined to accept and throw out those who show albumin.

The 11 cases of color blindness that were discharged by medical survey were examined first with the Jennings test and then the Holmgren skeins. The examination was repeated several times, and the board of survey, as well as the senior medical officer, is thoroughly satisfied that there was no question in the diagnosis of their condition.

Sick quarters.—The month of June completes the first year of our organization in which sick quarters has played such an important part. The plan originally made has been followed with very few modifications, and has been found to work most admirably. All activities of the base have cooperated to the fullest extent; there has been no friction, and it is believed that all activities will agree that the presence of the facilities offered by sick quarters have given them a sense of security they could not possibly have felt had the old base hospital gone out of commission, leaving nothing in its place. During the year 3,209 cases have passed through sick quarters, 898 of which were transferred to the naval hospital at Norfolk for treatment. Of the total (3,209) 2,625 were admitted from the training station, 355 from the receiving ship, 195 from the air station, and 34 from miscellaneous sources, such as submarine base, ships in the harbor, etc. In addition to the original plan of work, one medical officer has been assigned to the care of the families of Navy personnel, and this activity has grown to such an extent that during the month of June this officer covered 1,041 miles attending to his duties.

PARIS GREEN AS A LARVICIDE FOR ANOPHELINE LARVÆ.

The following is an extract from an article appearing in the United States Public Health Service Report of December 9, 1921, entitled "Arsenic as a larvicide for anopheline larvæ," by M. A. Barber, special expert, and T. B. Hayne, technical assistant, United States Public Health Service:

QUANTITY AND METHOD OF USE OF PARIS GREEN.

"Paris green in antianopheline work should be diluted with a large proportion of inert dust. Only very small doses are necessary to poison larvæ, and the dilution enables one to spread a relatively small quantity of the poison over a large surface. Further, any risk of poisoning the operator or the water treated is minimized by the use of the diluted dust. As a diluent we have successfully used fine sand, rotton-wood dust, and road dust. Road dust, preferably mixed with some fine clay, seems to be as effective as any. The addition of weight in the form of some coarser sand is helpful in enabling one to direct the dispersal of the lighter dust. Some of the diluting dust sinks on contact with the water, but most of the arsenic is left on the surface. Flowers of sulphur has not proved a suitable diluting dust, possibly because so large a proportion of it remains floating that it is ingested with the Paris green, which latter is then too much diluted. A dilution of about 1 part of the poison to 100 parts of the inert dust seems to be a favorable mixture.

"The quantity of Paris green to be used must depend somewhat on the character of the breeding place. Where there is much high grass, reeds, and the like, one would use somewhat greater quantities of the poison than where the surface of the water is clear or covered by low surface vegetation only. Since the poison is relatively inexpensive, and the danger of poisoning the water of the breeding place is small, quantities somewhat larger than those given in the protocol would seem to be advisable, possibly about 10 c. c. (approximately 12 grams, 0.43 ounces avoirdupois, 0.6 cubic inches, or two level teaspoonfuls) to 90 square meters (1,000 square feet).

"A slowly settling cloud of dust carried along by a light wind is apparently the best agent for the distribution of the dust, and the main thing is to start this cloud in the right place and direction. A single cloud may destroy larvæ over a wide area and at a considerable distance from the operator. We have tried certain mechanical means for distributing the dust, such as the dust-guns used in dusting arsenic on cotton plants, but thus far we have succeeded best by simply throwing the dust into the air by hand. The cloud can thus be formed high or low, to the right or to the left, depending on the force and direction of the wind. The pole and bag method, sometimes used for dusting plants, has been found useful in treating a breeding place at the bottom of a deep ditch.

TIME OF DAY FOR THE USE OF THE POWDER.

"The best results are to be expected on a sunny day when the powder is spread after the sun is well up and the dew has disappeared from any vegetation covering the breeding place.

FREQUENCY OF TREATMENT.

"The frequency of treatment of a breeding place must depend largely on the temperature of the water. In a recent experiment anopheline larvæ were thoroughly destroyed over a given area. The place was kept under observation from day to day, and frequent collections of larvæ were made. Eleven days after treatment fully grown larvæ and a few pupæ were found. In this breeding place, then, it would have been necessary to repeat the treatment within ten days. The weather was warm, and the temperature of the water very high, and it is probable that in this pond the growth of the larvæ (larvæ of *A. quadrimaculatus*) was nearly at its maximum rate.

COST.

"Paris green was recently quoted at 22 cents per pound, f. o. b. New York City, packed in 300-pound barrels. Small quantities may be purchased in drug stores for $1 per pound. At 25 cents per pound the amount sufficient for at least 1,000 square feet, 10 c. c., would cost about seven-tenths of a cent. The calcium arsenate in common use for dusting cotton plants may be purchased for about 15 to 20 cents per pound. The use of a powder instead of a liquid should greatly lower the cost of transportation. Usually a dust suitable for dilution can be found in the neighborhood of the breeding place, so that one has to transport only a pound or so of Paris green for the treatment of a large area.

DANGER OF POISONING THE OPERATOR OR THE WATER TREATED.

"The danger to persons engaged in distributing arsenic-containing dusts as larvicides would seem to be mainly through the possibility of inhalation of the poison or its absorption through the skin rather than through ingestion. In our search for information regarding the possible harm to men or domestic animals engaged in distributing arsenical dusts as insecticides, we sent letters of inquiry to 17 United States or State agricultural experiment stations in the cotton or tobacco growing States, in the hope that information might be obtained from those who have had much practical experience with these dusts and their possible harmful effects. In some States these arsenical dusts, calcium arsenate in particular, have been used by the ton in combating the boll weevil. Of the 16 stations replying to our inquiry 14 of the correspondents had had experience in the use of arsenical dusts. Of these 14 about half had knowledge of some injury to man or domestic animals through the use of these arsenical dusts. The lesions reported were chiefly of the acute type and of a minor degree, such as sores on exposed parts of the body, irritation of the bronchial tubes, and sometimes intestinal disorders—lesions which usually healed promptly. Some more serious cases of chronic poisoning were reported to us by Mr. B. R. Coad, in charge of the Delta Laboratory, United States Bureau of Entomology, at Tallulah, La., who kindly wrote us a full description of these cases. The cases were of the cumulative type of poisoning, and occurred exclusively among persons who had worked with the dusts in close quarters for several years. They occurred as the result of exposure to calcium arsenate as well as to other kinds of arsenical dusts. 'The chronic types of poisoning are practically always accompanied by some dermatic disorder, the injury of which varies widely with the individual, and is somewhat recurrent. Furthermore, in extreme cases we find neuritis and occasionally some fairly pronounced heart symptoms. It has proved a very obnoxious ailment, and, furthermore, a very stubborn one. Apparently it is brought about by a saturation of the system with arsenic, and the victim is nearly always hypersensitive to arsenic exposure. In the case of constant exposure the mucous membranes of the nose and throat reach such a condition that they are exceedingly sensitive to mechanical irritation by any form of dust, and a slight exposure to dust brings on an attack which very closely resembles hay fever.'

"It is to be remembered that these chronic cases followed a long and intimate exposure to arsenic dusts. Mr. Coad was of the opinion that the amount of exposure incident to the antianopheline work we have described would probably not lead to any particular danger. It is significant that so little trouble is reported by experiment-station workers and by other persons who have used arsenic dusts extensively for some years. Possibly their immunity has been due in part to the fact that they use principally the slightly water-soluble calcium arsenate, and that cotton-plant dusting extends over a comparatively short period each year. However, in antianopheline work where such small quantities of highly diluted Paris green are used, and where the work is wholly out of doors, simple precautions should suffice to protect the user, nor would a health officer anticipate any strenuous objections from the people of a community to the use of a substance so commonly employed as an insecticide.

"In our experiments we have used no precautions other than to stand to the windward of the dust cloud—the place where one would naturally stand in distributing the dust—and we have experienced no harmful results whatever. However, even with the small quantities used in larvicide work, it is well to remember that one is working with a poison and that some precautions should be taken at least until the matter is further investigated. It is probably sufficient to keep to the windward of the dust clouds and to avoid inhaling the dust as far as possible. In case a great deal of exposure is necessary, one should use some precaution to keep any large amount of Paris green from entering the clothing or accumulating anywhere on the skin.

"As regards the danger of poisoning the water treated, it should be emphasized that only a minute quantity of Paris green is dusted over a very large surface, and of that compound only a very small fraction is water-soluble. We have never observed any effect of the poison on culicine larvæ or on any aquatic insect or animal, however delicate, other than the surface-feeding anopheline larvæ. In particular, we have never observed any indication of harm to top-feeding minnows or to any other natural enemy of larvæ. The danger to domestic animals through drinking treated water seems very remote. In order to meet any objections on the part of the owner of a breeding place, one might arrange to have the stock removed from the breeding place for a day or so, but the owner will hardly insist on this precaution when it is explained to him that the powder is the same as that commonly used against insects and that only a very small quantity of it is to be used on a large body of water.

"In sum, the possible advantages of arsenic dust used against anopheline larvæ are its cheapness, portability, ease of distribution by means of the wind, and the possibility of using it over areas difficult of treatment by methods now in use. The chief disadvantage is that its use is limited to anopheline larvæ—ova and pupæ of all kinds, and culicine larvæ are apparently unaffected. It is believed, however, that this method will have a place in antimalarial work, especially in places not easily drained and so covered by vegetation or other obstacles as to render them inaccessible to natural enemies of larvæ, or to other methods of treatment."

CHLOROPICRIN AS SHIP FUMIGANT.

The following is an extract from The Nation's Health of July 15, 1922:

"Sulphur dioxid is the æon-old standby in ship fumigation. It is a fairly good agent of deratization; accidents to human beings very seldom follow its use; it is relatively cheap; it requires very little apparatus to use; highly skilled labor is not absolutely necessary in its application. On the other hand, its diffusibility is not good; its weight sometimes makes post fumigation aeration somewhat slow; it is destructive to colors and tarnishes or even corrodes certain metals.

"Carbon monoxid is of considerable value; it is fairly efficacious for killing small mammals; it is fairly cheap; it is not destructive; there is no danger from fire during its use, as with sulphur dioxid: it is light and aeration is easy following its use. A special apparatus and skilled operatives are required for its use; it diffusibility is not uniform and is uncertain; in the presence of a humid atmosphere it is apt to cause sweating of painted surfaces; it is ordorless, tasteless, nonirritant, and invisible, and has therefore the great hazard that someone may walk into it and be killed.

"Hydrocyanic acid gas is an extremely valuable fumigant; it is highly lethal for mammals, many insects, and all birds; it is highly diffusible, relatively cheap, and not destructive. Skilled and dependable labor is required for its use; aeration must be perfect before the fumigated compartments may be entered. It is a useful but highly dangerous weapon in the armentarium of the sanitarian.

"An attempt was made by Seguy F. (*Arch. de Med. et de Pharm.*, Nav., 1921, III, No. 6, p. 509 *et seq.*) to utilize chloropicrin in the proportion of 5 c. c. per cubic meter as a deratizing fumigant for ships. The chemical formula of chloropicrin is CCl_3NO_2 and is made by the action of calcium hypochlorite on calcium picrate. It boils at 111.9° C., freezes at —0.602° C., and has a density of 1.648 at 25° C. It is an intense lachrymant. For a ship of 4,000 cubic meters capacity (about 1,500 registry tons) 20 liters, at a total cost of 280 francs (about $50 gold), were required. The agent killed all rats and bugs, but 24 hours' aeration was necessary. The difficulty of removal of the gas by ordinary ventilation methods interposes an almost insuperable obstacle by reason of the time element involved. This gas is relatively safe, however, because no one will walk very far into it."

INSTRUCTIONS TO MEDICAL OFFICERS.

Circular letter, serial No. 198—1922.

HWS: MFD. 125221 (71).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., July 13, 1922.

To: All medical officers.
Subject: Training of flight surgeons.

1. A large number of medical officers will be needed for training in aviation medicine and subsequent duty as flight surgeons.

2. The training period will consist of a course of instruction of approximately four months' duration either at Washington, D. C., or at Mineola, Long Island.

3. Any medical officer who may desire to identify himself with the specialty of aviation medicine is requested to make early application to the bureau, inclosing a report of a physical examination such as is prescribed for pilots.

E. R. STITT.

Circular letter, serial No. 199—1922.

SDS. HWM: HCM. 124842 (73).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., July 18, 1922.

To: All medical officers.
Subject: Forms N. M. S. " F." and N. M. S. " K.," revision of.
Inclosure: 1.

1. Form F has been revised to include all information necessary for the morbidity and mortality statistical purposes of the Bureau of Medicine and Surgery. Form K will therefore be abolished when the present supply of either Form F or Form K is exhausted.

2. Naval medical supply depots will not issue the new form while requests can be filled from the old stock on hand.

3. Ships and stations will continue to use the present forms until the stock of such is used up and until such time as the revised Form F is furnished by the depots.

4. Copy of the new Form F is attached for information; supply of which can be secured when needed from the nearest naval medical supply depot in the usual manner (Form O).

E. R. STITT.

Circular letter, serial No. 200—1922.

WSG/T. 125949 (54).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., July 17, 1922.

To: All naval hospitals, U. S. S. *Mercy* and *Relief*, sick quarters, marine barracks, Quantico, Va.

Subject: Subsistence of enlisted personnel of the Navy and Marine Corps (Regular and Reserve) during period granted leave from treatment in hospital.

Inclosure: (A) Bureau's attached 1st ind., No. 125949 (54), June 3, 1922.

1. The Bureau of Navigation in forwarding this bureau's first indorsement (inclosure) in its second indorsement No. 57369–140 of June 9, 1922, made recommendation, as follows:

"1. Forwarded. This bureau concurs in the opinions expressed in the letter of the Bureau of Supplies and Accounts and the first indorsement of the Bureau of Medicine and Surgery, and recommends that reference (*b*) be rescinded to take effect June 30, 1922. (Signed) Thos. Washington."

2. The department by its letter No. 9047–1219–4 of July 12, 1922, decided as follows:

"1. Authority contained in decision of the department of May 14, 1919 (9047–1219), to pay enlisted personnel a subsistence allowance while absent on leave granted while patient in hospital, etc., is revoked, effective immediately. (Signed) R. E. Coontz, acting."

3. In accordance with the direction of the department as quoted in the foregoing paragraph, no further "so-called sick leave" as mentioned in this correspondence will be granted at naval hospitals on and after the date of the receipt of this letter; such leaves already granted will not be extended; but such leaves already in force when this letter shall be received may be completed.

E. R. Stitt.

[1st indorsement.]

WSG/T. 125949 (54).

Department of the Navy,
Bureau of Medicine and Surgery,
Washington, D. C., June 3, 1922.

To: Secretary of the Navy.

Via: Bureau of Navigation.

Subject: Subsistence of enlisted personnel of the Navy and Marine Corps (Regular and Reserve) during period granted leave from treatment in hospital.

Reference: (*a*) Opinion of Judge Advocate General, No. 9047–1219, May 14, 1919; (*b*) letter of Acting Secretary, No. 9047–1219, May 14, 1919; (*c*) letter of Secretary, No. 9047–1219–2, June 26, 1919; (*d*) Acting Secretary's letter to Navigation, No. 26254–2883: 2, October 30, 1919; (*e*) this bureau's letter to all naval hospitals, No. 125949 (63), June 25, 1919; (*f*) Supplies and Accounts preceding indorsement No. 82–5–E, May 31, 1922.

1. The granting of so-called "sick leave" referred to in the attached papers and in the several references was primarily for the convenience of the Government while the Navy, including the Marine Corps, was expanded much beyond the available naval hospital facilities. By sending selected cases to their homes for the period of convalescence, the bureau was able to release beds for more serious cases, and to avoid rental of beds in civilian hospitals; it was also granted, secondarily, for the purpose of hastening convalescence through change of environment.

2. The scope of this authority was further extended to include the sick attached to naval vessels by the department's letter to the Bureau of Navigation (ref. *d*) of October 30, 1919.

3. This bureau concurs with the Bureau of Supplies and Accounts in the opinion that the practice in question should be terminated, but suggests that

instructions to that effect be made effective on June 30, 1922, in order that the new fiscal year may not be involved.

4. To avoid complications, directions should be given that no further so-called sick leaves, as mentioned, may be granted; that leaves already granted may not be extended; but that leaves now in force may be completed.

5. If authorized by the department, the bureau will issue instructions to the above effect to all naval hospitals, only.

E. R. STITT.

Circular letter, serial No. 201—1922. WJCA:ESK. 132687–0 (73).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., July 21, 1922.

To: All naval hospitals.
Subject: Modification of circular letter, Serial 189—1922.
Reference: (*a*) Bureau of Medicine and Surgery circular letter WJCA:ESK, 132687–0(54), serial No. 189—1922, of May 22, 1922.

1. You are directed to change paragraph 5, reference (*a*), to read as follows:

"5. All articles made by Veterans' Bureau patients from material supplied by the Bureau of Medicine and Surgery will be held pending legislation regarding their disposal, and information concerning this will be supplied in a subsequent circular letter." (This paragraph in no way applies to articles made by Veterans' Bureau patients from supplies and materials furnished by the Red Cross Society.)

And to add paragraph 6 as follows:

"6. The Bureau of Medicine and Surgery has no objection to Veterans' Bureau patients receiving occupational therapy training from the American Red Cross personnel at naval hospitals, under the same conditions as now apply to naval personnel."

E. R. STITT.

Circular letter, serial No. 202—1922. HBS/MPS. 132679 (81).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 3, 1922.

To: All medical officers.
Subject: Bottles issued to the Naval Service labeled sodium bicarbonate but found to contain monohydrated sodium carbonate.

1. Purchase of a quantity of sodium bicarbonate from the McKesson & Robbins Co., New York, during June, 1919, was made by the commanding officer, naval medical supply depot, Brooklyn, N. Y. This particular consignment, lot No. 2694–5A, has been found to contain monohydrated sodium carbonate. Medical officers are therefore directed to examine carefully all such bottles before issue. Monohydrated sodium carbonate may be distinguished from sodium bicarbonate as a free-flowing granular crystalline substance instead of a nonflowing palpable powder.

2. So far as can be determined, the above-mentioned lot was issued to the service during the summer and fall of 1921.

F. L. PLEADWELL, *Acting.*

Circular letter, serial No. 203—1992. WSG/T. 132697-0 (81).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 3, 1922.

To: All naval hospitals.

Subject: Bed capacity; Veterans' Bureau and Navy.

Reference: (*a*) Veterans' Bureau letter (ADH-Fac-6-MSS), July 14, 1922 (No. 129733-63); (*b*) this bureau's letter No. 132687-0 (72), July 12, 1922, to the nine naval hospitals involved only; (*c*) this bureau's circular letter No. 132687-0 (61), June 5, 1922 (serial No. 193—1922).

1. In the bureau's above-mentioned letters, statements were made of the number of beds to be reserved during the fiscal year 1923 for Veterans' Bureau patients and (ref. *b*) the number to be reserved for naval personnel.

2. By a more recent arrangement with the Veterans' Bureau (ref. *a*) of a reduced number of reserved beds (1,650 instead of 2,150) and because of the reduction in the enlisted force of the Navy to 86,000 men, it is directed that at the hospitals mentioned beds be reserved as follows:

Hospital.	Veterans' Bureau patients.	Navy patients.	Total.
Portsmouth, N. H	50	100	150
Chelsea, Mass	350	200	550
Newport, R. I	50	300	350
New York, N. Y	400	488	888
League Island, Pa	125	466	591
Washington, D. C	150	150	300
Norfolk, Va	100	700	800
Pensacola, Fla	25	99	124
Great Lakes, Ill	350	100	450

3. To economically administer these hospitals, it is directed that beds in excess of the number shown in the column "Total" above shall be considered, and reported as beds "Out of commission but available for emergency expansion;" all temporary buildings not required in maintaining the numbers of beds above mentioned will be dismantled, so far as necessary, and closed, but will be so left as to permit of being placed in service on short notice; the supply of water, steam, and electricity will be disconnected where and when practicable, due consideration being given to the fire hazard, and no other repairs will be made than those absolutely necessary for the preservation of the buildings.

4. As the arrangement with the Veterans' Bureau (ref. *a*) contemplates "50 beds which may be utilized from time to time in naval hospitals where a definite quota of beds has not been established," naval hospitals, other than those mentioned in paragraph 2 above, are directed to admit Veterans' Bureau patients in emergencies, and to notify this bureau of all such admissions.

F. L. PLEADWELL, *Acting.*

N65-JPL-BL. 31847-29.

NAVY DEPARTMENT,
BUREAU OF NAVIGATION,
Washington, D. C., July 14, 1922.

BUREAU MANUAL CIRCULAR NO. 5.

From: Bureau of Navigation.
To: All ships and stations.
Subject: Injury or death of persons in the Naval Service, information concerning.

1. The following changes in Bureau of Navigation manual are approved and directed to be made upon receipt of this letter:

Add the following articles:

"D-8413. *Information concerning injury or death of persons in the Naval Service.*—The bureau is in receipt of numerous letters from relatives of deceased or injured persons requesting detailed information concerning the death or injury of the individuals concerned.

"D-8414. In all cases of death and in cases of accident involving serious injury to any person in the Naval Service, commanding officers will, as soon as possible, acquaint the next of kin with all the circumstances connected therewith, so far as definitely known. The communication (telegram or letter) should be in such detail and in such language as to show personal consideration for the next of kin, an accomplishment which can not but react favorably to the Naval Establishment. (See Art. D-8411 for reports to department.)

"D-8415. Care shall be exercised to see that the information given is not at variance with the findings of any court or board which may have been convened in the premises."

R. H. LEIGH, *Acting.*

VITAL STATISTICS.

In the future the "Monthly Health Index," which will be published on the fifteenth of each month, will contain statistical data for individual ships and shore stations. The statistics appearing in this bulletin are summaries compiled from those published in the "Monthly Health Index."

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

TABLE No. 1.—*Monthly report of morbidity in United States Navy and Marine Corps for the month of July, 1922.*

	Entire Navy.	Forces afloat.	Atlantic Fleet.	Pacific Fleet.	Shore stations.	Atlantic stations in United States.[1]	Pacific stations in United States.	Marine Corps.
Average complement	[2] 120,803	[2] 82,919	[2] 31,250	[2] 19,950	[2] 37,884	[2] 23,778	[2] 6,179	21,596
All causes:								
Number of admissions	5,062	2,535	650	505	2,527	1,197	227	1,054
Annual rate per 1,000	502.83	401.85	2:5.76	202.35	800.38	604.08	440.83	585.66
Diseases only:								
Number of admissions	4,418	2,196	555	433	2,222	....	....	915
Annual rate per 1,000	438.86	355.91	213.12	172.30	703.77	....	....	508.42
Injuries and poisons:								
Number of admissions	644	339	85	72	305	....	....	139
Annual rate per 1,000	63.97	54.94	32.64	288.50	96.60	....	....	77.24
Communicable disease, exclusive of venereal disease:								
Number of admissions	376	137	....	....	239	49	5	145
Annual rate per 1,000	37.35	22.20	....	....	75.70	24.73	9.71	80.57
Venereal disease:								
Number of admissions	1,339	889	175	142	450	175	142	254
Annual rate per 1,000	133.01	144.08	67.20	56.90	142.53	88.32	275.76	141.14

[1] Does not include ninth naval district.
[2] Includes Navy and Marine Corps personnel.

NOTE.—Asiatic and unassigned ships not reported.

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of July, 1922.*

	Forces afloat, Navy and marines (complement, 82,919).		Forces ashore, Navy and marines (complement, 37,884).		Total (complement, 120,803).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases	2,196	317.76	2,222	703.71	4,418	475.38
Injuries and poisons	339	49.05	305	96.59	644	69.29
Total admissions	2,535	366.81	2,527	800.30	5,062	544.67
CLASS III.						
Appendicitis, acute	34	4.91	39	12.35	73	7.85
Autointoxication, intestinal	10	1.44	12	3.80	22	2.36
Cholangitis, acute	24	3.47	13	4.11	37	3.98
Cholectystitis, acute	3	.43	0	....	3	.32
Cholelithiasis	0	....	1	.31	1	.11
Colitis, acute	3	.43	3	.95	6	.64
Constipation	10	1.44	16	5.06	26	2.79
Enteritis, acute	20	2.89	15	4.75	35	3.76
Gastritis, acute, catarrhal	4	.57	10	3.16	14	1.50
Gastroenteritis	33	4.77	51	16.15	84	9.03
Hemorrhoids	32	4.63	34	10.76	66	7.10
Pharyngitis, acute	16	2.31	19	6.01	35	3.76
Ulcer of duodenum	1	.14	1	.31	2	.22
Ulcer of stomach	1	.14	0	....	1	.11
Total admissions	191	27.63	214	67.77	405	43.57
CLASS VII.						
Varicocele	18	2.60	10	3.16	30	3.22
CLASS VIII.						
Chicken pox	5	.72	2	.63	7	.75
Diphtheria	0	....	7	2.21	7	.75
German measles	12	1.73	1	.31	13	1.40
Influenza	67	9.69	26	8.23	93	10.01
Measles	7	1.15	2	.63	9	.97
Mumps	6	.86	1	.31	7	.75
Pneumonia, broncho	3	.43	3	.95	6	.64

TABLE No. 2.—*Number of admissions reported by Form F cards, etc.*—Continued

	Forces afloat, Navy and marines (complement, 82,919).		Forces ashore, Navy and marines (complement, 37,884).		Total (complement, 120,803).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Pneumonia, lobar	8	0.11	6	2.21	15	1.61
Scarlet fever	0	....	1	.31	1	.11
Total admissions	108	15.62	50	15.83	158	17.00
CLASS IX.						
Dysentery, bacillary	0	....	1	.31	1	.11
Dysentery, entamebic	0	....	2	.63	2	.22
Typhoid fever	2	.28	0	....	2	.22
Total admissions	2	.28	3	.95	5	.53
CLASS X.						
Dengue	3	.43	22	6.96	25	2.69
Filariasis	0	....	2	.63	2	.22
Malaria	19	2.74	140	44.33	159	17.10
Total admissions	22	3.18	164	51.93	186	20.01
CLASS XI.						
Tuberculosis (all forms)	5	.72	20	6.33	25	2.69
CLASS XII.						
Chancroid	252	34.46	127	40.22	379	40.78
Gonococcus infections	554	80.16	224	70.94	778	83.71
Syphilis	83	12.01	99	31.35	182	19.58
Total admissions	889	128.63	450	142.51	1,339	144.07
CLASS XVIII.						
Bronchitis, acute	100	14.47	78	24.70	178	19.15
Laryngitis, acute	1	.14	3	.95	4	.43
Pleurisy, acute fibrinous	8	1.15	1	.31	9	.97
Rhinitis, acute	34	4.91	13	4.11	47	5.05
Tonsillitis, acute follicular	180	26.04	98	31.03	278	29.91
Total admissions	323	46.73	148	61.12	516	55.52
CLASS XX.						
Hernia	32	4.63	30	9.50	62	6.67

TABLE No. 3.—*Summary of annual admission rates for venereal disease reported from ships for June, and from various shore stations for the four-week period, July 2 to July 29, 1922, inclusive.*

	Annual rate per 1,000, June.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All ships	0	142.53	1,285.71	0	129.00	800.00
Battleship and cruiser force:						
Atlantic Fleet	37.50	130.96	428.57	48.82	108.48	225.30
Pacific Fleet	42.85	98.50	164.21	68.45	93.96	119.80
Asiatic Fleet	60.60	384.98	545.45	32.81	232.59	295.70
Destroyer force:						
Atlantic Fleet	0	139.26	1,153.84	0	147.04	640.00
Pacific Fleet	0	70.87	720.00	0	89.09	371.51
Asiatic Fleet	0	549.22	1,250.00	18.43	290.48	597.36
Miscellaneous:						
Atlantic Fleet	0	144.01	757.89	0	127.12	429.47
Pacific Fleet	0	112.28	406.77	0	82.33	220.85
Asiatic Fleet	0	378.64	1,285.71	0	317.39	800.00
Unassigned, including ships on special duty	0	148.52	480.00	0	154.62	250.40

TABLE No. 3.—*Summary of annual admission rates for venereal disease reported from ships for June, etc.*—Continued.

	Annual rate per 1,000, July 2-July 29, 1922.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All naval districts in the United States	0	101.44	355.98	5.43	87.57	210.23
First naval district	9.72	89.12	324.80	16.99	40.31	142.85
Third naval district	0	113.27	307.22	3.08	69.36	114.94
Fourth naval district	0	316.39	355.98	5.43	171.40	149.77
Fifth naval district	0	75.97	333.77	27.13	104.28	210.23
Sixth naval district	28.06	37.51	115.04	38.31	53.31	143.18
Seventh naval district	0	0	0	20.61	20.61	20.61
Eighth naval district	0	90.18	105.93	85.60	111.16	192.00
Ninth naval district	98.76	98.76	98.76	73.69	73.69	73.60
Eleventh naval district	28.33	37.97	60.88	15.76	30.58	42.80
Twelfth naval district	17.56	115.50	196.72	54.82	110.41	128.21
Thirteenth naval district	0	34.07	99.99	10.98	31.76	68.57

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASE.

	Per cent, June.		Per cent since Jan. 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All ships	70.75	8.27	67.24	10.57
Battleship and cruiser force:				
Atlantic Fleet	73.14	12.03	70.50	11.69
Pacific Fleet	82.47	5.15	82.58	9.13
Asiatic Fleet	23.40	14.89	49.72	14.91
Destroyer force:				
Atlantic Fleet	80.89	12.35	65.12	9.13
Pacific Fleet	83.63	5.45	79.35	6.21
Asiatic Fleet	55.66	.94	52.02	9.09
Miscellaneous:				
Atlantic Fleet	75.00	3.26	64.60	10.11
Pacific Fleet	85.24	14.75	79.09	11.49
Asiatic Fleet	57.69	11.53	54.27	17.64
Unassigned, including ships on special duty	68.18	11.36	61.46	11.31

	Per cent, July 2-July 29, 1922.		Per cent since Jan. 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All naval districts in the United States	76.76	7.88	70.04	14.94
First naval district	77.27	9.09	72.67	11.95
Third naval district	73.07	7.69	65.39	20.76
Fourth naval district	85.29	2.94	81.17	5.43
Fifth naval district	64.70	8.83	64.00	14.48
Sixth naval district	50.00	16.66	75.00	14.70
Seventh naval district	0	0	100.00	0
Eighth naval district	85.71	0	68.26	26.98
Ninth naval district	100.00	0	79.16	13.04
Eleventh naval district	83.32	16.66	80.00	14.28
Twelfth naval district	82.75	17.24	70.52	23.12
Thirteenth naval district	100.00	0	86.66	13.33

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the four-week period, July 2 to July 29, 1922, inclusive.*

Classes.	Navy (complement, 99,207).		Marine Corps (complement, 21,596).		Total (complement, 120,803).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases of blood	1	0.13	0		1	0.10
Diseases of circulatory system	36	4.71	14	8.42	50	5.38
Diseases of digestive system	426	55.80	139	83.66	565	60.79
Diseases of ductless glands and spleen	2	.26	0		2	.21
Diseases of ear	89	11.65	17	10.23	106	11.40
Diseases of eye and adnexa	61	7.99	11	6.62	72	7.74
Diseases of genito-urinary system (non-venereal)	151	19.78	24	14.44	175	18.83
Communicable diseases transmissible by oral and nasal discharges	131	17.16	12	7.22	143	15.38
Communicable diseases transmissible by intestinal discharges	4	.52	1	.60	5	.53
Communicable diseases transmissible by insects and other arthropods	51	6.68	131	78.84	182	19.58
Tuberculosis (all forms)	23	3.01	1	.60	24	2.58
Venereal diseases	1,005	131.65	254	152.88	1,259	135.46
Other diseases of infective type	221	28.95	59	35.51	280	30.12
Diseases of lymphatic system	39	5.10	21	12.63	60	6.45
Diseases of mind	20	2.62	10	6.01	30	3.22
Diseases of motor system	61	7.99	28	16.85	89	9.57
Diseases of nervous system	23	3.01	7	4.21	30	3.22
Diseases of respiratory system	586	76.76	109	65.60	695	74.78
Diseases of skin, hair, and nails	90	11.79	32	19.26	122	13.12
Hernia	46	6.02	6	3.61	52	5.59
Miscellaneous diseases and conditions	82	10.74	18	10.83	100	10.76
Parasites (fungi and certain animal parasites)	109	14.27	19	11.43	128	13.77
Tumors	10	1.31	2	1.20	12	1.29
Injuries	437	57.24	128	77.04	565	60.79
Poisons	20	2.62	11	6.62	31	3.33
Total	3,724	487.84	1,054	634.44	4,778	514.11

TABLE No. 5.—*Deaths reported, entire Navy, for the four-week period, July 2 to July 29, 1922, inclusive.*

Causes.	Navy (complement, 99,207).	Marine Corps (complement, 21,596).	Total (complement, 120,803).
Malaria	0	1	1
Pneumonia, lobar	1	0	1
Tuberculosis, chronic pulmonary	2	0	2
Syphilis	1	0	1
Dysentery (unclassified)	0	1	1
Myelitis	1	0	1
Malignant growths	1	0	1
Other diseases	5	1	6
Drowning	19	0	19
Other accidents and injuries	5	1	6
Total	35	4	39
Annual death rates per 1,000, all causes	4.58	2.40	4.19
Annual death rates per 1,000, disease only	1.44	1.80	1.50

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UNITED STATES NAVAL MEDICAL BULLETIN

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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

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Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
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TABLE OF CONTENTS.

PREFACE.

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comments on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

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Only the names of actual reviewers for a current number appear.

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U. S. NAVAL MEDICAL BULLETIN

VOL. XVII. OCTOBER, 1922. No. 4.

SPECIAL ARTICLES.

YELLOW FEVER IN ST. THOMAS, WITH SPECIAL REFERENCE TO ITS SPONTANEOUS ELIMINATION.

By E. PETERSON, Lieutenant, Medical Corps, United States Navy.

Forty years ago August Hirsch said in his Handbook of Geograpical and Historical Pathology, "The earliest history of yellow fever along the shores of the Gulf of Mexico, including the West Indies, is enveloped in an obscurity which we can not now enlighten. In particular, there is no way of getting an answer to the question whether the disease was prevalent there, and, if so, to what extent, before the arrival of European colonists; or to the question, when and under what circumstances it first appeared among the newcomers. It is not only the defectiveness of the records from these earliest times of our intercourse with the Western Hemisphere that renders all historical research on the subject illusory; a still more serious impediment, and one that has continued in force down to the most recent times, is the frequent confounding of yellow fever with bilious remittent malarial fevers, especially with *Febris remittans haemorrhagica*." (1)

According to this writer, the first reliable accounts of yellow fever date from the middle of the seventeenth century. From this period on we find discussions of the importation of the disease from place to place, from island to island. The chroniclers of that time further remark on the circumstance that it was especially the new arrivals that were visited by the sickness, and that not only the settlers but also the crews of merchant ships and ships of war at anchor in the ports of the West Indies were menaced to a great extent by the disease.

According to Gorgas, Carter, and Lyster, "there seems good reason to believe that the Gulf coast of Mexico was probably the original cradle of this disease in man, and that it may also be its last resting place. Just how far back the history of the disease may be traced depends upon interpretations of early writings of Spanish explorers from the time of Columbus to the middle of the seventeenth century. We know that epidemics of unknown character did occur among the Mayans in Yucatan as far back as the first century of the Christian era. We know that these people moved from Guatemala to their present homes in Yucatan for some unknown cause. An explanation has been offered by Morley, the well-known anthropologist, to the effect that this migration was due to the exhaustion of the soil around their cities and villages so that corn could not be raised. While this seems the most reasonable explanation, it does not prove that diseases in the area may not have been a contributing cause. However this may be, we feel pretty sure that Columbus found the disease waiting for him on his arrival, and it is believed that the disease was first introduced among white men in Santo Domingo." (2)

Hirsch (1) credits the accounts of Dutertre ("Hist. génér. des Antilles Franc.," Paris, 1667) as describing the first authentic epidemic of yellow fever, occurring in Guadeloupe in 1635. This epidemic lasted off and on until the year 1649; it did not reappear again until 1699. According to Ligon (3) (History of Barbadoes, London, 1657) the disease occurred in epidemic form in Barbadoes in 1647. He states that the inhabitants of the island and shipping too were so grievously visited with the plague (or as "killing a disease"), that before a month had expired after his arrival the living were hardly able to bury the dead. The disease then disappeared for 43 years, and when it recurred in 1690 it was at first not recognized as being the same disease which devastated the island of 1647. (4)

Through his chronological survey of the epidemics of yellow fever in the West Indies, North America, Central America, and the Mexican Gulf coast of South America, Hirsch shows how the disease was imported from place to place and how it disappeared in certain islands to recur again after a few years, until nearly the entire Caribbean littoral could be included in the endemic area of the disease. Various seaports on the Atlantic coast of the United States were visited at frequent intervals.

According to Hirsch, only two epidemics that may be designated with certainty as yellow fever had been observed on South American soil up to the year 1850. Both of these happened at Guayaquil, the first in 1740, concerning which an importation of the disease from outside is expressly mentioned; and the second in 1842, which can in like manner be proved to have been introduced by strangers who had come from New Orleans by way of Panama. Paraja (5), apparently unaware of Hirsch's reference to the epidemic in 1740, states that not even a tradition exists to cause the disease to be suspected. According to him the epidemic of 1842 caused "a mortality more or less unbelievable if one relies upon lay historians."

The general outbreak of yellow fever in Brazil dates from the end of 1849, when the disease appeared in Bahia, having been imported either from New Orleans or Habana. (1)

ST. THOMAS.

Dr. John Bard of New York gives the first available record of the existence of a possible epidemic in St. Thomas. He had heard from the "ancient inhabitants" of New York that so long ago as the year 1702 a malignant fever, little inferior to plague, was imported, which from its extreme mortality was distinguished by the name of "the great sickness." Doctor Bard adds: "The formidable disease, if tradition says true, was brought here (New York) from St. Thomas in a single bale of cotton." (3)

The first authentic report of yellow fever in St. Thomas dates back to 1793. This epidemic lasted to 1795. The disease then reappeared again in 1816–1818, 1825, 1833, and 1852–53. During the latter two years the disease became very prevalent throughout the Antilles, and St. Thomas has the questionable distinction of having been the starting point of this epidemic. (1)

From 1852 on, there are certain records available in St. Thomas which give us a distinct idea how devastating the disease was, especially to the shipping and to the military garrison. The records are those kept by the cemetery authorities and consist of two large volumes in which the name of every person buried in St. Thomas appears; age, sex, birthplace, cause of death, and plot in cemetery where buried are also given.

A striking fact in reviewing these records is that nearly every person who died from yellow fever was attached to a ship lying in the harbor or was a member of the military garrison. Apparently every country on the globe has some mother's son buried on this rocky peak in the Caribbean.

The following tables show the number of persons that died from yellow fever and were buried in St. Thomas from 1852 to 1902, when the last death from this disease occurred:

DEATHS FROM YELLOW FEVER IN ST. THOMAS.

TABLE I.—1852-1861.

Year.	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	Total.
January	0	29	1	14	11	4	4	4	22	0	89
February	1	5	0	12	13	2	15	1	6	0	55
March	0	3	1	15	21	2	2	0	6	0	50
April	0	13	0	14	12	10	17	0	0	0	66
May	0	37	0	54	32	49	17	0	0	0	189
June	0	68	0	65	15	93	3	0	0	0	244
July	0	29	0	22	4	22	1	0	0	0	78
August	17	4	0	6	3	12	0	2	0	0	44
September	21	0	0	0	1	0	0	0	0	1	23
October	41	0	2	0	1	0	0	33	0	3	80
November	63	1	1	4	2	3	11	32	0	2	119
December	112	0	8	3	0	3	7	23	0	3	159
Total	255	189	13	209	115	200	77	95	34	9	1,196

DEATHS FROM YELLOW FEVER IN ST. THOMAS—Continued.

TABLE II.—1862–1871.

Year.	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	Total.
January	0	0	0	7	4	31	25	3	8	0	78
February	0	0	0	4	1	19	20	0	1	0	45
March	0	0	0	1	0	14	12	0	0	0	27
April	0	0	1	7	1	5	0	0	0	0	14
May	0	0	2	2	2	8	2	0	0	0	16
June	0	0	4	1	5	2	0	0	0	0	12
July	0	0	5	2	4	5	0	2	0	0	18
August	0	0	5	6	7	2	2	8	0	0	30
September	0	0	5	0	12	10	0	6	0	0	33
October	0	0	3	1	44	44	0	8	0	2	102
November	0	3	5	0	65	43	0	21	0	0	137
December	0	1	26	2	90	55	0	6	1	0	181
Total	0	4	56	33	235	238	61	54	10	2	693

TABLE III.—1872–1881.

Year.	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	Total.
January	1	0	0	0	0	0	0	0	0	0	1
February	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	3	3
September	0	0	0	0	0	0	2	0	0	0	2
October	0	0	0	0	0	0	11	0	0	1	12
November	0	0	0	0	0	0	0	0	2	0	2
December	0	0	0	0	0	0	0	0	1	0	1
Total	1	0	0	0	0	0	13	0	3	4	21

TABLE IV.—1882–1891.

Year.	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	Total.
January	0	0	0	1	0	0	0	0	0	0	1
February	0	0	0	3	0	0	0	0	0	0	3
March	0	0	0	6	0	0	0	0	0	0	6
April	0	0	0	1	0	0	0	0	0	0	1
May	0	0	0	4	0	0	0	0	0	0	4
June	0	0	0	0	0	0	0	0	1	0	1
July	1	0	0	0	0	0	0	0	1	0	2
August	0	0	1	2	0	0	0	0	1	1	5
September	0	0	0	0	0	0	0	0	4	0	4
October	0	0	0	0	0	0	0	0	2	0	2
November	0	0	1	0	0	0	0	0	1	0	2
December	0	0	2	2	0	2	0	0	0	0	6
Total	1	0	4	19	0	2	0	0	10	1	37

DEATHS FROM YELLOW FEVER IN ST. THOMAS—Continued.

TABLE V.—1892-1901.

Year.	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.
January	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	2	0	0	0	0	0	2
September	0	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	0	0	0	0	0	2

TABLE V.—1902-1911.

Year.	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	Total.
January	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0
July	1	0	0	0	0	0	0	0	0	0	1
August	0	0	0	0	0	0	0	0	0	0	0
September	0	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	0	0	0	0	0	0	1

TABLE VI.—NUMBER OF TOTAL CASES OF YELLOW FEVER FOR EACH MONTH FROM 1852-1902.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
169	103	83	81	209	257	99	84	62	196	260	347	1,950

As stated above, Hirsch gives credence to the opinion that the epidemic of yellow fever that raged over the Antilles in 1852–53 started in St. Thomas. As seen from Table I, the epidemic commenced in August when 17 people died from yellow fever. Of these, 7 were soldiers from the Danish garrison, 3 European residents, and the balance sailors from European and American ships lying in the harbor.

The first deaths recorded during the month occurred in the garrison. The death that occurred in February was that of a sailor from the American brig *Lady Maxwell.* Of the 255 persons who died from yellow fever during 1852, 19 were Danish soldiers, 15 European residents (including the American consul), and 221 European and American sailors.

This represents the typical toll from this disease. White sailors were the common victims. In January, 1853, a Chinese also died from the disease.

From the nature of the disease it seems reasonable to suppose that St. Thomas was an endemic center for yellow fever for the two decades between 1852 and 1872. The break that occurred during 1861, 1862, and 1863 may represent years when the disease was actually absent from St. Thomas, but amongst the 9 cases that died in 1861, at least 1 was a European resident of the island. The 4 cases in 1863 were all sailors from ships in the harbor that may have been infected at other ports. But amongst the first cases that died in 1864 some were residents and members of the garrison. Hence it seems that the above break is only apparent and that the disease was actually present.

From 1870 yellow fever suddenly ceased to play the important rôle it had held for the last 20 years in the health conditions of St. Thomas.

The death from yellow fever that occurred in 1872 was in a sailor who might have contracted the disease in another port. With regard to the epidemic in 1878, the "Sanitary report of the Kingdom of Denmark" (6) of that year states:

"This disease (yellow fever), which previously had been present in the island for a number of years, has not shown itself since March, 1870; hence for a period of nine years, in spite of the fact that the island is in steady communication with two of the most important foci of the disease, Rio de Janeiro and Habana. The disease was introduced into St. Thomas from Habana in July, 1878, and spread during the balance of the year amongst the ships in the harbor and in the garrison; 40 cases in all with 30 deaths. At the same time a continued fever of other than the usual type spread all over the island, with sudden onset resembling that of yellow fever, a short continuous fever-attack followed by a contracted convalescence. The landsphysicus considered this an abortive form of yellow fever."

In Table III we find that the year 1878 is credited with 13 deaths from this disease, whereas the sanitary report of Denmark notes

30 deaths, with 40 cases in all, illustrating the inaccuracy of the statistics during these years. What is of particular interest in the above report is the appearance of an unusual type of fever that spread over the entire island. From the description given one is forced to think of dengue fever.

In the sanitary report for 1880 it is stated (6) that the epidemic started in October and ended December 30 and that 25 cases occurred, with 9 deaths, another discrepancy as compared with Table III. With the exception of 2 children all the attacked were seamen or people recently arrived. From the report for 1881 (6) we find that 23 cases of yellow fever occurred and that *nearly* all were imported.

The deaths from yellow fever occurring in 1882 and 1884 were all amongst European sailors. The epidemic of 1885 was confined to the garrison, and all who died were soldiers; the same holds true of those cases that died in 1887.

From the year 1884 the records from the cemetery files can be supplemented with special reports from the King's physician and his assistants, the communal physicians. Thus we find a report by Doctor Wissing for the years 1884–85 covering the yellow fever outbreak during these years. Doctor Wissing shows how the case that died in August was imported from La Guayra, Venezuela. The patient passed quarantine inspection, but became ill six hours later. He remained for three days in a hotel in town before his case was brought to the attention of the health authorities. A diagnosis of yellow fever was then made, and the patient was removed to the municipal hospital, where he died. Doctor Wissing states that no other case developed from this one.

The epidemic that occurred in the latter part of 1884 and during the first half of 1885 was undoubtedly caused by the importation of a case on a French steamer. This case was a stowaway and escaped quarantine inspection. A few hours after landing he became very sick and was removed to the marine hospital. The following morning he presented the typical symptoms of yellow fever, including black vomit. Investigation showed that he had undoubtedly received his infection in Habana. Seventeen days later a Dane connected with the harbor master's office contracted the disease and died. In December 2 cases occurred on a sailing vessel lying in the harbor. The 2 were removed to the hospital, where they both died. During this month another case occurred in town who gave history of having just returned from Habana.

In January, 1885, the local epidemic started in earnest. The first case occurred in the Government house and was soon followed by a number of cases in the barracks. In this latter place 26 cases occurred during the year, with 15 deaths. In August and December 4 more deaths occurred amongst newly arrived Europeans. During 1885, 32 cases in all were reported, with 19 deaths.

At the proposal of the King's physician, Doctor Magens, a yellow fever commission was appointed by the Government to study the yellow fever situation at the barracks. This commission found that the shore bed to the east of the barracks, where all kinds of débris, both from town and barracks, were gathered, undoubtedly was the cause of the epidemic. The commission recommended "that the shore line be filled up with good material." In the meantime the soldiers were removed to the country and the barracks thoroughly disinfected.

Doctor Wissing, one of the communal physicians in St. Thomas at this time, enters into discussion with other physicians of the Danish Islands with regard to the spontaneous occurrence of the disease. Doctor Wissing is of the opinion that yellow fever can not occur spontaneously after it has been absent for a number of years, but that its reoccurrence is due to importation. Doctor Brønsted, of St. Croix, declared that yellow fever could occur spontaneously in the West Indies in general, but that *St. Thomas was an exception.* Wissing rightly calls attention to the falsity of such argument. "That a disease can occur spontaneously in one place and must be imported in order to occur at another is on the face of it without meaning." Magens, of St. Thomas, believed that yellow fever might occur spontaneously in the harbor, although importation might play some rôle. Wissing states: "It is a fact that a fatal case of yellow fever was imported here in the latter part of 1884 and that a small epidemic started right after; until the mentioned importation there had not been yellow fever in St. Thomas for a number of years, and I consider it a powerful and solid argument for its not being endemic that it does not occur at all for a number of years and then suddenly occurs after a known importation."

Doctor Calmer, however, from his study of yellow fever statistics in St. Croix, concluded one should be careful in drawing conclusions from the apparent long intervals of freedom from yellow fever that, as is well known, occurred in nearly all of the West Indian Islands. Wissing did not believe that Calmer's statistics were very conclusive on account of the uncertainty of the diagnosis. On the other hand, Wissing states that in an endemic area, epidemics could occur at times and mild sporadic cases in the intervals. But where the disease occurs only with long free intervals there it is not endemic, but due to importation.

"But," Wissing asks, "what does it mean that after the epidemic has ceased, sporadic cases may appear for several months with quite long intervals between each case?" He compares this with a measles epidemic in Copenhagen. "The epidemic starts, it grows until the culmination has been reached, it subsides week after week; fewer and fewer cases occur until a few sporadic cases spring up here and there, when the epidemic is finally stopped."

Yellow fever reappeared in St. Croix in 1885, after that island had been free from the disease for six years. Wissing can not agree with the opinion expressed that the disease appeared spontaneously on that island when it was in direct communication with St. Thomas where yellow fever was known to exist during 1885.

During 1886 no case of yellow fever was officially reported.

In 1887 we find an argument between the communal and the quarantine physicians as to the presence of yellow fever. The quarantine officer reported 2 cases of the disease in two soldiers that had been placed as guards on board two ships that had arrived from smallpox-infected ports. The first one was feeling somewhat indisposed before he went on this duty, and two days later was taken seriously ill with symptoms of *remittent fever*. He was placed in the hospital, where he developed symptoms of high fever, bloody vomit, albuminuria, and yellow discoloration of the skin and later died. The second case was taken sick four days after having been placed on guard on another ship. This patient also died with typical symptoms of yellow fever. A third case also developed under similar circumstances. He recovered, however. He developed the same symptoms as the others except black vomiting. The communal physician considered these cases as bilious remittent fever. From a study of the symptoms it seems, however, that the quarantine officer was right.

No cases of yellow fever were officially reported during 1888 and 1889. In 1890 we find a new landsphysicus in St. Thomas. In his annual report for that year he says in part: "During the summer 7 cases of yellow fever occurred. The first case occurred in the early part of June, the second in the latter part of July, the third and fourth in the first part of September, and 3 in the first part of October. In order not to harm the islands without sufficient cause—through possible isolation and quarantine—these cases were officially reported as *pernicious remittent fever*. This was considered to be so much more permissible as the cases were more or less sporadic and the disease did not appear as an epidemic. Any importation of the disease could not be proven, and it is also commonly considered that this disease can occur anywhere in the West Indies spontaneously.

"Six cases were in young European adults who had been only a short time in the West Indies. These all died. The seventh case occurred in an 8-year-old boy who had been born in St. Thomas but who had recently returned from a long visit to Denmark. This boy recovered.

"Any connection between the above cases could not be shown; the disease attacked young Europeans of different nationalities in different positions and residing in different places. A long time, sometimes over a month, passed between the development of the various cases."

In addition to the above cases, three deaths from yellow fever occurred amongst the soldiers at the barracks. This epidemic is of peculiar interest from many standpoints. The landsphysicus failed to find any proof that the disease was imported. The mortality was extremely high. Cases occurred in the barracks, and in widely separated localities. Two explanations can be given. The disease was still endemic in St. Thomas in spite of the fact that no cases were officially recognized during 1888 and 1889. This explanation finds some support when we recall the argumentation over the cases in 1887, and is, of course, also supported by the fact that importation could not be shown. The other explanation is that importation of the disease had taken place without the authorities being able to demonstrate it.

From 1891 on, no case was officially recognized as yellow fever. We find, however, that during 1896 two cases were imported through the shipping. These cases died. During 1897 the landsphysicus states, in his annual report, that intermittent and remittent fevers increased and that the *remittent type of malignant character was not so rare.* He states, however, that no case of yellow fever occurred during this year. In the report for the year 1901 we find that *no distinct case of yellow fever* occurred but that "the Stegomyia mosquito, which lately has been pointed out by American and Cuban physicians to be the vector of yellow fever contagion, is very common in St. Thomas as well as in the other West Indian Islands."

In the report for the year 1902, the landsphysicus, Dr. P. Mortensen, pays a glowing tribute to the work of the American physicians in the West Indies. He says in part: "The Americans have had wonderful success in fighting smallpox in Porto Rico. But still more credit is due them on account of the excellent manner in which they are fighting yellow fever in Porto Rico as well as in Cuba. During the reign of Spain over these islands they were a continuous source of danger to the whole West Indies; yellow fever was always present, and every so often it occurred in severe epidemic form, especially in Habana. The United States has certainly done an herculean job in cleaning out this Augean stable, but it has been done, and the United States can refer with pride to the results that have been accomplished. . . .

"The Americans have succeeded in a few years in practically stamping out yellow fever both in Porto Rico and in Cuba. This has also been a great help to the Danish Islands, and St. Thomas has learned a lot from this work. There are still some sources of yellow fever in Mexico and Colombia, but they are farther away and are not so dangerous to St. Thomas as were those of Porto Rico and Cuba in Spanish times."

In the above report it is also stated that no distinct case of yellow fever occurred in St. Thomas during 1902, although a young Danish officer attached to the local barracks succumbed to a disease very much resembling yellow fever. The landsphysicus was of the opinion that it was a typical case of yellow fever. (7)

During this year we also find that three cases of "pernicious malaria," resulting in death, were imported through the shipping.

From 1903 on it is very difficult to show that any yellow fever occurred in St. Thomas. From this time the death rate from intermittent and remittent fevers also rapidly declined, and the formidable figures which represented these diseases in the death tables became overshadowed by those representing deaths from gastrointestinal infections.

The deaths from such conditions as intermittent and remittent fevers undoubtedly were closely associated with the yellow fever situation. We find, however, that these fevers grow less and less in number as the sanitation of the city improves. The Danes built a complete system of surface drainage in the city proper, and the influence of this improvement is readily seen in the marked reduction of deaths from malarial fevers. The latter condition ceased to be an urban factor and became a rural one, still, however, affecting the suburbs of the town.

SPONTANEOUS ELIMINATION OF YELLOW FEVER.

The one fact that stands out clearly is that yellow fever has disappeared from St. Thomas without any attempt on the part of the island to eradicate its mosquitoes. As a matter of fact, the disease had practically disappeared from St. Thomas before Finley's theory of mosquito transmission had been proven.

History tells us that many of the West Indian ports were free from yellow fever for long periods of time. Epidemics occurred and died out, and years later recurred. There is no doubt about the fact that the recurrence of the disease after these years of freedom was due to reinfection of the community from without. H. R. Carter (8), that master in tropical sanitation, has given us a mechanism of the spontaneous elimination of yellow fever from endemic centers, which not only gives the reason for this elimination, but also shows that the conception of a world free from yellow fever is a practical one and needs only a few helping strokes from the sanitarian before it is an accomplished fact.

Let us follow Carter in his logical argumentations and deductions. "In endemic centers it is not necessary to exterminate Stegomyia to eliminate yellow fever. If the number of mosquitoes be brought below the 'critical number' for yellow fever, at that place the disease will die out. Note, too, that this critical number for any place will vary directly as the proportion of men immune to yellow fever is to the total population.

"Thus, if with 100 cases of yellow fever introduced into a community in which all were susceptible to yellow fever, the number of Stegomyia were such that exactly 100 men would be infected from them, the disease would neither die out nor increase. This would be the critical number of Stegomyia for that place and time. With fewer mosquitoes than this, less than 100 men would be infected and the fever would die out. If more, it would increase. Now, if one-quarter of the inhabitants are immune to yellow fever, obviously the same number of mosquitoes which infected 100 men before would now infect only 75—one-quarter of their bites going to immunes and hence wasted—and the disease would die out. The number of mosquitoes required to infect 100 more men, and hence perpetuate the fever, would have to be increased by one-third above the first number.

"Obviously, then, this critical number, below which the Stegomyia must be brought to eliminate fever, is less in a town as the proportion of susceptible people increases, and more intensive work is required to eliminate it from such a community, other things being equal, than from one in which a large proportion of the population is immune."

We know that yellow fever has disappeared from such places as Georgetown, Demarara, Port au Prince, Santo Domingo, and St. Thomas without any effort on the part of these communities to lower the mosquito index. But, as Carter states, nonreport of yellow fever does not of itself imply its nonexistence. If a number of nonimmunes are introduced into a supposedly yellow-fever free city and the disease develops amongst them, this is positive proof that yellow fever existed there. On the other hand, if intimate contact was kept up between these nonimmunes and the natives for a long time and no yellow fever developed, it may be deduced from our present knowledge of the disease that it did not at the time exist there. This practical test has been applied to nearly all of the above towns.

Let us now consider Carter's mechanism of spontaneous elimination of yellow fever in a little more detail.

It is assumed that one attack of yellow fever usually gives a permanent immunity. The endemicity of yellow fever in a certain area depends on three factors for its continued existence: Parasites (in mosquitoes and men), active mosquitoes (*Aedes calopus*), and susceptible men. These factors should all be present at the same time and the insects have access to both infected and susceptible people. If for any reason any one of these factors disappears or ceases to function, yellow fever can no longer exist.

According to our present knowledge of the disease, the parasites of yellow fever exist only in the infected mosquitoes and in infected people. The life of a mosquito in nature is compartively short—hence also the life of the harbored parasites. Man serves as a reservoir only for a short time. If the third factor, susceptible men, is not present at the same time and place as the infected mosquito, yellow fever will have no chance to spread, but will disappear.

Susceptible people may be supplied in two ways: Immigration (shipping) and births. "Both classes effect continuance of yellow fever, and theoretically either one may be sufficient to continue it. Yet the proportional effect of the introduction of an adult and the birth of a baby in keeping up the infection is very different. That of an adult immigrant is very much the greater, so that to supply the people necessary to keep up yellow fever, it requires a very much larger number of babies to be born than of susceptible adult immigrants. In proportion to their number then, adult immigrants are of far more importance in thus keeping up yellow fever than babies, and a town receiving no susceptible immigration needs to be much larger to be a permanent focus of yellow fever than if it did receive such immigration. Indeed Gorgas, in 1916, expressed himself as believing that immigration of susceptible adults was necessary to continue yellow fever . . . that it could not be kept up by the births alone."

In St. Thomas the influx of susceptible adults through shipping grew gradually less and less and the new born showed themselves incapable of keeping the endemic alive.

Hence, in Carter's words: "If one attack of yellow fever produces in general a permanent immunity, a community will have in time no people susceptible to yellow fever left. Unless there is an introduction of such people, yellow fever would then disappear; and as soon as the infected mosquitoes died off, the parasites would disappear and the community be free from infection. Indeed, yellow fever would doubtless disappear *before* there were 'no people susceptible to yellow fever left,' because, under the doctrine of chances, there would be no susceptible people left, fulfilling the conditions of time and place mentioned above, before there were absolutely none at all—possibly long before." Carter calls this mechanism the "failure of the human host."

REINFECTION OF A COMMUNITY.

Once a community has freed itself of yellow fever by failure of the human host, it will remain free forever, unless the same three factors for conveyance are again brought together. Because the mosquitoes are a constant factor—always breeding to the limit—the next appearance of the disease would depend on the influx of susceptible people and the introduction of parasites.

A community which for some reason or other has lost its importance as a shipping center and whose immigration is practically nil will not become susceptible to a yellow-fever epidemic until the newborn have increased in number and grown up to become one of the deciding factors. The number must be large enough in order that the conditions of time and place be fulfilled when the parasite is finally introduced. In order to keep the disease out, isolation from infected places is necessary.

" The community that has eliminated yellow fever through the control of the insect host does not need to isolate itself from infected places as long as this control continues to be efficient, because, with control of the insect host, yellow fever is not communicable, and such parasites as are brought in by infected men or infected mosquitoes would, at the most, establish a very temporary focus of infection. If the control were complete, infected men would transmit no parasites. It is to be noted, however, that the reduction of Stegomyia sufficient to eliminate yellow fever from a town in the Tropics would nearly always be less than that required some years later to prevent its spread, because there will then be a larger proportion of susceptible people than at first. Hence the mosquito control must be more intensive." (8)

Carter gives the following factors as responsible for the great diminution of yellow fever which has been going on since the decline of the tropical sugar industry and which is still in progress.

"(1) Diminished immigration to the Caribbean littoral due to diminished trade and commercial importance of this area.

"(2) The substitution of steam for sailing vessels has enormously lessened the number of infections carried between ports, thus lessening the reinfection of such ports which had cleared themselves of yellow fever.

Sailing vessels—	Iron steam vessels—
Frequently carried stegomyia as well as infected men.	Rarely carry stegomyia.
Longer in port.	Less long in port.
Larger crews per unit of carrying capacity.	Smaller crews.
Laxer discipline.	More strict discipline.

"(3) Diminished strategic importance of the Caribbean Sea and the practical withdrawal of European fleets and garrisons, thus lessening the number of susceptible people.

"(4) The extinction of the great permanent foci at Habana, Panama, and Rio.

"This enabled such ports on the Caribbean especially as could spontaneously free themselves of yellow fever to remain free—being no longer exposed to reinfection, or rather much less so exposed.

"(5) The European war has both restricted foreign immigration and caused commercial depression."

In surveying the death tables from yellow fever in St. Thomas we find epidemic outbreaks of the disease nearly every year from 1852 to 1871. From 1872 to 1891 we find many years without deaths, some years with a few deaths amongst sailors (imported cases), and a few years with small epidemics.

The general tendency of the disease to disappear is clearly seen. Between 1892 and 1901 only two deaths occurred, and these were imported cases, apparently not followed by any secondary ones. It is difficult to believe that the death from yellow fever recorded in 1902 actually was a case of this disease. From our present knowledge of the epidemiological features of yellow fever it seems that a case occurring in a member of the garrison would be followed by other cases, as we have here a number of susceptible people concentrated in one building (the mosquito always being present).

From 1902 on not even a suspicion of the disease being present in St. Thomas has been noted.

In analyzing the factors having bearing on this spontaneous elimination of the disease from St. Thomas we find that it occurred before the method of transmission of the disease was known and hence could not have been influenced by any sanitary measures.[1] Due to the marked decline in shipping and lessened immigration the number of susceptible people was brought below the "critical number" and hence by "failure of the human host" the disease disappeared. By elimination of the disease from Habana and other ports through control of the insect vector, chances for reinfection of St. Thomas were rendered more remote.

The importance of clearing up great permanent foci of infection and its influence on the smaller foci was realized by the Gorgas commission of the International Health Board when they, in a world survey for endemic yellow fever centers, reported that this disease could be "eradicated from the west coast of South America by

[1] *Aedes calopus* (Meigen) has been a constant factor in St. Thomas—breeding to the limit. Mosquito eradication was not attempted until a few years ago when the United States took over the islands. Since that time the progress of mosquito eradication has steadily, although slowly, gone forward step by step.

eradicating it at Guayaquil, Ecuador." The truth of this statement has practically been realized.

The soundness of Carter's view with regard to the mechanism of spontaneous elimination of yellow fever is further seen on the west coast of Africa.

The yellow fever commission, headed by General Gorgas and after his untimely death by General Noble, which was sent under the auspices of the International Health Board to study the yellow fever situation on the west coast of Africa, found no trace of a yellow fever epidemic in spite of the fact that *Aedes calopus* was present all over. The old idea that an extended area of endemic pestilence must exist or that the whole area of West Africa must represent such a pestilence district must be discarded in the face of the findings of the commission. The same reasons may be given for this disappearance as have been given above—lessened shipping, substitution of steam for sail, clearing up of West Indian foci, and, finally, the " failure of the human host."

The proof that yellow fever has disappeared from this coast was furnished during the World War, when large bodies of white troops were introduced without the occurrence of any epidemic.

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KIDNEY FUNCTION.

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Kidney function deals with the ability of the kidney to excrete substances from the blood stream—a process usually accompanied by concentration, especially in the case of what we consider to be waste products (urea, uric acid, etc.). Concentration here means that the percentage strength of the substance is greater in the urine than in the blood. It would appear that, in addition to the secretory (or excretory) function, the kidneys have also an active synthetic function. Nash and Benedict have presented strong evidence to the effect that the ammonia in blood and urine is the result of the latter.

The efficiency of the kidneys is frequently affected by disease, especially such as disturbs the kidney, and is also usually diminished after the age of 50 years as the result of senile changes. It can not be too strongly emphasized, however, that disease of the kidney does not necessarily imply an inability (either partial or complete) to eliminate substances—anatomical need not parallel functional lesion. Function may be normal, with organic changes present, especially if they are focal in nature. So, disease of the kidneys is not synonymous with impaired kidney function. Even less definitely is the latter condition established by the finding of albuminuria with or without cylinduria.

Renal insufficiency does not affect the excretion of all compounds to the same extent. It is well known that the functions for chlorides and for urea are independent of each other. Uric acid may be retained in the blood while the excretion of other nitrogenous substances is apparently normal. In any urine examination, then, one should bear in mind the possible effect of an impaired excretory power relative only to the substance under consideration. From experience, we may estimate the probable effect upon excretion of other substances, but as yet no hard and fast comparisons can be drawn. To advancing uric-acid retention is usually added that of urea, and later of creatinine. But in gout (where the increase of blood uric acid is believed to be the result of retention) the uric acid alone is retained, even when it may exceed by far that which would be accompanied by retention of other substances in nephritis. And our experience also leads us to expect, with a marked general retention of nitrogenous compounds, that certain other substances (sugar, cholesterin, diastase, etc.) will be retained.

As the preceding would suggest, the usual result of impaired kidney function is retention in the blood stream of material that is normally secreted into the urine. The other side of the picture is a diminution of such material in the urine unless the kidneys work overtime. This they will do, but a continued effort of such nature aggravates the condition and, sooner or later, exhaustion will result. Such is the sequence of events in uremia, in which one finds the amounts of nonprotein nitrogenous compounds increased in the blood and decreased in the urine. It is well to bear in mind this complementary nature of urine and blood examinations.

The functional variation from normal may, however, be evidenced by an increased permeability of the kidneys. In such a case, depletion would be the result, as happens occasionally in chronic diffuse nephritis when one finds low values for the blood urea. And, finally, the alteration that disease may produce in the ammonia function noted above must not be overlooked, as it has an important protective duty in the acidosis of certain diseases. I have considered this more fully in a separate article on acid-base equilibrium.

In this connection, we speak of the kidney "threshold" for a substance, i. e., the concentration required in the blood stream before the kidney will excrete it, at least in abnormal amount. For chlorides, this is quite definite at 562 milligrams per 100 mils of blood plasma; for sugar, it lies at about 160–180 milligrams per 100 mils of whole blood, and if such concentration be passed, then glycuresis occurs until the blood sugar is normal. The threshold is not necessarily absolute, but simply indicates that, with less sugar, for instance, only the normal traces are passed. Chloride excretion begins only when their concentration passes the threshold value, and the rate of their elimination depends upon their excess. Other compounds, such as urea, for example, may have no definite threshold value.

Disease may affect the value, either by raising it and causing abnormal retention, or by lowering it and giving rise to depletion. The threshold for sugar rises with advancing age; up to a value of 200 milligrams of sugar per 100 mils of blood, diuresis will lower it. In diabetes mellitus, the sugar threshold may rise to 200 per cent or more of the normal. Some consider that renal diabetes is the result of a lowered threshold for sugar.

The thoughtful practitioner of medicine is interested in kidney function for several reasons. It is frequently affected in disease, and the timely recognition of impairment enables one to guard against serious consequences, such as uremia. Chemical analysis of the blood indicates the metabolic substances affected, and guides in the adjustment and regulation of diet, habits, etc. We have mentioned the connection with acidosis. The status of kidney function having been established, one can more intelligently interpret the results of urine examination. And, before accepting a normal finding, one should be satisfied that one kidney has not taken upon itself the work of a badly crippled partner. Lastly, remember that a normal function does not exclude a diseased kidney.

Renal function and acidosis enter prominently into the question of operative risk. The former is especially material in genito-urinary surgery, notably in the average prostatectomy. A few days' drainage of the bladder may alleviate a renal insufficiency due to obstruction or infective processes in the lower genito-urinary tract. Failing so to do, the patient is not a good surgical risk, as then the impairment is probably due to the kidney itself. Frank states that, from a standpoint of renal function, a patient is not in the best possible condition to undergo any surgical procedure if he has a phenolsulphonephthalein excretion of less than 40 per cent (unless due to disease of other organs, especially the liver), an Ambard coefficient of more than 0.1, and, as regards the urine, but little variation in quantity from day to day, fluctuations in specific gravity of less than 0.007 regardless of diet, and a nocturnal polyuria. Others have added a nonprotein nitrogen of the blood of more than 50 milligrams per 100 mils, and, with the phenolsulphonephthalein test, an appearance time of more than 25 minutes, or less than 20 per cent excretion during the first hour.

Many methods are employed for the estimation of renal function, and, in general, they are based upon four principles of procedure.

1. The determination of the degree of retention in the blood of various metabolic products. Here enters chemical analysis of the blood, in the course of which examination is made especially for urea, uric acid, creatinine, nonprotein nitrogen, and chlorides.

2. The determination of the rate of excretion via the urine of a chemical substance that has been injected or ingested in known amount. Such as phenolsulphonephthalein, methylene blue, indigo-carmine, rosaniline, sodium chloride, potassium iodide, salicylic acid, lactose, urea, etc.

3. The comparison in a patient on a known diet between the ingestion and excretion of, as well as the ability of the kidneys to concentrate, a group of substances involved in normal metabolism, viz, water, nitrogen, and sodium chloride. This is Mosenthal's method.

4. The determination of the ratio between the concentration of various metabolic products, especially urea, in the blood and their excretion in the urine, the result being expressed as a ratio of excretion, or as a coefficient. This includes the Ambard coefficient, the McLean index, the Austin, Stillman, and Van Slyke formula, etc.

The relative value of the different methods is debatable. Probably those least open to criticism are chemical analysis of the blood, the phenolsulphonephthalein test, and Mosenthal's method. The formulæ have many warm advocates as well as severe critics. A rough clinical comparison of the two kidneys may be obtained by determining the urea in specimens of urine simultaneously collected by means of the uretheral catheter.

Blood chemistry, now that its value has been established, is generally given preference and allowed greater weight in case of disagreement with other tests If treatment brings a high blood urea to normal while the Ambard coefficient remains high, kidney function is probably not impaired. It measures excretory function for normal metabolic products, and has the additional value of an aid in prognosis, especially if the creatinine is increased, in diagnosis, and as a guide to treatment, especially dietetic. It has the disadvantage of a possibly unfamiliar technique, and does not afford a comparison of the two kidneys.

The substances usually considered are the nitrogenous compounds (nonprotein nitrogen, urea nitrogen, uric acid, and creatinine), but retention of others (sugar, cholesterin, chlorides, diastase) are also of significance in this connection. Of the nitrogenous constituents, the kidney excretes creatinine most readily, urea next, and uric acid with the most difficulty. It normally concentrates creatinine about a hundred, urea about eighty, and uric acid only about twenty times. As a consequence, an impairment of function results first in the retention of uric acid, then urea, and, finally, creatinine is also retained. Owing to the relatively small amounts of uric acid and creatinine present, the nonprotein nitrogen, which includes the nitrogen in them as well as in other compounds, is not appreciably affected except by the urea increase. This is the basis of an intelligent interpretation of the findings.

The urea (and therefore the nonprotein nitrogen) are so markedly affected by diet, especially among nephritics, that judgment must be used when they are employed as indices of renal function. This fact was not properly appreciated until recently, and probably accounts for much of the discredit cast upon chemical analysis of the blood in this connection. The uric acid, being less exogenous in origin, is perhaps the most delicate and the safest index. The increase appears early, and 3.5 milligrams per 100 mils blood may be considered the high normal value. An increase during a high-purine diet is especially significant, as it does not occur in normal persons. We have found the uric acid determination of much assistance in judging the significance of occasional casts and traces of albumin in urine—an increase speaking for an organic kidney lesion. On the usual restricted hospital diet, over 20 milligrams urea nitrogen per 100 mils blood should be considered suggestive of impaired renal function; over 75 speaks decisively for renal involvement and probable uremia. Values around 50 demand judgment and a scrutiny of the diet as well as search for other possible causes of unusual protein metabolism. Results of change of diet are usually apparent only after several days. Values for creatinine of over 4 milligrams per 100 mils of blood do not occur without great impairment of renal function and probability of uremia.

Phenolsulphonephthalein (*phthalein, or red*) *test.*—This was developed by Rowntree and Geraghty, and its simplicity makes it very useful, especially to the isolated practitioner with limited laboratory facilities. It estimates only function for a foreign substance, is not considered quite as reliable as chemical analysis of the blood, and, of course, does not give the additional information that the latter supplies. It is, however, of much value, has no contraindications, and does compare the kidneys when combined with ureteral cathetrization or the use of a separator.

The technique of the test can be found in any work that considers clinical laboratory methods.

Impairment of renal function, of course, increases appearance time and lessens the excretion, serious cases not unusually excreting less than 1 per cent during two hours. Positive results are of more significance than negative, and the excretion of the dye is less affected by glomerular than by tubular changes. Values of more than 75 per cent for two hours may be accompanied by diuresis, and Frank considers such a finding suggestive of renal disturbance with irritation if there is any other corroborative evidence.

Mosenthal's test is a refinement of previous work that endeavored to estimate renal function by measuring the ability of the kidneys to concentrate and excrete substances that occur normally in the blood stream (water, chlorides, and nitrogen). As originally promulgated, it involved the use of a definite diet that he now describes as the "high-protein" diet. A "low-protein" diet and the diet normal for the patient were later tested, and he finds that the essential facts held with all. The result has been a simplification of technique that enables wider application, and its use for ambulant cases in ordinary private practice. It was claimed that earlier evidence of renal insufficiency was obtained by this method than by the phthalein test, the Ambard index, or by determination of the blood urea.

At 8 a. m., void and discard urine, and eat breakfast. Void and collect urine only at 10 a. m., 12 noon, 2, 4, 7, and 10 p. m., and at 8 a. m. on the following morning, this last sample being the night urine. Eat lunch at 1 p. m. and dinner at 7 p. m. (three hours before last evening collection of urine). The meals are those to which the patient is accustomed, and a record of everything consumed is kept in round figures in order that a basis for criticism of the diet may be at hand. No food or drink is to be taken except at meals.

Determine volume and specific gravity of each sample, and the 24-hour excretion of chlorides (as NaCl) and nitrogen. He avails himself of the inaccuracy of the ordinary hypobromite estimation of urea, and estimates that the results obtained by dividing the urea value thus obtained by 2.14 (the nitrogen factor) is a sufficiently accurate expression of the total nitrogen value for the purposes of the test.

As normals, he gives 1.020 (1.018 with the "high-protein diet") or over in any specimen as a maximal specific gravity, the extreme values of the different samples to show a variation of 0.009 or more, and a night sample of 750 mils or less. By "fixation of specific gravity" is meant a variation between extremes of less than 0.009.

A normal maximal specific gravity indicates that the kidney can concentrate the urine satisfactorily, providing the 24-hour amount is adequate. A high specific gravity with oliguria occurs only in passive congestion of the kidney, and in acute, subacute, or chronic nephritis, conditions that also show a markedly diminished NaCl excretion, together with considerable albuminuria and edema. Long life is often possible providing a low specific gravity is compensated by polyuria, as in diabetes insipidus and a few cases of chronic nephritis.

A high fixed specific gravity (about 1.020) may occur in normal individuals as the result of insufficient fluid intake, or may be the result of diseases characterized by edema and oliguria, especially myocardial insufficiency and acute or chronic nephritis. A low fixed specific gravity is a danger signal and is found in many widely varying conditions (diabetes insipidus, chronic nephritis, marked anemia, the elimination of edema, cystitis, pyelitis, polycystic kidney, prostatic hypertrophy, urethral stricture, paralysis of the bladder as in tabes dorsalis or tumor of the cord, etc.), which may do well as long as there is a compensatory polyuria.

A nocturnal polyuria indicates an overworked kidney, and this may result in functional damage. Over 400 mils should be considered somewhat suspicious of renal insufficiency. In nephritis, it may be improved by curtailing the food intake. Edema, hypertrophied prostate, and diabetes mellitus should be excluded. It is a graver sign of functional impairment when on a low protein diet, as it may be largely compensatory during a high one.

NaCl is being ingested in unnecessary amount if the 24-hour excretion exceeds 5 grams. A very low excretion, together with edema, indicates an inadequate elimination, and is then not a criterion of the diet.

If 5 or 6 grams of nitrogen are eliminated in the urine every 24 hours there is sufficient protein in the food to maintain the individual's health and strength, provided the diet contains a considerable amount of starch, and restriction of proteins should be guided by the nature of the disease.

The test then supplies information useful in diagnosis and prognosis, an early index of renal function, and a guide to diet. Chemical analysis of the blood, especially as to the nitrogenous constituents, will furnish further details as to the manner in which the intake of nitrogenous foods and sodium chloride should be varied. Conclusions should preferably be based upon more than a single test.

The underlying idea in the use of formulæ is to eliminate any confusion that might arise as the result of changes in the blood concentration of urea due to the level of the general protein metabolism. They are usually based upon the urea function, but may be derived for other and urinary constituents such as chlorides or sugar. They are criticized mostly because of the use of exact mathematical formulæ for the expression of life processes, and because of disagreement as to what does constitute the law of urea function. Again, it is inconvenient to accurately collect the urine excreted during short periods. In arteriosclerotic conditions and those of cardiac decompensation, they are occasionally at fault, and should be checked by other methods, especially blood chemistry. It is doubtful if they give information that is not supplied by blood chemistry alone. The Ambard coefficient changes before the nonprotein nitrogen of the blood, but they agree closely in later stages. The coefficient has also possibly a greater prognostic significance than the phthalein test.

While Ambard has also developed a formula based on the chloride function, the following one relative to the urea function is the more familiar.

$$K=\frac{U}{\sqrt{D\times\frac{70}{Wt}}\sqrt{\frac{C}{25}}}$$

K is known as Ambard's coefficient; U is grams urea per liter of blood; C is grams urea per liter urine; D is grams urea per 24 hours; and Wt is the weight of the individual in kilograms. The normal value is about 0.08 (0.06–0.09), and indicates either no disease or compensation. K rises as kidney function is impaired, more than 0.2 indicating severe, and more than 0.3 maximal impairment. A rise is graver with vascular than with chronic diffuse nephritis. Depression of the coefficient means increased renal activity due to irritation. The coefficient is said to have a peculiar diagnostic significance with tuberculosis of the kidney, a normal value indicating that only one is affected, while an increased coefficient means that both are affected or that there is a toxic nephritis of the opposed kidney.

McLean's index is:

$$\frac{D\sqrt{C}\times 8.96}{Wt\times U^2}$$

The symbols have the same significance as with the Ambard coefficient. A normal value is 80 to 100. It is lowered in renal insufficiency. Values below 50 mean impairment; below 10, marked impairment. The index may be 1 in terminal states.

Austin, Stillman, and Van Slyke have corrected what they believe to be erroneous assumptions in Ambard's formula, and suggest, as giving more consistent results, the following:

$$K=\frac{D}{B\sqrt{VW}}$$

D is grams urea in 24-hour urine specimen; B equals grams urea per liter of blood; V is liters of urine per 24 hours; and W is weight of individual in kilograms. The normal value is 7.5 ± 3, and renal insufficiency produces lower values.

We can establish the status of renal function in any given case, and are then in a position to intelligently prescribe dietetic and other treatment. The substances affected by a retention are determined, and our aim should then be to adjust diet, etc., in such a manner that the kidneys are able to excrete materials brought to them. Regulate the regimen by the excretory powers of the kidneys, but do not overlook the nutritive needs of the body.

THE FUNCTIONS AND ORGANIZATION OF MEDICAL CORPS UNITS SERVING WITH THE MARINE CORPS IN THE FIELD.

By S. N. RAYNOR, Major, United States Marine Corps.

THE MEDICAL REGIMENT, INFANTRY DIVISION (WAR STRENGTH).

Like every other branch of the Army, the Medical Department has been completely reorganized since the World War. Old units have been discarded or radically modified and new names adopted, so that modern sanitary tactics presents many phases of a new subject.

The general scheme of the new Medical Department field organization is best exemplified in the recently established "medical regiment." The prescribed methods of this unit in the collection, treatment, and evacuation of the wounded are followed, with appropriate modifications in every organization of the Army, from the battalion to the base. A study of its workings at this time will greatly facilitate the study of the medical service of the brigade, which will be considered in the next article.

The medical regiment is primarily a divisional organization. All of the medical services of the division have been brought together into one unit. The old hospital companies have been assembled as a battalion of the medical regiment; the former ambulance companies now constitute the ambulance battalion, and a new organization called the "sanitary battalion" has been added. In addition to these battalions, the medical regiment includes a headquarters, a service company, a medical supply section, a medical laboratory section, and a veterinary company. The medical regiment is commanded by the division surgeon.

The medical regiment, as a divisional unit, occupies an intermediate position between the infantry regiments and the larger medical units in the rear. It transports the wounded to the nearest ambulance station by litter, and from there to the hospital station by ambulance. The hospital station is equipped with beds, operating equipment, and arrangements for treating gassed cases. Facilities are available for fairly extensive medical and surgical treatment, but as a rule only emergency work is performed, as the hospital must not be allowed to become overcrowded, and the interests of the patients are better conserved by transporting them as speedily as possible to the better equipped hospitals in the quiet sectors.

One medical regiment is assigned to each division, one to each corps, and four to an army. The two latter organizations have hospital and transportation facilities in addition to the medical regiment, but the division does not under normal conditions.

A brigade acting alone might have attached to it one sanitary company, one ambulance company, one hospital company, and additional medical personnel from the medical regiment.

An outline of the organization of the medical regiment is given below:

ORGANIZATION OF THE MEDICAL REGIMENT. (WAR STRENGTH.)

Headquarters (division surgeon's office):
- 1 colonel (division surgeon).
- 1 lieutenant colonel (executive officer).
- 6 majors—
  - 1 sanitary inspector.
  - 1 orthopedist.
  - 1 urologist.
  - 1 neuro-psychiatrist.
  - 1 dentist.
  - 1 veterinarian.
- 3 captains or lieutenants (including 1 attached chaplain).
- 1 warrant officer.
- 12 enlisted men (attached from service company).

Service company:
- 2 captains or lieutenants.
- 40 enlisted men.

Sanitary battalion:
- 1 major.
- 12 captains or lieutenants.
- 306 enlisted men.

Ambulance battalion:
- 1 major.
- 7 captains or lieutenants.
- 177 enlisted men.

Hospital battalion:
- 4 majors.
- 22 captains or lieutenants (6 dental).
- 247 enlisted men.

Medical supply section:
- 2 captains or lieutenants.
- 13 enlisted men.

Medical laboratory section:
- 1 major.
- 1 captain.
- 7 enlisted men.

Veterinary company:
- 4 captains (1 meat inspector).
- 70 enlisted men.

Making a total for the regiment of 60 officers, 1 warrant officer, and 860 enlisted men.

HEADQUARTERS.

The headquarters of the medical regiment is divided into two sections, one constituting the office of the division surgeon and the other the headquarters of the regiment.

As stated in the previous article, the division surgeon is a member of the staff of the division commander and is also in command of the medical regiment. As senior medical officer he has supervision over all matters pertaining to the public health and as a member of the staff and as commander of the medical regiment he is in charge of the sanitary tactics of the medical troops.

A lieutenant colonel is executive officer of the medical regiment.

Attached to the division surgeon's office are six specialists having the rank of major, as indicated in the outline of the organization. These officers are the chief advisers of the division surgeon, and each has supervision of the divisional work pertaining to his specialty.

THE SANITARY BATTALION.

The sanitary battalion is essentially a battalion of litter bearers. The designation "sanitary" is not suitable and probably will be changed. During combat it collects the wounded from the aid stations and from the field and carries them by litter to the ambulances in the rear. In camp or cantonment it operates sanitary apparatus and is employed in improving the sanitation of the area.

The battalion consists of 13 officers and 306 enlisted men. It is divided into a headquarters and 3 sanitary companies.

The headquarters consists of 1 major in command, 1 technical or first sergeant, 1 staff sergeant, 1 sergeant, and 3 privates who act as chauffeur, messenger, and orderly, respectively. Its equipment consists of a tent and a field desk borrowed from one of the companies. It has no fixed location, but would probably be most frequently placed at a collecting station.

THE SANITARY COMPANY.

The sanitary company is organized as follows:

Captains or lieutenants	4	Sergeants	8
Technical sergeants	1	Corporals	4
Staff sergeants	5	Privates, first class, and privates	82

The personnel is divided into two sections—a litter-bearer section and a collecting-station section. The number of men assigned to each section can not be definitely fixed, as it varies greatly with the needs of the situation. It frequently happens that no collecting station is needed, or it may happen that the route of evacuation is long and the ambulances are unable to get up close. Under the latter condition the collecting station becomes a very important reinforcement of the aid station and will require many men to handle it. The organization must, therefore, be very elastic. Personnel can be assigned at will to duty with either the litter-bearer section or the collecting station, as the situation may require.

The table of equipment for the medical regiment has not as yet been completed by the War Department. The table given herein is an extract from a tentative list prepared by the Surgeon General's Office. It is expected that it will be adopted without material change and may be accepted, for all practical purposes, as standard.

In order that each company may act independently when occasion requires, the tables have been prepared with the company and not the battalion as the basic organization. The equipment of the litter bearers is such as can be carried on the person and consists of a litter and a belt. The belt contains pockets for first-aid dressings. It is not improbable that the belt will be finally adandoned and a pouch slung from shoulder substituted. The collecting station is the rendezvous for the wounded of a brigade, and its equipment is intermediate between that of an aid station of an infantry battalion and a hospital station of the medical regiment. It is, for the most part, easily packed in boxes and bundles and is transported upon trucks. Each company is allowed four three-quarter ton trucks.

The matériel is divided into seven sets, as follows:

One set drugs, chemicals, and reagents.
One set surgical instruments.
One set surgical dressings and appliances.
One set hospital furniture and supplies.
One set field-equipment supplies.
One set food supplies.
One set miscellaneous supplies and equipment.

The drugs and chemicals are relatively few in number and consist of such as are commonly used for emergency treatment and the relief of minor ailments.

The surgical equipment is designed for emergency surgery and consists of small cases of instruments, needles, simple surgical apparatus, and splints.

The surgical dressings are abundant and complete for their purpose, consisting of large numbers of bandages, rolls of cotton, adhesive plaster, first-aid packets, etc.

The hospital furniture and equipment is of the simplest character. It consists of such articles as hot-water bags, basins, instrument boilers, etc. No cots are provided, but litters are available for recumbent cases. Fifty litters are assigned each company.

The field supplies include blankets, carriers (field) for litters, a folding operating table, a venereal prophylactic unit, notebooks, buckets, lanterns, etc.

The food supplies consist of cans of milk, soup, coffee, and sugar.

The miscellaneous supplies consist of such articles as rope, axes, flash lights, nails, twine, etc.

Each station is provided with 2 ward tents.

The transportation for each company consists of 4 bicycles, 10 riding horses, 1 kitchen trailer, 1 trailer tank (180 gallons) and 4 trucks (three-fourth ton).

The battalion headquarters has, in addition, 1 motor cycle with side car, 1 bicycle, and 3 riding horses.

The litter-bearer section works between the ambulance station and the front, for the most part, transporting wounded from aid stations to collecting stations and from there to ambulances. It will work in front of the aid stations of the infantry battalions only when the regimental medical detachment is insufficient for this duty.

The collecting station should be situated at a convenient place between the ambulance station and the aid station of the infantry battalion. The exact location would, of course, vary with the nature of the terrain and the character of the combat. Sometimes it might not be used at all; at others, used at the ambulance station as an adjunct, or it might be placed immediately behind the battalion aid stations.

In order to give a schematic location for the collecting station, a point may be selected along the line of evacuation about 1,000 yards in front of the ambulance station, which would make it about 2,500 to 3,000 yards from the front. It must be borne in mind, however, that this location is purely schematic and would be varied as local conditions required.

In combat, the duty of the sanitary company is to transport wounded by litter under conditions which prevent the use of wheeled transportation. Such work necessarily lies in the front areas.

Normally the wounded will be evacuated by litter to the aid stations by aid station personnel, and from the aid stations to the ambulances by the personnel of the sanitary companies.

The organization should fill a long-felt want. There is no part of the evacuation of the wounded more difficult or more important than that which takes place in the front line. No other means of transportation is possible. When transportation is lacking in the rear, the wounded may be housed in tents and buildings, and their injuries cared for in the interval of waiting; but on the field the wounded are constantly subjected to additional dangers, and their injuries are becoming progressively more serious and complicated. The prompt removal of the injured from the field is the first duty of the medical department in combat. The litter bearers from the sanitary company are expected to cover the whole field from front to ambulance station, when necessary, although their prescribed position is the area between the aid stations and the ambulance stations.

One collecting station is established by each sanitary company, or one for each infantry brigade. They provide temporary shelter for the wounded awaiting transportation by ambulance and are means of affording the wounded more thorough threatment before evacuation than can be furnished at the crowded aid station.

As previously stated, the sanitary battalion is employed in time of peace, and in camps and cantonments at all times, in improving the sanitary conditions of the garrison.

THE AMBULANCE BATTALION.

This unit provides wheeled transportation for the wounded from the battle field to the hospital. It proceeds as near to the front as conditions will permit, and there receives the wounded collected by the sanitary battalion and conveys them directly to the hospital station.

The ambulance battalion consists of a headquarters and three ambulance companies. The headquarters is established at an "ambulance station." Two of the ambulance companies are motorized and one is equipped with animal-drawn vehicles. Twenty ambulances are assigned to each company.

The ambulance station is the center of the activities of the ambulance battalion. From here the ambulances are dispatched to places where they can be loaded with the wounded. The headquarters section consists of a major (in command), a captain, three sergeants, and three privates. There is no prescribed office equipment. Such few articles as are needed are borrowed from the companies. Its transportation consists of a motor car, a motor cycle with side car, and a bicycle.

Like other units of the medical regiment the location of the ambulance station varies with local conditions. The following general requirements must be satisfied: (1) It must be accessible by road from front to rear; (2) it must be near enough to the hospital to keep in easy touch with it and must be connected to it by a passable road; (3) it must be as near as possible to the aid stations and collecting stations in order to prevent unnecessarily long carriage by litter and must have access over a good road to these stations; and (4) it must be in a position reasonably well protected against fire. When it is possible to do so the wounded should be evacuated by a different road than that congested with supply wagons of other services.

For the purpose of giving it a schematic position, it might be placed in the forward divisional zone about equidistant from the separate ambulance companies and on the road to the hospital station. The reserve ambulance company could also be stationed here. This would place the ambulance station a little over 2 miles from the front line. From this point ambulances, of course, work forward as far as conditions permit.

THE AMBULANCE COMPANY.

The two motorized companies and one animal-drawn company of the ambulance battalion are organized and equipped very much alike, except for differences due to the different types of transportation provided.

There has been a pronounced tendency in recent years to increase the number of motor ambulances at the expense of the animal-drawn, but it has been determined that the animal-drawn vehicle can travel over torn-up roads and plowed fields much better than can the motorized ambulances, and that horses can pull loads where automobiles can not go. In view of these facts, we can not as yet dispense with the animal-drawn ambulance.

Excepting that 6 more privates are assigned to the animal-drawn companies, the prescribed personnel for the two kinds of companies is the same. The table of organization is as follows:

Captains or first lieutenants	2
Technical sergeants or first sergeants	1
Sergeants	4
Corporals	3
Privates, first class, and privates (for animal-drawn)	53
Privates, first class, and privates (for motorized)	47

The transportation for the two types of companies is radically different. The motorized ambulance companies are each provided with 20 ambulances, 1 trailer kitchen, 1 trailer tank (300 gallons), 1 trailer spare parts, 5 trucks (three-fourths ton), 1 motor car, 1 motor cycle with side car, and 1 bicycle. The animal-drawn ambulance company has 20 ambulances, 2 escort wagons, 1 spring wagon, 1 motor cycle with side car, and 1 bicycle.

Each ambulance is provided with 1 driver and 1 orderly. This leaves 8 noncommissioned officers and 7 or 13 privates for administrative and company duty. The additional 6 privates assigned to the animal-drawn company are charged with the care of the animals.

The equipment, other than transportation, supplied the company is of two classes: The first consists of the "ambulance kit," and the second of the "ambulance company sets."

The "ambulance kit" comprises appliances and dressings which are carried on each ambulance. They are neither numerous nor bulky. The principal items are 4 litters, 8 woolen blankets, 1 rubber blanket, flash lights, a bottle of aromatic spirits of ammonia, bandages, splints, cotton, adhesive plaster, and first-aid packets.

The "sets" furnished the ambulance company consists of supplies which will supplement and replace the articles provided in the "kits." They comprise 40 litters, 80 woolen blankets, 20 rubber blankets, an assortment of splints, a prophylactic unit, and a number of small articles, such as emergency medical packs, notebooks, and pins.

The duty of the ambulance battalion is, as its name implies, to convey wounded from the field in ambulances.

Like the sanitary battalion, this organization must be scattered over a wide territory and considerable independence of action allowed each element. In combat it will be operated more often as three separate companies than as a whole. When attached to a division of two brigades one company will be assigned to each brigade and one will be held in reserve. The action of separate companies will be coordinated through the battalion headquarters at the ambulance station. This headquarters station takes the place of the old "ambulance control station." The designation "ambulance head" has been discontinued. The activities of ambulances are regulated from the ambulance station.

On the march, ambulances will be detached from the parent organization and assigned to follow the foot troops, one, two, or more per regiment, as conditions require and facilities permit. In widely scattered cantonments it is usually convenient to attach an ambulance or two to different billeting towns. In no case, however, should ambulances pass from the supervision and control of the officer in command of the ambulance battalion. This officer should take such steps as may be necessary to insure the speedy assembling of all the ambulances in his battalion when conditions render it necessary.

At no time, in peace or war, must the ambulance be used for any other purpose than the transportation of the sick and wounded, and the hospital personnel and equipment.

THE HOSPITAL BATTALION.

So far, we have considered only such units as are chiefly concerned with evacuation. The hospital battalion affords the wounded the first opportunity to have their injuries dressed, free from the hurry incident to getting them beyond the range of fire.

The hospital battalion consists of a headquarters and three hospital companies. The entire battalion is normally operated as one unit at the hospital station.

Each hospital has a capacity of 150 recumbent cases without crowding. An additional 100 can be cared for in an emergency. This brings the maximum capacity of the hospital to 250. About 150 Gold Medal cots and 100 litters are provided for beds.

The headquarters consists of 1 major (in command), 1 captain or first lieutenant, 1 technical or first sergeant, 1 staff sergeant, 1 sergeant, and 4 privates first class, and privates.

The organization of each company is as follows:

Majors	1	Sergeants	7
Captains or first lieutenants	7	Corporals	3
Technical sergeants	1	Privates first class and privates	65
Staff sergeants	4		

The transportation provided for headquarters consists of one motor car and one bicycle. Each company is provided with 20 trucks (1½ to 2 ton), 1 kitchen trailer, 2 motor cars, and 1 bicycle.

As in the sanitary and hospital battalions, the equipment is provided on the basis of the company's requirements and not those of the battalion. The equipment per company is approximately as follows:

One set drugs, chemicals, and reagents.
One set surgical dressings.
One set surgical instruments and appliances.
One set dental laboratory.
One set dental, operating.
One set hospital furniture and supplies.
One set field equipment and supplies.
One chest food supplies.
One set miscellaneous supplies and equipment.

The set of drugs, chemicals, and reagents is a well-chosen assortment sufficient for the needs of medical cases and including a liberal supply of antiseptics and disinfectants. The whole set can be packed within a few boxes the size of a steamer trunk.

The set of surgical dressings consists almost entirely of bandages and dressing packets. It is similar to and about twice as large as the set furnished the collecting station.

The set of surgical instruments and appliances contains a liberal supply of the instruments best adapted for general use in major surgery, and an assortment of special instruments for eye, ear, nose and throat, and genito-urinary surgery. This supply of instruments is sufficient for two or three operating teams working at the same time.

The hospital furniture and equipment consists of a long list of small articles, such as basins, brushes, crutches, irrigators, litters (100), pillows (150), towels, hospital clothing, etc.

The field equipment and supplies consists of 500 woolen blankets, 100 rubber blankets, 6 carriers for litters, a medical and surgery chest, a mess chest, 150 Gold Medal cots, 2 field operating tables, and a number of additional small articles.

The dental set contains sufficient supplies for routine dental treatment and enough laboratory equipment to permit of making splints and other apparatus for treating injuries to the mouth and jaws.

The chest of food supplies contains canned soup, canned milk, coffee, and sugar.

The miscellaneous supplies and equipment consists of kitchen utensils, axes, spades, lanterns, etc. Especially important items under this heading are 20 ward tents, 4 large and 4 small paulins, and 150 mattresses.

From the foregoing it will be seen that the hospital battalion is well equipped to render the necessary immediate treatment required for the sick and wounded of the division. As it is essentially a mobile field unit, it is not expected to provide prolonged treatment which can be better given in the permanent and semi-permanent hospitals in the rear area.

THE MEDICAL SUPPLY SECTION.

This corresponds to the supply section of the infantry, except that is concerns itself chiefly with the procurement and distribution of medical supplies. Its personnel consists of 2 officers, 3 noncommissioned officers, and 4 privates.

THE MEDICAL LABORATORY SECTION.

This section consists of 2 officers, 1 staff sergeant, 2 sergeants, and 4 privates. It is provided with complete field laboratory equipment, packed in 12 chests, each about the size of the regulation trunk locker. The equipment consists of microscopes, an incubator, glassware, stains, reagents, and other necessary laboratory supplies. The function of the laboratory section is twofold: First, it assists the sanitary inspector by examining food and water supplies and in determining, by laboratory tests, the presence or absence of contagious diseases in suspected individuals; and, second, it assists the hospital by examining blood, sputum, and other specimens.

These are the routine duties of the unit. In addition to this it will render aid in every possible manner by laboratory investigation, in the detection of diseases, and in the treatment of the sick.

THE DENTAL SECTION.

A dental clinic will be a department of each hospital and will consist of 7 officers and 6 enlisted men. In addition to rendering emergency dental treatment, this section will give advice and assistance in treating wounds of the mouth and jaws.

THE SERVICE COMPANY.

This organization corresponds very nearly to the headquarters company of the infantry regiment. It consists of 2 officers, 14 noncommissioned officers, and 26 privates.

THE VETERINARY COMPANY.

The veterinary service comes under the general supervision of the medical department, both for purpose of administration and supply; but its evacuation service is necessarily separated from that of the medical department proper and touches it at few points.

The veterinary service consists of 5 officers and 14 noncommissioned officers. It has a special equipment of drugs, surgical instruments and appliances, surgical dressings, and hospital furniture. It is supplied with 16 horses (draft) and 17 horses (riding), 2 trucks (2-ton), 2 wagons, and 1 bicycle. It establishes a collecting station for wounded animals and evacuates chiefly by halter and leading rope.

THE HOSPITAL STATION.

The location of the hospital unit is designated "hospital station," conforming to the usual nomenclature of field medical formations as illustrated by "aid stations," "collecting station," and "ambulance station."

The hospital station is usually located near the rear of the division zone. It should be accessible by wagon road from the front and rear. If conditions permit, it should be about opposite the center of the division front.

The arrangements of the hospital would vary with the special needs of the station. It would consist of seven departments, as follows:

1. Sorting hospital.
2. Sick and gassed hospital.
3. Surgical hospital.
4. Hospital for transportable wounded.
5. Laboratory section.
6. Supply section.
7. Reserve hospital section.

The sorting hospital is the receiving and dispatching unit. It corresponds to the "triage" of the French Army. Here the wounded are classified, recorded, and distributed to appropriate departments. From here they are returned to the front or evacuated to the rear. The headquarters and office are usually located at or near this hospital.

The sick and gassed hospital may or may not be operated as one, depending upon the amount of gas which has been encountered in action.

The surgical hospital contains the operating pavilion and beds for dressing serious surgical cases.

The hospital for transportable wounded is provided for the slightly wounded. Many of these will not require beds, as they may be speedily evacuated.

The laboratory section, supply section, and reserve hospital section perform the functions implied by their names. The duty of the hospital battalion is to provide the sick and wounded with immediate definitive treatment, which must be provided before they can be transported to the stationary hospitals in back areas.

Units of the corps and army evacuate the patients from the hospital station. At times the corps will take over the entire hospital and provide the division with a new unit.

NOTE.—The subject matter of this article has been compiled from pamphlets used in courses of instruction at the infantry school, Camp Benning, Ga. The writer disclaims any credit for originality.

HYGIENE OF SUBMERSIBLES.[1]

PART I.

By Capt. C. M. BELLI, Medical Corps, Royal Italian Navy.

CONSTRUCTION.

The introduction of submarines and submersibles has opened up a totally new and very interesting chapter in naval hygiene. On these vessels the conditions of existence are so different that the rules of hygiene for ordinary vessels are inapplicable, and further hygienic research becomes necessary, as, in the World War, these

[1] From Annali di Medicina Navale e Coloniale, Rome, February, 1922.

new instruments demonstrated an extreme offensive power, and presumably their construction will undergo an extraordinary development. The literature on the hygiene of these vessels is limited to a very few original works exclusively by Italian authors.[2] The reason for this scarcity of publications lies in the difficulty of undertaking experimental studies on the subject and in the necessity for maintaining secrecy with regard to the internal arrangements of the vessel.[3]

Until the beginning of the war the architecture of the submarine was shrouded in an atmosphere of mystery. After the seizure of the Austro-German submarines by the Entente and, reciprocally that of the allied submarines by the enemy, the motive for this reserve, at least concerning past methods of construction, ceased, and at this time it is possible, without violating any military secrets, to base our naval hygienic considerations upon a knowledge of the internal arrangements and instruments on board these vessels.

To-day the true submarine has been abandoned, and there is being constructed only the submersible torpedo boat, known as the submersible; that is, a boat which ordinarily travels on the surface of the water, and which, in order to attack the enemy or to retreat, can submerge to such a depth as to render it invisible and invulnerable.

From the nautical point of view the two types of boats are distinct, because the submarine has a reserve buoyancy less than 10 per cent of the displacement, while that of the submersible is greater. In the latter, with a considerably increased bulk, the conditions of life are more favorable; a large portion is above water, and the entire maneuvering station remains at a convenient height above sea level, so that the crew, when the submersible is navigating at the surface, can take the air on deck.

The large submersibles have a displacement of from 1,500 to 2,000 tons, the more recent ones reaching even 5,000 tons; their length is 70 meters or more, and they have two screws. They attain a speed

[2] Belli: Hygienische Betrachtungen über unterseeische Schiffe, "Arch. f. Schiffs u. Trop. Hyg.," 1905.
Belli e Trocello: Viziamente e rinnovamento dell'aria nei sottomarini, "Ann. di Med. Nav.," 1908.
Belli e Olivi: L'aria nei sommergibili immersi, "Ann. di Med. Nav.," 1912.
Belli e Olivi: Il ricambio materiale nei sommergibili immersi," "Ann. di Med. Nav.," 1912.
Belli e Olivi: Crasi sanguigna, respirazione e circolazione nei sommergibile immersi, "Ann. di Med. Nav.," 1913.
Marantonio: Meccanismi di ventilazione e di ricambio dell'aria respirabile sulla nave somergible *Balilla*, "Ann. di Med. Nav.," 1917.

[3] To give an idea of the jealous care with which construction secrets are guarded, I will relate an incident within my experience. In 1905, having published an article on the hygiene of submersibles based on a German review, I was accused of divulging military secrets. Naturally the inquiry brought to light that the State defense had suffered no danger through the incriminating article. For the successive publications I obtained the licet of the general staff. Public authorization has been given for issuing the data of the present work.

of 25 miles on the surface and 15 miles immersed, and can submerge to a depth of from 30 to 40 meters.

The large tonnage permits the quartering of a crew of 40 or more men under sufficiently comfortable conditions, the carrying of enough fuel for a radius of action of more than 6,000 kilometers, and everything else necessary for navigation, so as to be able to remain away from the base 30 or 40 days.

These vessels are divided into two classes: Those with single, spindle-shaped hull, Holland type (English), and those which are double, with an inner, pressure-proof hull, the exterior being in the form of an ordinary ship—the Laurenti type (Italian), Krupp (German), Laubeuf (French), Lake (American).

The difference between the types consists essentially in the method of immersion, the interior arrangement being approximately identical.

In the type with double hull, the inner one represents the true hull. The intervening space is subdivided into water-tight compartments which are either empty or else form tanks for water ballast or liquid fuel. The walls separating the compartments are water-tight and permit the boat to maintain a certain degree of floatability in case of leaks involving the two hulls and flooding one compartment. The doors between compartments are likewise water-tight.

The submersible can navigate at various depths, such as:

(*a*) On the surface of the water.

(*b*) In the awash state, more or less emerged (with only the periscope showing or with the whole tower out of water).

(*c*) Completely submerged.

Submerging is accomplished by automatically filling the proper compartments with sea water, which enters by an aperture in the outer hull furnished with valves. A return to the surface is accomplished by expelling the sea water from the compartments, using turbine exhaust pumps run by electric motors. Under exceptional circumstances compressed air is introduced into the compartments, but this is regarded as a means in reserve. The transition from the one method of navigation to the other is accomplished in two or three minutes. Submersion can last more than 24 hours.

With complete submersion the conditions of visibility are analogous to those which prevail on a steamer enveloped in a thick fog, vision through the mass of water not being possible beyond a few meters. With partial immersion, visual perception is accomplished by means of the periscope, a sort of telescope formed with a cylindrical tube which may be raised to the surface of the water (normally it is held at about 80 centimeters) or lowered, and which by means of combinations of lenses and prisms furnishes a means for discerning objects almost as with the naked eye. In the reflector of the periscope is seen only an eighth part of the horizon, which, however, may be entirely scrutinized by turning the instrument so as to change the field of vision.

Underwater navigation is silent because the electric motors while running make no noise. The silence is broken only by the sound of the screws of near-by vessels, which is detected by means of acoustic receivers adjusted for purposes of offense and defense.

INTERNAL STRUCTURE.

In submersibles of a single hull, three planes are considered: Deck, main corridor, and hold. In submersibles with a double hull there is a fourth plane, constituting the double bottom.

Deck plane.—The deck has a form like that of a torpedo boat, but the central portion is narrower and the ship's sides slope to the sea with an incline much more accentuated.

In the central part rises the conning tower, with its two periscopes. Hatches, the ventilation tubes, and the passages for the guns and torpedoes open forward and aft of the conning tower; above appear the radio antennæ and the periscope tubes.

The conning tower has a superstructure around the walls of which are arranged port holes for use when the boat is emerged; hatches open from the roof giving access to a companionway leading to the rooms below. It is superimposed upon the control room and contains the governing apparatus.

Only when in port does the hull stay open; exceptionally it is open when navigating at the surface, with the sea perfectly calm. Under these conditions the personnel may come upon deck, which with ordinary navigation remains clear.

Corridor plane.—This is constructed so that the inside walls of the hull form those of the corridor, the flooring beneath being of metal strips. All the surrounding chambers are intercommunicating by means of apertures fore and aft. On the Laurenti type of submersibles there is a second passage across the intervening space between the two hulls, which makes it possible to pass from bow to stern without going through the accumulator rooms. Such a passage is arranged for the safety of the personnel in case of accident. When the tubing is damaged, or through some other cause the sea water penetrates the accumulator boxes and comes in contact with sulphuric-acid gas, there is a strong development of chlorine which renders the air unbreathable. Under these circumstances this passage offers a safe exit for the personnel.

The number of compartments into which the hull is divided bears a direct relation to the dimensions of the boat. With the exception of the two extremities, which remain empty, these compartments are used as living quarters, control room, torpedo launching rooms, motor (heat and electric) rooms, and for electric accumulators. The quarters for the crew and officers are located in the central compartments.

On account of the small amount of space and its arrangement, living conditions were very unsatisfactory in the first submersibles. The crew, in carrying out maneuvers and while resting, occupied very uncomfortable positions. With increased size of the boats, their underwater characteristics changed and more nearly approached the conditions which obtain on ordinary vessels. The crew now enjoy relative comfort and can carry on their regular occupations without any difficulty. On the large submersibles there is a spacious dormitory for the crew; but also on the smaller ones every man has a hammock or a small camp bed. The officers are lodged in one or more small rooms with a bunk for each officer and they have a small wardroom. In the same central part of the boat there is a stove, cook's galley, steward's room, and two toilets. The stove is electric; a coal stove can not be used, because fire consumes oxygen which is very necessary for respiration.

One of the most difficult problems to solve has been the installation of toilets. At first, provision was made for the removal of excrement through deodorizing boxes. Recently a convenient system of toilet cabinets has been devised, having an arrangement of double valves and a pump, such as are used for torpedo boats, but with the difference that the material is ejected from the ship by a stream of compressed air.

The capacity of the compartments, both absolute and relative to the number of persons, varies essentially according to the size of the ship. Nevertheless, bearing in mind the serious causes for vitiation of the atmosphere, in order to give to each individual the greatest possible quantity of surrounding air, the number of men is restricted, and as a consequence each person has a larger amount of work to perform than on ordinary vessels.

From the data published by Marantonio upon the German submersible seized during the war by the Italian Navy, and rebaptized *Balilla*, I have calculated the amount of surrounding air per person and per space.

Inclosed space.	Cubic capacity (meters).	Number of persons.	Amount of atmosphere per person (cubic meters).
Torpedo-launching room, bow	92	14	6.5
Torpedo-launching room, stern	31	2	15.5
Battery compartments, bow	79	3	26.0
Battery compartments, stern	101	5	20.0
Control room	43	5	8.5
Combustion motor room	131	3	43.0
Electric motor room	81	4	20.0
Total	558	36	....

On this submersible, with a total air capacity of 558 cubic meters and a crew of 36 persons, the average surrounding air per individual is 15.5 cubic meters, with a great difference between one place and another, varying from a minimum of 6.5 to a maximum of 43.0 cubic meters. In an absolute sense the proportion can not be considered small, being greater than that for the majority of ordinary ships; in a relative sense, when submerged, it is sufficient to insure respiration to those on board for but a few hours. The average is attained when all the spaces freely communicate; but the amount varies with the opening and shutting of the various doors communicating with the different compartments.

Torpedo-launching rooms.—These contain the torpedo-launching tubes and the torpedoes kept in reserve; if the boat is of average tonnage, the spare space is utilized as a dormitory for the crew.

Control room.—This is located beneath the conning tower; here are assembled the two periscope tubes, the telephones, the speaking tubes, and the radio apparatus.

Engine rooms.—The propulsive motors are of two varieties: Heat engines for navigation at the surface, and electric motors for underwater navigation.

The heat engines are generally of the type designed for oil combustion (gasoline and similar products); however, the more recent French and English types use the steam-turbine variety.

The heat engines propel the vessel when at the surface or when partially submerged, as long as it is possible to keep open the tubes surrounding the periscopes through which passes the air needed for combustion. They are arranged in pairs, two on each side, respectively. The products of combustion are expelled through two large tubes, one on each side, corresponding to the smokestacks of ordinary vessels. The tubes pass through the double bottom on each side and expel their contents above the water line.

From the hygienic point of view in this class of ships, the combustion motors present two advantages: They heat the surrounding atmosphere less, sufficient coolness being maintained by means of water circulation, and, by introducing the air necessary for running the motor, ventilation is aided.

With turbine motors cooling can not be effected by means of water circulation, and in this type of motor, notwithstanding the covering of the hottest pieces with insulating material, there is excessive heat radiation into the surrounding atmosphere. Such an inconvenience may be remedied, up to a certain point, by separating the engine room from the other compartments by walls with a water circulation and by systematic forced ventilation.

The primary function of combustion motors is to furnish mechanical energy for navigation at the surface; but these motors can, through the working of the dynamo, charge the storage batteries which supply the energy to the electric motors for partial or complete underwater navigation.

In the vicinity of the heat motors are the pumps for exhausting water and the air compressors; all this apparatus causes excessive crowding of the compartment, leaving only a very narrow space in the center.

In the same compartment in a small boat, in a special one in the larger types, are installed the electric motors with continuous current, which, while the vessel is running submerged or partially submerged, take the place of the combustion motors. The motors, by virtue of their reversibility, are at the same time the regenerators of the electric current (dynamo), and when the boat emerges serve to charge the batteries, which also are charged at the shops on shore or by mother ships.

Battery compartment.—The batteries which furnish electric energy to the motors for navigating submerged are located in one or two compartments on the plane of the central passage; in some boats on the plane of the hull. These batteries are of the sulphuric-acid or liquid type. The ordinary batteries preferred in the European submarines are composed of impermeable boxes of ebonite, closed by covers provided with holes for the passage of the poles. They are fastened perfectly water and air tight in order to prevent the creeping of the electrolyte and the escape of gases generated by the development of the electric fluid. Inside the boxes the lead plates are arranged in series, separated one from the other by strips of rubber and immersed in dilute sulphuric acid.

The Edison alkaline batteries employed in American submersibles are made of steel and nickle and contain a solution of potassium. As compared with the ordinary type, they present the following notable hygienic advantages: By doing away with sulphuric acid, they remove the possibility of the generation of gases (sulphuric anhydride and chlorine) which render the atmosphere unfit to breathe, thus affording a great improvement in the matter of respiration and avoiding the possibility of serious accidents; they occupy an appreciably smaller space and require less attention; on the other hand, from the technical point of view, they are inferior to the ordinary sulphuric-acid types.

Plane of the hold.—This portion of the boat is set apart for the storing of ammunition, fuel, compressed air, water, and the other requirements for navigation.

Liquid fuel is stowed in perfectly closed tanks, from which it is conveyed to the motors by pumps.

The air under a compression of 150 to 180 atmospheres is conserved in steel tanks arranged as far as possible beneath the flooring of the engine room. The amount provided is in proportion to the dimensions of the boat, attaining quantities of 10 and more cubic meters to every 2 tons of weight. The replacement of the air consumed or lost through the tubing is effected by means of force pumps which operate when the vessel is completely emerged. A system of piping leads from the tanks to a tap provided with valves in each compartment.

In one of the compartments is located the fresh-water tank of a form and construction similar to that in ordinary ships.

In the deepest part of the inner hull is the bilge, which is almost inaccessible when all the apparatus and appliances are in place.

Double bottom.—The double bottom for the water ballast extends the whole length of the hull in the Krupp and Laubeuf types, is limited to the central part of the boat in the Holland and Lake types; likewise to the center but shorter in the Laurenti. In certain types some of the compartments with a double bottom are filled with a material which expands on contact with sea water thus closing any possible leaks.

The double bottom being ordinarily closed, without communication with the surrounding portions of the ship, has no importance as regards hygiene, except when entered for cleaning and repair work.

INTERNAL ATMOSPHERE.

Submersibles when navigating on the surface of the water, both from the nautical as well as the hygienic point of view, do not present notable differences over ordinary torpedo boats, and within certain limits the same principles imposed by naval hygiene on the latter can also be applied to them. The submersible is characterized by the ability to navigate beneath the surface, in which condition it constitutes an hermetically closed space, circumscribed by impermeable walls, entirely surrounded by a thick stratum of water, and absolutely separated from the atmosphere.

This being the case, the following questions arise: First. What are the causes of the changes which the air undergoes inside the vessel? Second. In what proportion do they occur and which of them predominates? Third. What index may be adopted as the limiting factor of these changes?

1. *Causes of the deterioration of the air.*—In ordinary ships the causes which produce the vitiation of the air are chiefly the functioning of the vital organs of man and the various and complex activities in which he engages. In submersibles the causes of the vitiation of the air are similarly complex, but have different effects owing to the fact of the space being hermetically inclosed.

Man renders the air impure through his biological functions. Respiration and cutaneous perspiration produce chemical and physical changes in the air. An adult man, working moderately, subtracts every hour from the surrounding air by his respiration 42 grams of oxygen and gives off 47 grams of carbon dioxide, as well as a small and variable quantity of ammonia, sulphureted hydrogen, and heavy volatile acid. At the same time, man emits every hour with his pulmonary respiration and cutaneous perspiration 50 to 60 grams of water. Furthermore, man vitiates the air by the radiation of heat. Engaged in moderate work, man emits every hour by radiation about 100 calories. The thermic capacity of the air is 0.35 calory per cubic meter, whence through this single source of heat, if no absorption of heat by the water surrounding the boat takes place, the temperature of the air inside the latter will be noticeably increased. Man also vitiates the air with tobacco smoke. Lastly man causes a final vitiation of the air by carrying on board in his clothing and various objects the finely pulverized dust of the outside atmosphere.

Another important cause of the chemical and physical vitiation of the atmosphere lies in the heat and electric motors. The heat motors produce chemical changes with their products of combustion and with the gases thrown off into the atmosphere by the fuel carried on board.

The fuel employed for the heat motors is composed of the residues of the distillation of petroleum, the principal products of combustion of which are carbonic anhydrid and water vapor, while the secondary products are oxide of azote (which is subsequently converted into hypoazotite), nitrous or nitric acid, methane, acetylene, and various other substances. The gasoline tanks are closed hermetically, hence theoretically no loss from them should take place. In actual practice, however, small quantities of gas escape from joints of the tubes and valves and become mixed with the inside air. When the submersible is in communication with the external air, the gasoline vapors escaping from the tanks and the products of combustion are quickly expelled outboard by the exhaust ventilators, so that the air is completely changed at frequent intervals; but if submersion follows immediately upon the stopping of the engines, there is no time for completely renewing the air, which therefore remains vitiated.

Electric motors vitiate the air by the functioning of the accumulators. The reaction of sulphuric acid on the metal develops hydrogen, which in part reduces the sulphuric acid, with the production of sulphureted hydrogen and sulphurous anhydrid, and is in part set free. The storage batteries are inclosed within impermeable boxes from which the gases are carried directly outboard by means of proper ventilators; consequently, except in case of damage or breakage, these gases can not be given off into the surrounding air except in a minimum quantity.

Finally, a chemical vitiation of the air is produced by the lubrication of the machinery, which is accomplished with heavy mineral oils introduced into the parts in motion to diminish wear and for the purpose of saving motive force which would otherwise be lost. These oils distill at a temperature above 200° C. They constantly contain, however, a greater or less quantity of light oils having a lower boiling temperature, which in contact with the superheated parts of the engine become gaseous and mix with the surrounding air.

The physical change in the air produced by the functioning of the heat and electric motors consists in the elevation of the temperature. The consumption of gasoline varies with the speed; its calorific power is very high, namely, 1,136 calories, so that at cruising speed several hundred thousand calories are developed per hour. The greater part of the heat energy is transformed into mechanical work, but a portion is given off into the surrounding space. The same thing happens with the electric motors. The mechanical energy furnished by the electric motors does not correspond to the energy consumed. A portion of the latter, about 0.17 of 1 per cent, is translated into the development of heat, which increases the temperature of the inclosed spaces in question. In a submersible of large displacement there are developed in this way more than 10,000 calories per hour. Ordinarily the storage batteries are charged at the electrical stations on shore and are placed on board already in a charged state, so that the development of heat in discharging is a minimum, and the surrounding temperature is therefore not increased in this way. This is not the case when the storage batteries are charged on board, because in performing this operation the temperature of the jars is increased and heat is given off into the surrounding air.

The ventilators carrying off hot air lower the temperature unless submersion takes place immediately after stopping the motor.

Secondary causes of physical and clinical changes in the air reside in artificial illumination, the varnish of surfaces, the escape of compressed air, and ventilation.

Illumination is accomplished by means of incandescent electric lamps, which entail a slight increase in the temperature of the air by the radiation of heat. In fact, a 16-candlepower lamp radiates 40 calories per hour, so that supposing there were 50 lamps giving out radiation there would be about 2,000 calories per hour.

The sheet metal is coated with lead and covered with enamel varnish which is likely to become oxidized, thus drawing oxygen from the air.

During the maneuver of emersion, while ballast water is being exhausted by compressed air, an amount of air escapes which, though slight, is still sufficient to cause an increase of the pressure of the inner atmosphere.

Immersion is regulated by means of a compensating tank located beneath the floor of the control room. Two air exits are provided from the tank, and during immersion the air exhausted from the intervening space is replaced by an equal volume of water. If the tank is allowed to remain empty for a period of time the air is vitiated by the gases arising from putrefaction of the sea water remaining on the floor, and the introduction of this air into the interior of the boat causes chemical changes in the atmosphere and increases the barometric pressure.

Finally, ventilation by means of the outside air introduces into the submersible the fine dust held in suspension in the atmosphere.

The process of deterioration of the air is not continuous; the chemical changes depending upon the biological functions of man are constant; on the other hand, those proceeding from the running of the engines are produced in proportion to the amount of the latter, considered in terms of the duration of functioning and the temperature attained by the parts of the machinery. Therefore, in every operation of the submersible three periods must be distinguished: In the first period navigation takes place at the surface, and therefore the changes in the air are caused by the heat of the motors; in the second period the submersible navigates beneath the surface of the water where the changes in the air are caused by the heat motors and batteries; finally, in the third period, in resuming ordinary navigation, we return to the first condition. Therefore, not only are the changes different in the three periods, but in the second the changes of the first persist in part, to which are added those proper to the second period; the same is true of the third period with respect to the two preceding ones.

Kind of changes in the air and their value.—The changes caused by man are based on physiological data and can be calculated with sufficient approximation. On the contrary, the physical and chemical modifications derived from motors and other above-mentioned causes are variable inside of wide limits and may be ascertained only through direct investigation. Complete researches were effected by Belli in a series of collaborations with Trocello, and again with Olivi, in which the results obtained were very nearly coordinate.

Organoleptic properties.—The air in a submersible after several hours of immersion develops a special odor, differing from the musty odor of an inclosed compartment on land in that it irritates the mucous membrane because of the presence of sulphureted anhydrid developed by the batteries and hydrocarbonates escaping from the motors by explosion.

Physical characteristics.—The physical changes of the air have on the whole a limited importance.

Temperature.—The temperature upon first immerging is raised from 2° to 3° C. above the external temperature, but tends afterwards to a thermic equilibrium with the various surroundings and with the water round about. The reason for this fact is found in the physical conditions of the submersible with respect to its external surroundings. The hull is of steel, one of the best of heat conductors, and is surrounded on all sides (during immersion) by a liquid medium that possesses a great capacity for heat; therefore from the walls there will be a strong caloric dispersion into the surrounding water. The initial increase is due to the heat from the gasoline motors; but with the hull closed and immersed, notwithstanding the great radiation of heat from the several sources (machinery and men), the dispersion of heat is such that the temperature of the air is principally dominated by that of the sea water, with which the internal atmosphere tends to put itself in thermic equilibrium. Immersions are made to a depth of from 20 to 40 meters, where the temperature of the sea water is influenced by the seasons.

In Italian seas the temperature of the water near by and round about is slightly higher than the air above; this explains why the temperature of the submersible is higher than that of the external air measured before immersion.

The temperature, then, is maintained within limits tolerable to the human organism. In temperate seas, during immersion in the cold season, the air in a submersible is rather cold; but keeping warm is not difficult with suitable clothing and through artificial electric heating. In the summer season the temperature does not often go higher than 30° C. and, being accompanied by a high degree of atmospheric humidity, causes great discomfort, as in places oppressed with a hot-humid atmosphere. The air in proximity to combustion motors is hotter than in other portions of the vessel and ventilation tends to spread this heated air, at least when immersion follows immediately upon the stopping of the motor.

Humidity.—The relative humidity increases up to 90 per cent and over, reaching at some points saturation, as is demonstrated by the tiny drops of moisture condensed on the walls. The increase is not so great as it should be when based on the water vapor calculated to be normally thrown off by man. The reason for this, however, has not been determined.

Every opening which would permit the entrance of outside air is closed, hence the water vapor, a product of the various degrees of humidity on board, accumulates in the internal atmosphere.

The interior of the submersible being restricted, the air can absorb only a limited quantity of water vapor. For this reason, in the cold season, the temperature of the air being low, saturation is accompanied by a relatively low degree of water vapor. The increase, however, when the immersions are of brief duration and in the winter has but slight effect upon the organism. When the immersions are made in the summer season, with the temperature higher than 30° C., the excessive humidity of the air causes a feeling of annoyance when the stay below water is protracted beyond a certain period.

Barometric pressure.—The atmospheric pressure increases with respect to its environment from 10 to 30 millimeters, but the variations are less regular and constant than those of temperature. The increase of pressure may be attributed in part to the escape of hydrogen and other gases from the electric storage batteries, but it is principally derived from the escape of compressed air from the air tubes and valves. At the moment of emersion, before opening the small doors, the air valves are opened, which gradually places in equilibrium the internal and external pressure, thus avoiding sudden pressure changes.

Chemical composition of the air.—The chemical changes are much more important than the physical ones. The chemical composition of the atmospheric air undergoes quantitative modifications in its normal components, and qualitative ones through the addition of gaseous impurities.

The variation of these components is represented by the diminution of the oxygen and an increase of the carbon dioxide.

Oxygen.—The percentage of oxygen in the air undergoes a diminution greater than the consumption of oxygen by the processes of organic combustion through the men of the crew, because a portion of the gas serves for other oxidations, especially for those of the hydrocarbons of the motors. The diminution is proportional with the duration of immersion, and a minimum percentage of 18 was noted in an experiment of Belli and Olivi after 6 hours of immersion. With the successive renewals of air (always in the position of immersion) the percentage increased to about 19 and fluctuated around this figure for the rest of the experiment; that is to say, for the next 18 hours. It may then be maintained that with normal immersions the quantity of oxygen remains sufficient for respiration, it being ascertained in physiology that asphyxiation occurs only when the proportion of oxygen in the air falls below 3.5 per 100, which can only happen in case of mischance.

Carbon dioxide.—The proportion of carbon dioxide varies according to whether the men work or remain in repose. With the diminution of oxygen, the increase of carbon dioxide is greater than that dispersed in the air through the process of respiration, because there exist other causes than that of animal respiration. In the experiments of Belli and his collaborators the increase was gradual and reached the proportion of 31 per 1,000 after the first 6 hours of immersion. The experiment was protracted for 24 hours; but after 6 hours the physical-chemical state of the air became almost intolerable (because it was the month of July) and the air was renewed about every 5 hours. After every renewal the proportion was lowered between 13 and 17 per cent, rising promptly to its first figure and reaching at the end of the experiment, after 24 hours, 37.2 per 1,000.

The increase was without doubt significant; however, no alarming toxic phenomena were observed. This knowledge assumes a special importance even for general hygiene, inasmuch as it demonstrates that with a proportion of carbon dioxide of 37 per 1,000 man can live and attend to a certain amount of work.

Gaseous impurities.—The gaseous impurities, represented by gases extraneous to atmospheric air, are as follows:

Indifferent: Hydrogen.
Unbreathable: Sulphurous anhydrid.
Poisonous: Hydrogen sulphid, chlorine, hydrocarbonates, carbonic oxide, ammonia, nitrous and nitric anhydrid, arseniureted hydrogen, organic gaseous substances of an indeterminate nature.

Hydrogen.—The presence of hydrogen may be presumed because of the functioning of the electric storage batteries, since hydrogen is derived from the same chemical reaction from which originates sulphurous anhydrid and sulphureted hydrogen, as demonstrated by the researches of Belli and his collaborators. Hydrogen is indifferent to the human organism and produces no harm through inhalation, but it is dangerous because in certain proportions (from 9 to 66 per cent) it forms with the air an explosive mixture.

Sulphurous anhydrid.—Sulphurous anhydrid produces a very powerful effect on the organism, especially when combined with air to be breathed. In air which contains 0.05 of 1 per cent of it, animals can not breathe without suffering, and with a dose of 0.24 of 1 per cent a rabbit is killed in about 4 hours. In the researches cited above, a maximum of 0.314 gram per cubic meter of air was demonstrated after 20 hours, a small quantity, but sufficient to explain, in combination with the other poisonous gases, that slight feeling of suffocation which gives warning during a prolonged immersion.

Sulphureted hydrogen.—Sulphureted hydrogen is also a most poisonous gas, killing a dog in an atmosphere containing 0.125 of

1 per cent of it. In submersibles it has been found in the proportion of 0.00049 gram per cubic meter of air, a quantity which can not affect the health.

Chlorine.—Ordinarily chlorine is completely absent; in case of accident it is produced by the penetration of sea water inside the electric storage batteries. The escape of chlorine is very dangerous, as it is highly noxious in the proportion of 1 to 10,000.

Hydrocarbonates.—Hydrocarbonates collect in quantities of 0.1449 gram per cubic meter of air. This quantity is already found at the beginning of immersion, and neither increases or decreases when immersion is prolonged—a sign that it is produced mainly through the gasification of gasoline in motors as well as from the lubricating oils.

The chemical composition of the derivatives of petroleum is varied and their toxic power is in correspondence therewith. The poisonous effect depends upon the dose and upon the duration of inhalation. The quantity found was so small as to produce but slight effect even if it were of the most poisonous quality.

Carbon monoxide, ammonia, nitrous and nitric anhydrid.—These have been absent in all researches.

Arseniureted hydrogen.—Arseniureted hydrogen may be present because of abnormal reactions from the batteries. It is a toxic gas in the proportion of 1 to 100,000.

Giordano has observed two almost simultaneous instances of poisoning from arseniureted hydrogen on board two submersibles. They were equipped with storage batteries, which were not only unprovided with air-tight tin covers, but also the ventilating hole on the inside of the box was in direct communication with the surrounding air. The lead plates were enveloped by asbestos sacks, in order to prevent, under the action of the movement of the vessel, the crystals of lead oxide, which particularly form in positive plates, from falling to the bottom of the box. A chemical examination demonstrated the presence of arsenic in the asbestos and traces of arseniureted hydrogen in the air during the functioning of the storage batteries. The presence of arsenic in asbestos which is of recent manufacture and used for the first time might cause a throwing off of arseniureted hydrogen as well as hydrogen alone. With the successive charges and discharges of the storage batteries the greater part of the arsenic is eliminated and, as has been proved on experimenting with animals, the small portion which still escapes does no harm.

Similar cases of acute poisoning from arseniureted hydrogen have been observed on a French submersible after two consecutive immersions, each of 18 hours. An examination of the air of the submersible revealed the presence of arseniureted hydrogen developed from the batteries of the accumulators.

Other cases have been noted upon English submersibles, caused by the use of lead plates or of sulphuric acid containing arsenic.

The development of toxic gases takes place particularly during the charging of batteries. To avoid the development of arseniureted hydrogen it is necessary to employ lead free from arsenic, and sulphuric acid which contains not more than 0.0008 part of it by weight. In all cases it is necessary to thoroughly ventilate the battery an hour before the charging of the accumulators and while in use.

Atmospheric dust.—This is made up of those mineral, vegetable, and animal particles which in small quantities impregnate the atmosphere, causing no special effect. It is of minimum quantity.

Organic substances of indeterminate nature having a toxic effect.—An individual who remains in a hermetically inclosed space admitting no outside atmosphere suffers disturbances which grow from a simple feeling of discomfort to the gravest symptoms of asphyxiation.

The cause of symptoms produced in confined air is not definitely known, and various hypotheses have arisen in explanation. Sanarelli, Biffi, Hermans, and several others are of the opinion that the poisons found may be due to processes of putrefaction thrown off by the skin, from intestinal fermentation, from disease conditions (ozena, fetid breath, dental caries, etc.). Other authorities, while admitting the formation in the stagnant air of malodorous compounds, deny that they may have any toxic effect and that their quantity is such as to cause symptoms. Wolpert holds that the phenomena are due to the diminution of the quantity of carbon dioxide eliminated from the crowded compartments. Weichardt attributes the disturbances found in the inclosed spaces to the waste products analogous to the colorless, odorless toxic gases formed under fatigue. Flügge excludes the presence of toxic products and attributes the cause of the symptoms to physical factors in the surroundings, such as increase of heat, humidity, and immobility of the air.

On Italian submersibles no serious disturbances have been observed. The men confined for long hours inside the boat experienced only cephalgia and mental torpidity, occasionally assuming the form of complete lethargy. In the confined atmosphere of a completely submerged submersible a considerable quantity of carbon dioxid is accumulated; and sulphurous anhydrid, sulphureted hydrogen, and hydrocarbonates are present. There are likewise present in a considerable degree the physical factors mentioned by Flügge (immobility of the air and its high thermic and hygrometric quality). This to me seems sufficient to explain the symptoms.

Predominance of the various air changes in different localities.—The physical-chemical state of the air differs in various locations, according to the number of men and the kind of machinery and apparatus on board. In the torpedo and control rooms the changes of the air are principally due to the presence of persons. In the combustion and electric-motor rooms they are to be attributed to the combustible and lubricating oils for the engines, and in the accumulator space to the chemical reactions of the accumulators. However, the differences between the communicating rooms tend to disappear, because inside a closed boat the air becomes rapidly mixed through the law of the diffusion of gases and by means of differences in temperature. The difference is maintained, in particular localities, because of the different densities of gases, hence carbon dioxid, which is heavier than air, collects in the lowest parts of the rooms.

3. *Index of the limiting factor of the changes.*—The changes of the air during immersions of brief duration have no injurious results and in no way threaten life; however, when the time is prolonged it may reach such a point as to bring serious danger. A criterion which might warn the crew of the approach of danger would be, however, of the highest utility.

The quantitative modifications of oxygen and of carbon dioxid are not constant, and still less constant are the gaseous impurities thrown off into the atmosphere of submersibles. We can not therefore fix basically the physiological data nor the experimental results of the maximum duration of immersion.

In dwellings the sense of smell gives warning that the impurities of the air have reached the limit of tolerance of the human organism; but this sense, although very keen, is dulled when exposure is protracted for any length of time and especially in an atmosphere containing gases which have different effects, so men who are confined in submersibles do not receive this physical warning of imminent peril.

In default of olfactory warning, small, warm-blooded animals may be employed, such as rats, guinea pigs, and pigeons. Upon the first submersibles it was customary to carry small rats in cages, as their death gave warning of the beginning of danger for man, who would then have a chance to escape. As a matter of fact, rats are very sensitive to toxic gases (especially carbonic oxide) and die in 10 minutes in an atmosphere where a man may live an hour. In the experiments of the authors quoted above the rats did not give any sign of suffering, so that this physiological check proved the result of the chemical research as to the absence of carbonic oxide from the air. The indication given by the death of the rats may be late in manifestation, hence this method often fails in its aims. On the other hand, on recent boats, the danger of carbonic oxide being eliminated, the need of animal proof is obviated.

The proof of a lighted candle going out in this atmosphere is valueless, because in an atmosphere harmful to man there is still enough oxygen to feed the flame.

On shore our only index of impure air is the presence of carbon dioxide in dwellings, and the maximum limit is fixed as 1 part to 1,000. May not the same index be adopted for submersibles?

If we consider only the carbon dioxide thrown off by the respiration of man, in a little over a half an hour in a submersible of average size the limit is attained. The net air capacity of a submersible for maintaining life would permit of immersion of less than an hour. In actual practice, however, it happens otherwise. Respiration inside a submersible during immersion is not as agreeable as when in a balmy wood, but experience demonstrates that it is possible to live and work there for several hours without appreciable suffering. The reason for this apparent contradiction is not hard to trace. The maximum quantity of 1 to 1,000 of carbonic dioxide admitted by the hygienists does not represent the limit of tolerance for this gas, but it has been assumed as the easiest appreciable exponent for the complex changes which the air undergoes in the confined surroundings of dwellings on shore.

The vitiated air within a confined space may become harmful in two ways: By slow and continuous action in the form of chronic poisoning, or by the rapid action of acute poisoning. In the first instance there will be a lowering of hematosis, of nutrition in general, and of all vital powers of the organism. In the second case, acute asphyxiation is brought on, as in the tragedy of the Black Hole of Calcutta, in which out of 146 prisoners after 8 hours' confinement, there came out alive only 22; and that of the boat *Londonberry*, where, out of a crew of 200, 72 died.

The measure of carbon dioxide was proposed by Pettenkofer as an expression of the degree of purity of the air in dwellings for a prolonged and continuous sojourn; on the contrary, the limit of tolerance of carbon dioxide for a brief sojourn is very much higher as demonstrated in the personal example of Pettenkofer, who stayed several hours in an atmosphehre of 10 to 1,000 of carbon dioxide without discomfort, and that classic incident of the chemistry hall of the Sorbonne with a proportion of carbon dioxide of 10 to 1,000, and, to remain in the field of naval hygiene, that of Belli and Trocello in the dormitories of the torpedo chasers, 11 to 1,000, without apparent disturbance to the crew.

In dwellings on land the content of carbon dioxide has been selected as an index of the corruption of the air, because of the supposition that the substances constituting the true changes, and especially the supposed volatile toxins emitted with respiration, proceed co-equally with the quantity of carbon dioxide; but the parallelism between the carbon dioxide and the other gaseous impurities does not exist, and the contrary is, moreover, the case. In submersibles the factors which change the composition of the air, whether with regard to the modifications which occur or from the point of view of the loss of purity, are not the same as with dwellings on land, for the reason that the proportion of carbon dioxid as an index of the contamination of the air can not be fixed on a scientific basis. At all events, wishing to accept this criterion, we must raise the limiting factor at least to 15 to 1,000, which corresponds to about half the maximum quantity encountered in the experiments above cited, as also half the amount endured by divers (30 to 1,000).

The criterion for determining the amount of oxygen needed during immersion has also no scientific basis, inasmuch as when the air has become quite heavily charged with carbon dioxide the quantity of oxygen which remains is amply sufficient to maintain life.

On which account the apparatus for the extemporaneous determination of the oxygen and the carbon dioxide of the air introduced in the submersibles merits little confidence, and furthermore, being founded on colorimetric reactions, gives results which are not very exact.

In my opinion it is possible to determine when it is time to renew the air without employing any instrument.

In the experiments on submersibles it has been proven that the crew begins to feel discomfort from the confined atmosphere when the proportion of carbon dioxide reaches 20 to 1,000. To remain after that time within physiological limits, it is proper to put in operation the means of renovation, when the gas which serves as an index shall have reached 15 to 1,000. Calculating upon physiological data, the quantity of carbon dioxide given off in breathing by a crew in relation to the atmosphere of the submersible, the above proportion of 15 to 1,000 is reached on an average in from 6 to 8 hours, after which a renewal of the air becomes necessary.

A criterion of greater approximation may be had by making a calculation for every individual boat. A man, working moderately, as on board a submersible, gives off into the air 23 litters of carbon dioxide per hour. Thus we may establish after x number of hours, that the air contains the aforesaid quota of 0.015, through the following formula, in which n is the number of persons embarked, c is the cubic contents of the submersible:

$$23 \times n : c = 0.015 : x;$$

$$\text{hence } x = \frac{0.015 \times c}{23 \times n}$$

Example: Given a submersible of 500 cubic meters (500,000 liters) of air, with 36 persons in the crew:

$$x = \frac{0.015 \times 500{,}000}{23 \times 36} = 8$$

that is, we should take steps to renew the air after 8 hours of immersion or better, 9 hours from the last complete renewal of inside air.

VENTILATION.

1. METHODS OF VENTILATION.

The greatest obstacle to underwater navigation, from the personnel point of view, is the difficulty of remaining inside the boat when it is in a state of immersion. Thus the hygiene of submersibles consists, above all, in the study of the factors of habitability under all of its aspects. Among these factors the predominant one is the renewal of respirable air.

Submersibles make use of two methods of ventilation, natural and mechanical. Those used in navigating above water are the same as the methods employed in the ordinary torpedo boat; those for navigation beneath the water are proper to the submersible.

The means of admitting air, analogous in all the types of submersibles, are the following:

(*a*) *The hatchway.*—This is a means of entrance to the inside of the boat, and at the same time gives ventilation and illumination. One of circular form opens on the conning tower, between the two periscopes, and gives entrance to the engine room. Others, ordinarily three in number, open on the upper bridge, the first and the last into the fore and after torpedo-launching rooms, respectively, the middle one into the electric motor room.

The hatchway of the conning tower may remain open when navigating above water, and the others ordinarily must be kept closed.

(*b*) *Ventilation tubes.*—Several of these, varying in number, are assigned to the ventilation of the combustion motors and are comparable to the various pumping or exhaust artificial methods. Among these tubes, two rise 3 meters above the upper bridge and are near the periscope tubes; therefore, to distinguish them, it is useful to indicate them by the term "para" periscope tubes (paraperiscopici). During complete immersion they are closed by means of a sliding valve; but the part which remains above this fills with water which, on returning to the surface, is ejected by means of a jet of compressed air. Two or more serve for the extraction of gases emitted from the accumulators.

Other apertures are made in the hull for discharging torpedoes, for the telephonic buoy, for the siren, for radiotelegraphic cables, for periscopic tubes, for the expulsion of gases from thermal motors, but they have no hygienic purpose and do not serve for ventilation or as passageways.

Mechanical ventilating devices are operated by electric motors. As on ordinary boats, the driving out and drawing in of air is necessary, both for respiratory functions and for promoting the combustion of thermic motors, so that the crew benefits by both these factors. In addition to the above-mentioned devices, there is a special one having the hygienic function of carrying off gaseous substances escaping from the accumulators.

The provision of air for navigation on board submersibles in some cases is by a detached system, in others a system of centralization, and in still others with two systems operating at one time.

The detached system is used exclusively for the exchange of inside air for outside air, and hence it is employed when the boat is in communication with the atmosphere. The centralized system, in addition to the foregoing, performs a second function, i. e., providing for the circulation of air inside the closed boat. The detached system, analogous to that employed on the ordinary torpedo boat, employs exhaust and intake ventilators placed in each single compartment, without any intercommunication one with the other. The number of these ventilators, their length, and the location of their outlets is arranged according to regular navy criterion. In any event an exhaust ventilator is necessary in the toilet rooms.

The system of central ventilation consists of tubing which leads to all the inhabited compartments and has two openings for each room, one on one side for the introduction of air, the other on the opposite side for its extraction. At the two extremities the tubing is connected with two ventilators, the pulsator at the bow, the exhaust at the stern. When the hatchways are open, putting in operation both ventilators at once, the pulsator sucks in the air from the nearest hatchway, and sends it to all the compartments; the exhaust ventilator, located at the opposite extremity, carries the air out through the adjacent hatchway. When the hatchways are closed the ventilators act merely as agitators, putting the air inside the boat into circulation.

The louvers of the pressure ventilators and the intakes of the suction ventilators open in the upper part of the rooms, contrary to the rule of placing the louvers of the pulsators in the lower part and the intakes for the exhausts in the upper part. The systematization of the openings of the upper part is convenient when the centralized system of ventilation is in operation with the boat immerged, because the movement of air remaining confined to the upper strata, the carbon dioxide accumulated below is not disturbed. On the contrary, with the hatchways open, the scope of the ventilation is to completely renew the atmosphere, driving out the carbon dioxide and other impure gases. The location of the intakes of the aspirating ventilator in the upper part of the room is unsuitable, for the reason that it leaves in the lower part zones of stagnant air. Under these circumstances, in order to also renew the air in the lower part and remote from the intakes of the fixed tubing, there are installed flexible sleeves which will enlarge the field of aspiration of the ventilators.

As in the engine rooms of ordinary vessels, a special system of ventilation is installed in submersibles to further the combustion of the gasoline for the operation of the thermic motors in which a large volume of fresh air, of great benefit to the men, is introduced by electrically driven apparatus: pulsators which introduce the air into the compartment, exhausts which draw the air from the rooms and expel it outside. The quantity of pulsator ventilators is much greater than that of the exhausters, because a large quantity of air is employed to drive the products of combustion through the tubes intended to carry them off.

Electric motors are operated in underwater navigation; that is, with the hull completely immerged, and in partial immersion when the "para" periscopic tubes, although out of water, for reasons of safety must be kept closed. Consequently during the operation of the electric motors there is no introduction of air from the outside. It is an essential condition therefore that such motors may go on operating in closed surroundings without prejudice to the health of the crew. From these motors when they are working, there is developed a considerable quantity of heat, which raises the temperature of the atmosphere. With the motors running while the submersible is immersed, it is not possible to utilize ventilation to lower the temperature of the atmosphere, as on ordinary ships. Instead, three different methods are employed for this purpose: One, cooling by means of sea water, another the intermixture of the air of all the compartments, and the third the employment of refrigerating machines.

The cooling of the air by means of sea water is accomplished by using a ventilator which sucks the air from the accumulator rooms and conveys it through a tube across the space between the hulls. Here the air gives off its heat and is cooled by the sea water, returning to the accumulator rooms at a lower temperature.

The cooling of the air by circulation is attained by a mixture of the entire atmosphere of the boat, brought about through a system of central ventilation which places in circulation the air from all the compartments in such a way that the hottest air of the electric-motor rooms gives off heat to the cooler air of the other compartments until a thermic equilibrium is reached.

The third method, cooling by the refrigerating machines, was at first introduced to cool the batteries of the accumulators and finally was extended to the living places. The air, by means of suction apparatus, is made to pass through the refrigerating room, where it is cooled and separated from its water vapor, which is deposited in the form of brine. In the refrigerating room the air passes into circulation conductors, by means of which it circulates through all the compartments. The plant may also be operating when the boat lies on the surface of the sea with the air from the outside atmosphere passing through the refrigerating room. In large submersibles there are two plants, one for compartments forward and the other for compartments aft.

This arrangement is very useful hygienically, inasmuch as it lowers the temperature and the humidity of the air and does away with the principal cause of disturbances in confined atmosphere.

A special system of exhaust ventilation has been devised for the electric accumulators, which when charging cause the development of toxic gases, which develop, too, although in an appreciably lesser degree, when the accumulators are discharged.

The batteries are closed hermetically with air-tight covers to prevent the gases from entering the atmosphere. For greater safety, the ventilating system draws off the gases that are set free and expels them outward.

GAS WARFARE—ORGANIZATION IN PEACE AND WAR.[1]

By Maj. W. R. Galwey, O. B. E., M. C., R. A. M. C.

Gas warfare organization in the British Army at the beginning of the use of this arm was in much the same status as it was in the other allied armies. Responsibilities were divided and policies were constantly changing. Offense measures were first under a branch of the War Office. Defense appliances and troop protection fell to the Army Medical Department, in which a new section was created for the purpose. The offense had, as an advisory group, the chemical committee of the Royal Society, composed of eminent scientists, and the antigas committee, also numbering among its members prominent specialists, functioned in a similar capacity for the defense.

In May, 1915, the Ministry of Munitions was formed and took over chemical warfare problems of research and supply, but the antigas department was not transferred from the War Office to the Ministry of Munitions to become a section of the chemical warfare department until October, 1917. At this time a new advisory committee—the chemical warfare committee—was appointed. It consisted of practically the same persons who had been on the former committee.

[1] Reprinted from the Jour. Roy. Army Med. Corps, April, 1922. Abstracted by Lieut. G. H. Mankin, Medical Corps, United States Navy.

In 1916 the experimental station at Porton was placed in commission. Here were carried on the large-scale field experiments and applied research into both offensive and defensive measures. Here were studied the physiological effects of gas poisoning as well as the pathology and the methods of treatment.

Abundant proof of the wisdom of the transfer of the antigas department to the chemical warfare department has accumulated since the time that it first became evident that any divorce of defensive from offensive research was fatal to rapid action and efficiency.

At the time of the signing of the armistice the chemical warfare department consisted of the following sections:

(1) Administrative headquarters in London, with the chemical warfare and chemical designs committees attached to it.

(2) An antigas section at University College, responsible for research on defensive measures and the manufacture and supply of all antigas equipment.

(3) The Porton Experimental Station for field work and applied research on a large scale.

(4) A small-scale experimental station at Wembley.

(5) Research for special problems at universities and other places throughout the country.

Consequent upon the demobilization, the organization went through various times of stress, but was finally reconstituted in its present form. The chemical warfare department is now under the master-general of ordnance and forms a branch of the directorate of artillery. It is a joint organization, serving the needs of the three services—Navy, Army, and Air Force. It is advised on technical matters by the chemical warfare committee.

Many of the problems of defense are in the fields of hygiene and physiology, but it must be remembered that gas-defense administration is not one of medical administration.

The following constitutes the author's personal view of the minimum medical organization required in peace time if the British Army is to be prepared for a future war.

The directorate of pathology in the War Office deals more particularly with the medical aspects of gas warfare and keeps in touch with its representatives in districts at home and abroad. The assistant directors of pathology and deputy assistant directors of pathology are charged with keeping in intimate contact with all new work in physiology, pathology, and treatment which will aid in bringing about the most effective care of gas casualties. Similarly, the directorate of hygiene keeps its representatives, the assistant and deputy assistant directors of hygiene, informed of work on problems of respiration and physical efficiency which bear upon the wearing of defensive appliances. The officers mentioned above, in connection with the directorates, should be required to pass on all information in their respective fields to all medical officers and Royal Army Medical Corps personnel.

He feels that every medical officer should be required to go through the Army antigas school or through the experimental station at Porton.

As a distinctly medical problem, is mentioned the matter of disinfection of respirators. It is pointed out that there is a real danger of infection of this equipment with a variety of disease-producing germs. It is recommended that either 1 per cent Izal solution or 2½ per cent cresol solution be used as the disinfecting fluid.

Another matter of first importance is the training of stretcher bearers in first aid to gas casualties and the instruction of hospital corpsmen in the treatment of these cases, particularly in the administration of oxygen by the Haldane method to a large number of patients simultaneously.

A diagram giving the desirable antigas organization for war, which seems to lend itself to reduction to moderate simplicity, makes provision for the following:

At general headquarters, the director of gas services:
- (1) Offensive, Assistant director of gas services (with Special Brigade R. E.).
- (2) Defensive, Assistant director of gas services.
- (3) Central laboratory.

At army headquarters:
- Chemical adviser.
- Assistant chemical adviser.
  - Army gas school (two-day course for staff officers and senior regimental officers).

At corps headquarters:
- Chemical adviser.
  - Corps gas school for officers and noncommissioned officers.

At division headquarters:
- Division gas officer.

At headquarters, line of communication, under the direction of the assistant director of gas services (defense):
- Chemical adviser.
- Assistant chemical adviser.
- Base gas schools.

The medical organization consisted, broadly, of one or more casualty clearing stations for each army area, a gas center in each division, and of certain base hospitals set apart for the reception and treatment of gas casualties. It was designed that treatment should be supervised by a consultant, specially conversant with these cases, at the base, and one or more consultants in the forward areas. There was liaison between the medical and gas directorates at general headquarters, and the central laboratory for defense research had a physiologist on its staff.

The author suggests that both casualty clearing stations and base hospitals should have special arrangements for disinfection of clothing and for the administration of oxygen. He indicates the necessity for the gas-proofing of motor ambulances as well as aid posts and dressing stations in the next war, and that, further, this new form of warfare is bristling with new problems for the medical department whether on the side of protection or treatment.

He gives a diagram of a so-called gas center in a field hospital. It consists, in the main, of three long temporary buildings placed parallel to one another and connected by a walkway. Two of these buildings were fitted up as wards, one for serious cases and containing fittings for oxygen administration, the other for slight cases without oxygen installation. The third building contained the receiving, bathing, and dressing rooms. The ward for serious cases was situated between the other two buildings. The buildings present no particularly new features with regard to their interior arrangement and require no special description here.

Benjamin Henry Latrobe.

HISTORICAL.

BENJAMIN HENRY LATROBE.

1764–1820.

THE DESIGNER OF THE FIRST NAVAL HOSPITAL.

By W. M. Kerr, Lieutenant Commander, Medical Corps, United States Navy.

We pay so little attention in general to what is going forward on the scene on which we ourselves are actors that when now and then a real story, unadorned by fiction, is presented to us in the succession of its circumstances, we are apt to fancy it too full of incident and contrivance to have passed on the theater of actual life. I have more than once made this observation in reading my old journals of trivial transactions, which had very little but truth to recommend them. In this respect we are like actors of dramatic scenes, who are so engaged with their own parts that they hardly ever study the performance of others. We wait till our own act comes, and then go on, as we have accustomed ourselves to do.

I have often intended to make the recital of some of my own adventures an amusement of my leisure, but whenever I have attempted it the appearance of fiction has accompanied many of the most positive facts. Indeed, the general rage for novels, which most frequently recite very common occurrences but which we know to be invented, throws a false reflection upon every relation which at all steps out of the common road.

The practice of keeping a regular journal was recommended to me very early in life by my father, merely for the sake of writing down my ideas with ease and correctness, for he recommended at the same time that I should at the close of every year extract all the generally useful facts and burn the remainder. I have followed his advice at intervals ever since I was a boy, both in writing and burning my journals. Since my arrival in America I have in a great measure altered my plan of a diary into a collection of observations and a record of facts in which my personal interest and actions were not immediately concerned.[1] *B. H. L.*

[1] Foreword of the Journal of Latrobe.

Benjamin Henry Latrobe was the youngest son of the Rev. Benjamine Latrobe, a clergyman of the Moravian faith, and Ann Margaret Nutis, the daughter of a gentleman of Pennsylvania. The Latrobes were of old French stock, having emigrated to England from France during the persecution of the Huguenots. Miss Nutis had been sent from Pennsylvania by her parents, who were Moravians, to be educated in Germany and meeting the Rev. Benjamin Latrobe while there, they were married about the year 1755.

The childhood of Benjamin Henry Latrobe which, until 11 years of age, was spent chiefly at school in Yorkshire, was marked for his fondness for drawing, and he early attained a correctness of perception and a force and facility of delineation which are generally acquired only after years of practice. When he was 12, he was sent to Saxony, to a Moravian seminary, where he remained until he was prepared to enter the University of Leipsic where he remained nearly three years. During this time he was a diligent student and devoted himself to the acquisition of that knowledge which he believed would be useful to him in later years.

In 1785, when in his eighteenth year, he left Leipsic and spent some months in traveling through Germany. The following year he returned to England and established a residence in London. He adopted architecture and civil engineering as a profession, and concentrated all his energies upon the acquisition of practical information concerning these sciences. His father's friends in London were influential, and he gained ready access to the best society of England, forming friendships and acquaintances with the distinguished scientific men of his day. He became intimate with the celebrated Smeaton,[2] who, although retired from the active practice of his profession, gave him the benefit of his advice and vast experience.

[2] John Smeaton, an English civil engineer, was born at Austhrope, near Leeds, Yorkshire, June 8, 1724, and died there, October 28, 1792. At an early age he showed an inclination toward mechanical contrivances and when 16 he became apprentice to a philosophical instrument maker, and in 1750 set up in business on his own account. The following year he began a course of experiments on a machine of his own invention to measure a ship's way at sea. In 1753 he was elected a Fellow of the Royal Society. In 1755 the Eddystone Lighthouse was burned down, and Smeaton was intrusted with the task of rebuilding it. Operations were begun in August, 1756, and completed in October, 1759. This lighthouse remained in use until 1882, when it was replaced by a new structure. Besides improving various mathematical instruments used in navigation and astronomy, he carried on experiments in regard to other mechanical appliances, among them investigations of wind and water mills for which he received the Copley medal of the Royal Society in 1759. After this, Smeaton was employed on many works of great public utility. He made the River Calder (in Yorkshire) navigable; planned and executed the Forth and Clyde Canal in Scotland, constituting a waterway for traffic passing between the Atlantic and the North Sea. He improved various harbors: designed and erected several bridges. He built a steam engine at Austhrope, and made experiments with it to ascertain the power of Newcomen's engine, which he brought to a greater degree of perfection, both in its construction and power. Smeaton spent much of his leisure in the study of astronomy, for which purpose he fitted up an observatory in his house.

In 1788 Latrobe entered the office of Mr. Cockerell,[3] one of the leading architects of London, where his classic education, his skill with the pencil, his profound mathematical knowledge, and his acquaintance with the architectural features of the great buildings of Germany and France gave him a decided advantage over the other young men employed there. In this office he soon acquired a practical knowledge of drafting and architectural calculation, and, believing himself competent to commence the practice of his profession, he opened an office of his own. He met with immediate success and was soon appointed surveyor of the public offices in London.

In 1790 Latrobe was married to Miss Lydia Sellon. As a result of this marriage two children were born, a son and a daughter: In 1793 Mrs. Latrobe died. Her death affected him profoundly; and although he was at a period in his life when his professional relations in London offered him every inducement to remain in that city, he determined to leave England. He had taken a great interest in the new doctrines of government which were then being widely discussed. Taking the side of liberal principles, he was among those who looked to America as the scene of that great experiment in government which has since been so successfully accomplished; and as his mother had been born in America where her relatives still resided, he determined to cross the Atlantic and to practice his profession in the United States. He completed his business in England, declined the office of surveyor to the Crown, with a salary of £1,000 per annum, disposed of his property, and on the 25th of November, 1795, he left England.

On the 20th of March, 1796, after a passage of nearly four months, Latrobe landed at Norfolk, Va.[4]

After remaining several months at Norfolk, he went to Richmond, where he was employed to superintend the erection of a penitentiary which he had designed and which the legislature had determined to build. He designed many dwellings which were erected in Rich-

[3] Cockerell, Samuel Pepys (1754–1827), architect. His mother was a daughter of John Jackson, the nephew and heir of Samuel Pepys, and through her Cockerell became the representative, and inherited many interesting relics, of the great diarist. Cockerell soon rose to eminence in his profession, and in 1796–1798 he rebuilt the church of St. Martin, Outwich, London, his most important work. He also designed several large and handsome residences. One of his sons, Charles Robert Cockerell (1788–1863) became a far more distinguished architect than his father.

[4] In those days the world moved slowly. No change had yet been made in methods of transportation and communication. It took as long to travel from London to Rome as it did in the time of Julius Caesar. It is interesting to note in this connection that the nineteenth century was destined to be the period of the world's greatest progress, due to the development of rapid transportation and communication accomplished by steam and electricity, in which some of the sons of B. H. Latrobe took an active part. B. H. Latrobe, Jr., was for years the civil engineer of the Baltimore & Ohio Railroad, and another son, John Hazlehurst Boneval Latrobe, was the head of that organization's legal department.

mond, Norfolk, and Petersburg. He was employed to examine and report upon the feasibility of the construction of the Dismal Swamp Canal and the improvement of navigation of the Appomattox and the James Rivers. His services as a geologist and mineralogist were frequently in demand, and he devoted some time to a study of the geological features of Virginia. He traveled much throughout the State. His acquaintances were numerous, his talent appreciated, his society sought; ample occupation was afforded him, and he had no reason to regret the loss of the prospects which he could have enjoyed had he continued to reside in England. On one of his many excursions through Virginia he visited President Washington, at Mount Vernon, an account of which will be found in his journal.[5]

He was a great admirer of beauty, and his tribute to Miss Custis, the grandchild of Martha Washington, who had been adopted by Washington, shows his high appreciation of that lady's good looks. He writes as follows: "Miss Eleanor Custis has more perfection of form, of expression, of color, of softness, and of firmness of mind than I have ever seen before or conceived consistent with mortality. She is everything that the chisel of Phidias aimed at but could not reach."

In 1798 Latrobe removed to Philadelphia, where he designed a new building for the Bank of Pennsylvania. This building is the work which permanently established his professional reputation in this country, and his performance is all the more remarkable in that he did not have access to a single book on architecture from which to obtain the proportions of the type to which the building belongs. The vessel in which his library had been shipped to America had been taken by a French privateer, so that for several years he was without a single architectural authority and was obliged to rely solely upon his memory and his taste.

In Philadelphia he met the lady who became his second wife, Mary Elizabeth Hazlehurst, daughter of Isaac Hazlehurst, who was the business partner of Robert Morris, the great financier of the American Revolution. His marriage was a happy one and resulted in the birth of two sons, B. H. Latrobe, jr., and J. H. B. Latrobe.

Latrobe's next professional undertaking was the construction of the first waterworks for supplying the city of Philadelphia with the water of the Schuylkill by means of a steam engine, which pumped the water into reservoirs, from whence it could be distributed through the streets of the city. It was the first time that such an enterprise had been attempted in America, and Latrobe was looked upon as a visionary when he proposed the scheme. Unfortunately,

[5] The Journal of Latrobe. D. Appleton and Co., New York, 1905.

Major L'Enfant,[6] a French engineer, the designer of the plan of the city of Washington, had disappointed the people of Philadelphia in the home which he undertook to build for Robert Morris, and in the city assembly rooms, for which a large sum of money had been raised by popular subscription and squandered. The house for Mr. Morris was never finished, the incomplete structure eventually being torn down, and the assembly rooms never rose above the foundations. L'Enfant had scarcely left the city when Latrobe made it his home and attained public notice by the two works that he at once commenced—the Bank of Pennsylvania and the city waterworks. The bank building was easily understood by the inhabitants, but the city water supply was at first incomprehensible, ranking with the schemes of L'Enfant, and they believed they were justified in transferring at once to Latrobe, because of his profession and French name, all the unpopularity of L'Enfant. People were not satisfied with treating him and his designs with contempt. Personal abuse was heaped upon him. Difficulties were thrown in the

[6] On the 16th of July, 1790, an act was passed by Congress authorizing the President to appoint commissioners to survey, under his direction, a district of territory, not exceeding 10 miles square, at some place on the River Potomac, between the mouth of the Eastern Branch and Conococheague. The President, "with that consummate judgment which distinguished his career, fixed upon just the one spot in the entire range of territory prescribed by Congress which commanded the threefold advantages of unfailing tide-water navigation, convenient access to Baltimore and other large cities, and superb natural sites alike for public buildings and the varied wants of a populous city."

To prepare the plan of the future city, the commissioners appointed Charles Pierre L'Enfant to be their engineer. He had come to America as an officer in the French line in 1777, was wounded in the assault of Savannah by D'Estaing, was taken prisoner, was exchanged in 1782, became major of engineers in the American Army in 1783, was sent to France by the Society of the Cincinnati to arrange for the engraving of its gold badge, and, being accomplished in many ways, on his return he was employed, in 1789, to prepare the Old City Hall in Wall Street, New York, for occupation by Congress after the adoption of the Constitution.

Brought into notice in this way, L'Enfant seemed to be the proper person to prepare the plan for the new city; and at once proceeded, with the assistance of Andrew Ellicott and others, to execute the work. It was Ellicott who established the meridian of Washington, the intersection of which by an east and west line is marked by the Capitol.

L'Enfant appears to have had carte blanche in the matter of planning the future city; nor had Peter the Great more control in this regard, when he laid out, on the marches of the Neva, the grand avenues of the Russian capital, than the French major of engineers—who in some respects imitated him—when he traced, on the swampy ground of the Tiber, a small stream long ago diverted into the city's sewers, the plan of a city, which in the stately magnificence of its public buildings has long surpassed the city of the former Czars. When the map of the future Washington was finished and the public sales were to be effected L'Enfant refused to submit his work to public inspection; his excuse being that certain neighborhoods would be seized by speculators, and shanties run up where he designed palaces to be constructed. Such not being General Washington's view of the matter, the commissioners took possession of the maps, and L'Enfant's further services were dispensed with. In 1812, he was employed by Mr. Madison to plan a fort on the Potomac below Washington, and later Mr. Monroe offered him a professorship at West Point, which he did not accept. As an old man he wandered about the streets of Washington in peculiar dress. He died in 1825, taking his place in the ranks of the vast host of forgotten bene meritos. He was buried on the farm of William Dudley Digges at Green Hill, Prince Georges County, Md., where his declining years were spent as a guest, but his remains were removed 84 years later (Apr. 28, 1909) to a site in Arlington Cemetery in front of the Lee Mansion.

way of his procuring laborers. Injuries were done to the buildings by unknown persons. No argument could convince the public of his good intentions. Popular dislike of Latrobe advanced with the progress of the work until, when the pipes were laid in the streets and the steam engine finished, affairs became so strained that he was threatened with violence. In fact, the situation became quite melodramatic.

On the afternoon of the day when the steam engine was in readiness, by Latrobe's orders the hydrants were left open. In the middle of the night, with three friends and one of his workmen, he went to the waterworks, kindled a fire under the boiler, and set the pump in motion. Everything worked as he anticipated, and the inhabitants of Philadelphia awoke to see the streets of their city flooded by water from the gushing hydrants.

The successful operation of the waterworks established his reputation firmly in Philadelphia. With a wife and a growing family to support, he endeavored to increase his professional activities. He was engaged to survey a route for a canal to connect the Chesapeake and Delaware Bays, and shortly after the commencement of the survey he became interested in the construction of the Capitol in Washington, to which city he had made frequent visits.

As shown by his correspondence, he was thrown with the leaders of society in Washington, and the following extracts from letters written by him throw light upon the customs of the times.

WASHINGTON, *Nov. 24, 1802.*

Having employed my morning in my business I went to dine with the President. His two daughters, Mr. and Mrs. Madison, Mr. Lincoln (Attorney General), Dr. Thornton, a Mrs. Carter from Va., and Captain Lewis, (the President's Secretary) were in the party. The dinner was excellent, cooked rather in the French style, (larded venison), the dessert was profuse and extremely elegant, and the knic-knacs, after withdrawing the cloths, profuse and numberless. Wine was served in great variety, from sherry to champagne, and a few decanters of rare Spanish wine. The conversation of which Mr. Madison was the principal leader, was incomparably pleasant, and though Mr. Jefferson said little at dinner besides attending to the filling of plates, which he did with great ease and grace for a philosopher, he became very talkative as soon as the cloth was removed. The ladies stayed till five, and half an hour afterward the gentlemen followed them to the tea table, where a most agreeable and spirited conversation was kept up until seven, when everybody withdrew. It is a long time since I have been present at so elegant a mental treat. Literature, wit, and a little business, with a great deal of miscellaneous remarks on agriculture and building, filled every minute. There is a degree of ease in Mr. Jefferson's company that everyone seems to feel and to enjoy. At dinner Mrs. Randolph was asked by Mr. Carter to drink a glass of wine with him and did so. Mr. Jefferson told her she was acting against the health law. She said she was not acquainted with it, that it must have passed during her absence. He replied that three laws governed his table—no healths, no politics, no restraint. I enjoyed the benefit of the law, and drank for the first time at such a party only one glass of wine, and, though I sat by the President, he did not invite me to drink another.[7]

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[7] Practically all the letters written by Latrobe are in the possession of his descendants. An explanation of this remarkable fact is to be found in the following quotation from an address on "the Capitol and Washington at the beginning of the present century," delivered by John H. B. Latrobe before the American Institute of Architects in Washington, D. C., Nov. 16, 1881.

"The materials from which much of the foregoing has been prepared have been furnished by the letter books and portfolios already mentioned. That I should have letter books from a date that knew not press, copybooks, or manifold writers, needs an explanation that might be put into a footnote were it not connected with one who, if not an architect, was an artist, a mechanician, and a scientist, and in this way near of kin to the profession whose members are before me. I refer to Charles Wilson Peale. About the year 1802 he invented what he called 'a polygraph,' the essential parts of which were a light horizontal rod, with jointed sockets at each end to hold common quill pens. This was connected with parallel motions; one traveling on the upper part of the inclined desk, while the other was suspended from a frame above it—the two permitting the pen rod to move the width and length of a sheet of paper. Two of such sheets of paper were held flat by spring bars at their upper edges. The movement of the two pens being thus made identical, while the left-hand one, held by the writer, wrote the letter, the right-hand one wrote a duplicate original, which was placed in the desk drawer, until a sufficient number had accumulated to be bound and indexed. Of these originals I have 18 volumes, covering the period from 1803 to 1816, inclusive. Unfortunately, they form but one side of the correspondence which embraces all conceivable subjects. In my father's frequent changes of residence the other side has been lost. I do not know if there is a polygraph still in existence. If not, this notice will, at any rate, make a matter of record of a most ingenious device, the invention of one whose name is inseparably connected with the history of art in America." In a letter to Mr. Jefferson dated Oct. 2, 1803, Latrobe, speaking of the polygraph, says: "I am not yet entirely master of the motion so as to write exactly the same hand which a single pen produces; but in an hour's practice I learned to write with the same ease and rapidity as with a common pen. I doubt not you have heard of the machine, and perhaps you possess one of them. What I have written on the other side is a specimen of the truth with which a copy is made."

That Jefferson owned a polygraph is indicated by the following news item which appeared in the Washington Post of May 28, 1922. "The polygraph, with which Thomas Jefferson wrote his letters and manuscripts, has just been restored to a working condition in the workshop of the Rouss physical laboratory at the University of Virginia by the mechanical ingenuity of A. J. Weed.

"This instrument was presented to the University of Virginia in 1875 by Col. Thomas Randolph. In his letter of presentation he states that Jefferson used this polygraph during the last 20 years of his life.

"Careful measurements were made of all broken parts and new pieces were substituted in their places, but all of the original parts which could be used were cleaned and refinished.

"When closed the polygraph presents the appearance of a substantial mahogany box, 10 by 17 inches in size and 5 inches high. On opening the cover a push pin is disclosed, by pressing which the central portion of the case can be loosened from the bottom on one side and stood in an upright position with the bottom and top of the case resting flat on the table.

"Upon withdrawing a sliding bolt the writing mechanism can be brought forward. This consists of two penholders of silver mounted on a wood bar in such a manner that while they are free to be moved in any direction the motions of both are identical. This is made possible by two pantographs, one end of each being attached to the bar carrying the two pens. One pantograph controls the horizontal motion of the pens and the other controls their vertical movements. When one pen is dipped into an ink bottle the other pen makes a corresponding movement in a duplicate bottle.

"The preservation of so many of Jefferson's papers and letters is due to the fact that he used this instrument and therefore wrote them in duplicate."

In 1798 Latrobe had met in Washington Dr. William Thornton, a man of great genius, but not an architect, who had drawn the plan of design of the Capitol which had been selected by General Washington as the one to be followed in its erection. Thornton was of

English descent, born in the West Indies. He became the first superintendent of the Patent Office. He invented a paddle-wheel steamboat, and in later years accused Fulton of having wrongfully deprived him of it. When Latrobe met him he was one of the commissioners appointed to superintend the construction of the Capitol. Latrobe makes the following remarks concerning this meeting in his journal: "I spent the afternoon with the doctor. One of the first subjects introduced was the plan of the Capitol, of which he had a ground plan and east elevation. . . . With freedom, but without giving offense, I objected to both plan and elevation, and offered to give the doctor a drawing in perspective of his design which I trusted would convince him of his errors. But he never sent me the necessary materials."

In 1803 President Jefferson invited Latrobe, then in Philadelphia, to undertake the supervision of the construction of the Capitol, and he accepted the appointment to the office of Surveyor of Public Buildings mentioned in the following letter:

WASHINGTON, D. C., *March 6, 1803.*

SIR—Congress has appropriated a sum of $50,000 to be applied to the Public Buildings under my direction. This falls, of course, under the immediate business of the Superintendent, Mr. Munroe, whose office is substituted for that of the Board of Commissioners. The former post of Surveyor of the Public Buildings, which Mr. Hoban held until the dissolution of the Board (at $1,700 a year) will be revived.

If you choose to accept it you will be appointed to it and would be expected to come on by the first of April; indeed if you could make a flying trip here to set contractors at work immediately, in raising freestone, it would be extremely important, because it is now late to have to engage laborers and the quantity of free stone which can be raised, delivered and cut in the season is the only thing that will limit the extent of our operations this year.

I shall set out tomorrow for Monticello and shall be absent 3 weeks, but shall be glad to receive there your answer to this.

Accept my friendly salutations and regards.

TH. JEFFERSON.

Latrobe's first step on receiving his appointment was to examine the work that had been done and to see how far the plans yet unfinished could be carried into execution.

In his journal he says: "I called for drawings to guide my operations. The President gave me a plan, and Dr. Thornton gave me another. They were copies of each other and both perfectly useless; neither of them agreed with the work as founded or carried up, and there were no details whatever. In the superintendent's office no drawings existed. To speak plainly, the design was evidently the production of a man wholly ignorant of architecture, having brilliant ideas, but possessing neither the knowledge necessary for the execution nor the capacity to methodize and combine the various parts of a public work. In some respects the plan, as far as it indicated what was intended, was impracticable, and in all respects it was so inconvenient and often useless in its arrangements that I despaired of correcting it. However, I gave it several days of severe study, and then stated to the President that I could not undertake its execution. He consented to alterations. I proposed consulting Dr. Thornton. The President said it was unnecessary and would be useless. Having in the course of a week, however, formed and reduced to drawing all my proposed alterations, I called on the doctor, to whom I believed much to be due on the score of delicacy. I procured an interview, at which, after much argument and heat, he at last consented to admit my ideas into the plan. But the next day he called on me, and, with much irritation and using language offensive and uncivil, he recanted."[8]

Latrobe not only encountered opposition on the part of Doctor Thornton, but all who had been engaged in the work opposed him. Every effort was made to injure his reputation. If he suggested an alteration in the plans, if he pointed out a defect, if he showed the impracticability of executing a part of the design, he was sure to bring upon himself a host of assailants. Congress especially was opposed to any change in the plans that had been approved by General Washington. Several times Latrobe was on the point of resigning from his office, and was only prevented from doing so by the firm and unwavering support that on all occasions he received from the President.

Shortly after his appointment Latrobe commenced the construction of the south wing of the Capitol, of which the foundation had been already laid. The whole design of the interior of this wing is his work, the exterior, of course, was built in conformity with the design of the north wing, which was built under the direction of Doctor Thornton and which was so far completed by the year 1800 that Congress moved to Washington and occupied it.

At the time of his appointment to the office of Surveyor of the Public Buildings, the design and supervision of the construction of the buildings at the navy yard in Washington was put into Latrobe's hands at an extra compensation of $1,000 per annum. He designed the workshops and supervised all the improvements within or in connection with the yard during his residence in Washington.

[8] The result of Latrobe's visit to Doctor Thornton is best explained by the following letter, dated Feb. 27, 1804:

To the President of the U. S.

Dear Sir:—I judged very ill in going to Dr. Thornton. In a few peremptory words, he in fact told me that no difficulties existed in his plan but such as were made by those who were too ignorant to remove them: and though these were not exactly his words, his expressions, his tones, his manner and his absolute refusal to discuss the subject, spoke his meaning more strongly and offensively than I have expressed.

In Mr. Jefferson's reply, dated the following day, he says:

"Dear Sir: I am very sorry the explanations attempted between Dr. Thornton and yourself over the manner of finishing the House of Representatives have not succeeded."

The navy yard gate,[9] which was long admired for its excellent taste and the beauty of its proportion, is an example of his art. It was by reason of this appointment as civil engineer of the Navy Department that Latrobe was requested a few years later, to design the plans for the first naval hospital.

Latrobe moved his family from Philadelphia to Washington in 1807 and established a residence in what was known as the "Navy Yard House," where they resided until the spring of 1812. From notes left by one of his sons, John H. B. Latrobe, we quote the following:[10]

"My earliest recollection of my father and mother dates from the Navy Yard House. The occasion was their appearance when dressed for a 'Drawing Room' to which they were going at the President's. I remember well a tall striking-looking person, 6 feet, 2 inches high in fact, in black, wearing knee breeches and silk stockings with silver buckles in his shoes, erect as a soldier, and without being handsome in the face, of a distinguished carriage. My mother was as distinguished in her appearance as my father was in his. She was a very tall woman, five feet, 8 inches and had always been celebrated for the beauty of her figure. Her face was in no ways remarkable. She had been a leading belle in Philadelphia, and had the air of a woman of fashion of that day. On this occasion she was dressed in white satin with a long train, and wore a turban of spangled muslin with a gold crescent, fastening a heron's upright plume. They must have been regarded as a very noble looking pair.

"In addition to my father's other accomplishments he was an excellent musician, and my mother was celebrated for her voice, cultivated when she was a girl, under the instruction of the best masters in Philadelphia of that day.

"The Navy Yard House was an attractive one for the society of Washington in 1808 or thereabouts. Mr. Madison was a frequent visitor, Chief Justice Marshall, Mr. Foster, the British Minister, Mr. Serruvier, the French Minister, Madam Dushkoff, the wife of the Russian Minister, Robert Fulton, Doctor Mitchell, Gilbert Stuart, the painter.

"Another visitor was the dearest little woman in the whole world, my mother's bosom friend, Mrs. Juliana Miller, one of the most diminutive of her sex, but one of the best and truest.

"Both my father and mother were fond of society. My father was a man of great conversational powers and rare accomplishments. My mother was a brilliant talker and a wit."

A description of Latrobe is contained in the following letter written by John H. B. Latrobe to his cousin John Frederick Bateman.

[9] "The entrance to the navy yard is through a spacious gateway of hewn stone"—October 2, 1809. Recollections of Samuel Breck, edited by H. E. Scudder, Porter, and Coates, Philadelphia, 1877.

[10] John H. B. Latrobe and His Time—1803 to 1891. By John E. Semmes.

BALTIMORE, MARYLAND,
8 June, 1870.

MY DEAR COUSIN: I have forwarded to your London address a copy which I made of Reinhart Peal's [Rembrant Peale ?] very poor portrait of my father, the only merit of my work being that it is pretty nearly a facsimile.

My father was six feet, two inches in height, of erect and military carriage. In repose his face was almost dull. In conversation it was all animated and his listeners thought him handsome. His hair was very dark, with a slight wavy curl. He spoke most living languages, German, French, Spanish, Portuguese and Italian with fluency and understood most dead ones, Greek and Latin thoroughly, and knew a good deal of Hebrew; was a clever poet and an accomplished musician.

In 1811 the south wing of the Capitol was completed and the further progress of the public buildings was suspended for want of appropriations to carry them on, the approaching war with Great Britain being alleged as the reason for curtailment in the expenditures for this particular object. The work at the navy yard, however, was carried on upon a larger scale than ever.

From the following extract of a letter written by Mrs. Latrobe to her friend, Mrs. Juliana Miller, 185 Walnut Street, Philadelphia, we learn that in the spring of 1812 the Latrobes moved from the Navy Yard House to a residence on Pennsylvania Avenue.

WASHINGTON, *February 17, 1812.*

. . . We were last week at a dance given by the officers of the *Enterprize* [subsequently celebrated for her engagement with and capture of the '*Boxer*' in 1813] in the great sail loft of the Navy Yard; the insufferable smell of tar gave me a headache or I should have spent a pleasant evening.

We are about to remove from our present habitation to a larger house on Pennsylvania Avenue. We shall be very near the Hamiltons [11] and not far from the President's and what is equally agreeable, we shall be near the market and can offer you, my dear Juliana, a much better accommodation than when you were last here.

J. H. B. Latrobe, commenting on this period, cites his personal recollection of the city as it was in 1812:

Pennsylvania Avenue was little better than a common country road. On either side were two rows of Lombardy poplars, between which was a ditch often filled with stagnant water, with crossings places at the intersecting streets. Outside of the poplars was a narrow footway, on which carriages often intruded to deposit their occupants at the brick pavements on which the few houses scattered along the Avenue abutted. In dry weather the Avenue was all dust; in wet weather, all mud; and along it "The Royal George" an old-fashioned, longbodied four horse stage—either rattled with members of Congress from Georgetown in a halo of dust, or pitched, like a ship in a sea way, among the holes and ruts of the national highway. The Capitol itself stood on a steep declivity, clothed with old oaks and seamed with numerous gullies. Between it and the Navy Yard were few buildings, here and there over an arid common; following the amphitheater of hills from the southeast around to the heights of Georgetown, houses few and far

[11] Paul Hamilton, Secretary of the Navy.

between, indicated the beginning of the present city. The Patent and Post Office, in one hugh un-ornamental, barn-like brick edifice, occupied the place of their marble successors; and at the other end of the avenue, the 'White House' had become a conspicuous object with the adjacent public offices. Still following the amphitheater around the eye caught a glimpse of Alexandria and rested upon the broad expanse of water where the Eastern Branch joined the Potomac, with Greenleaf's Point between the two, on which the great tribe of the Shawnees once lit its council fires and had its fishing ground.

Additional extracts from two other letters written to Mrs. Juliana Miller by Mrs. Latrobe throw some light upon those times:

WASHINGTON, *June 27, 1812.*

The theater is nearly opposite to our present residence. They have full houses. Many of the members of Congress, never (I suppose) having seen a play, avail themselves of it. There was a terrible riot last evening, owing to the musicians refusing to play "Hail Columbia." One of them called out "Play Foster's March," upon which Sam Ringgold threw a bisket at him, and another gentleman, Mr. Howard of the Senate, caught him by the collar and dragged him over the railing. A terrible battle ensued which ended in an apology from Warner and an order to start up "Hail Columbia", which was played so long a time that most probably none of the audience will ever wish to hear it again.

WASHINGTON, *December 14, 1812.*

On Tuesday a very splendid ball was given to the Navy Officers—Hull, Morris, Stewart, etc. My husband could not be absent as he holds an office in the Navy Department, and I was not sorry we went, as it is not likely that I shall ever witness such another scene. At about five in the evening my husband came home and informed me that we must immediately illuminate our house, as the account of a victory gained by Commodore Decatur had just arrived. My house in ten minutes was prepared for lighting up, and we prepared for the ball. The avenue was very brilliant on our way to the Capitol Hill, and the company assembling, the crowd was immense. Mrs. Madison was there, but not the President. The evening went on with crowded dancing and treading as usual upon the toes and trains of those who did not dance; when about ten o'clock a loud huzza announced the arrival of young Archibald Hamilton, who had that moment appeared with the colors of the *Macedonian.*[13] He was

[13] Commodore Decatur cruising in the *United States*, a 44 gun vessel, on Sunday, October 25, 1812, in lat. 29° N., long. 29° 30′ W., sighted a large sail to the southward and eastward. The stranger was running down a little free, while the American ship was on a wind, standing towards the chase, which was soon ascertained to be an enemy. The latter having come within a league, hauled up, and passed to windward, when each party was enabled to see that they had a frigate to oppose. The stranger now wore and came round on the same tack with the *United States*, keeping away sufficiently to get within reach of her long guns, when she hauled up on an easy bowline, with her mizen-top-sail aback. At this moment the distance between the two ships a little exceeded a mile when the Englishman opened his fire. Finding the enemy on his weather quarter, Commodore Decatur delivered his larboard broadside, wore round, and came up to the wind on the other tack, heading northerly. It was observed that all the carronade shot fell short, the enemy doing very little injury by his fire.

Having passed her antagonist, the *United States* delivered her starboard broadside, and wore again, bringing her head once more to the southward, or on the same tack as the enemy, both ships steering rap full [with every sail drawing], with their mizen topsails aback, and keeping up a heavy cannonade. In this manner the action continued about an hour, the English vessel suffering heavily, while her own fire inflicted very little injury on her antagonist. At length the stranger's mizen-mast came down over his lee quarter, having been shot away about ten feet above the deck. He then fell off, and let his foresail drop, apparently with a wish to close. As the ships got near

borne into the room by many officers. Good little Mrs. Hamilton, his mother, stood by me, and was so much agitated at the sight of her son that she must have fallen, had I not stepped forward and offered her my arm. The young man sprang into her arms, his sisters threw their arms around him, and the scene was quite affecting. The colors were then held up by several gentlemen over the heads of Hull, Morris, and Stewart, and "Hail Columbia" played and there were huzzas until my head swayed. The aforesaid colors were then laid at the feet of Mrs. Madison. Oh tempora! Oh mores! This was rather overdoing the affair.

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together, the shot of the American vessel did fearful execution, the forecourse being soon in ribands, the fore and main-topmasts over the side, the main-yard cut away in the slings, and the foremast tottering. The *United States* now filled her mizen-topsail, gathered fresh way, and tacked. As the stranger was drifting down, nearly before the wind, and was almost unmanageable, Commodore Decatur had no difficulty in heading up high enough to cross his wake, which he handsomely effected, with his people still manning the larboard guns. At the time the *United States* filled her mizen-topsail, in preparation for stays, it is said that the enemy, under the impression she was about to run away, gave three cheers, and set a union jack in his main rigging, all his other flags having come down with the several spars. When, however, the American ship was seen luffing up to close, the jack was lowered, and resistance ceased.

As the *United States* crossed the stern of the English ship, the firing having ceased on both sides, she hailed and demanded the name of her antagonist, and whether she had submitted. To the first interrogatory, Commodore Decatur was answered that the ship was the *Macedonian* 38, Captain Carden, and to the second, that the vessel had struck. On taking possession, the enemy was found fearfully cut to pieces, having received no less than a hundred round shot in his hull alone. Of three hundred men on board him, thirty-six were killed, and sixty-eight wounded.

The *Macedonian* was a very fine ship of her class, mounting, as usual, 49 guns, eighteens on her gun deck, and thirty-two pound carronades above. She was smaller, of lighter armament, and had fewer men than her opponent, of course, but the disproportion between the force of the two vessels, was much less than that between the execution. In this action, the advantage of position was with the British ship until she was crippled, and the combat was little more than a plain cannonade, at a distance that rendered grape or musketry of little or no use, for the greater part of the time. The fire of the *United States* took effect so heavily in the waist of her antagonist, that it is said that marines of the latter were removed to the batteries, which circumstance increased the efficiency of the ship, by enabling new crews to be placed at guns that had been once cleared of their men. On the other hand, the marines of the *United States* remained drawn up in the waist of that ship, most of the time quite useless, though they are understood to have shown the utmost steadiness and good conduct under the example of their gallant commander, the weight of the enemy's fire passing a short distance above their heads.

The *United States* suffered surprisingly little, considering the length of the cannonade, and her equal exposure. She lost one of her top-gallant masts, received some wounds in the spars, had a good deal of rigging cut, and was otherwise injured aloft, but was hulled a very few times. Of her officers and people 5 were killed and 7 wounded. Of the latter, two died, one of whom was Mr. John Musser Funk, the junior lieutenant of the ship. No other officer was hurt.

On taking possession of his prize, Commodore Decatur found her in a state that admitted of her being taken into port. Her two principal masts were secured, and a jury mizen-mast was rigged by Mr. Allen, the first lieutenant of the *United States*, who was put in charge of her, with great ingenuity, so as to convert the vessel into a bark.

When the necessary repairs were completed, the two ships made the best of their way to America; Commodore Decatur discontinuing his cruise, in order to convoy his prize into port. The *United States* arrived off New London on the 4th of December, and about the same time the *Macedonian* got into Newport. Shortly after, both ships reached New York by the Hell Gate passage.

The order and style with which the *Macedonian* was taken, added materially to the high reputation that Commodore Decatur already enjoyed. His services were acknowledged in the usual manner, and he was soon after directed to cruise in the *United States*, with the *Macedonian*, Captain Jones, in company. Mr. Allen, the first lieutenant of the *United States*, was promoted to the rank of a master-commandant, and he received due credit for the steady discipline that the ship's company had displayed.—J. Fenimore Cooper's History of the Navy of the United States.

In the month of August, 1814, the British captured Washington and on August 24 the Capitol and White House were burned. The British intended the complete destruction of these buildings. Happily their efforts were only partially successful. The greater part of the exterior and the principal divisions of the interior resisted their efforts. The soldiers piled the interior of the Senate and House Chambers as well as the wooden corridor between the wings with inflammable material and made a great blaze. All the woodwork and some of the stone and brick work were damaged.

Latrobe gives the following graphic description of the effect of the fire: "In the Hall of Representatives the devastation has been dreadful. There was no want of materials for the conflagration, for when the number of members of Congress was increased, the old platform was left in its place and another raised over it, giving an additional quantity of dry loose timber. All the stages and seats in the galleries were of timber and yellow pine. The mahogany desks, tables and chairs were in their places. At first, rockets were fired through the roof, but they did not set fire to it. They sent men on it but it was covered with sheet iron. At last they made a great pile in the center of the room of the furniture, and retiring, set fire to a quantity of rocket stuff in the middle. The whole was soon in a blaze, and so intense was the flame that the glass of the lights was melted, and I have now lumps weighing many pounds, run into a mass. The stone is, like most freestone, unable to resist the force of flame, and I believe no material would have been able to resist so sudden and intense a heat. The exterior of the columns and entablature scaled off and not a vestige of sculpture or fluting remained."

As early as 1809, Mr. Latrobe had been asked by Governor Claiborne, of Louisiana, to ascertain whether it was practicable to supply New Orleans with water by the same means that had been so successful in Philadelphia. In 1810 he became convinced of the feasibility of the undertaking, and having been promised an exclusive concession of the water privilege, he sent his eldest son by his first wife, Henry S. Latrobe, who had been for some time in his office, to New Orleans to negotiate for the concession. In 1811 the Legislature of Louisiana granted to him the exclusive privilege for 20 years from May, 1813, the time intervening between this date and the date of the grant being considered as sufficient for the erection of the necessary buildings and machinery. He commenced the preparation in Washington of those parts of the building which could be made cheaper than at New Orleans, sending them by sea to his son who was in that city engaged in erecting the works.

The war with Great Britain in 1813 broke up Latrobe's plans. The engines for the waterworks had not yet been built nor could they be built at New Orleans, and if built, as was originally intended, in Washington, they could not be sent around by sea without the risk of capture and a great loss of time. As work on the public buildings and his salary had been suspended by the war, he determined to remove to Pittsburgh, and there to superintend the engines for the New Orleans waterworks, sending them when completed down the Mississippi. While making arrangements to carry this plan into effect he heard that Robert Fulton, with whom he had long been intimate, contemplated removing his engine works to Pittsburgh and obtaining for his steamboats the same monopoly on the Mississippi and tributary rivers that he enjoyed on the Hudson. He wrote to Fulton; the result was a combination of interests, and Latrobe in the fall of 1813, as the agent of the Ohio Steamboat Co., moved his family to Pittsburgh, and began there the construction of a steamboat which was the fourth to be launched upon those waters. When the boat was finished it was his idea to build the engines for which his son was waiting at New Orleans.

The journey to Pittsburgh was made by the family in a vehicle which, says J. H. B. Latrobe, "had been built after a design of my father's and its color was a dark olive green. It had the usual seats for four persons *vis-a-vis*, and the driver's seat was under the same roof. But instead of giving him the entire width of the seat a semicircular space in the center was surrounded with a back, elbow high, on either side of which were nooks which we children called 'nests' and which we occupied with our backs to the horses and our feet over the front seat. This gave us a capital chance to talk with David, the coachman, a jet black little fellow who drove for my father as long as the latter had horses to drive. To alleviate the possibility of one of us children falling out of the usual side door, while leaning against it to look out, my father put the door behind, making it necessary to scramble over the hind seat to get into the carriage. The curtains were of leather and were so contrived that by an ingenious arrangement of pulleys they could be drawn into the roof instead of being fastened at the edges in the usual way. In the bottom of the vehicle was a well, a good sized box that could be lifted out, its cover forming part of the floor. It was waterproof, as it needed to be when the carriage was crossing fordable streams. Our journeys from Washington to Philadelphia to see my grandfather were made in this carriage, as was the long, weary journey to Pittsburgh."

In his undertaking in Pittsburgh Latrobe was disappointed. Fulton had based his estimates upon prices current in New York, and the high cost of labor and materials in Pittsburgh exhausted the money Fulton had allotted for the project before the work was completed. The result was a breach, destructive alike to the interests of both men. As all hopes of being able to build the engines for his New Orleans works vanished, he was greatly discouraged; but as the war had ended, he was fortunate in being reappointed to his former office as surveyor of the public buildings in Washington.

While at Pittsburgh Latrobe designed several private dwellings that were erected there or in the neighboring State of Kentucky. Among the latter were the residences of Henry Clay, at Lexington, and of Governor Taylor, at Newport.

Upon receiving his appointment, Latrobe immediately went to Washington to examine the condition of the public buildings. In the summer of 1815 he returned for his family, and soon afterwards found himself once more at the seat of government. His reception here was of the most gratifying kind, and letters of congratulation came to him from all those with whom his profession had at any time connected him.

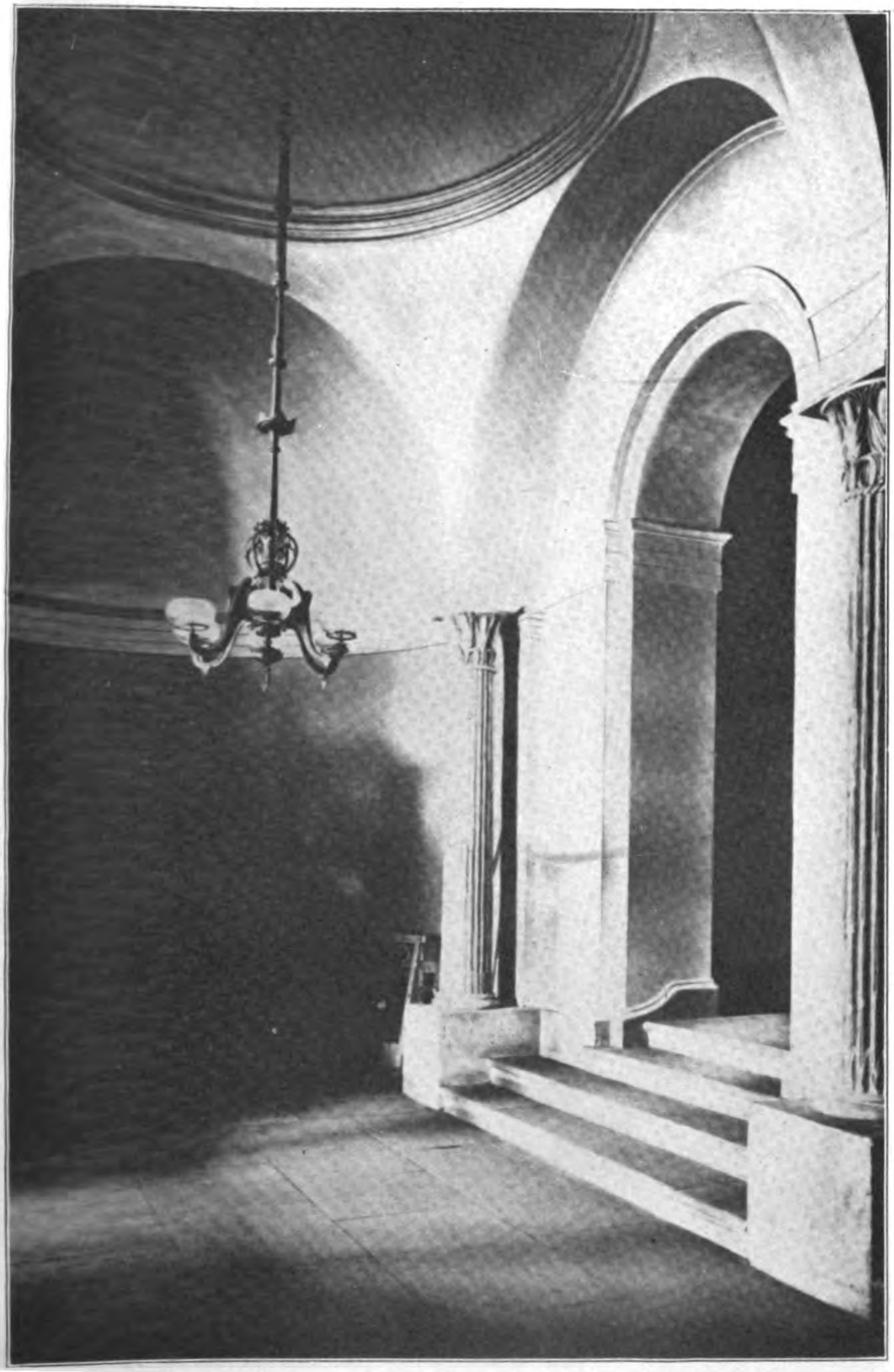
For nearly three years Latrobe devoted himself assiduously to the restoration of the public buildings at Washington and made those alterations in the interior arrangements of the south wing and north wing which the destructive fire started by the British soldiers necessitated.

The Hall of Representatives was altered from an oval into a semicircle, and the design as it is now executed is the work of Latrobe. The columns of Potomac marble are due exclusively to him. During his rambles in Virginia he observed the great quantities of this material that projected above ground in many localities, and, having ascertained that it was susceptible of high polish, he proposed that it should be used in place of freestone for the columns of the Senate and House of Representatives.

Certain of his designs display distinct originality. In the small vestibule at the east entrance to the north wing of the Capitol the vaulted roof is supported by columns representing the stalk of Indian corn with its fruit. The shaft of the column is composed of stalks of the corn bound together by a cord at the bottom. of sufficient size to form the molding of the base, and with a smaller cord at the top so as to form a proper fillet below the capital. The capital is composed of the ears of the corn with the husk or outer covering sufficiently open to show the grain within. The proportions of the columns are perfect and the effect is singularly striking.[13]

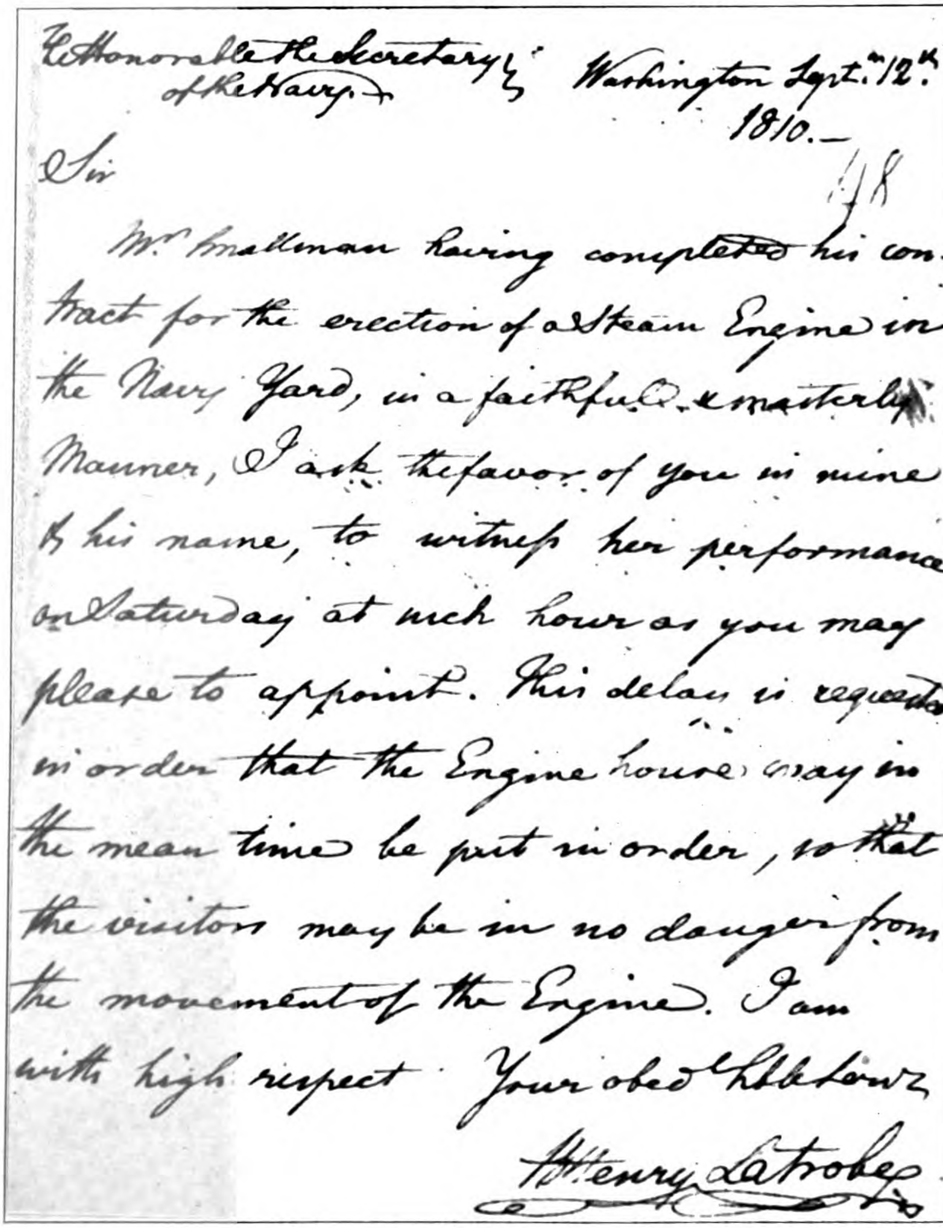
[13] The design of these columns is commonly attributed to Jefferson, but the following extract of a letter written by Latrobe to Jefferson, who was at Monticello, leaves little doubt as to the author of the design, for Latrobe would never have written such a letter to Mr. Jefferson had the latter been the originator of the design:

"Dear Sir:—I have packed up and sent to Richmond, to be forwarded to Monticello, a box containing the model of the capital of the columns of the lower vestibule of the senatorial department of the north wing of the Capitol, which is composed of ears of maize, on a short frustum, raising it about four feet from the ground. It may serve



Basement vestibule, north wing of the Capitol, showing Indian corn design.

630–1


The Honorable the Secretary of the Navy. Washington Septr. 12th. 1810.—

Sir 48

Mr. Smallman having completed his contract for the erection of a Steam Engine in the Navy Yard, in a faithful & masterly Manner, I ask the favor of you in mine & his name, to witness her performance on Saturday at such hour as you may please to appoint. This delay is requested in order that the Engine house may in the mean time be put in order, so that the visitors may be in no danger from the movement of the Engine. I am with high respect Your obedt. hble Servt.

B Henry Latrobe

The handwriting of Benjamin Henry Latrobe

The Supreme Court room and the Senate Chamber vestibule are of his design, and in the capitals of the columns of the latter the leaf and flower of the tobacco plant are used as were the ears of corn in the capitals of the columns of the small vestibule of the east entrance of the north wing.

In addition to his work on the public buildings, Latrobe is said to have designed St. John's Church on Lafayette Square.

In 1817 Latrobe received news of the death of his eldest son in New Orleans. He had made that city his permanent abode and was rapidly advancing in his profession.[14]

On the 26th day of February, 1811, a bill was passed in Congress establishing marine hospitals in the United States. This bill provided that the money accruing from the execution of an act for the relief of sick and disabled seamen should be paid to the Secretary of the Navy, the Secretary of the Treasury, and the Secretary of War, who were by this bill appointed a board of commissioners, to be known as the "Commissioners of Navy Hospitals." This money, together with the sum of $50,000, appropriated by the same bill out of the unexpended balance of the marine hospital fund, was to be

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for a dial stand; and should you appropriate it to that use, I will forward to you a horizontal dial in Pennsylvania marble of the proper size. These capitals during the summer session obtained me more applause from the members of Congress, than all the works of magnitude or difficulty that surround them. They christened them the "corn-cob capitals"—whether for the sake of alliteration I cannot tell, but certainly not very appropriately."

[14] "On October 6, 1817, Latrobe wrote to Thomas Jefferson, then at Monticello, a letter from which the following is extracted: "I have lost my eldest son after three days' illness, by the yellow fever at New Orleans. He was the pride and hope of my family. Upon him, in case of my own death, my younger children could have depended for support and education. What he was to us all, and what he promised to be to his country, may be faintly gathered from a sketch of his short life in the National Intelligencer of the 2nd or 3rd of this month."

The sketch referred to in the letter is the following:

Died at New Orleans of the prevailing fever, after an illness of only five days. Mr. Henry Sellon Boneval Latrobe eldest son of B. Henry Latrobe, Esq., of this city.

From his infancy he had given promise of eminent usefulness. An ardent desire of knowledge and an almost intuitive faculty of acquiring whatever he attempted to learn, distinguished him always from the majority of his school-fellows. To the brilliancy of genius he added a presence of mind, a civil courage, and a discretion beyond his years. . . . At 12 years of age he entered the college of St. Mary at Baltimore. . . . At 14 circumstances detained him at Philadelphia when he attended the lectures of the University, and was chosen by the late Dr. Woodhouse from the class as his assistant. Returning to St. Mary's he graduated at 16, and by his valedictory oration on the Education of American citizens. . . . he merited singular applause.

His irresistible propensity to follow his father's profession, of which he had studied both the civil and military theory, under Mr. Godefroi, prevailed to place him in his father's office, where in a short time he gained so much experience in the great public works then executing in Washington, and acquired so much influence among the persons employed that he was appointed Clerk of the Works at the Capitol by Mr. Madison, and at the same time performed all the practical duties of Engineer to the canal and to public roads of the District of Columbia.

In 1811 the supply of New Orleans with water called him to that city where he commenced the works with a spirit and intelligence that would soon have completed them had not the war interrupted them.

After the declaration of war he was engaged in the works required by the U. S. in the neighborhood of that city, and when the British invaded Louisiana, he was among the first to offer his services to General Jackson, who appointed him assistant engineer paid to these commissioners and was to constitute a fund for Navy hospitals. This fund was to be augmented by all the fines imposed on naval officers, seamen, and marines.

The commissioners were, moreover, authorized by this bill to procure a suitable place, or places, proper for naval hospitals, and, if the necessary buildings could not be obtained with the site, they were empowered to have such erected, "with a due regard to economy, giving preference to such plans as with most convenience and least cost would admit of such subsequent additions as the funds would allow and circumstances require."

In a report[15] dated February 2, 1813, submitted to the honorable William Jones, Secretary of the Navy, on work directed to be undertaken since 1803, is the following, which indicates that Latrobe prepared the plans for the first naval hospital which it was proposed should be erected in Washington.

I have been ordered by the Department to report a plan of the proposed naval hospital and having devoted to the subject very close attention, I submitted a design, report and estimates, which are, I presume, with the Commissioners appointed by law. I also attended the late Secretary to the site approved by him in this city for the erection of the buildings.

As to the Report and Plans, I have copies should the originals be mislaid. This service was considered to be a duty not necessarily belonging to my engagement with the Navy Department. All which is respectfully submitted.

B. HENRY LATROBE,
Civil Engineer, Navy Department.

In a Treatise on Marine Hospitals, by Surgeon W. P. C. Barton, United States Navy, published in 1814, the author tells of the outcome of the endeavor to establish naval hospitals.

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to Major Lacarriere Latour. Major Latour in his works mentions him in the following words:—

"That very morning, (December 28, 1818), the engineer Henry S. Boneval Latrobe had established, under the fire of the enemy's artillery, and a cloud of rockets, a 24 pounder on the left of the battery No. 1 on the line. This gun dismounted one of the field pieces which the enemy had placed in the battery on the road."

The principal engineer, Major Latour, being engaged on the first and principal line of defense, Gen. Jackson ordered Capt. Latrobe to construct a second line, between the first and the city to which to retreat in case of defeat. The manner in which he performed this duty gained him the entire confidence of the General. . . .

He had his share in the labors and glory of the 8th of January, and on the retreat of the British to their ships, he was ordered to erect such works in advance as should render their return with reinforcements impracticable. He was not then 22 years of age. Peace restored him to his civil occupations, and he projected works and buildings at New Orleans which soon gave him the lead in his profession. In 1815 he was appointed by the U. S. Government a commissioner with Com. Patterson and Mr. Duplessis, the collector, to select a site for a lighthouse, so essential to the safe navigation of the river. His design and report on that work . . . . will give to professional men a full idea of his early talents and taste. . . .

It is remarkable that, till his last illness, his temperance and activity had secured him from all sickness in the dangerous climate of New Orleans; and on the 24th of August he wrote to assure his family that there need be no apprehension on his account. A few days afterwards he fell a victim, perhaps to his security. . . .

Henry S. Latrobe was 24 years old on the 19th of July last.

[15] Miscellaneous Letters, Navy Department Library, vol. 1, 1813, No. 78.

Though two years have elapsed since the passing of this law [the bill to establish naval hospitals], the end it was intended to effect has never yet been accomplished. The talents of that able engineer, Mr. Latrobe, were employed by the Secretary of the Navy (Mr. Paul Hamilton) for the designing of an architectural plan of the buildings to be erected. This plan was admirably calculated for the erection of permanent and convenient edifices, to which, from time to time, as exigencies might require, or the hospital fund admit, additions might be made, so that when the whole was completed it would present one entire and perfect building. In this plan he had exceedingly well combined the requisite economy, so far as compatible with the ultimate object of the law, with that simplicity, elegance, and convenience, which characterize all the works of this master architect. This plan met with the warmest approbation of the secretary of the navy, but was objected to by the other two commissioners, for those qualifications which ought to have entitled it to their favorable opinion, viz., its permanency and stability. The business therefore fell through, and the whole plan proved abortive.

The great need of establishing naval hospitals at this time was emphasized by Surgeon Barton, who, in his Treatise on Marine Hospitals, says:

The time has arrived, when we must view the establishment of extensive navy hospitals, as an event by no means remote or improbable, but in fact as necessarily connected with the augmentation of the navy, and the preservation of the health and lives of the officers and seamen who compose it.

An extensive and energetick naval establishment, cannot possibly be conducted without the institution of publick marine hospitals for sick and hurt officers, seamen, and marines; and asylums connected with them, for superannuated or decrepit pensioners of the service. We have no such institutions at this time, in any part of the United States. The very inconsiderable establishments in some of our seaport towns, limited in extent, and unsystematically organized, deserve not the appellation of hospitals. In some of these there are medical officers, whose ability and experience would certainly enable them to superintend and govern very extensive establishments, if the appropriations by Congress for the building of such hospitals, were adequate to defray the expense of them. The spirit of exertion and enterprise then of these surgeons, would, if unrestrained by the necessity of such circumscribed expenditure in their operations redound very much to the interest and welfare of the service.

Every naval station in the United States, presents a noble site for the erection of marine hospitals. Those of St. Marys and Norfolk, on the southern coast; the central ones of Philadelphia and New York; and those of New London, Newport, and Boston, on the northern coast, are peculiarly well adapted for hospital establishments. The liberality and munificence of a government cannot find more worthy objects of their favour, than that class of its citizens who voluntarily expose their lives and fortunes to the most imminent perils and afflicting accidents—for the safeguard, the protection, and defence, of the honour and prosperity of our country. And when we view the present want of extensive institutions for the care of sick sailors, we cannot but hope, that the imperious necessity for their establishment, will, before long, elicit the attention of Congress; particularly when we advert to the known impolicy of such deficiencies. They are impolitick, because it is natural to suppose, that men will be deterred from entering a service, in which no sufficient provision is made for alleviating the distresses it is liable to produce.

Nothing causes seamen to discover alacrity, promptitude, and faithfulness, in the performance of their severe and arduous duties, or contributes more to reconcile them to the comfortlessness, the hazardous chances and accidents, to which they are constantly liable in the service—than a certainty of being attended humanely and ably, by the superintendents of a medical department replete with every comfort and convenience for the sick and afflicted. Every one who has had an opportunity of mixing with seamen on ship-board, must be aware of this fact. While, on the other hand, the neglects, irregularities, or inability, of the medical officers, never fail to create discontentment and disgust. In the petition to the lords commissioners of the admiralty, made by the delegates of the English fleet at Spithead, in the ever memorable mutiny that prevailed in his Britanick majesty's navy in the year 1797, when the command of the whole fleet was usurped by the seamen, in consequence of what they deemed their grievances, one of the principal articles referred to the neglect of their sick on board the ships, and the embezzlement of such necessaries and comforts as were allotted by government to their use. This alarming mutiny could not be quelled, until these grievances were absolutely relieved; and it was deemed prudent and expedient to issue new orders and instructions from the office of sick and wounded seamen, respecting the medical department, the strict observance of which was required of the surgeons. Indeed, I have myself seen, among a number of sick seamen with whom I was left in charge at the navy yard of this place [Philadelphia], where they were necessarily huddled into a miserable house, scarce large enough to accommodate the eighth part of their number—a spirit of impatience, and even of revolt, in those who were able to discover it, that was calculated to contrive the most serious injury for the service. So wretched was the hovel, and so destitute of every necessary comfort for sick persons, in the charge of which I was left with thirty patients, (although a surgeon had been between five and six years on this station) that every man who gathered sufficient strength, and was successful in getting an opportunity to effect his escape, absconded immediately.

The replies of these men, when I addressed them respecting the desertion of their comrades, were strongly expressive of their wearisomeness and impatience of such disgraceful accommodations; and their disgust and sense of grievance were uttered in terms, that convinced me the intention to desert was not confined to a few of them.

Undoubtedly Surgeon Barton's remarks had some effect on those in authority, for in the following letter we see that the Secretary of the Navy, the honorable Benjamin W. Crowninshield, evidently desired to expedite the building of the hospitals.

WASHINGTON, *January 1st, 1815.*

The Hon[ble] the SECRETARY OF THE NAVY.

SIR: The designs of the Navy Hospital, are now within a few hours of being finished, and will be presented to you tomorrow morning about one o'clock.— Having delivered the only perfect copies in my possession to Mr. Hamilton, when Secretary of the Navy, I have been obliged to make out a new set of drawings from my first sketches, and have devoted all my leisure since my late very painful illness to their completion.

Mr. Dallas requested me the day before yesterday to ask of you the favor to meet me at his office in the Treasury. If tomorrow (Friday) this favor could be granted to me, I shall be much obliged.

The designs of that part of the Marine hospital which is proposed to be first built, I have seen in possession of the Commissioners of the Navy within a few months.

I am very respectfully,
Yr. Obed. Servt.

B. H. LATROBE.

No evidence exists that Latrobe's design was ever used. The first naval hospital at Washington was established in a building rented for that purpose near the navy yard. This was succeeded by one established at the navy yard, which was discontinued in 1843, when the sick were transferred to marine headquarters. The Civil War caused these accommodations to be insufficient, and a temporary hospital was established in the grounds of the "Government Hospital for the Insane," and used until October 1, 1866, when the naval hospital on Pennsylvania Avenue near the navy yard was completed.[16]

From November, 1815, until Latrobe severed his connections with the Capitol, the records show many protests from the commissioners against the slow progress of the work and against him giving too much attention to private matters, for Latrobe had many private interests and enterprises which he was endeavoring to manage contemporaneously with his work on the Capitol. Both he and the commissioners were fretting, he, because he felt under too much restraint, and they, because he gave, according to their ideas, too little time and attention to the public work.

April 24, 1816, Congress abolished the commission of three who had been put in charge of Government buildings and authorized the appointment of a single commissioner at a salary of $2,000 per annum, Samuel Lane, of Virginia, being appointed to fill this position. On October 31, 1817, Mr. Lane made Capt. Peter Lenox, clerk of works at the Capitol against the protest of Latrobe. This appointment was the cause of Latrobe sending in his resignation to President Madison, who does not seem to have raised any objection to this action, but referred it to the commissioner, through whom it should have come.

The commissioner answered as follows:

NOVEMBER 24, 1817.

B. H. LATROBE.

SIR: Having seen your letter to the President of the United States resigning the appointment of Architect of the Capitol, I have to inform you that your resignation is accepted and to request that you will deliver to Captain Lenox all the books, plans, instruments, etc., belonging to the public in your possession.

Yours.

SAMUEL LANE,
Commissioner of Public Buildings.

[16] Notes on Naval Hospitals, Medical Schools, and Training Schools for Nurses, by J. D. Gatewood, passed assistant surgeon, United States Navy, 1893.

After the acceptance of his resignation, Latrobe removed his family to Baltimore. There he was engaged to build the Exchange on Gay Street and to supervise the construction of the cathedral, which had been started in 1805. The building of the Exchange was commenced in 1817 from a design made by Mr. Latrobe while he was in Washington. The cathedral, in point of size and solidity of execution, is his greatest work. The Bank of Pennsylvania was long considered as the most beautiful; but while it does not yield to the cathedral in taste or execution, it is of course inferior in size.

After his removal to Baltimore, Mr. Latrobe decided to go to New Orleans with a view to completing the waterworks there which had been commenced by his son and in which so much of his fortune had been invested. Leaving his family in Baltimore, he went to New Orleans by sea in 1819 and began assembling the engines which he had had built in Baltimore. In 1820 he removed his family to New Orleans, with the intention of making that city his residence until the waterworks were completed and their success certain. His work progressed rapidly. The engine and pumps were installed and in two weeks the entire work would have been done and water flowing through the streets, but on the very day that he was engaged in superintending the laying down of the pipe connecting the pumps with the Mississippi he was stricken with yellow fever and in a few days he was dead. He was buried beside his son in one of those cemeteries in New Orleans which he had described so vividly in his journal.

EDITORIAL.

YELLOW FEVER IN RETREAT.

In connection with the article on "Yellow fever in St. Thomas with special reference to its spontaneous elimination," by Lieut. E. Peterson, Medical Corps, United States Navy, which appears in this number of the BULLETIN, it seems proper to recall the remarks concerning yellow fever made by George E. Vincent, president of the Rockefeller Foundation, in his review of the activities of the Foundation in 1921. President Vincent summarized as follows the salient facts about yellow fever:

"Probably prevalent in Aztec times in Mexico and Central America; for last two centuries a dreaded scourge in Mexico, the West Indies, Central and South America, frequently invading North American ports and causing thousands of deaths in the lower Mississippi Valley; fact of transmission of bite of female Stegomyia mosquito established by American Army Medical Commission under Reed in Cuba, 1900–1901; Habana and Cuba freed from fever by Gorgas, who organized antimosquito measures 1901–2; example followed in Rio de Janeiro and Vera Cruz, 1903–1909; Panama Canal Zone successfully protected by same methods, 1904–1906; fear that canal traffic might carry disease to Far East and the confidence of Gorgas that fever could be eliminated led to appointment in 1916 by International Health Board of special commission to survey seed beds of infection; Gorgas, head of commission, recommended a campaign of extermination; during delay caused by war, Noguchi, of Rockefeller Institute of Medical Research, visited Ecuador, Peru, and Yucatan, isolated germ believed to be inciting cause of yellow fever, and prepared vaccine and serum, 1918–1920; yellow fever commissions organized in Central American countries, Colombia, Venezuela, Ecuador, and Peru; intensive campaign, 1918–1919, under Connor eliminated disease from Guayaquil, the chief endemic center; 1920, commission sent to West Coast of Africa to investigate suspected areas; with occasional outbreaks, most of them traceable to places in southern Mexico, the fever gradually gave ground; late in 1920 Mexican Government organized commission and invited cooperation of International Health Board.

"Up to the beginning of 1921 experience with Noguchi's vaccine and serum indicated that the former when properly administered affords a marked protection against attacks of yellow fever, and that the latter if it is used on or before the third day of the onset of the disease reduces the mortality in a striking way. Data reported during last year confirm these conclusions. In Peru, of a group of 50 nonimmune soldiers who were being sent into an infected district, 25 were vaccinated and 25 were left unvaccinated. Twenty of the latter group contracted yellow fever, while no case of the disease occurred among members of the former. Of 12 yellow-fever patients in Belize, Honduras, who were treated with serum on or before the third day of the attack, 11 recovered. Until yellow fever is eradicated at its sources, the vaccine and serum promise to be most valuable means of prevention and cure.

"With the entrance of the Mexican Government early in 1921 into the yellow-fever campaign the prospects of successful advance brightened. The chief remaining sources of infection were attacked. During 1921 Ecuador, Honduras, Nicaragua, and Costa Rica were not invaded by the disease. Guatemala reported no case after February 2; Salvador's last case was recorded February 15; by July 16 Peru was free, as was British Honduras in November. From northern Brazil cases were reported, but the situation was being dealt with by the Government. It was gratifying to the Foundation to be able to advance money for continuing the campaign in Peru at a time when Government funds were not quickly available. The advantages of having resources which could be immediately mobilized in an emergency were strikingly demonstrated. It was another example of the efficiency of a unified plan of cooperation. The outlook is encouraging; it is too early to proclaim a complete victory, but the purpose to push the fight against yellow fever remains steadfast."

(W. M. K.)

BUBONIC PLAGUE.

In connection with Surgeon McCoy's excellent lecture on some features of plague which was printed in the last number of the BULLETIN, it is interesting to read some remarks on plague by Dr. M. Neveu-Lemaire, which appeared in *La Presse Médicale* of May 31, 1922.

After describing the primary and secondary endemic foci of the disease and the manner in which it has affected the colonies of France in the past, the writer continues his discussion, in part, as follows:

Since the most remote times, it has been noted that epidemics of plague were always preceded by a considerable mortality among the rats of the locality. Rats are not, however, the only animals capable of harboring the bacilli of plague. Mammals which are capable of spreading the infection are sufficiently numerous. They are particularly the rodents—mice, marmots, and the spermophiles. Mammals belonging to other classes, such as the dog, the cat, monkeys, sheep, the hog, and the donkey may convey the disease. However, the great disseminators of bubonic plague are two species of rat, found in all parts of the world, the sewer rat and the black rat.

The sewer rat, *Epimys norvegicus* (*mus decumanus*), is also known by the name of gray rat, city rat, or brown rat. It is longer than the black rat; its coat is fallow gray on the back, grayish on the belly; its ears are the length of one-third of the head; its tail thick at the base, is a little shorter than the trunk. An interdigital membrane unites the claws at their base. This rat, more common than the other, originates from the Orient and, about two centuries ago, invaded the Occident following the great famines which raged in the Asiatic regions. It is very prolific and resisting, chasing the black rat before him; it lives particularly in the country and in the interior towns, inhabiting especially the sewers, cellars, and the subsoil. It is important as a propagator of an epidemic, because it emigrates readily, swims easily, and can disseminate the malady through the country from village to village and from city to city. There exists a brown or black variety *Epimys norvegicus maurus*, which must not be confused with the following species.

The black rat, *Epimys rattus* (*Mus rattus*), is known as the domestic rat or garret rat. Smaller than the preceding variety, it is distinguished by its black coat on the top, gray underneath; by its ears, longer than half its head; by its tail, slim at the base and a little longer than the trunk; and, lastly, by the absence of an interdigital membrane. Probably of Asiatic origin, it has existed in Europe since the Middle Ages, lives chiefly in the upper stories of houses, but also on ships and on docks where foodstuffs are kept. Equally as prolific, it emigrates less than the preceding species, and swims less easily. A variety of this species, *Epimys rattus alexandrinus*, which resembles in color *E. norvegicus*, although it has a blacker back and a whiter stomach, is found in certain warm regions, such as Italy and Egypt.

Plague is transmitted from the rat to man by means of the flea. The rôle which this insect plays was established in 1898 by a French physician, P. L. Simond.

Fleas are temporary parasites, and each species is generally adapted to a particular host, but the specificity of this parasitism is not absolute, and the majority of fleas can pass from one animal species to another, which explains the transmission of the malady from rat to man. In an investigation by A. W. Bacot, 34 different species of fleas were found on various rats, but these rats were not the normal hosts of the majority of the species of flea. Ordinarily about a dozen species of flea are found on rats. Among them, two species play an important rôle in the transmission of plague—*Ceratophyllus fasciatus* and *Xenopsylla cheopsis*. A flea commonly found on man, but rarely on the rat, *Pulex irritans*, can play a rôle in the transmission of plague from man to man.

"*Ceratophyllus fasciatus* is distinguished from the other two species by the presence, back of the prothorax, of a dark denticulated cape, called the thoracic comb. This flea normally lives on the rats in Europe, in India, and in Egypt; it transmits plague from rat to rat and can remain infected 45 days, according to Gauthier and Raybaud, and 67 days, according to Bacot. It seldom attacks man; therefore is not especially dangerous.

"*Xenopsylla cheopis* possesses no comb; it resembles a great deal the flea of man, even though its color is a little clearer; the presence of a bristle which is inserted before the eye is the point which differentiates it from the latter. This flea is a normal parasite of the rat in all warm regions, but it can also live and be reproduced in the temperate countries. H. Violle has observed it in great proportion in Paris on the sewer rat, even during the cold season. While it is the habitual parasite of the rat, it readily bites man and passes readily from one host to another. This species is the principal propagating agent of bubonic plague from rat to man. It remains infectious from 36 to 43 days, and the plague bacilli live in much greater number in its organism than in that of *Ceratophyllus fasciatus* or of *Pulex irritans*.

"*Pulex irritans* is man's own parasite, which can, nevertheless, be exceptionally found on various domestic animals and even on rats; it is a cosmopolitan species, abundant during the hot season in the temperate climates Its rôle in the transmission of plague from man to man is certain, although the bacilli are less numerous and live a shorter time in the flea's stomach than in that of *Xenopsylla cheopis*.

Zirolia and Verjbitsky have observed plague bacilli in the dog flea, *Ctenocephalus canis*, and they have succeeded in experimentally transmitting the malady with the aid of this insect. Verjbitsky has obtained analogous results with the cat flea, *Ctenocephalus felis*, but on the contrary, experiments made by the English commission to India with this same species have been negative. A rat flea of Asia, *Ceratophyllus anisus*, is able to transmit plague from rat to rat, but it will not bite man. Lastly, the mouse flea, *Leptopsylla musculi*, can harbor plague bacilli; and by means of it Verjbitsky has succeeded in transmitting the malady from rat to rat.

Experiments have also been made with bedbugs, *Cimex lectularius*, which is easily infected by the plague bacilli, but a large quantity of the bedbugs so infected die. In the case of the surviving ones, the bacilli multiply and the intestinal contents of the insect remain virulent at the end of 48 days. *Cimex rotundatus* acts in the same manner, according to the experiments made by Cornwall and Menon in India in 1917, and this species remains infected as long as 38 days after the bite. However, in the case of bedbugs, the development of the plague bacilli is a great deal slower than in the case of fleas and their rôle in the transmission of the plague must be very slight, if it exists at all.

As it is known that certain rats are the reservoirs of the plague bacilli, and that the fleas which they lodge, more particularly *Xenopsylla cheopis*, are the transmitting agents, it is quite simple to explain the evolution of the epizootic among rats and of human epidemics. When a rat dies of the plague, the fleas which it lodged leave its corpse and attach themselves to other rats, as soon as they find them, which they contaminate. Thus the malady among rats is spread. In the regions where plague is endemic, in India for example, the fleas have the opportunity, when rats diminish following an increase in their mortality, to bite the natives, thus transmitting the malady to them, so that the human plague is always associated with an epizootic in rats.

According to Violle, 1 cubic centimeter of plague blood contains 100,000,000 bacilli, so that one flea which bites a sick rat can accumulate probably 5,000 germs in its stomach cavity. But by what mechanism does the flea transmit those bacilli when it afterwards bites an animal or individual? By analogy with what occurs in malaria, it was at first believed that the plague bacilli could be found in the salivary glands of the flea and that they were thus inoculated with the saliva, but this hypothesis had to be abandoned as untrue. It was determined that after a flea had bitten an infected animal no plague bacilli is found in that portion of the digestive tube between the mouth and the proventricule, but they are numerous in the stomach, and the fact that they are so numerous proves that they have multiplied, but the valve formed by the proventricule prevents them normally from leaving the stomach and being inoculated through the medium of the buccal portions of the flea. It has been noted that the flea, while it bites, drops from time to time its excrement on the skin, and this excrement, containing numerous plague bacilli, is infectious. This is not, however, the most common manner of transmission. In 1914 Bacot and Martin, experimenting with *Xenopsylla cheopis* and *Ceratophyllus fasciatus*, observed that a certain number of these insects suffered from an obstruction of the alimentary canal. Later investigations demonstrated that in these cases the plague bacilli had been multiplied to such an extent in the proventricule and in the stomach that they had formed a compact mass, incapable of being evacuated. Fleas so infected are more famished than normal fleas. When they are placed on a host they suck with vigor, but the aspirated blood can not pass through the stomach. Therefore, when the effort ceases, the blood, which has been aspirated and has come in contact with the plague bacilli, is contaminated, and as it is regurgitated into the wound by force infection occurs. Regurgitation being produced many times in succession, the result is that the number of inoculated bacilli is augmented. In the case of bedbugs, the anatomical disposition of the digestive tube not permitting the blockage which has just beeen mentioned, the excrements only are infectious. Some authors admit that several bites are necessary to transmit the plague, but Swellengrebel has succeeded in infecting 43 guinea pigs out of 45 by one bite of *Xenopsylla cheopis*.

How can the appearance of an epidemic far away from the original home of the malady be explained? Let us suppose that a vessel, having been contaminated in an oriental country, arrives at an European, African, or American port. Black rats infected with plague have slipped aboard with the cargo; a great number of them have died during the voyage and their bodies have remained at the bottom of the hold; those which have survived may have left the vessel upon its unloading and may have gone to die in the market places near the docks and the warehouses, where native rats are usually found in abundance. The latter are contaminated by infected fleas which have left the imported plague-infected rats, and a veritable epizootic is started among them. The majority, frightened by the mortality among them, emigrate and take refuge in dwellings, or they in turn contaminate, through the medium of their parasites, the domestic rats living in garrets and under the roofs of houses. Fleas leave the latter, and finding no other rats to bite. the greater part of them having died and the survivors having emigrated, fall upon man, whom they contaminate. Thus have started a great number of epidemics of plague which have raged at different epochs in diverse regions of the globe.

The prophylaxis of plague, as that of yellow fever, can be efficacious, when the knowledge of the etiology which has been acquired is applied. In order to prevent plague from being spread a great distance, it is first necessary to refer to certain international measures. Each country must take the precautions necessary to prevent the scourge from spreading, and this general prophylaxis must consist, above all, in the destruction of animal carriers of virus and of the vectors of the pathogenic germ; that is to say, of the rats and the fleas. The means of deratization are many; they consist, either of destroying the rodents by means of virus, of traps, or of toxic substances, or by causing them to perish in depriving them of all that can serve as food or shelter. The destruction of fleas and bedbugs is also obtained by different processes; the insecticides most commonly used are carbon disulphide and oily substances, such as petroleum, naphtha, etc.

When an epidemic has been discovered, in spite of the precautions which have been carefully taken, the individual must then protect himself. This individual prophylaxis is especially necessary for persons called upon to administer to the sick. Besides the precautions used for all contagious maladies, one must be protected, moreover, from the bites of fleas by wearing a one-piece garment, fitting closely at the neck, at the wrists, and at the ankle, similar to the contrivances which are used by mechanics or aviators. The wearing of a mask is recognized as being the only means of efficacious protection against the pneumonic plague, and certain types of masks, used against gas during the war and conveniently modified, could be utilized to that effect. Finally, preventive vaccinations, the technique of which need not be dwelt upon here, should be administered not only to the hospital personnel and to men engaged in deratization, but to all the inhabitants of an infested locality. (W. M. K.)

ON FAULTS IN WRITING.

Not long ago, Dr. George H. Simmons, editor of the *Journal of the American Medical Association*, was called upon to give an address as president of the Chicago Institute of Medicine. He selected as his subject "Medical periodical literature," upon which he is well qualified to speak, because of an acquaintance of nearly 30 years with medical journalism. He began by reviewing the growth of the medical periodical in the United States. When Oliver Wendell Holmes was chairman of a committee of the American Medical Association on medical literature, in 1848, only 20 medical journals were published in this country. The number had risen to 230 in 1903, but it has since declined to 120. Doctor Simmons notes "a distinct change in the type of papers appearing in medical journals to-day as compared with 20 years ago. The therapeutic article of the past, replete with favorite prescriptions, often proprietary in character, has given way to scientific contributions on therapeutic methods, on pharmacology, on pathology, on etiology, on methods of diagnosis, on prophylaxis." Although the number of medical journals has decreased in late years, the volume of writing for publication has not undergone any diminution, for the *Journal of the American Medical Association* is now receiving about 1,500 manuscripts a year, exclusive of the papers submitted to the sections of the annual meeting. It seems that about three-fifths of the manuscripts voluntarily offered are returned, and Doctor Simmons devoted the greater part of his address to a consideration of the reasons for the rejection of the majority of the papers submitted for publication.

One reason for rejection is lack of space. Some of the papers received are excellent both in the matter treated and in the manner of presentation, and there is no doubt about their acceptability. Many papers are too long, but one that is informative, that presents new facts or practical information, is not returned if fairly well written, though it may be necessary, with the author's help or approval, to shorten or revise it. The question of the proper length of a paper, like Einstein's theory as to space and time, is a matter of relativity. A paper of 500 words may be long; one of 5,000 may be short. Undue length is a common fault, and Doctor Simmons finds three chief reasons for it. The first is "rambling," due to the absence of a plan, so that the author repeats himself and meanders to reach a given point. As a remedy, cross headings are recommended, not only because in a paper of any length they are of assistance to the reader, but because the task of introducing them reveals to the writer defects in the logical arrangement of his matter. If the proper beginning is not apparent, Doctor Simmons recommends the author to "go right to the subject without preliminaries; to begin in the middle if necessary; when the end is reached the difficulty of the beginning will often have disappeared.

The second cause of undue length is verbosity, which is to be remedied by revision. When revising a manuscript one ordinarily finds many words, phrases, clauses, sentences, and occasionally even paragraphs that can be struck out without detriment to the meaning. Such deletions not only save space but improve the style and help the reader.

The third fault is the tedious discussion of nonessential details. In an extreme form this fault is displayed by papers in which the author, who has a new fact or observation to make, buries it under a mass of material which often takes the form of a long historical introduction.

The real remedy for the defects which Doctor Simmons sees in paper after paper received at the editorial office of the *Journal of the American Medical Association* is, in his opinion, a more careful study of the art of writing and a thorough revision of all papers submitted for publication. In support of this he quotes Sir Clifford Allbutt's method, as described in his book, Notes on the Composition of Scientific Papers. The plan of this well-known medical writer is first to put down ideas and facts on slips of paper and sort them under headings; then to make a first draft and revise it; then a second and revise it; then a third and revise it; and then to put the whole away for at least a week "in order that the final reading may be done with refreshed attention." It may be noted that this method was also employed by Lafcadio Hearn in all his writings. Sir William Osler wrote in much the same way. During an inspection of some of the manuscripts in the Osler library, Doctor Simmons was able to trace one article through its various stages: First there were notes on odd bits of paper, evidently written at odd moments; then there was a rough outline on the paper in long hand; then the first typewritten copy, with interlineations, transpositions, and deletions; next the second typewritten copy, which had been considerably modified; and, finally, the third typewritten copy, which had been sent to the printer. "If," Doctor Simmons asks, "this is the method of the masters, what about the rest of us?" (W. M. K.)

PAINFUL BACK AND FEET.

A symptom which is most difficult to treat is pain in the back and in the feet. It is a symptom commonly encountered at sick call, especially if some distasteful duty such as coaling ship is impending, and is a condition prone to be exaggerated. Where objective symptoms, such as involuntary protective muscular spasm and periarticular swelling, are absent, advice regarding proper methods of walking and standing is all that is indicated in the way of treatment. For a patient without objective symptoms who complains that he can not perform his duties, a routine back or foot treatment which keeps him either flat on his back in bed or occupied with an intensive course of corrective exercises should be prescribed. The malingerer, or rather the exaggerator, as most of them are, tends either to progress rapidly toward a cure or to a request for return to duty. In a case of this sort, if the condition proves to be more serious than at first it was believed to be, no harm has been done by this treatment; and if the patient be a malingerer, it will serve as a warning to others appearing at sick call with similar motives.

Pain in the back and in the feet comprises the principal complaint of a large majority of patients seen in orthopedic consultation and often occurs in both localities in the same patient, which in itself suggests some associated etiological factor. If organic disease can be ruled out and there is no history or evidence of definite trauma, the condition may be due to faulty posture resulting from lack of muscular tone, actual muscular weakness, overweight, or habit—as walking with the toes turned out. A healthy adult instinctively stands correctly if there is nothing to prevent him doing so. The aborigines never were instructed in the proper methods of walking or standing, yet the posture was such that we can profitably study it and learn much therefrom concerning correct bodily mechanics. Faulty posture is often the price paid for civilization.

Where muscles are inefficient, either from misuse, lack of tone, or weakness, the erect posture is partially maintained by ligaments primarily intended for another purpose. Pain, which is nature's warning that something is at fault, is the result. If this warning be disregarded, nature calls into play a protective spasm of the muscles about the affected part which stiffens the joint and enforces rest. It is the primary function of ligaments to maintain the structure and relation of the elements constituting the joint in opposition, and to limit the extremes of motion; therefore, when the erect position is maintained without the proper use of the muscles, the individual must employ the ligaments to a certain extent for this purpose. This explains the abnormally acute curve in the lumbar spine and the everted foot often seen in individuals complaining of pain in the lumbar region and in the feet.

In the erect posture, the lower portion of the spine and the tarsus are most affected by gravity when there is a general lack of tone to the muscular system. Less weight is carried above the lumbar spine, and what is carried is supported at a better advantage, as the spinal column is more vertical. The other joints entering into the maintenance of the erect posture are the hips and knees, both of which have a greater excursion of motion in locomotion, thus, temporarily at least, relieving the strain from the ligaments which on standing or sitting are not held at their extremes of motion. This explains the frequency of symptoms in the spine and tarsus.

In the treatment of these conditions the cause of the muscular relaxation must first be investigated. Frequently the lack of muscular tone is only a manifestation of a general atonic condition. The patient is often one who is not making a success in life, is somewhat overweight, has possibly a transient glycosuria, and is not particularly active. When the cause of the atonic condition has been determined, one should endeavor to relieve the affected parts from strain by the prevention of weight bearing, after which nature can be assisted in her repair of the damage done by such an agent as physiotherapy.

When all evidence of strain has disappeared, exercises without weight bearing should be begun in order to mobilize the affected joints as much as possible. Instruction in the proper mechanical use of the body should be given the patient at this time in order that, after all symptoms of strain have subsided and the stiffened joints have been mobilized, he may know how to hold himself erect and walk properly when weight bearing is finally permitted.

Exercises with weight bearing are then to be taken up in an attempt to strengthen the weak muscles. These should not be confined solely to the muscles affected, although most attention should be directed toward them, for, if the tone of the general musculature can be improved, the delinquent muscles will be more apt to respond. The use of such apparatus as back braces and foot braces should be discouraged in these purely postural cases except as an aid to maintain the proper posture until the patient can retain it himself. (J. W. W.)

ON THE PREVENTION OF CARDIAC DISEASES.

In late years much effort has been devoted to the prevention of tuberculosis and infant mortality, and now the prevention of diseases of the heart and of the circulatory system is beginning to claim its share of attention.

Statisticians have disagreed as to whether or not diseases of the heart and of the circulatory system have increased during the past several decades, but there are in the United States a great multitude of persons in various age groups afflicted with such disease. It has been stated that if it were possible to bring together every person in the United States in whom cardiac disease had been definitely diagnosed, we would assemble sufficient cardiacs to equal or possibly outnumber the population of the city of Chicago. If we were to add to this number the persons in this country who suffer from arteriosclerosis or from chronic renal disease, we might have a cardio-nephritic population larger in size than that of the city of New York, which is now estimated at 5,753,151. An average of 2 per cent of the persons examined by life-insurance companies are rejected each year because of a variety of organic heart defects. In connection with the examination of men who were drafted into military service in the recent war, it was reported that of 2,400,000 examined 5 per cent showed organic cardiac defects.

The rôle which heart diseases have played in causing poverty and adversely affecting the lives of entire families because of the crippling of the wage earners is difficult to estimate, but it no doubt constitutes a very substantial and serious factor in the social lives not only of the several million suffers from these diseases but among their dependents as well. The studies of various men recently published indicate the necessity of more intensive study of a number of occupational groups which are particularly subject to industrial hazards. Dr. Louis I. Harris, who has contributed to the *Nation's Health* recently several articles dealing with the prevention of cardiac disease, believes that such special occupational studies would reveal a very much higher percentage of cardiac defects in a number of industries than was found to prevail among insurance applicants or men drafted into military service. There is fairly definite evidence that in men employed in the iron and steel mills, especially when their work brings them in close proximity to the various types of furnaces or processes which subject them for comparatively long periods to high temperatures, the incidence of myocarditis is considerable. It would be of great value to learn more about the prevalence of organic disease among stationary and marine firemen, as well as to determine from among the great mass who are commonly designated as "laborers" the relation of physical strain or exposure to excessive heat and other factors present in the various occupations of the laborer, to the development of organic cardiac disease. Unfortunately for science, the Navy can throw little light on this point because of the comparatively short time a fireman remains at this arduous work—promotion soon separates him from the coal shovel and slice bar—but the point is worth keeping in mind.

It is definitely known that heart diseases result from focal infections, also from the various infectious diseases, as well as from perverted functioning of various organs possessing internal secretions. Cardiac and arterial diseases are most intimately related to syphilitic infection. Among the commoner causes of organic heart disease one finds a variety of toxic agents incident to faulty metabolism or to lack of care as to personal hygiene and toxic agents arising as a result of various diseases as well as those that occur in industries. Long-continued physical strain is an important factor.

In an indirect way, mental and nervous strains, excesses of various kinds, as well as other factors in the home or industry which induce fatigue may act as indirect causes of cardiac disease.

Preventive medicine is particularly concerned in the early recognition of cases in which any one of the numerous causes may have operated to produce damage upon any part of the heart or the vascular system, so that such persons may be shielded from these causes and those preventive measures applied which are appropriate to meet the problem of reducing the incidence of cardiac diseases at the various stages of life.

In instituting preventive measures, education of the masses must be conducted with energy and consistency, and it must be education of a character that shows in terms of dollars and cents that it pays to safeguard the human machine. A great deal will be accomplished when people can be persuaded to submit to periodic medical examination. Special study must be given to the question of the protection of adolescents, as it is during this period that vital changes are being effected in the human organism. Special attention must be given those recovering from infections or other diseases which predispose to cardiac disease, and to those who are recovering from acute cardiac disease or cardiac breakdown.

Encouragement should be given to the establishment of workshops for cardiacs so that work of a suitable character, done under proper medical supervision, could be performed by those having cardiac defects who are under compulsion to be self-supporting. There is need of factory medical inspection of the most thorough kind which will appraise the harmfulness of the various industrial factors in their effects upon the heart.

The short work day should be encouraged wherever severe muscular exertion or other factors producing marked fatigue may be found in the industrial environment. It is extremely important to warn those with a tendency toward the development of diseases of the heart and of the circulatory system against the reaction of mental strain, worry, rush and bustle, unrestrained zeal and ambition, and of the far-reaching effects which they produce directly or indirectly upon the vascular system and upon the heart.

Last but not least, provision must be made for the control of cardiac disease during childhood.

The foregoing constitutes more or less an epitome of the tentative program of the Department of Health of the City of New York for the prevention of cardiac diseases, which program promises in time to reduce the rate of prevalence of organic heart disease in that city just as tuberculosis and infant mortality have been reduced.

(W. M. K.)

IMMUNITY AGAINST MEASLES.

Although in the year 1921 there occurred only 26 deaths among 1,694 patients originally admitted to the sick list in the Navy for measles, the death rate in civilian communities, especially among children under 6 years of age, is high; in fact statistics show that it equals the death rate from smallpox before vaccination was introduced. The introduction of vaccination by Jenner in 1796 was an epoch-making event in the history of preventive medicine and, as we all know, the practice has brought about a diminution in the incidence of smallpox. According to the *Lancet* for March 25, 1922, it seems that we may be on the eve of a similar turning point in the prevention of measles, as Dr. Rudolf Degkwitz (*Deutsche medizinische Wochenscrift*, January 5, 1922) has found it possible to confer immunity by the injection of serum from a patient convalescent from measles.

Doctor Degkwitz's observation, however, is not new, for Nicolle and Conseil (*Bull. de la Soc. Med. d. hôp. de Paris*, April 12, 1918) used serum from a child, the first case of measles in a family of four children. Two of the other children were not treated, but a child 2 years of age was given serum from the first case taken on the seventh day of convalescence and 10 days after the first symptoms. The other two children developed measles in three or four days, but the 2-year-old escaped infection, although exposed to the first child and later to his two brothers who had developed the disease. Richardson and Connor (*Journal American Medical Association*, April 12, 1919) also report experiments in passive immunity on six children who were protected against measles by intramuscular injections of the serum of a patient convalescent from measles.

In the March number of *Medical Science*, Dr. J. D. Rolleston reviews the literature on this subject up to Degkwitz's latest article in which he gives his conclusions based upon the inoculation of more than 1,700 children. As we all know, the prodromal stage of measles, before the initial rise of temperature and malaise make their appearance, is highly infectious, and it is impossible to detect and isolate infected cases early enough to prevent the spread of the disease. By the time the diagnosis is made, all nonimmunes who have been in contact with the patient may have been infected. Degkwitz has proved that by inoculation of a small quantity of serum derived from a convalescent patient, all the contacts can be protected completely or to such an extent that they only develop the disease in its mildest form.

The success of the inoculation depends upon the time in the prodromal stage when it is given and the amount of serum injected. The earlier in the incubation period the child is inoculated, the smaller will be the dose necessary to protect him, and vice versa, until a stage is reached when if the inoculation is postponed too long no amount of serum will produce immunization. Up to four days from the date of infection, 2.5 cubic centimeters of the serum is sufficient to protect a child under 4 years of age from measles. This dose Degkwitz calls the unit of protection. On the fifth to sixth day, 5 to 6 cubic centimeters, or two units, will be necessary. On the seventh day much larger doses will not afford certain protection, and on the eighth day inoculation is useless, as even large doses, 30 cubic centimeters, neither prevent the onset nor influence the course of the disease. According to Degkwitz the usual period of incubation is four days; and applying the data given above, he advises the following routine:

If in a case of measles the rash is just appearing, all children who have been in contact with the patient should be immediately inoculated with 2.5 cubic centimeters of serum from a convalescent patient and they will be protected. If the rash is already 24 to 48 hours old, 5 to 6 cubic centimeters must be used to protect the other children. In both cases the immunized children may safely be allowed in the room with the patient. If the rash is 72 hours old, 8 to 10 cubic centimeters of serum should be given, and in all probability about two-thirds of the contacts will be protected.

No ill effects of inoculation have been observed by Degkwitz, who is always careful to exclude syphilis or tuberculosis in the donors. His results have been uniformly good within the limits stated. The question of the duration of the immunity is still uncertain; 33 days is the shortest observed, but more than a year has been reached in other cases.

Degkwitz's work opens a field for experimentation. Immune human serum is difficult to obtain on a large scale; therefore it is highly desirable that an immune animal serum be developed, which might be produced in any quantity required, and it would be of value to extend these experiments to adults with a view to reducing the incidence of measles among them. (W. M. K.)

ON FILARIASIS.

It is well known that white people may live for long periods of time in tropical countries where filariasis is quite common without apparently contracting the disease. This in contrast to other mosquito-borne diseases, such as malaria, yellow fever, and dengue, to which the white man is so susceptible. Francis, of United States Public Health Service, has presented a few concrete facts that primarily explain how mosquito transmission is accomplished with much less degree of certainty and promptness in filariasis than in yellow fever and malaria.

1. The microfilaria does not multiply in the mosquito.

2. Only a small number of microfilariæ are imbibed by the mosquito when sucking blood, and a still smaller number finally reach the proboscis.

3. Multiplication of the filarial parasite takes place in the lymph gland of man and must be deferred until a male and a female find lodgment within the same gland and there grow and develop their genital organs preparatory to bringing about a fecundated adult female parent worm, permanently located in that lymph gland.

4. Maximum opportunity of infecting mosquitoes with filariæ is limited to a few hours around midnight.

5. The microfilaria is not injected by the mosquito into the blood stream of man, but deposited on the skin, which the larva must penetrate to find its way to the nearest lymph gland.

6. A comparatively small number of larvæ find their way to the proboscis of the mosquito; a certain number pass into the hind gut and are lost; and of those that pierce the stomach wall and lodge in the thoracic muscles where the necessary larval changes must take place, only a small number finally find their way to the proboscis.

The life of an infected mosquito is probably shortened by reason of harboring the worms.

From above facts it is readily seen that a large number of mosquito bites are necessary to bring about the favorable conditions needed for propagation of the worms in men with subsequent appearance of microfilariæ in the blood.

Culex quinquefasciatus (syn. *fatigans*) has been proven to be the most successful vector of this disease. She is a night mosquito and hence bites at a time that is most favorable for infestation. This factor undoubtedly has some bearing on the epidemiology of the disease, in that the contact between the filaria-infested native population and the white residents at this time is the least, the latter usually residing in separate sections of the city or colony. This is vitiated, however, to a certain degree by the fact that *C. quinquefasciatus* is a strong flier. With regard to the rôle of other mosquitoes as possible transmitters, both *Stegomyia pseudoscutellaris* and *S. scutellaris* are proved vectors. Flu, of Batavia (Dutch East Indies), recently succeeded in infesting two anophelins, *Myzomyia ludlowi* and *M. rossi* Giles. A large number of larvæ perished in these mosquitoes, however. *Aedes colopus* has never been proven an efficient host of *Filaria bancrofti*. Francis found that *Microfilaria bancrofti* taken into the mosquito's stomach did pierce the stomach wall in limited numbers and lodge in the thoracic muscles, but there they died as microfilariæ without development into the larval stage.

In discussing the various accepted factors having bearing on the spread of filariasis, Flu points out that Batavia is a most suitable place for such a spread, but that some other factor or factors undoubtedly must be responsible for the rather small incidence of infestation in Batavia (from 2.3 to 15 per cent, according to the location of the various districts) when compared with that of other countries where the incidence varies from 10 to 90 per cent. Flu believes that the relatively low figures obtained at Batavia are due to the transient character of the population. These transients serve as traps for the filaria, absorbing a large portion of the larvæ from the infected mosquitoes, thus reducing the chances of infection among the settled population.

Maxwell has recently published a rather exhaustive study of filariasis in China. In the infected areas of that country this disease plays a large part in diminishing the working capacity of a considerable number of the manual workers and in rendering many of them altogether incapable of work. The geographical distribution of the disease in China is, according to Maxwell, rather sharply defined, forming a belt along the coast 15 to 25 miles broad, from the Yangtse River to the Tonquin border, with a tendency to extend up along the various river valleys. The infective index in this area is about 25 per cent. Most of the islands off the coast are infected, but not heavily. The author finds that the causative agent is nearly exclusively *Filaria bancrofti.* He gives a large array of clinical manifestations, which do not differ, however, to any marked extent, from those of other countries where such heavy infestation is present. Of particular interest is what Maxwell describes as filarial hemoptysis—hemorrhage from the lungs occurring in patients with filarial infection, correlated in time with an attack of filarial fever, with or without manifest evidence of lymphangitis. In some of the cases the author found the microfilariæ in the expectorated blood; tuberculosis was excluded as far as was humanly possible. Another rare complication of filarial infection was gangrene of the scrotum. The author has seen eight such cases and finds that the condition is ushered in by a sharp attack of fever, accompanied by redness and swelling of the lower half of the scrotum. In a few days the lower half of the scrotum became black and comparatively dry, and if left to itself gradually sloughed off. (E. P.)

CLINICAL NOTES.

BRONCHIAL ASTHMA IN A CHILD APPARENTLY CURED BY INTRAMUSCULAR INJECTION OF PEPTONE SOLUTION.

By R. H. LANING, Lieutenant Commander, Medical Corps, United States Navy.

There was noted in the Year Book of General Medicine, 1921, an abstract of an article by A. G. Auld, of London, England, relating to the curative results obtained in cases of bronchial asthma, particularly with children, by the injection of peptone solution. At the time, being interested in a case of severe bronchial asthma in a 9-year-old boy, I suggested to his mother that she allow me to give him this treatment, in as much as thorough tests performed by an eminent Boston authority had failed to reveal any anaphlyactogen sensitization which could have caused the condition.

The abstract above mentioned is as follows:

This article presents extended results of the treatment of asthma by the use of peptone, by A. C. Auld, of London, England.

These results are based on a fairly large number of patients, all of whom received treatment for more than a year previous to the time this article was written. The method of immunizing depends on the type of case; no reaction appreciable to the patient should follow the injection (intravenous), and the latter should be made slowly.

The treatment has been instructive in respect to the grouping of asthmatic cases. Two main groups occur, which show no tendency to pass into each other. One group comprises such patients as quickly respond to the treatment, and in whom the effect is more or less lasting, the recurrences being infrequent and milder in character. The other group is resistant, and is subdivisible into such patients as are totally resistant and those in whom by careful immunization the disease may be largely overcome.

The first group presents, as a rule, most of the following characteristics: General good health, little family predisposition, limited duration of the disease though a variable factor, regularity in the recurrence of attacks, freedom from bronchitis, and emphysema.

Brief records of two patients in this group are cited. The first was a man 22 years old, who had suffered for four years. After seven injections the attacks began to yield, and ceased entirely after the tenth. The second patient was a woman 37 years old. She had suffered from asthma for four and a half years. After eleven injections she remained quite free for five months, when the disease returned in a milder form. Another short course of treatment was given, and during the next year she had only three slight attacks.

The author states that no one responds better to the treatment than children. In them he makes the injection into the spinal muscles, basing the practice on an observation by Meltzer, that the venous arrangements in these muscles are such as to cause the absorption of the medicament to approximate more to an intravenous injection. Witte's peptone must not be used, Auld says, as it may cause a severe local reaction. Most other varieties, however, are innocuous in this respect. The same dose as that used intravenously for an adult should be given, but in double concentration.

Bronchitis complicating asthma in a child is not the bar to treatment which it presents in an adult. None of the children hitherto treated has been refractory.

In discussing Group 2 a few observations are given regarding cases which resist the treatment. They include nearly all those individuals with chronic bronchitis and developed emphysema, and cases presenting any degree of cyanosis, even without bronchitis; also those in whom, apart from the asthmatic paroxyms, a more or less oppressed condition of the respiration is practically never absent. As a rule, the affection has lasted many years, dating from childhood, or from the age of puberty, and a family history of asthma can nearly always be elicited; sometimes hay fever is also found. Often the only effect that can be produced in such cases by means of peptone—and it has very important bearing—is the complete suppression of the attacks for a short period by a mildly toxic dose. For two or three weeks the patient for the first time experiences complete relief and thinks a cure has at last been attained, only to be sadly disappointed. The dose of peptone necessary to affect this desensitization must be carefully considered in relation to the individual case, and should produce, in from one to two hours, headache, malaise, shivering, slight rise of temperature, sickness, with pain in the abdomen and diarrhea. Sometimes a herpetic eruption occurs about the mouth or is even more widespread.

In regard to immunization in difficult cases, there are two, if not three, necessary considerations presented:

The first is the rate of injection of peptone and its dilution; the second is the peptone to be used, and the indication afforded by the dermal reactions as the case proceeds. If the patient takes the peptone well, larger doses may succeed, given by very slow injection to avoid reaction. If the patient is sensitive to peptone, however, great care is required, as the larger dose given in this way may precipitate an attack of asthma. Rarely this occurs very quickly—in a few minutes—with concomitant flushing of the face, especially if Witte's peptone is used, which seems to contain a toxic ingredient not present in muscle peptone. Again, a mixture of peptones sometimes succeed best. The dermal reaction (which may be prolonged by a Von Piquet borer) is not of much value at the beginning, as nonasthmatical subjects may give it, and it varies considerably in different persons, but as immunization proceeds it ought to lessen, and finally disappear; that is, show no distinction from the control made with the solution in which the peptone is dissolved. Experience proves that the immunizing injection should never reach the critical point; it only injures the immunity mechanism. As a general rule, also, there ought to be three clear days between each injection.

In the large number of cases of asthma treated by the author during the past three years the patient's diet has been largely a negligible factor. The diet must, of course, be regulated, but the cutting out of certain articles rarely produces any marked or lasting effect. No doubt there are cases, but they form a small class, in which idiosyncrasy exists in respect to some particular food (which may be entirely carbohydrate). The same applies to asthmas caused by animal or vegetable emanations. Again, the dyspneic attacks in bronchitis may be due to the products of bacteria locally. But in the great majority of genuine asthmatics the explanation is rather to be sought in a defect in the hydrolysis, or metamorphosis of foreign protein residing in the digestive organs or in the lymph or the body cells. To this protein poison the asthmatic individual is sensitive, and the bronchial muscles contain the dominant receptors for it. This sensitiveness may be either hereditary or acquired, and is influenced by climatic and other environmental conditions. This leads one to consider the likelihood of other organs or tissues behaving in a similar manner, and causing recurrent fulminant disorders in which no local gross lesion is discoverable. The fact that in animal experiments the protein poison or a foreign protein selects different organs in relation to the species may be of some significance in this connection.

The family history of the boy is somewhat significant in that his father and paternal grandmother have been more or less constant sufferers from "catarrh," and in that one maternal aunt and one maternal uncle have been sufferers from asthma. Most of the deaths in the family appear to have been from pneumonia.

Outside of chicken pox and influenza at the age of 5 years, the boy has been healthy, except for bronchial asthma and its attendant emphysema. The story of his asthma, according to his mother, is as follows: When the child was 7 weeks old, he developed a condition diagnosed at the time as bronchitis, which diagnosis was later changed at the age of 4 months to bronchial asthma. The asthmatic attacks appear to have had no relation to food or to the seasons and used to come on approximately every two months or so. The attacks might be mild or frightfully severe, lasting three or four days, and were typical in character. As time went on these attacks tended to become more and more severe and to occur at shorter and shorter intervals, until, finally, in the summer of 1921, they were recurring every 10 days or so, giving the child no chance to recuperate between attacks. At the age of 6 years he had had his tonsils removed, and had been given a thorough physical examination, including laboratory and X-ray procedures and skin tests with numerous foreign proteins, both pollens and food, with no results, except that after the tonsillectomy there was a short period of freedom from the asthmatic attacks.

The peptone treatment as described in the above abstract was started the latter part of August, 1921, and prior to it a thorough physical, laboratory, and X-ray examination was given the boy with no abnormal findings except that he possessed a markedly emphysematous chest, a mildly cyanotic appearance of the face, and was somewhat below normal weight. Nine injections of Fairchild's peptone were given three days apart into the muscles of the back in the following manner: $\frac{1}{2}$ c. c. 5 per cent peptone; $\frac{1}{2}$ c. c. 10 per cent peptone; 1 c. c. 10 per cent peptone; $1\frac{1}{2}$ c. c. 10 per cent peptone; 2 c. c. 10 per cent peptone; $2\frac{1}{2}$ c. c. 10 per cent peptone; 3 c. c. 10 per cent peptone; 3½ c. c. 10 per cent peptone; 4 c. c. 10 per cent peptone. The peptone solution was made up fresh each time, autoclaved and filtered through cotton under aseptic conditions. After the first four or five injections, there was marked tenderness and pain at the site of injection, starting three or four hours after the injection and continuing for six or seven hours altogether, with slight fever and increase in the chest râles; the symptoms following the last three injections were very mild. Eight months have now elapsed since the treatment was given and to date there have been no signs of asthmatic recurrence except for one attack 12 hours after the last injection. The boy's mode of life and surroundings, as far as can be ascertained, have been the same since the treatment as before it. He has lost the mildly cyanotic hue which he used to possess, and has put on considerable weight. He still, however, displays the signs and symptoms of emphysema, but there has been a remarkable improvement in his facial and physical appearance from that of a delicate child to that of a robust one.

A CASE OF ABSCESS OF THE LUNG.

By W. H. Funk, Lieutenant, Medical Corps, United States Navy.

H. W. F., C. B. M., U. S. N., age 32, on the sixth day of his illness, was received at the Shanghai General Hospital, Shanghai, China, with a broncho-pneumonia, following a severe attack of influenza of two days' duration. Physical examination showed extensive involvement of the right middle and lower lobes, and slight involvement of the left lower lobe. Maximum temperature varied from 103° to 101° F. with an evening rise of 2½° to 3°. By the thirteenth day of the disease, the left lung had entirely cleared up, while the right lower showed patchy areas of consolidation. The patient began to have severe drenching sweats and septic temperature on the twentieth day. Needling of an area close to the spine showing increased dullness, faint tubular breathing, and diminished transmission of voice sounds, resulted in a dry tap. The cough, which previous to this time had been loose with slight muco-purulent expectoration, had become paroxysmal in type and nonproductive.

Eight days after there was a spontaneous expectoration of about 200 cubic centimeters of purulent foul-smelling fluid of a greenish tinge. Improvement, both subjectively and objectively, was very marked for a few days following. However, by the thirty-first day the temperature had again become septic, reaching 103° F. in the afternoon. During this time the lung signs were clearing up except for the area close to the spine which previously had been needled. Exploratory thoracentesis in this region again yielded a dry tap.

After four days of septic temperature there was another spontaneous expectoration of a large amount of purulent foul-smelling fluid. Relief was not so marked as that following the previous emptying. On the forty-second day there was the third and last spontaneous expectoration of 200 cubic centimeters of a sero-purulent foul-smelling fluid. Three days after, temperature dropped to normal and remained so. A slight mucoid expectoration quickly disappeared. The patient made a very rapid convalesence and was discharged from the hospital to his home on the fifty-fourth day of his illness.

Several X rays showed a uniform increase in density over the entire right lung. Sputum examination was repeatedly negative for tuberculosis, with staphylococci, streptococci, and diplococci always in abundance. The white-blood count gradually rose, reaching its highest mark, 37,800, a few days before the second expectoration and fell to 8,000 four days after the last expectoration.

The diagnosis of abscess of the lung was made on the spontaneous expectoration of large amounts of pus on three different occasions. In no case did this immediately follow a coughing spell. In the patient's own words, "It just started flowing out of my mouth." This second expectoration was brought about by the patient lying in bed, so as to give considerable gravity effect. Operation was considered, but deemed inadvisable after consultation because of the lack of exact localization. Open-air stimulative treatment was employed throughout the latter half of the illness. Therapeutic lying over the side of the bed gave no results. Although the patient had a markedly septic temperature, with frequent drenching sweats, he retained his strength in a surprising manner. Convalesence was rapid.

Examination on discharge from the hospital showed slightly roughened breathing and diminished transmission of breath and voice sounds over the right lower lung in back, close to the spine.

UNUSUAL LOCATION OF AN EXTRAGENITAL CHANCRE.

By W. T. Brown, Lieutenant, Medical Corps, United States Navy.

While extragenital chancre is not an uncommon finding, the occurrence of one located on the eyelid is possibly infrequent enough to warrant a report of the case.

H. M., private, United States Marine Corps, was admitted to the Shanghai General Hospital with a diagnosis of blepharitis of the right eye, which condition had existed for about six weeks and had gradually progressed in spite of careful treatment.

Inspection revealed a slight erosion of both lids at the inner canthus, extending over the caruncle, with an area of swelling and redness of the surrounding skin about the size of a dime. The conjunctiva was slightly congested. The patient experienced no discomfort except from the troublesome epiphora which was present.

The medical officer transferring the case suggested that the ulcer might be a chancre, and this diagnosis was confirmed by finding the *Spirochaeta pallida* in the scrapings from the ulcer. The day after admission a well-marked enlargement of the lymph nodes on the affected side, along the mandible and neck, was noted and a generalized macular rash appeared.

The blood Wassermann was four plus.

The primary lesion healed quickly during the subsequent treatment, with no deformity remaining.

BENIGN TUMORS OF THE MALE BREAST.

By J. D. BENJAMIN and T. C. QUIRK, Lieutenants, Medical Corps, United States Navy.

Three cases of tumor of the male breast have appeared on this station during the past year. Two of these cases have been operated upon and the third is now under observation. A diagnosis of adeno-fibroma was made from specimens sent to the laboratory of the United States Naval Medical School in each case.

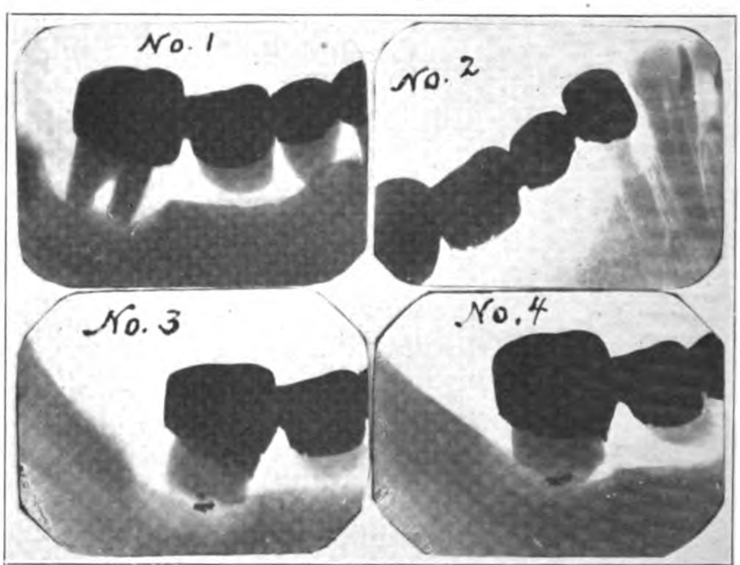
J. V. D., aviation machinist's mate, was admitted to the sick list on June 1, 1921, with a tumor of the breast. This mass was completely excised under procaine. No reoccurrence of this mass has been noted.

D. H., aviation metalsmith, was admitted to the sick list on January 9, 1922, with a small mass in the breast. This mass was apparently completely excised under procaine on that date. On March 31, 1922, this man appeared at the dispensary with a reoccurrence of the same mass. It was again excised, a mass the size of an orange being removed. Examination of this mass again revealed it to be fibro-adenoma.

B. P. B., aviation carpenter's mate, was admitted to the sick list with a tumor of the breast on April 14, 1922, and is now under observation.

These cases are reported because, although tumors of the male breast are not rare, it seems unusual for a tumor of the male breast when apparently entirely excised and reported as benign to reoccur twice as large in as short a period as three months and the second laboratory report to again show a benign tumor.

The masses were not adherent but were hard, fibrous, nodular, nonvascular. There was no lymphatic involvement, no capsule, nor any retraction of nipple. They were superficial and freely movable.



Showing condition before and after Doctor Bryant's method of treatment.

A DENTAL HINT.

By Emory A. Bryant, Lieutenant Commander, Dental Corps, United States Navy.

It sometimes happens that a patient presents himself for treatment with a bridge in which the abutment tooth at one end has decayed inside the crown owing to disintegration of the cement, allowing the crown to become loose and the tooth structure to decay to such an extent that only the roots of the crowned tooth are left in the alveolar process. Usually these roots are in such bad condition that extraction is necessary. Such a condition leaves the bridge with only one abutment to assist in mastication. This soon becomes loose, owing to the loss of the sustaining structure of its accompanying abutment, and the denture becomes a menace to the health of the patient as well as a source of great pain and discomfort.

This condition is usually found in lower bridges, and the usual abutment affected is the posterior one, due, as a rule, to inability to keep the abutment tooth dry while cementing the bridge in place. The cement soon washes out, and if the bridge is not at once removed, repaired, and recemented, the tooth structure dissolves, the bridge loosens, and soon becomes painful.

The methods I have devised to meet this condition vary with the case in hand, but for illustration I will consider a bridge from the lower bicuspids extending back to the twelfth-year molar or the wisdom tooth inclusive, with the tooth structure dissolved, the roots only remaining under the abutment crown of the posterior abutment tooth. If the roots are solid in their socket and have been filled to the apex, previous to original crowning, all that is necessary to do is to open through the cusp of the crown, cutting out nearly all of the gold cusp, to enable removal of all the softened structure down to a solid base on the remaining roots, insert in the root canals one or two of the screw posts of the smaller sizes and screw tight, take a piece of plate gutta-percha, soften and press down over the screw heads in such a manner that they project above the gutta-percha for at least an eighth of an inch; then fill in the crown with amalgam, forming the cusp anew and carving to suit the case. When the filling is hard, finish up all projecting gutta-percha or amalgam at the gum margin, and the denture will again be as useful as the original structure.

This case is one of the more ordinary kind remedied by a simple method. In some cases not only the structure of the abutment tooth is destroyed, but the roots are loose in their socket and usually abscessed. The procedure in this variety is the same as in the other until all the débris is removed. The next step is to extract the diseased roots from under the crown, taking them out laterally so as not to disturb the bridge from its original position. After the bleeding has been stopped, swab out the wound with phenol on cotton, followed by iodin used freely. Remove, by bur or curet, the septum of bone usually between the roots of a lower molar in such a manner as to leave a depression or socket at this point; again swab out as before and press down through the opening at the top of the crown cusp, a cone-shaped piece of gutta-percha, packing it as far down in the wound from which the roots have been extracted as it will go without bulging around the gingival margin of the crown and continuing to pack in gutta-percha until the crown is filled flush with the top and forming the cusp. Local application of a counterirritant around the gum margin is made and the patient is told to return in two or three days. When he returns, the inflammation has usually disappeared. The case is now ready for the permanent operation, which consists of replacing the gutta-percha cone with a reproduction of it made from a porcelain tooth, cusp downward, into the depression and held in place by amalgam filling inserted around the part projecting up into the crown and forming the cusp. The placing as well as the formation of the porcelain base of the abutment is rarely the only difficult part of the operation, but it is not a complicated procedure.

The case illustrated from X-ray radiographs before extraction of the roots and after insertion of the porcelain base is one of several cases which I have handled by this method. Figure 1 is a view of the bridge with the roots incased by the abutment crown as presented before extraction of the worthless roots and showing considerable loss of bone. Figure 2 presents the anterior abutment of the same bridge, which shows that but half of this root had any surrounding bone structure. Figure 3 shows the porcelain base in place two weeks after the extraction of the roots. Figure 4 presents the same view after the period of one month. Attention is invited to the area of bone replacement shown in Figures 3 and 4.

The patient informed me that after the first week he felt no inconvenience whatever when using the bridge for mastication; in fact, he said it did service as well as the original bridge.

SOME INTERESTING DENTAL CASES.

By G. C. Fowler, Lieutenant, Dental Corps, United States Navy.

Osteoma of superior maxilla.—Patient, male, aged 23 year. Examination revealed a large hard bony mass of tissue on the outer border of the alveolar process of the upper right maxilla. X ray showed this mass of tissue to extend from the first bicuspid posterior to the mesial border of the third molar, and slightly below the normal gum margin to the attachment of the buccinator muscle, protruding half an inch outward or laterally, and extending inward toward the median line, practically filling the right antrum, and projecting into the nasal cavity. No enlargement of the hard palate was noticeable. The dark field illumination showed dense tissues on the right side. The left side was normal.

There was slight retraction of the lip on the right side, which was very prominent on smiling. There was no pain to pressure. The hard tumor mass was rounded and immovable, and had never caused any discomfort. It was first noticed by the patient about two years ago, but being painless and not uncomfortable no attention was paid to it by him. The family history was negative to growths of any kind.

The first molar was missing, and there was a loose, ill-fitting bridge on the second molar extending to the second bicuspid and pressing slightly, about one-eighth of an inch, into the gum. Both teeth were vital, with a slight thickening of the peridental membrane at the apices.

Conservative treatment was deemed advisable and operative procedures were postponed for the present. It was decided to wait until the tissues healed after the irritating bridge and teeth had been removed and to watch for future developments. The treatment consisted of removing the bridge and teeth involved, under local anesthesia, and taking an impression of the maxilla, including the tumor and surrounding tissues, as a control for future impressions.

The tissues healed without difficulty. One month later another impression was taken and by careful measurement it was shown that the tumor had decreased in size. The patient was sent to duty and informed that he should observe the growth and report when practical to have impressions taken, in order that careful observation might be made of the condition.

Diseased teeth as possible cause of rheumatism; removal of unusual impacted molars.—Patient, male, age 28 years, suffering from rheumatism, was referred by ward doctor for possible focus of infection. Radiographs taken of all teeth showed several rarefied areas and the impaction of the upper molars. Under conductive anesthesia all teeth that showed rarefied areas were removed; also the impacted molars. The rheumatism cleared up so that the patient was able to do light duty in about three weeks after the teeth had been removed. Prior to removal of the teeth he had been unable to move about without the aid of crutches for three months.

Considerable space existed between the upper left second bicuspid and third molar. The first molar was lost when the patient was about 10 years old. He stated that he was about 17 years old before he erupted the third molar. The third molar extended buccally, giving considerable curve to the roots, forcing the lower molar to strike on its lingual surface of the crown, causing considerable pain at times.

Under conductive anesthesia the third molar was extracted, and on examination of the socket the crown of the second molar was discovered, and it was also extracted through the opening made by the previous extraction. The socket was cleansed daily and in due time healed without difficulty. Strange to state, the impacted molar did not penetrate the antrum of Highmore.

ADDITIONAL ASSURANCE FOR THE FIT OF A DAVIS CROWN.

By C. T. Lynes, Lieutenant, Dental Corps, United States Navy.

In the fitting of a Davis crown, it has appeared to me that to grind a crown and root so that they are perfectly adapted to one another is an impossibility. If you carefully observe the ground surfaces of both under a powerful glass I think that you will agree with me that it simply can't be done.

There are several methods of overcoming this point, mainly by cast base construction, but even with this method the line of union between the crown and the root is not minutely perfect.

That the following method is lasting is evidenced by the fact that the first Davis crown that I set by the use of this method is still intact after 10 years service.

1. Grind root and crown and fit post according to the usual method.
2. Cement the post into the crown.
3. Apply a bit of base-plate gutta percha, cut to the shape of the root, over the pin. (The hole for the pin to slip through can be readily made with the rubber dam punch.)
4. Heat the crown and post, with gutta-percha in place, over an alcohol lamp. Place the pin in the root and press to as near the proper position as possible. Remove the whole appliance from the root, trim the surplus gutta-percha from the edges of the crown, reheat, and again apply to the root. Repeat this until the crown attains its proper position and a perfect union is accomplished. Seal the edges of the gutta-percha to the crown.
5. Cement the finished product to place.

This method not only produces a perfect union between crown and root, but it also establishes a base that acts as a cushion for the crown, thus prolonging the life of the root.

The numberless cases of fractured teeth, where the line of fracture extends above the alveolar process, can also be treated by this method, the gutta-percha being trimmed so that no irritating surfaces result.

REPORTS.

A REPORT ON THE NARCOTIC CONTROL ASSOCIATION OF CALIFORNIA.

By W. G. FARWELL, Lieutenant Commander, Medical Corps, United States Navy.

The first State-wide narcotic conference in the United States was held on October 27, 1921, when the Narcotic Control Association of California was organized in San Francisco. More than 1,000 prominent Californians interested in the control of drug addiction were present at this meeting, which was opened by Mayor Rolph; addresses were made by doctors, lawyers, Federal, State and municipal officials, civic and religious workers—all of whom appeared to be impressed by the growing but insidious evil of drug addiction and the necessity for stamping it out.

James A. Johnston, warden of San Quentin Prison, was elected president of the association, and the following resolutions were adopted:

(1) The organization of a central State body and provisions for the formation of county organizations throughout California to work in conjunction with the State association.

(2) Provision for the memorializing of the President of the United States, the National Congress, and the Department of State, whereby the provisions of the International Opium Congress at The Hague may be better enforced and the unlawful importation of crude opium and coca leaves be prevented, as well as the stoppage of the unlawful sale and distribution of narcotic drugs throughout the world.

(3) Provision for the amendment of the Harrison Narcotic Act, whereby a minimum penalty of not less than six months' imprisonment nor less than a $500 fine shall be imposed upon first offenders, and whereby immediate deportation, upon completion of sentence, shall be made of all alien violators of the Harrison Act.

(4) Provision for strict Federal surveillance of all manufacture, sale, and distribution of narcotics.

(5) Provision for more drastic legislation in California against the drug peddler.

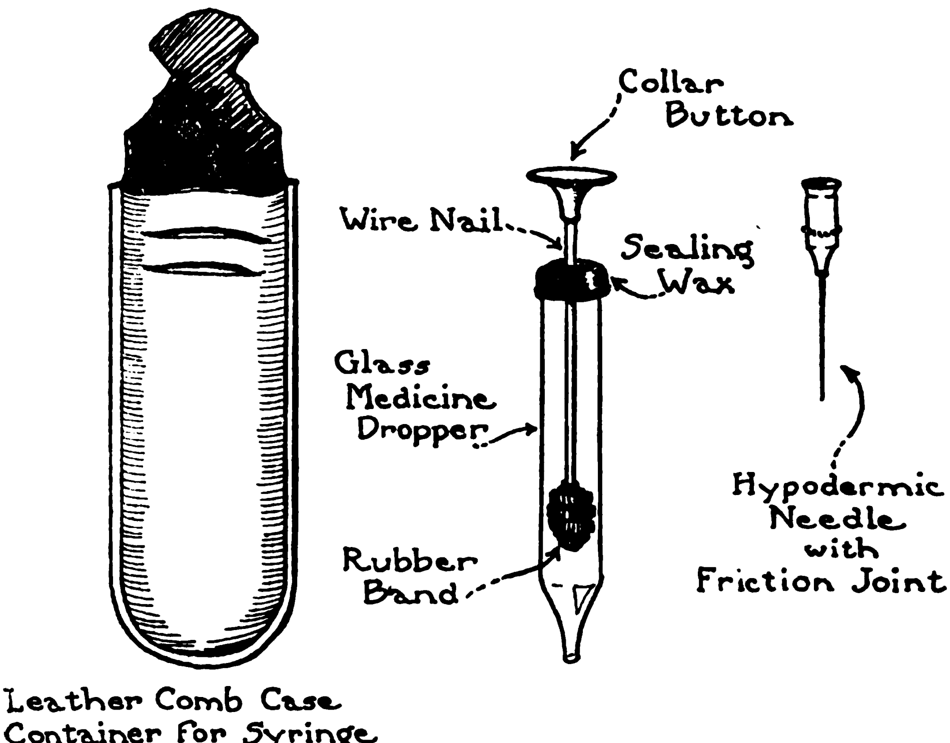
The writer was detailed as the naval representative at this conference and gave a brief address upon drug addiction in the Navy, which may be summarized as follows: While there has been a general increase in drug addiction in recent years, the fact was brought out that this habit is not as prevalent in the service as in civil life because of the following conditions:

(*a*) Recruits are given a thorough physical examination at recruiting stations and later at training stations, which often eliminates advanced cases of drug addiction.

(*b*) The close associations and the military discipline required in the Navy tend to expose a drug addict sooner or later.

(*c*) The fact that naval vessels move from port to port takes the addict away from his source of supply, and frequently results in

HOME-MADE HYPODERMIC SYRINGE



desertion, or occasionally in his coming to the medical officer, confessing, and begging for a "shot."

However, as drug addiction has unquestionably increased of recent years, particularly in large cities, and as the majority of recruits are obtained from this source, every effort is being made to discover and eradicate these characters from the Navy, where they have increased proportionately of late. When drug addicts are found in the service they are promptly court-martialed and receive a "bad conduct" discharge. During the past year, of the ten thousand and odd men that passed through the naval training station at San Francisco only 11 drug addicts were found. These cases were discharged and turned over to the police in San Francisco, who immediately freed them, as there were no civil charges against them. This is a situation that requires better cooperation between the civil and naval authorities, not only in San Francisco, but in other coastwise cities, as these addicts, when released from the Navy, congregate in the large towns where narcotics are easily obtainable and swell the constantly increasing number of dope fiends in these communities.

If the police control of drug addicts was made more stringent, and suspected cases could be kept under surveillance until definitely diagnosed, when these cases appear at recruiting stations they could be turned over to the police, instead of being merely turned away from the recruiting stations to become foci for the further spread of this dread habit, as is the case at present.

While it may appear at first glance to be a cruel and inhuman act to discharge drug addicts from the Army and Navy without trying to cure them, it must be remembered that the military service is in no sense a reformatory, and exists only for the military protection of the citizens of the country; any condition that would lower the fighting value of a military organization must be promptly eradicated.

In order to show the extent to which drug habitués will go to get their "dope," the following incident was mentioned: A Navy enlisted man was recently arrested in San Francisco for some minor offense, not connected with drug addiction, and lodged in one of the city jails that contained a number of drug habitués. One of the "dopes" became friendly with the sailor and persuaded him to write to a certain address in the city requesting that a shirt be sent to him. In due course of time an ordinary woolen shirt arrived at the jail and, after being carefully examined by the warden, was delivered to the sailor, who unsuspectingly turned it over to the drug addict. Soon after, the jail authorities noticed that many of the prisoners were under the influence of a narcotic; investigation showed that the shirt had been soaked in a saturated solution of cocaine, and after its arrival in the jail cut up in small pieces, distributed among the addicts and soaked in water to remove the cocaine, with the result that as one of them told the warden, "They didn't care how long they stayed in jail!"

Another instance of the ingenuity shown in obtaining narcotics was the recent case of an enlisted man in the destroyer flotilla of the Pacific Fleet who was discovered receiving cocaine concealed beneath the stamps of letters addressed to him.

The homemade hypodermic syringe shown in accompanying illustration, which was found in the possession of a drug addict at the naval hospital, Great Lakes, Ill., was then demonstrated to the members of the association.

NOTES AND COMMENTS.

Readers of the BULLETIN who have enjoyed the essays on subjects pertaining to the history of medicine contributed to its pages by Capt. J. S. Taylor, Medical Corps, United States Navy, will be pleased to learn that his essays on "Montaigne and Medicine," which appeared recently in serial form in the Annals of Medical History, have been issued in book form by Mr. Paul B. Hoeber, of New York.

The book which bears the title "Montaigne and Medicine" contains Montaigne's comments on the physic and physicians of his day; his thoughts on many material matters relating to life and death; an account of his bodily ailments and peculiarities and of his travels in search of health, all written in Doctor Taylor's charming style.

It is dedicated to Dr. Hiram Rittenhouse Loux, of Philadelphia, "who ministers with consummate skill to forms of suffering for which there was no relief in Montaigne's day."

During four trying years Doctor Taylor, as editor of the BULLETIN, labored in the interest of the officers of the Medical Corps of the United States Navy, and we feel certain that each of them will wish him all success in his latest literary venture.

One of the most enlightening papers on the chronic effects of suffocating gases which has come to our notice appeared in the May issue of the *Journal of the Royal Army Medical Corps*. Its author is Capt. Alexander Mearns, Royal Army Medical Corps. Lieut. G. H. Mankin, Medical Corps, United States Navy, has prepared the following abstract of this paper for readers of the BULLETIN:

Chronic effects of the inhalation of suffocating gases may be exhibited for a variable length of time after convalescence in those who have been subjected to a so-called severe gassing in the field or elsewhere, and also in those who, though never having undergone an acute gassing necessitating treatment, yet have been subjected to a slight intoxication or an absorption of noxious fumes more or less continuously for some time, as occurs among those working in industrial plants. The gases responsible for the effects studied by the author are those of the suffocative series—chlorine, phosgene, chlorpicrin, and trichlormethylchloroformate.

The cases were divided into two main classes—first, those with physical signs and symptoms indicative of organic changes, and, second, those in whom no such changes are found and are described as functional.

As might be expected, the respiratory system shows the greatest degree of change. This change, in general, results in three types, each with its separate symptomatology and pathology.

(*a*) *Fibrotic type.*—This condition is often seen as a sequel to an acute gassing, but much more frequently among workers in industrial plants with only a history of continual light absorption of gas, and seems chronic from the outset. Usually the onset has been insidious, and only after the symptoms become well established could the physical signs indicate the exact condition of the lungs, which was revealed as a fibrosis at the hilum of the lung, spreading along the bronchi and vessels.

Symptoms.—Shortness of the breath on exertion is the first symptom in cases unaccompanied by bronchial catarrh, while in others the symptoms resemble those of a chronic catarrh. The peri-bronchial fibrosis once having been established, the main symptom is a dry, unproductive cough, often paroxysmal, worse in the morning, the expectoration varying with the associated catarrh. Due to minute varicosities in the capillaries of the bronchial wall, there is frequently blood-stained sputum, or even small hemorrhages. Shortness of breath, orthopnoea at night, faintness on exertion, general deterioration in health, loss of weight, and associated digestive disturbances are noted in greater or less degree. Occasionally cardiac symptoms, such as palpitation, retrosternal pain, and tachycardia occur, and are usually accompanied by sweating, irritability, and vague feelings of depression. There is an increased susceptibility to acute colds and influenza. Night sweats are uncommon.

Physical signs.—The most constant sign is the shallow type of breathing, which becomes dyspneic on exertion. On percussion, areas of impaired resonance, often amounting to almost absolute dullness, are found over the hilum of the lung, particularly on the right side. These areas vary with the extent of the fibrosis and spread in the direction of the bronchial tubes. Vocal fremitus and resonance are increased over these areas, and the type of breathing is bronch-vesicular, with slightly prolonged expiration. There is impaired ventilation, loss of elasticity of the chest wall, and a restriction of the movements of the diaphragm. The restriction of the movement of the diaphragm is not functional, but probably defensive, as the taking of a deep breath gives rise to pain and cough. X-ray examination shows areas of shadow which correspond to the thickened areas revealed clinically. These thickened areas spread out from the hilum into the lung like a fan and coincide with the distribution of the bronchi, bronchioles, and blood vessels.

As far as could be learned the previous history of the cases recently examined contained nothing which would obviously predispose to lung disease.

With regard to the changes that actually occur, there is a progressive peri-bronchial fibrosis extending from the hilum of the lung outward, in advanced cases, to the ultimate distribution of the bronchioles, with or without associated bronchitis and emphysema. There is also a loss of elasticity in the whole of the respiratory tract, due to a loss or destruction of the elastic fibers throughout the lung.

Evidence of anoxemia in several of the recent cases has been proven by the beneficial effects of a sojourn in the high oxygen chamber, though the effects soon passed off, and also by the effort syndrome symptoms frequently associated, which have been shown to be largely due to oxygen want. Considering the large number of workers who do not develop this condition, it is evident that the inhalation of the gases is only one element in the production of fibrosis, that individual susceptibility must function in its occurrence and a low-grade bacterial infection institute or continue its development.

(*b*) *Emphysematous type.*—The existence of emphysema after gassing in cases with no history of previous lung disease is usually associated with or is a sequel to the other two types—fibrotic and bronchitic. The respiratory and cardiac symptoms, the physical signs in the lungs and heart, in no way differ from those observed in cases of emphysema from other causes, except in the rapidity of onset.

(*c*) *Bronchitic type.*—Most of the cases of supposed tuberculosis following gas inhalation are of this group. The symptoms and signs are so suggestive of tuberculosis that diagnosis can only be made after careful examination.

Symptoms.—These are, in the main, similar to those of bronchitis—cough, expectoration with or without hemorrhages, marked loss of weight, transient fever, shortness of breath, and general deterioration of health. Examination of the chest reveals bronchitis râles generalized or localized to certain areas, harsh vesicular breathing, and impaired resonance on percussion. Physiological examination in these cases shows a permanent lowering of the respiratory exchange and consequent deficiency in respiratory functions. The symptoms described resemble so closely those occurring in chronic and subacute tuberculosis of the lung that the relation of gas poisoning to this disease has been considered, especially in view of the apprehension originally entertained. Several thousands of gas cases have been examined for the frequency of tuberculosis by many clinicians, whose reports are of especial interest. The conclusion that presents itself after the study of these papers is that the inhalation of gas has an extremely small influence on the occurrence of tuberculosis, but that in a few cases it may light up a focus of infection previously latent.

The other possibility, namely, whether acute gas poisoning creates a condition in the lung predisposing or favorable to the development of tubercle, finds a tentative answer, at least, in the work of Achard upon guinea pigs. Among the cases recently examined no tubercular disease was discovered.

Digestive system.—Digestive troubles traceable directly to the action of gas are extremely few, though various symptoms indicative of atonic dyspepsia are to be observed upon occasion, but these gradually disappear after a period of a few months. Where they do persist, two factors in their causation are evident, the general weakness and malnutrition consequent on want of oxygen and, probably more important, the absence of the massaging effect of the diaphragm due to its restricted movement.

Cardiac system.—No organic lesions have ever been traced directly to gas poisoning, though changes in the heart, hypertrophy, and dilatation naturally follow on the lesions of the respiratory tract described.

Sequellæ with no organic lesions.—Especially among the "lightly gassed" we find a group of cases wherein little can be noted clinically to account for the symptoms. The anoxemia and symptoms that are present, and which may last for a considerable length of time, yield to the treatment of a sojourn in the high oxygen chamber, thus showing that they are not due to any gross physical change, but constitute a definite gas neurosis. The severity depends upon the "instability" of the individual, and is probably largely preventable. The use of oxygen is considered to be the proper form of treatment for this type of cases.

In conclusion the author states that "it has been shown that there are two types of sequellæ to inhalation of asphyxiation gases. (*a*) A type affecting primarily the respiratory system with definite progressive organic changes of the nature of a peribronchial fibrosis, emphysema, and pseudotuberculosis. (*b*) A type of gas neurosis, having the signs and symptoms allied to those of effort syndrome, without demonstrable organic changes."

Recently a letter was received by the Bureau of Medicine and Surgery from a medical officer who desired to know if the bureau wished a strict compliance with article 1139 of the United States Naval Regulations which states that "the medical officer shall not give an unofficial certificate of ill health or of inability to perform any duty."

It appears that this officer, who is on duty at the dispensary of a large navy yard, frequently receives requests for certificates of disability from injured yard employees in order that they might receive compensation from various lodges, benevolent societies, and relief associations, and that the refusal of these certificates, in accordance with the regulations, at times, submitted an injured workman to an injustice, inasmuch as his medical attendant was prohibited from giving him the certificate necessary in adjusting his claim for compensation.

The bureau forwarded the correspondence to the Judge Advocate General for a decision as to whether article 1139, United States Naval Regulations, 1920, applies to employees of a navy yard.

The decision of the Judge Advocate General may be gleaned from the following extract of a letter from the Judge Advocate of the Navy to the Chief of the Bureau of Medicine and Surgery:

"Article 1139 of the United States Navy Regulations, 1920, prohibits medical officers from giving unofficial certificates of ill health or of inability to perform any duty. It is the opinion of this office, however, that this article of the regulations merely defines the relation of a naval medical officer to other individuals in the naval service and does not apply to the relation of a naval medical officer to civilians employed in navy yards or naval stations under the jurisdiction of the Navy Department.

"This office is, therefore, of the opinion that *requests for certificates from the civilian employees of navy yards or stations to enable them to receive compensations from lodges, benevolent societies, and the yard relief association may be properly unofficially granted.*"

The impression is quite general that the white race does not thrive in the Tropics.

Not long ago an article appeared in a London paper advocating restricted admission of the colored races to tropical Australia on the ground that whites can not live and labor in the Tropics. About the time it was published an article appeared in the *Medical Journal of Australia* describing what has happened to whites who have resided for several generations in the Dutch East Indies. It is not generally known, says the *Living Age*, that families of Teutonic blood have been actually living for five or six generations in Holland's tropical possessions. Some of these have retained their white blood pure; others have mingled with the natives.

The author of the article, Doctor Elkington, of the Commonwealth Health Department, describes the history of nine families of Dutch ancestry sprung from settlers who took up their abode upon the island of Kisar in 1767. After the Dutch garrison withdrew from the island, these families remained behind, intermarrying with the natives, relapsing into heathenism, and losing all memory of the Dutch language. During the eighties the Government became aware of the existence of these people and tried to help them, with the result that they have been rechristianized and won back to civilization. Doctor Elkington reaches the conclusion, by studying these white or part white denizens of the Tropics, that they have maintained their mental and physical traits substantially unchanged after five or six generations.

These characteristics have survived in spite of environmental conditions and associations lasting over 60 years, from 1819 onward, and probably for some 70 years or more, which are generally supposed to be totally unsuitable for persons of European stock. These conditions have included native standards of food and food supply, endemic malaria, the psychological effect of what must have been for the earlier generations an acute sense of abandonment by their own race, life under the rule of native chiefs, constant association with a native race of low mentality, loss of European language and European religion, interbreeding to a high degree, and constant exposure to a tropical climate.

There is nothing in the available history of these people to show that a tropical climate per se has tended to produce degenerative effects on them or to limit fertility.

Whatever evidence they may have shown of lowered physical or mental activity in the past can be fully explained by the environmental conditions of food supply, malaria, and particularly of native associations, aided possibly by the accentuation of stock weaknesses arising from interbreeding over several generations.

It is always a source of pleasure to note the success of medical officers with whose work we are familiar, even though they serve under another flag. In the *British Medical Journal* for May 27, 1922, we read that the gold medal founded by the late Sir Gilbert Blane has been awarded by the Director-General of the Medical Department of the Navy and the presidents of the Royal College of Physicians and the Royal College of Surgeons to Surgeon-Commander Sidney W. Grimwade, who obtained a first-class certificate at the examination held in February, 1922, for promotion to the rank of surgeon-commander. Three Blane medals which remained unadjudged owing to the absence of promotion examinations during the war have been awarded to Surgeon-Comander Reginald St. G. S. Bond, Surgeon-Commander Robert W. B. Hall, and Surgeon-Commander Sheldon F. Dudley, for distinguished professional zeal and ability displayed throughout their service career.

Readers of the abstracts which have appeared in the BULLETIN in late years will recall the researches of these men in their respective specialties.

From the *Lancet* for May 27, 1922, we learn that out of some 360 titles of rare works on old medicine, advertised for sale by the International Antiquariaat of Amsterdam, more than 50 relate to the use and abuse of tobacco. This large proportion of books descriptive of a particular kind of intoxication might lead us to infer that old Dutch medicine was chiefly concerned with the evils of smoking, but the works in question are rarely Dutch and mostly modern, and, as a matter of fact, smoking has had from the earliest times a bad name. The priests or councils of the American Indian tribes seem to have been the first known smokers, and probably used tobacco as an intoxicant. They inhaled smoke by way of the mouth or nostrils when treating of war—the "pipe of peace" it was called euphemistically—or when proceeding to utter prophecy. When introduced into Europe, smoking was still held by many to have a mystic significance, and it became necessary for Pope Urban VIII to excommunicate certain priests who took tobacco while officiating at the mass. This was in 1624, some 20 years after James I had forbidden the use of tobacco in his realms.

A curious work, No. 241 in the catalogue, is the Commentary of Paullus, "De Abusu Tabaci Americanorum ipsissima est Chamaeleaguos Dodonaei." This very rare book was published at Strasbourg in 1665. Other interesting works are: Tobacco, injurious to the Constitution and its Use Scripturally Wrong. Dialogues between a Doctor and a Miner, by a Surgeon, London, 1840; Murray on Snuff-taking: Its Utility in Preventing Bronchitis, Consumption, etc., 1870; Löwy on Raucherparanoia; Jamet on L'Art de Fumer, Metz, 1845; Heward's St. Nicotine, 1909; and Bragge's Bibliotheca Nicotiana, Birmingham, 1880. The last-mentioned work is the bibliography of tobacco, and is to that subject what Lowndes and Brunet are to literature in general.

Among rare works offered for sale in this catalogue, but not necessarily dealing with nicotine and tobacco, special mention should be made of the Isagoge-Magico-Medica, of Aug. Etzler, published at Argentoratum (Strasbourg) in 1631. This deals with the whole subject of signaturism. Bidloo's superb volume with wide margins known as Ontleding (Anatomy) des menschelijken Lichaams, is here offered for 75 florins. The plates illustrative of human anatomy, by the celebrated artist G. de Lairesse, are those which Cowper embodied without acknowledgment in his famous "Myotomia." His theft was not suspected till the discovery, by an assistant librarian in the Royal College of Surgeons in England, that the name of Bidloo had been covered with a neat circular label on Cowper's title-page, the same process having been gone through in other similar volumes. One is sorry to take away the reputation for literary honesty of so good a surgeon as Cowper, whom, indeed, Lowndes defends in a note. Here also is offered for 65 florins Gautier Dagoty's extremely fine atlas of the Anatomy of the Generative Parts of Man and Woman. The book is one of great rarity, and is especially interesting in that the plates, which closely follow nature, are perhaps the earliest known instances of color-printing in three colors, an invention usually considered to be of quite recent date. Gautier Dagoty published his great folio in Paris as long ago as 1773.

J. R. Kuth, writing in the *Journal of Bone and Joint Surgery* for April, 1922, informs his readers that from a study of 208 cases of lower back pain, any injury or disease affecting the lower back structures (muscular, ligamentous, bursal, osseous, or joint) may give rise to a similar symptom complex in cases of chronic low back pains. Unfavorable static conditions in the lower back or extremities resulting from abnormalities in the lower extremities, postural or occupational strains, or from fatigue or weakness, frequently exist in these cases and operate as a cause in the production of symptoms either alone or in conjunction with other causes. In all cases of low back pain, the possibility of a progressive disease of the spine or of the spinal cord should be kept in mind. The best results from treatment were obtained in cases in which static abnormalities were corrected, in which lower back structures were protected or put at rest, and in which such structures, if shortened, were stretched. Graduated systematic exercises are an important adjunct in the treatment of many of these cases.

The so-called concentration method for tubercle bacilli in expectoration in cases where they are present in scanty numbers has been for some time past effected by forming an emulsion with antiformin, which dissolves the cellular and mucous elements and allows the bacilli to fall to the bottom of the liquid. By this method, however, many bacilli of recent development may be dissolved entirely, and others damaged to such an extent as to lose their special staining peculiarities. The concentration, therefore, consists merely in the collecting at the bottom of the liquid of those bacilli which have survived the process with a respective diminution in their total number. Tuberculous sputum to which the process of so-called concentration may be most usefully applied is that from patients in the early stages of the disease in which the bacilli are scanty, and therefore difficult to demonstrate with the ordinary methods of staining. From a negative result the patient feels himself justified in neglecting any kind of precaution, and in such a case it is indispensable that a result should be arrived at which is as near as possible absolutely true. The Lancet for May 27, 1922, calls attention to the fact that Prof. N. Pane, of the Bacteriological Institute at the University of Naples, has just published a new method in which a concentration of existing bacilli is obtained without any diminution in their number. The suspected sputum is placed in a sterile glass receptacle and four times its volume of physiological salt solution added; this is then incubated at 37° C. for 24 hours. During this time the mucus and cells are liquefied by the proteolytic enzymes produced by the accessory microorganisms which are more or less abundant in all sputum. The centrifugalization of the bacteria is by this means rendered easy by the elimination from the liquid of the organic substances which spoil the clearness of the preparations, and the tubercle bacilli are readily shown by the Ziehl-Neelsen method. In some cases investigation by this method has shown only occasional groups of agglutinated tubercle bacilli. Professor Pane considers this to indicate a slight immunizing defense in the organism.

4539—22——9

NURSE CORPS.

REPORT OF THE COMMITTEE ON NURSING PROBLEMS FINANCED BY THE ROCKEFELLER FOUNDATION.

The conference of persons interested in the development of nursing, which met in New York at the invitation of the Rockefeller Foundation in March, 1919, has submitted a report after practically two years of investigation. The original committee was invited to consider the development of public health nursing, and was made up of well-known members of the medical and nursing professions and several lay members whose work has been along the lines of industrial hygiene and public welfare. The completed committee placed the actual conduct of the investigation in the hands of Miss Josephine Goldmark, whose work in social research and studies on industrial hygiene fitted her for such a task. The committee has made special mention of its appreciation of her study of the difficult and complex problems and believes that the detailed report will prove of fundamental value in the development of nursing and of nursing education in the future.

In February, 1920, a second conference was called, also at the invitation of the Rockefeller Foundation, and at this conference the discussion centered on the proper training of nurses within hospitals and on private duty; in fact, the entire trend of nursing education was considered. The result of this conference was the widening of scope of the former committee, which was increased in June, 1920, by six members, including superintendents of hospitals and of nursing schools, a clinician, and a representative of mental hygiene. A brief résumé of the report and the conclusions of the committee will be of interest to our readers.

In an endeavor to secure disinterested and impartial opinions on controversial subjects, both nurse and lay investigators were employed in the field work. The study of hospital training schools was carried on by Miss Elizabeth G. Burgess, R. N., inspector of training schools of the New York State Department of Education; Mrs. J. B. Piggott, R. N., Maryland State inspector of training schools; Miss Carolyn E. Gray, head of the department of nursing education, Western Reserve University; Miss A. H. Turner, professor of physiology, Mount Holyoke College; Miss F. G. Gates, formerly dean of the Women's College, University of the State of Illinois. Miss Turner also made a study of postgraduate courses for teachers and administrators in schools of nursing.

In compiling data for the chapter on hospital training schools, assistance was rendered by Miss Edith R. Hall, Mrs. M. P. Gaffney, and Miss P. K. Angell.

For the study of public health agencies, the field work was carried on by Miss Grace R. Bolen, Miss Christina C. Miller, Miss Elsa M. Butler, who were not nurses but experienced in public health work, and Miss Helen Ross, experienced in industrial investigation; Mrs. B. A. Haasis, R. N., and Miss Janet R. Geister, R. N., secretaries of the National Organization for Public Health Nursing, and Mrs. A. M. Staebler, R. N., secretary of the Massachusetts Committee on Health in Industry.

In the study of private duty nursing the field work was carried on by Mrs. J. David Thompson and Miss Adda Eldridge, R. N., with the special assistance of Miss Sara E. Parsons, R. N.

The first part of the report considers the rôle of the nurse in public-health work, and gives an outline of the major health problems of the present day, such as the control of infant mortality and tuberculosis. It is stated that education is the only means of accomplishing the changes in daily habits of people which alone can solve these problems. The objection of the health administrator may be approached to a limited extent by mass methods, but direct personal contact with the conditions of the individual life is essential to success in a matter so truly personal as hygiene. After enlarging upon this fact, the committee stated that all public health authorities appear to agree that the need for nurses is the largest outstanding problem before the health administrator of the present day. This need has led the authorities to consider the possibility of finding a short way out of the difficulty by the employment of women who have been given a course in public-health work less involved than that required for the education of a registered nurse. The problem of the necessary and desirable equipment of these teachers of hygiene was carefully studied, and the various types of public-health nursing were noted and investigated. The hotly debated question whether the public-health nurse should or should not render bedside care was reviewed. The function of other messengers in the field of public health were noted and their work was pronounced *correlated* to that of the health instructor which, combined with bedside care, is a function possible only to the fully trained nurse. The committee is convinced that the teacher of hygiene in the home should possess, in the first place, the fundamental education of the nurse and that this should be supplemented by a graduate course in the special problems of public health. The conclusions of section 1 are as follows:

That, since constructive health work and health teaching in families is best done by persons capable of giving general health instruction, as distinguished from instruction in any one specialty, and capable of rendering bedside care at need, those agents responsible for such constructive health work and health teaching in families should have completed the nurses' training. There will, of course, be need for the employment, in addition to the public-health nurse, of other types of experts such as nutrition workers, social workers, occupational therapists, and the like.

That as soon as may be practicable all agencies, public or private, employing public-health nurses should require as a prerequisite for employment the basic hospital training, followed by a post-graduate course, including both class work and field work, in public-health nursing.

The committee next investigated the modern hospital and the modern dispensary, which represents social forces of enormous and growing possibilities. The need for women of fundamental training and high qualifications is as manifest here as in the field of public-health nursing; in fact it may be regarded as of first importance in this field of work. Defective preparation and a lack of proper qualifications in many instructors in schools of nursing were noted. The appointment of full-time instructors is a recent development in schools and is not yet general; but it is a marked advance as the results noted shows. The committee is of the opinion:

That the career open to young women of high capacity, in public-health nursing or in hospital supervision and nursing education, is one of the most attractive fields now open, in its promise of professional success and of rewarding public service; and that every effort should be made to attract such women into this field.

The next problem considered by the committee was the fundamental one of providing nursing care for the sick of the community. The shortage of nurses which had existed during the war has been overcome to an appreciable extent during the last three years, the census reports showing an increase of 83 per cent; 149,128 is the number of trained registered nurses reported in 1920. Of these, 11,000 are employed as public-health nurses and the same number in hospitals and other institutions. The remaining 120,000 available for private-duty nursing are not all in active practice. In the cities the supply of trained nurses appears to be adequate, and the failure to receive nursing care is to be sought in economic factors rather than in shortage of nurses.

Discussion of the subject of the quality of the nursing service brought out radical differences of opinion. Some private physicians consider the graduate "overtrained" and believe a woman with a very brief training in bedside routine would be as satisfactory. As a result of this feeling, there have been persistent efforts to break down the standards of nursing education which have been laboriously built up during the past years. Others believe that the removal of the safeguards which guarantee the quality of service necessary for safety constitutes a real danger to the cause of public health. The committee records its conviction as follows:

That for the care of persons suffering from serious and acute disease the safety of the patient and the responsibility of the medical and nursing professions demand the maintenance of the standards of educational attainment now generally accepted by the best sentiment of both professions and embodied in the legislation of the more progressive States; and that any attempt to lower the standards would be fraught with real danger to the public.

The committee found that many physicians demand nurses of a higher type than those who are now in the field. While others desire merely "hands for the physician," with a minimum of education. Reviewing the facts, it seemed that high natural qualifications and sound education are needed for the care of acute and serious illness and for public health work; but for the care of mild and chronic illness and for convalescence, a different type of capacity and training could be utilized.

The distinction, the committee believed, should be according to the type of illness involved and not based on economic grounds. The survey does not indicate that the income of the private duty nurse is especially large. The solution of the economic problem which confronts the family of low income must be sought along lines of cost distribution through community organization, or along lines of group insurance.

The problem of subsidiary nursing is not new. In 1920 the number of nurses, male and female, in the United States was 300,000, and of these more than half were below the standard required of the graduate nurse. There are grave dangers in the existence of a loosely defined, unregulated group of partially trained workers, and serious complications arise when this group functions in the same field with a more highly educated type of workers. A fundamental duty to the public has been discharged by the nursing profession in stimulating the development of laws which define the practices of the profession and protect the community against fraud. The lower grades of nursing should also be defined and registered. The committee recognized the difficulty of selecting a proper name for this subsidiary group, but believe that "nursing aid" or "nursing attendant" best meets the need for clear differentiation while providing a suitable name. That committee recommended:

That steps should be taken through State legislation for the definition and licensure of a subsidiary grade of nursing service, the subsidiary type of worker to serve under practising physicians in the care of mild and chronic illness, and convalescence, and possibly to assist under the direction of the trained nurse in certain phases of hospital and visiting nursing.

(To be continued.)

THE PART PLAYED BY A NURSE IN A HOSPITAL PROGRAM.[1]

By Miss Lucy Minnegerode, Superintendent of Nurses, United States Public Health Service.

Ordinarily, well regulated hospitals may be divided into three distinct departments—medical, nursing, administrative. These departments are coordinated under the superintendent of the hospital, preferably a physician with executive ability, able to understand and appreciate the psychology of the heads of his services, to coordinate the work of all units and branches of units in order to make a perfect whole.

We will take it for granted that we are dealing with a hospital in which the ideal service to the patient and the welfare of the patient are of paramount interest.

Next to the medical service in importance must be placed the nursing service, and if the medical service is to be effective the physicians should be able to place implicit confidence in the efficiency and loyalty of the nursing service.

The superintendent of nurses and directress of the training school, if there is a training school in connection with the hospital, must be in sympathy with the hospital administration, loyal to the superintendent of the hospital, to the medical staff, and to the ideals established by the nursing profession. She should be in charge of all personnel whose duties are concerned with the care of the sick, under the superintendent of the hospital. All matters relating to this class of personnel should be conducted through her, and in all questions of policy affecting her people she should have a voice and a vote. In disciplinary matters she should be sustained unless there is reason to doubt her justice, in which case she should be removed.

The practice of exploitation of the student nurse for the benefit of the hospital is as old as nursing, and has resulted finally in bringing

[1] Read before the Catholic Conference in Washington, D. C.

about a situation which has placed many hospitals in a difficult position at the present time, since there has been a pronounced decrease in the student applicants for nurse training at a time when there is a very pronounced demand for a greater number of qualified nurses. The ratio of student nurse to hospital beds should be 1 to 5, in order that proper time may be allowed for study and recreation, and for every 6 students in a hospital there should be 1 graduate. This schedule may be modified to some extent by the construction and equipment of the hospital and may have to be increased for the same reasons. The practice prevalent in many hospitals of keeping student nurses on special duty with private patients for which the hospital is paid should be abandoned. Six weeks of special duty is sufficient for any student nurse, and the constant placing of student nurses on special duty for the purpose of earning money for the hospitals is but another form of exploitation of the student nurse for the benefit of the hospital to the detriment of the student.

A happy and contented nursing personnel makes for a happy and contented patient, since the nurse is in more constant contact with the patient than any other hospital personnel. The patient, too, is dependent upon the nurse for care and comfort, and the attitude of the nurse toward the hospital and its administrators will be inevitably reflected in the patient. Therefore, as a matter of policy, if not of justice, the nurse should be considered as an integral, important element in the success of the hospital. It is worth while to make her contented and happy in her work and loyal to the hospital by providing proper living conditions and quarters, adequate time for both recreation and study and ample educational opportunities and advantages, and to acquire a realization that to the student nurse as well as to the interne and medical student, the hospital is her workshop, study, and laboratory.

How can the hospital authorities reconcile a proper recognition of their responsibilities to the nursing service with the necessity, present in most hospitals, for rigid economy in order to meet necessary expenses?

First.—It is essential that the nurses receive a proper education. This is as much a matter of vital interest to the medical staff as to the nurse herself, and nothing should be allowed to interfere with the course of instruction as established by the hospital and approved by the State board of registration for nurses.

Second.—Proper quarters and recreational facilities should be provided, with adequate supervision of play as well as of work.

Third.—Nurses may be of greater service to the hospital and increase their value to the public as well by receiving instruction in the various therapies which have now become an integral part of all our first-class hospitals. In all branches of physio-therapy nurses can be used. The advantage of this is obvious, since because of the nurse's medical knowledge she can be made more valuable. The elimination of many different classes of personnel means the elimination of friction. There is no desire to infringe upon the rights and privileges of the physio-therapists in making this suggestion, but it is understood that in the United States Navy this practice has been followed with great success.

Fourth.—In occupational therapy and social service also, nurses should receive some training, and the heads of these various departments who would be experts in their specialty should be considered as a part of the teaching staff for student nurses.

Fifth.—The same is true of the dietetic department. The chief dietition is also a part of the teaching staff, and nurses should be of use to her in her department and should receive a thorough grounding in dietetics, at least to the extent that they would be able to follow intelligently instructions in the preparation of diabetic and salt-free or other special dietaries.

The fundamental essential, if successful administration is to be obtained, is cooperation among the heads of the various departments and with the administrative head of the hospital who coordinates the interests and activities of all these units. Through a close cooperation, unnecessary expense can be avoided, greater care given to the preservation of equipment, and to the elimination of waste, and the strict economy necessary in order to make ends meet financially can be more surely established than by a reduction in the essential comforts for the personnel. A loyal and efficient nurse body will be interested in making the program of the hospital a success.

Therefore, let us remember that only through the close cooperation of the various services can the true mission of the hospital be fulfilled, and that mission is the adequate, efficient, and interested care of patients.

At the recent convention held in Seattle, it was recommended, voted upon, and carried that the superintendents of the Federal nursing services be members of the advisory council of the American Nurses Association.

DIGEST OF DECISIONS.

The Comptroller General has decided that the stoppage of the pay of an officer absent without leave or because of misconduct includes the stoppage of his rental and subsistence allowance. He has further decided that an officer not having dependents, or an officer traveling with his dependents on a commercial steamer or transport at Government expense, is not entitled to a rental allowance.

The following correspondence is of interest in relation to the question of origin not in the line of duty:

DEPARTMENT OF THE NAVY,
OFFICE OF THE JUDGE ADVOCATE GENERAL,
Washington, July 22, 1922.

From: The Judge Advocate General.
To: The Chief of the Bureau of Medicine and Surgery.
Subject: Starnes, Charlie Joe, Ex-Sea-2c, U. S. Navy, re origin of disability.

1. Forwarded; all papers returned.

2. It appears from the matter contained in attached papers that the above-named man first enlisted in the United States Navy May 29, 1915, and served until November 14, 1916, upon which date he was discharged. It further appears that he reenlisted in the service January 8, 1918, and served until on or about June 19, 1918, on which date he was discharged by medical survey on account of "constitutional psychopathic state," origin not in the line of duty, not due to his own misconduct.

3. From an examination of the matter presented in attached papers this office is of the opinion that if there existed any disability which warranted the discharge of this man from the naval service by virtue of a medical survey, said disability must be held to have originated in the line of duty. The foregoing conclusion is based upon the case of Vincent Badolato, ship's cook, second class, United States Navy, May 19, 1921 (File No. 7657–390: 40), who was discharged from the naval service on account of "dementia præcox," not in the line of duty, due to a "predisposition existing prior to enlistment." In that case it was held that the naval service was estopped from asserting that Badolato was suffering from a predisposition toward dementia præcox before entering the service owing to the fact that he had served through a duration of the war enlistment, received a discharge, and subsequently reenlisted, no evidence of said condition having been found prior to his enlistment.

4. The case of Vincent Badolato, above referred to, has been consistently followed by this department in all similar cases since its approval. For example, it was held in the case of Rodney G. Clark, apprentice seaman, United States Navy, approved September 13, 1921 (File No. 29372–3) that before a

finding of "not in line of duty" based upon a presumption that the disability complained of existed prior to the claimant's enlistment in the naval service is warranted, it must be shown by definite facts that said individual was actually suffering from the said disability prior to his enlistment. In other words, quoting decision, "The facts which must be shown in a case such as the one under consideration before a finding of 'not in line of duty' is warranted, in the absence of fraud, are facts established by proof of their existence prior to enlistment; for example, if it is shown from the records of a creditable institution or the testimony of a reputable physician attending the complaiuant prior to his enlistment that he was suffering from tuberculosis, chronic, pulmonary, at that time; or if a statement of the claimant describing certain physical conditions which he had noticed prior to his enlistment is submitted, and this statement could have no other plausible explanation than that he was suffering from tuberculosis in some form at that time. i. e., prior to his enlistment, a finding of 'not in the line of duty' would be warranted, but under no other condition except where fraud is shown."

5. Likewise in the case of Hansel Arcebole, approved October 4, 1921 (File No. 29372–2), it was held that in view of the facts that there was no evidence of epileptic seizures prior to his enlistment in the Marine Corps since early childhood, the disability complained of must be held to have been incurred in the line of duty for the reason that a history of epileptic seizures during early childhood is not deemed sufficient to warrant a holding of "not in the line of duty," in the absence of facts showing that the claimant had suffered such seizures within a reasonable time prior to his receiving a blow on the head of sufficient force to knock him down, which blow was received while in the naval service and may in fact have brought on these seizures.

6. In the case of Walter Reinold Moline, fireman, third class, United States Navy, approved December 10, 1921 (File No. 29372–4), it was likewise held that in the absence of definite facts showing that the claimant in each case did in fact have the disability complained of prior to his acceptance into the naval service a strong presumption that said disability had its origin prior to his entry into the naval service is not sufficient to warrant a conclusion that said disability was so incurred, but, on the contrary, it should be considered as having had its origin subsequent to the entrance of the claimant in the naval service. In the case of Moline the facts showed that he had apparently suffered from eye trouble for many years prior to his enlistment in the naval service. but there were no facts showing that he had the disability complained of prior to his entrance therein, and in the absence of facts showing that the particular disability complained of actually existed prior to his entrance into the naval service, it was held, in the absence of fraud and facts showing that it was due to his own misconduct, that it originated in the line of duty.

7. Reference to attached papers discloses not only an absence of affirmative facts showing that the disability complained of existed prior to the entrance of the claimant in the naval service, but it is shown by sworn statements of individuals who have known the claimant for a number of years prior thereto that his "condition of health prior and up to the date of his enlistment was good."

8. In the case of Badolato, above referred to, this office held that "concerning so much of the diagnosis of this case as states that the patient is suffering from 'dementia præcox' this office has no recommendation to offer for the reason that it considers that the determination of the disease is a matter coming wholly within the jurisdiction of the Medical Corps. This office, however, is unable to concur in so much of the diagnosis in this case as states that the

'dementia præcox' did not occur in the line of duty, the same being a matter to be determined under the law and the facts."

9. Applying the above rule to the case under consideration, this office has no recommendation to offer concerning so much of the diagnosis of this case as states that the claimant was suffering from "constitutional psychopathic state," but in regard to the matter of the reasons assigned this office finds itself in disagreement. For example, it is stated by the board of medical survey that the patient was turned over to the psychiatric division because he had been telling girls in Norfolk, who were wearing a part of the naval uniform, that they were doing so illegally and would be arrested. "He had no authority to do this." Reference to section 125 of the national defense act, approved June 3, 1916, which was in force at the time when the conduct of the claimant complained of took place, discloses that it was unlawful for any person not an officer or enlisted man of the United States Navy, to wear the duly prescribed uniform of the Navy, or any distinctive part of such uniform, or a uniform any part of which is similar to a distinctive part of the duly prescribed uniform of the United States Army, Navy, or Marine Corps, the penalty prescribed being a fine of not exceeding $300 or imprisonment not exceeding six months or both such fine and imprisonment. The further statement that claimant had no authority to do this is likewise in error for the reason that being a citizen of the United States, as well as an enlisted man in the naval service, he was peculiarly authorized to advise individuals against the wearing of any distinctive part of the Navy uniform or a uniform any part of which was similar to a distinctive part of the Navy uniform.

10. After a full and complete consideration of all the matter presented in attached papers, and the opinions of the Attorney General, and decisions of the court relative to the question of line of duty, this office is of the opinion that whatever disability the claimant may have been suffering at the time of his discharge by medical survey must be held to have been incurred in the line of duty, and you are advised accordingly.

/s/ A. STANTON,
Acting.

Approved, 22 July, 1922.
/s/ T. ROOSEVELT,
Acting Secretary of the Navy.

BOOK NOTICES.

Publishers submitting books for review are requested to address them as follows:

The Editor,
U. S. Naval Medical Bulletin,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

Books received for review will be returned in the absence of directions to the contrary.

REVIEWERS.

Commander C. M. OMAN, Medical Corps, United States Navy.
Lieutenant Commander W. M. KERR, Medical Corps, United States Navy.

"*No book can be so good as to be profitable when negligently read.*"

REPTILES OF THE WORLD, by *Raymond L. Ditmars, curator of reptiles and asistant curator of mammals in the New York Zoological Park.* The Macmillan Co., New York, 1922.

Here is a rare book giving a general survey of the reptiles of both hemispheres and written in a popular vein by one who has made a life study of the subject. The large collection of living reptiles to be seen in the New York Zoological Park was created by the author of this most readable book, and it is doubtful if anyone knows more of habits of the reptiles of the New World than he does.

The reptiles found upon the earth to-day comprise mainly the tortoises, turtles and terrapins, the crocodiles and alligators, the lizards, and the snakes. The author necessarily has treated this large class of animal life by limiting his descriptions to representative groups and saying little of individual species. Interwoven with the descriptions of the anatomical characteristics of the various groups of reptiles are anecdotes of the author's search for specimens and of the methods employed in capturing them. Throughout the text is scattered much interesting information concerning the habits and the feeding, general care, and treatment of reptiles in captivity. Fact and fiction has been carefully separated, and the story of the reptiles is so well told that it should be interesting to the general reader.

A notable feature of the book is over 200 photographic illustrations. These apparently are from the author's camera, and each is a study of reptilian life. They have been so carefully prepared that the distinguishing characteristics of each creature photographed are easily noted.

Many persons are interested in turtles and tortoises; a smaller number have a liking for lizards and small crocodilians, but few people care to be associated with snakes. However, the snakes seem to have been the subject of the author's favorite study, and he has devoted the latter half of the book to them. He realizes that many of his readers will encounter the story of the ophidians with aversion, but it is his hope that ere the book is finally closed "a persistently reigning and unjust prejudice may be completely shattered by the explosion of a long train of erroneous theories, when the snakes have been described as they truly are, and the clean, graceful, and wonderful phases of their varied structure have been faithfully portrayed by the camera."

The snakes are of great economic importance, destroying rats and mice, and the prevalence of many snakes about the buildings on a farm comes from the presence of these rodents in them. Many snakes are surprisingly gentle in their attitude toward man, making beautiful and interesting pets. Many are hardy, not at all particular as to the character of their food—eating dead animals or strips of raw beef covered with well-beaten eggs—and live for years in captivity. Healthy and well-nourished snakes shed their skin at intervals of about two months, or sometimes at shorter periods.

The snakes either lay eggs or produce their young alive. The common garter snake is viviparous and sometimes produces as many as 75 young in a litter. This explains why this variety is so numerous in our country in spite of the fact that the farmer boy kills every one he encounters. The young of the poisonous snakes are provided at birth with perfectly formed venom-conducting fangs and glands; they are just as dangerous in proportion to their size as their parent. All young snakes at once shift for themselves after birth or hatching. "Though poisonous snakes are common enough in many parts of the world, the danger from them is not nearly so great as imagined. In India, where a large part of the population goes barelegged, the estimated number of human lives lost each year is about 20,000. Conditions are very different in the United States, though the various species of rattlesnakes, the copperhead snake, and the formidable water moccasin teem over vast area. Records of snake bites are exceedingly rare in North America."

In the pages of this book one who has served in the Navy a reasonable number of years will encounter the descriptions of many of the reptiles whom he has probably met in various parts of the world.

Among the chelonians we find several friends of our boyhood days—the snapping turtle, "a bold and aggressive animal, not hesitating to attack waterfowl, which it drags beneath the surface to drown, when it tears up the prey by means of the combined efforts of strong mandibles and forefeet." This is the fellow who occasionally "takes the bait of a fisherman, when its prodigious struggle to free itself from the hook leads the excited sportsman to believe that he has made a finny capture beyond all power of imagination." The little yellow-spotted turtles that bask along the banks of pools; and the little terrapins which "may be seen sunning themselves in rows on derelict timber, from which they tumble clumsily when frightened. Once in the water their broadly webbed feet take hold and they scurry to the bottom, where they hide in the aquatic vegetation. When they again approach the surface, it is with the greatest caution. Only the snout and eyes are thrust above the water. In this position they paddle about inspecting the outlook until thoroughly satisfied that all danger has gone, when, one after another, they clamber on their favorite roosts for another sun bath."

In wardroom tales of days long gone, one often hears mentioned a dish of which the diamond-back terrapin formed the principal ingredient. This creature used to be plentiful in the salt marshes along the coasts of North and South Carolina. They were comparatively cheap, but the market demand threatens their extinction, and a dozen 8-inch "diamond-backs" are worth to-day, according to the author, about $75.

The tortoises are strictly terrestrial species of the Chelonia, and older officers may recall the giant tortoise, specimens of which were to be found on the Galapagos Islands until a few years ago, when a scientific expedition secured what its members believed to be the last survivors of the tortoise colony. The author describes the love making of these immense creatures, of which specimens weighing over 300 pounds exist in his collection.

Many of us are familiar with the sea turtles, which have an extensive distribution throughout the tropical and semitropical seas. They are the giants of the aquatic chelonians and never leave the sea except to deposit eggs on sand beaches. One of the sea turtles—the green turtle—is of world-wide renown as an article of food; another—the hawk's bill turtle—furnishes the valuable "tortoise shell" which we always buy when in Japan.

In the section on the crocodilians the author answers the oft-asked question: "What is the difference between an *alligator* and a *crocodile?*" In reality the question is not a very important one, as among the 21 species of crocodilians there are but 2 members of the genus *Alligator*, one inhabiting North America and the other the Yangtze River in China. There is, however, a great difference in the temper and activity of alligators and crocodiles. "An enraged alligator will throw its head from side to side, bang the jaws together sonorously, and violently swish the tail, but a man with steady nerves may approach within a few feet of the animal, throw a noose over the head, tie the jaws together, push a pole toward the body, then by successive nooses pulled backward over the head and forward over the tail, splint the animal to the pole so it is entirely powerless. . . . Such proceedings would be abruptly terminated by a crocodile." The author describes his first meeting with a big fellow from Florida: "Driven out of the crate, the crocodile looked the picture of good nature. Standing away from what he thought to be the reach of his tail, the writer prodded the apparently sluggish brute with a stick to start it for the tank. Several things happened in quick order. With a crescentic twist of the body utterly beyond the power of an alligator, the brute dashed its tail at the writer, landing him such a powerful blow that he was lifted completely from the ground. As he left terra firma, an almost involuntary inclination caused him to hurl his body away from a pair of widely gaping, tooth-studded jaws swinging perilously near. Landing with a thud on one shoulder, though otherwise unhurt, the writer threw himself over and over, rolling from the dangerous brute that was actually pursuing him on the run, body raised high from the ground. . . . Such is the average crocodile—an active, vicious, and, above all, treacherous brute."

The author explodes the popular supposition that an alligator requires a long period of time to acquire maturity. That such is not the case has been demonstrated by a number of young alligators under his charge. "These outgrew one tank after another within a few years. It only takes four years for an alligator, from the time of hatching, to grow fully large enough to have a commercially valuable hide."

Among the lizards we find many acquaintances, especially familiar to most of us being the little geckos with their thick-set body, broad, flattened head, stumpy tail, and the round disk or "sucker" on each toe, which dart about the ceilings of tropical quarters after the lamps are lit in search of insects attracted by the light, and whose small white eggs the children often find in crevices about the house and place in a tumbler where the hatching process may be watched.

Probably next best known are the iguanas, of which there seem to be many species and which are so plentiful in tropical forests. It appears that fine specimens of the common iguana may be purchased from dealers in the United States for $3 or $4 each; but the rhinoceros iguana, a far more showy creature, costs about $25. As it is found only in Haiti and Porto Rico, I record this bit of commercial information for the benefit of any member of the marine expeditionary force on duty in the "Black Republics" who may wish to turn it to account. Rhinoceros iguanas might prove a better venture than parrots or monkeys.

The chameleons of course receive their share of attention in the discussion, and the author records several interesting facts about them.

Many lizards, especially those from desert regions, require great heat in captivity, and the author tells us that he has seen certain specimens "dashing about [their cage] with a great show of animation when a Fahrenheit thermometer registered 110°."

Many captive desert lizards live but a short time. They die from a lack of water. It was quite by accident that the author discovered how such specimens may be saved, for they will seldom drink from a pan or lap the dewlike drops of water from the vegetation in the cage. His specimens stubbornly refused water, became emaciated, and were slowly dying. One day when certain cacti in the cage were being watered a remedy for the trouble was discovered. A few drops of water were accidentally scattered over the lizards' backs, where they were instantly absorbed. Taking this as a valuable hint, the author had all the lizards thoroughly sprayed with a "mist" nozzle. A change was soon noted. After a few days spraying the reptiles took on plumper outlines, feeding with more energy. It is possible that in their desert homes the quick change of temperature, influenced by day and night, may produce a certain condensation of moisture, like a dew, thus enabling the thirsty skin of these little animals to absorb the needed fluid.

From the decks of small gunboats, cruising leisurely off the west coast of Mexico and Central America, one may often see a sea snake somewhat under a yard in length, jet black or rich brown above—on the upper half of the body—while the lower half is bright yellow. This, according to the author, is the yellow-bellied sea snake, *Hydrus platunis*, and it occurs only in these waters.

Reptiles of the World is a book which should be in the library of every naval vessel where it would be accessible for reference to all those interested in identifying and studying the reptiles encountered in travels about the globe. It is highly recommended to all who might wish to make the study of the reptiles a hobby, as some medical officers have done. (W. M. K.)

THE PRACTICE OF MEDICINE, by *A. A. Stevens, A. M., M. D., professor of applied therapeutics in the University of Pennsylvania.* W. B. Saunders, Philadelphia, 1922.

The writer of this volume on practice is peculiarly fitted to prepare a work worthy of careful consideration by the medical profession of the English-speaking countries by reason of his teaching experience in the University of Pennsylvania, and his vast clinical experience derived from his connections with the great hospitals of Philadelphia. In the preparation of the book, Doctor Stevens desired to present descriptions of the various internal diseases which should accord with the present state of our knowledge, and which, though concise, should give to the student and the practicing physician the most necessary points in pathology, diagnosis, and treatment, and he has succeeded in his wish to a remarkable degree.

In looking at a work of this size—the volume contains 1.106 pages—one does not often think of the labor involved in its production. The manuscript must be written and sent off to the publisher, in whose establishment it is made ready for the press—the copy is set up in type, galley proofs are struck off, and, after these are corrected, page proofs, which are submitted to the author for final correction, are printed. After all errors have been eliminated from the text and the index and illustrations have been prepared, the pages are printed and sent to the bindery, from which the finished product issues. These various processes take time, yet in spite of the months required for preparation, this volume is singularly up to date. A glance through the pages reveals mention of many of the very latest advances in the practice of medicine.

The work is intensely practical, a prominent feature being the excellent outline of treatment which concludes the discussion of each disease, and it gives promise of being a successful rival of the masterpiece of Osler, whose pupil Doctor Stevens once was and to whom his book is dedicated. (W. M. K.)

SYMPTOMS OF VISCERAL DISEASE, A STUDY OF THE VEGETATIVE NERVOUS SYSTEM IN ITS RELATIONSHIP TO CLINICAL MEDICINE, by *F. M. Pottenger, A. M., M. D., LL. D., F. A. C. P.* Second edition. C. V. Mosby Co., St. Louis, 1922.

The one outstanding need of modern medicine, according to the author of this important contribution to medical literature, is accurate clinical observation and interpretation; and the clinician who must weigh the value of clinical data gathered from all sources and give the final opinion of the case, should not only be familiar with laboratory methods and be able to properly interpret the findings, but he should cultivate the habit of accuracy in the observation of his patient and be able to understand the meaning of symptoms which point to departure from the normal functioning of the body.

In this book the author has attempted to interpret, so far as may be possible in terms of visceral neurology, symptoms which are found in the everyday clinical observation of visceral disease, and to show how pathologic changes in an organ affect other organs and the body as a whole through the medium of the visceral nerves. It might well be called a study in pathologic physiology. As the author remarks in the preface, the work is largely a discussion of "viscerogenic" reflexes; and, as such, prompts the reader to consider carefully the problems connected with the vegetative nervous system and impresses upon him the importance of careful clinical observation and analysis.

"While the importance of the vegetative nervous system has long been known to physiologists, clinicians generally have ignored it and failed to see its intimate relationship to clinical medicine; but it is the key which unlocks the door to many of the secrets of visceral activity. An understanding of the vegetative nervous system and the activities of the endocrine glands will explain to the clinician most of the physical acts connected with visceral function and furnish the bridge between the pathologic changes in tissues and the expression of the disease in altered organic function. In other words, the vegetative nerves and the products of the endocrine glands are the mediums through which visceral symptoms are expressed."

Although the study of the vegetative nervous system is briefly presented by the author, it is sufficiently complete to furnish "the essential facts which one should have in order to understand the manner in which body activities, both physiologic and pathologic, express themselves through it."

The volume is arranged in three parts, the first dealing with the relationship between the vegetative nervous system and the symptoms of visceral disease; the second, with the innervation of important viscera and a study of the more common viscerogenic reflexes; the third, with the anatomy and physiology of the vegetative nervous system.

The book should be read in conjunction with Mackenzie's Symptoms and Their Interpretation, to which the author refers frequently. (W. M. K.)

THE SURGICAL TREATMENT OF NONMALIGNANT AFFECTIONS OF THE STOMACH, by *Charles Green Cumston, M. D., and Georges Patry, M. D.* J. B. Lippincott Co., Philadelphia, 1922.

This is a very readable and instructive book. The writers show familiarity with the subject at hand and in the first chapter give us a very good and brief résumé of the various stages of development of the most commonly used operative procedures on the intestinal tract.

The subject matter is generally well handled, and the student gets a very good idea of both sides of the question under discussion, while the authors don't hesitate to give us their opinions in detail. There are still a great many points in regard to gastric ulcer and its many divergencies which are not settled by any means, and any book written by surgeons of ability and unquestioned reputation will be eagerly welcomed. (C. M. O.)

THE WRITING OF MEDICAL PAPERS, by *Maud H. Mellish, editor of the Mayo, Clinic Publications.* W. B. Saunders Co., Philadelphia, 1922.

Mrs. Mellish says in her introduction to this valuable little book: "Many men and women who, unfortunately, do not possess the art of writing and have not acquired its usable substitute, the craft of writing, have chosen medicine as a life work, for success in which they should be able to write well for the medical profession. They desire, therefore, to acquire the craft of writing with the least possible effort or delay. For these there is a need, not for new manuals, but for a handbook adapted especially to their profession and including the essential points to be found in general textbooks." So in order to assist those who are struggling in their attempts to express their thoughts on paper with brevity, accuracy, clearness, and in accordance with the accepted forms of the present day, she has prepared a small volume which is crowded with useful knowledge pertaining to the *craft* of writing.

The book contains short discussions of the misuse of terms and words, the advantage of the acquisition of a large vocabulary, the use of italics and abbreviations. The chapter on punctuation is especially helpful when one is in doubt as to what marks to use and when to use them. In a chapter on miscellaneous grammatical notes and pitfalls in diction, the writer points out some errors which are the result of our careless habits of thinking and forgetfulness of the common rules of grammar.

The latter half of the volume is devoted to a discussion of the technic of the preparation of a satisfactory paper, in which subject matter, length, arrangement, construction of the paper as a whole as well as that of the paragraph and sentence, the use of references, the revision of the manuscript, proofreading, the use of quoted material and respect for copyrighted matter are helpfully commented upon.

The volume closes with a list of the standard abbreviations for the titles of medical journals which should always be used when quoting references to the work of other writers appearing in these journals.

Mrs. Mellish has gone to great pains to tell her reader just what to do in order to prepare a readable paper, but, better yet, all through the volume she has been careful to tell him what not to do, which fact adds greatly to the value of her book.

This little volume will be helpful to the naval medical officer not only in preparing articles for publication, but in the preparation of his official correspondence, with which one can not be too careful. (W. M. K.)

APPLIED CHEMISTRY, AN ELEMENTARY TEXTBOOK FOR SECONDARY SCHOOLS, by *F. N. Peters, Ph. D., instructor in chemistry in Central High School, Kansas City, Mo.* C. V. Mosby Co., St. Louis, 1922.

This is a superb volume for the student of elementary chemistry, thanks to the author's direct, clear style and the completeness with which the subject is handled and owing also to the excellence of the many illustrations, the good type, and other features of the bookman's craft. It is a most readable book, and in it the author has presented the chemical facts of everyday life in a concise and interesting manner. It is especially recommended as a textbook for hospital corpsmen. (W. M. K.)

NEW GROWTHS AND CANCER by *S. B. Wolbach, M. D.* Harvard University Press, Cambridge, Mass., 1922.

This tiny volume contains the substance of a public lecture delivered at the Medical School of Harvard University and forms the tenth book of a series which aims to provide, in easily accessible form, modern and authoritative information on medical subjects of general importance. (W. M. K.)

THE DIVISION OF PREVENTIVE MEDICINE.

Lieutenant Commander R. F. Jones, Medical Corps, United States Navy, in charge.

Notes on Preventive Medicine for Medical Officers, United States Navy.

INSTRUCTIONS TO MEDICAL OFFICERS.

REMARKS ON DEEP-SEA DIVING.

By G. R. W. French, Lieutenant Commander, Medical Corps, United States Navy.

One of the important duties of the medical officer is the physical examination of men selected for deep-sea diving. In selecting divers, only men of high physical standard should be chosen, i. e., men free from diseases of the ears, heart, lungs, blood vessels, and kidneys, and men of good muscular development. Two other factors are to be considered in the physical qualifications of a deep-sea diver: (*a*) Degree of fatness; (*b*) age. Moderately stout men and middle-aged men are more disposed to caisson disease than young, slim, small, or wiry men. The degree of fatness is the more important factor. Nitrogen is several times more soluble in fat than in the ordinary body tissues, and on decompression the fat gives off its nitrogen more slowly. Hence a stout person is more liable to caisson disease. Men of middle age are more inclined to fatness and therefore more predisposed to caisson disease. The respiratory exchange in middle-aged men is slower, and in moderately fat men the blood, instead of being one-twentieth the body weight, is nearer one-thirtieth, and hence elimination of nitrogen in solution of body tissues would be slower than in the small, slim man.

Arteriosclerosis is a dangerous factor, and men with even moderate or slight arteriosclerosis should not be chosen.

Ear disease is a bar to diving. This is especially true of any trouble that interferes with the patulousness of the Eustachian tubes. Frequently men with even a slight cold, owing to congestion of these tubes, are unable to clear their ears; i. e., equalize pressure on both sides of the ear drums. Pain from unequal pressure on the drums is severe. If, despite the warning of ear pains, the diver is unable to clear his ears and persists in descending, a rupture of the ear drum is possible.

Air pressures exceeding three or four atmospheres (66 to 99 feet sea water) have an irritant effect on the lungs. Hence, it is evident the lungs must be sound and the individual free from tuberculous tendencies.

The best type for diving work is the young (20 to 30 years of age), small, thin, wiry man of phlegmatic temperament. The circulation of blood is faster in his case, he desaturates more quickly, and is less inclined to caisson disease.

PHYSICAL EXAMINATION.

The medical officer should examine all candidates for the course of instruction at the diving school. They must come up to the physical requirements before they are considered eligible for instruction.

Qualified divers should be examined at frequent intervals, and a special physical examination should be made in the case of all men prior to each diving operation, especially if the depth of the water is over 40 feet. Under ordinary conditions divers over 40 years should not be permitted to dive in water over 15 fathoms in depth.

AIR SUPPLY TO DIVERS.

The medical officer should assure himself that a sufficient amount of air of proper quality is furnished the diver for helmet ventilation. The minimum air supply in cubic feet per minute for any given depth may be computed by the following formula:

$$S=1.5(1+\overline{F(0.0303)}),$$

in which S is the required air supply in cubic feet, measured at the surface, and F is the number of feet the diver is below the surface. To enable the diver to perform hard work, arrangements should be made for supplying three times this quantity of air, if practicable.

AIR SUPPLY FROM MANUALLY OPERATED PUMPS.

Under usual service conditions the air supplied to divers is furnished by two-cylinder, double-acting, manually operated air pumps. The latest type of pump is the Mark III, which has a capacity of 405 cubic inches per revolution when 100 per cent efficient. Other types of pumps in service are Mark I; Mark I, model 1; Mark I, model 2; the Mark II; and the Mark II, model 1. The capacity of the Mark I is 277.7 cubic inches per revolution, when 100 per cent efficient. The capacity of the Mark I, models 1 and 2, and Mark II, and Mark II, model 1, is 296.3 cubic inches per revolution when 100 per cent efficient.

The efficiency of the service of manually operated diving air pumps will be found to vary greatly. The greater the depth or pressure against which pumps have to be worked, the greater will be the loss of efficiency. The efficiency of a pump will depend largely on the care and upkeep the pump has received. Tests on various service pumps against pressure as low as 20 pounds per square inch has shown efficiency of pumps varying from 30 to 90 per cent, and at higher pressures—75 pounds per square inch—efficiency has been as low as 5 per cent. It is essential that the efficiency of the pumps used should be known in determining the amount of air supplied to the diver. Inefficient pumps should not be used until properly repaired. As every foot depth of sea water exerts a pressure of 0.445 pound per square inch, and as loss of efficiency increases with pressure, it is necessary that pump efficiency be properly determined in all diving operations in water in which the depth is greater than 30 feet, and especially so if the pump has been in service for any considerable time.

DETERMINATION OF PUMP EFFICIENCY.

The percentage efficiency of a diving air pump can be practically and approximately determined by pumping air into a reservoir or air tank of known capacity, noting the number of revolutions required for the different pressures, and then making a mathematical comparison of the results thus obtained with the theoretical capacity of the pump at test pressures.

When T=theoretical capacity of pump in cubic inches per revolution;
P=test pressure in pounds per square inch by gauge;
C=capacity of test tank, air hose, and air space in pump connections;
14.7=pressure in pounds per square inch of 1 atmosphere;
R=theoretical number of revolutions required to charge test tank to P;
X=The number of revolutions actually required to charge test tank to P—

1. $$\frac{\frac{CP}{14.7}}{T}=R.$$

2. $$100\frac{R}{X}=\text{per cent efficiency.}$$

3. 100 minus per cent efficiency equals loss efficiency.

The theoretical capacity of the various two-cylinder, double-acting air pumps in service are as follows:

Mark I ($3\frac{7}{8}$-inch diameter cylinders, 6-inch stroke) is 277.7 cubic inches.

Mark I, model 1 (4-inch diameter cylinders, 6-inch stroke) is 296.3 cubic inches.

Mark I, model 2 (4-inch diameter cylinders, 6-inch stroke) is 296.3 cubic inches.

Mark II (4-inch diameter cylinders, 6-inch stroke) is 296.3 cubic inches.

Mark II, model 1 (4-inch diameter cylinders, 6-inch stroge) is 296.3 cubic inches.

Mark III (4¼-inch diameter cylinders, 7¼-inch stroke) is 405 cubic inches.

The capacities of air spaces contained in the air connections (capacity of branch pipes, air reservoirs, gauge pipes, etc.) of the Mark I; Mark I, model 1; Mark I, model 2; and the Mark III diving air pumps are approximately 83 cubic inches each. Those for the Mark II and the Mark II, model 1, are approximately 43 cubic inches in each.

The capacity of a 50-foot length of standard diving air hose (one-half inch internal diameter) is 117 cubic inches.

For proving the efficiency of diving air pumps in accordance with the foregoing method, a test tank of 1 cubic foot capacity is furnished with all new diving apparatus.

In using the test tank as a reservoir for measuring the volume of air furnished by a diving pump, the capacity of the air-hose connection between the tank and the pump must be taken into consideration when computing the capacity of the testing reservoir.

For convenient reference the following table has been compiled. This table shows the percentage of loss of efficiency of the two-cylinder, double-acting, diving air pumps at various revolutions when tested to 100 pounds pressure per square inch, in the manner prescribed, using a test tank of 1 cubic foot capacity and a 50-foot length of air hose between the tank and a pump:

Revolutions.				Per cent loss of efficiency.
Mark I.	Mark I, model 1; Mark I, model 2.	Mark II; Mark II, model 1.	Mark III.	
47.2	44.6	43.7	32.4	0
49.7	46.9	46.0	34.1	5
52.4	49.6	48.6	36.0	10
55.5	52.5	51.4	38.1	15
59.0	55.8	54.6	40.5	20
62.9	59.5	58.3	43.2	25
67.4	63.7	62.4	46.3	30
72.6	68.6	67.2	49.9	35
78.7	74.3	72.8	54.0	40
85.8	81.1	79.5	58.9	45
94.4	89.2	87.4	64.8	50
104.9	99.1	97.1	72.0	55
118.0	111.5	109.3	81.0	60
134.9	127.4	124.9	92.6	65
157.3	148.7	145.7	108.0	70

When testing air pumps for efficiency according to this method, using a test tank of 1 cubic foot capacity, errors are easily made in recording the exact number of revolutions required for a given pressure; therefore, each test should be repeated two or three times, and the average results thus obtained should be taken as the true result. On account of the heat generated when compressing air, and the consequent increase in volume due to expansion on account of heat, cooling water should always be used in the water cistern of diving air pumps when they are being operated against pressure.

The specifications for diving air pumps require that prior to acceptance they shall prove at least 80 per cent efficient when tested in accordance with the foregoing method, immediately after having been tested for endurance against a pressure of 100 pounds by gauge for a period of one hour.

DETERMINATION OF PUMP'S REVOLUTIONS TO FURNISH NECESSARY AIR SUPPLY TO DIVERS.

Knowing the capacity and efficiency of the diving pump, the number of revolutions per minute necessary to operate the pump to furnish the proper air supply to a diver can be determined as follows:

When D=depth of sea water, in feet, to which dive is made;

N=number of cubic inches of air the pump will furnish per revolution, measured at atmospheric pressure;

R=number of revolutions per minute required of pump to furnish 1.5 cubic feet (2,592 cubic inches) of air per minute, measured at atmospheric pressure;

X=number of revolutions per minute required of pump to furnish minimum allowable air supply (1.5 cubic feet) (2,592 cubic inches) per minute at D—

$$\frac{2592}{N}=R.$$

$$R(1+D(0.0303))=X.$$

If the efficiency of a diving air pump is less than 100 per cent, and its actual per cent efficiency at the equivalent absolute pressure at D is represented by a symbol as E, then:

$$\frac{100R(1+D(0.0303))}{E}=X.$$

As the value of N for the various types of two-cylinder, double-acting, diving air pumps, previously referred to when 100 per cent efficient, is 277.7 cubic inches, 296.3 cubic inches, and 405 cubic inches, then R must equal 9.33, 8.75, and 6.4 revolutions, respectively.

Multiplying these respective values by the coefficient 0.0303, the following results are obtained: 0.283, 0.265, and 0.194.

Hence, to determine any number of revolutions per minute, it is necessary to run any of these pumps to furnish the minimum allowable air supply (1.5 cubic feet per minute) for one diver at any depth, proceed as follows:

Diving air pump, Mark I.—Divide 100 per cent by the actual per cent efficiency of the pump at the equivalent pressure to which the dive is made, and multiply the quotient thus obtained by the sum of the product of the number of feet depth of sea water and the constant, 0.0283, added to 9.33 (number of revolutions required to deliver 1.5 cubic feet of air at atmospheric pressure).

Diving air pumps, Mark I, model 1; Mark I, model 2; Mark II; Mark II, model 1.—Divide 100 per cent by the actual per cent efficiency of the pump at the equivalent pressure to which the dive is made, and multiply the quotient thus obtained by the sum of the product of the number of feet depth of sea water and the constant, 0.265, added to 8.75 (number of revolutions required to deliver 1.5 cubic feet of air at atmospheric pressure).

Diving air pumps, Mark III.—Divide 100 per cent by the actual per cent efficiency of the pump at the equivalent pressure to which the dive is made, and multiply the quotient thus obtained by the sum of the product of the number of feet depth of sea water and the constant, 0.194, added to 6.4 (number of revolutions required to deliver 1.5 cubic feet of air at atmospheric pressure).

For example: Diving air pump, Mark III, 80 per cent efficiency; depth of sea water, 66 feet. How many revolutions per minute should the pump be run to furnish the minimum allowable air supply (1.5 cubic feet of air per minute) to a diver working at that depth?

$$100 \div 80 \times (66 \times 0.194 + 6.4) = 24 \text{ revolutions per minute.}$$

The maximum rate of pumping that it is possible to maintain by a pumping crew over a practical period of time is about 30 revolutions per minute, and as the depth or equivalent pressure increases this becomes less and less. Therefore, if the revolutions required are in excess of the number it is possible to maintain the work should be divided between two or more pumps.

What arrangements may be made for supplying the requisite amount of air to one diver working at a depth of 168 feet when diving air pumps, Mark III, each 80 per cent efficient, are used?

$$(100 \div 80) \times (168 \times 0.194 + 6.4) = 48.7,$$

or practically 49 revolutions per minute to furnish 1.5 cubic feet of air to one diver with one pump, or 24.5 revolutions per minute with two pumps.[1]

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[1] At this writing practically the only diving pumps in service in the Navy are the Mark III. However, in remote stations and older ships some of the older service pumps, Mark I and II, may be encountered.

When utilizing manually operated diving air pumps to furnish air for divers, the following conditions should be observed:

(*a*) Arrangements should be made to furnish at least the minimum allowable air supply (1.5 cubic feet per minute, measured at the absolute pressure to which the dive is to be made) to each diver, and, if practicable, a reserve air supply.

(*b*) Arrangements should be made to insure the dispatch of a relief diver.

(*c*) Except in shallow depths and where there is no danger of divers becoming foul of obstructions on the bottom, more than one diver should not be permitted to dive when using air from the same diving air pumps or group of diving air pumps.

(*d*) The rate of pumping should be regular.

(*e*) If the air being supplied to a diver is uncomfortably warm, cold water should be placed in the water cistern of diving air pumps, and kept cold by the addition of ice, if necessary.

AIR SUPPLY FROM POWER COMPRESSORS AND STORED COMPRESSED AIR.

For safety, ease of operation, and economy, a power compressor or stored compressed air is used to furnish air for helmet ventilation when the diver reaches deep depths. By the use of this apparatus great depths are attainable over long periods of time. In the hands of the unskilled this is a dangerous procedure, and those who have not been specially instructed in the practice and use of the power compressor or stored compressed air for diving should not be allowed to utilize this method.

In using power compressors or stored compressed air in diving, the air supply in cubic feet per minute, measured at surface, for any given depth is calculated at $4.5\ \overline{(1+F\ (0.0303)}$, in which F is the number of feet the diver is below the surface. The technic of the air supply is as follows:

Air is supplied to the diver from a tank (from 1 to 5 cubic feet capacity) in which the air pressure is maintained constantly at 25 to 50 pounds per square inch above the greatest pressure necessary for the greatest depth at which the diver is to descend. The diver controls the flow of compressed air from this tank by means of an air control valve which is interposed in the diving hose, 3 feet from the helmet, and fastened to his breastplate. The pressure in the tank is kept constant by low-pressure (100 pounds per square inch), automatically controlled, large-capacity, power-driven air compressors, or by high-pressure compressors, 2,000 to 3,000 pounds per square inch, of sufficient capacity, or high-pressure (2,000 to 3,000 pounds per square inch) stored compressed air (torpedo air flasks); in which case, a hand-operated (not automatic) reducing valve and by-pass are interposed on the line to the tank from which the diver takes his air.

AIR SUPPLY FROM HIGH-PRESSURE ACCUMULATORS.

High-pressure accumulators, such as the air accumulators of the torpedo installation on board vessels, may be used in diving operations. When connections are made with accumulators, diving operations are to be conducted directly from or in the immediate vicinity of the diving vessel, thus obviating the necessity for the use of a long length of air hose and its accompanying dangers. When the accumulators are of sufficient capacity, the air necessary for the diver should be taken from accumulators already fully charged to maximum capacity. When the capacity of the accumulators is insufficient for the depth to be accomplished, the air compressor shall be in operation when necessary, and care taken to see that the water-cooling system is intact in order to insure a cool air supply. The capacity of the air compressor and the accumulators must be known and taken into consideration when calculating the air supplied to the diver. Under no circumstances should the diver be permitted to dive to the limit of his air supply, no matter what the method is in use at the time. Sufficient air must always be held in reserve to enable a relief diver to go to the assistance of the man under water. To increase the capacity of the air accumulators on board ship, the torpedo air flasks can readily be utilized by connecting them up to the air line with stop valves opened.

AIR SUPPLY FROM TORPEDO FLASKS.

Torpedo air flasks may be utilized to furnish air to divers when deep-diving operations are to be conducted at a distance from the diving vessel. In the use of this method, at least three or more flasks must be connected to the manifold ready for use, and one flask held in reserve, to be used only in case of special exigency, as in the case of a fouled diver. Not more than two divers shall be permitted to dive from the same boat. The pressure in the working flasks, as indicated on the high-pressure gauge, shall not be permitted to fall below 220 pounds per square inch in excess of pressure at which the divers are working while on the bottom. After they are clear of the bottom and safely on their way to the surface the third flask may be opened. In case it should be found impossible to obey these instructions the reserve flask may be opened. However, at the same time a reserve supply of air in another boat must be immediately brought up and connected to the manifold. Under these conditions the duration of air supply from one flask is calculated as follows:

C=capacity of one air flask in cubic feet.

A=atmospheric excess pressure in air flask.

D=number of divers.

E=number of atmospheres' excess pressure to which dive is made.

Allowing 1 air flask atmosphere for charging testing tank, air hose, and helmet to E; 4.5 cubic feet to each diver per minute measured at absolute pressure, or E1 atmospheres; and reserve pressure of 220 pounds per square inch, or about 15 atmospheres, to remain in the air flask in excess of that in which the divers are working while on bottom, or E, the calculation of time of air supply is as follows:

$$\frac{C(A-(15+C+1))}{4.5\,D(E+1)} \text{ equal duration of supply in minutes.}$$

AIR SUPPLY FROM LOW-PRESSURE ACCUMULATORS.

The method of supplying air to divers from low-pressure accumulators is applicable to vessels or stations equipped with gas-ejector systems—diving vessels, navy yards, and so forth. In this method the arrangement is practically the same as for diving with air from high-pressure accumulators. The air pressure in the accumulators is maintained steadily by large-capacity, low-pressure, steam, or electrically driven, automatically controlled air compressors. The capacity of the compressors is such that there is never a question of shortage of air supply, the maximum depths to which divers will be able to descend will depend upon the pressure of the air. There is no accurate method of determining the exact amount of air passing through the diver's helmet in this method of diving, and the only means of knowing whether adequate ventilation is being maintained is by the diver's physical well-being, and the percentage of CO_2 in the air of the helmet.

When utilizing air from air accumulators or air flasks the following conditions are essential:

(*a*) The temperature of air must be such as not to cause discomfort to the diver.

(*b*) The air in the accumulator must be free from noxious fumes and as near standard purity as possible, i. e., contains as near 0.04 of 1 per cent CO_2 as practicable. In utilizing air from high-pressure accumulators it must be remembered that the air in the cylinders of the compressors is greatly heated in charging the accumulators, and oil with a high flash point must be used, castor oil if possible, so that no flashing in the cylinders will take place, producing CO and CO_2. As little oil as practicable should be used in the cylinders of a diving pump.

(*c*) Thirty to fifty pounds pressure per square inch in the testing tank above water pressure (at the depth of the dive) must be maintained to insure proper ventilation of the helmet.

(*d*) The reserve air supply must always be maintained in case of accident to compressors, and so forth, to insure a proper stage decompression for the diver.

TIME UNDER WATER AND ASCENT OF THE DIVER.

The medical officer should recommend the time the diver shall spend under water; and if working at any considerable depth, he should assure himself that the decompression, i. e., the ascent of the diver, is properly managed.

In deep water, time under pressure should be made as short as practicable, as the greater the length of stay the longer will be the time spent in the ascent.

The cardinal essential point in connection with the ascent of a diver is a proper and efficient decompression, so managed as to eliminate the possibility of caisson disease. For diving, the most efficient practical method of decompression is that known as stage decompression.

The following tables are constructed on this theory and have been proved safe. While they are not guaranteed to protect a diver from a moderate attack of "bends," a diver so decompressed in accordance with them will be spared from any serious attack of caisson disease.

In all diving operations, decompression, i. e., ascent in accordance with these tables, should be strictly followed and, except in special exigency, no diver should be brought to the surface faster than the time specified.

Decompression Table No. 1.—*Ordinary time limits in deep water and stoppages to be made during ascent.*

Depth.	Time under water, I. E., from surface to beginning of ascent.	Stoppages at different depths.									Total time for ascent.
		90 feet.	80 feet.	70 feet.	60 feet.	50 feet.	40 feet.	30 feet.	20 feet.	10 feet.	
Feet.											*Minutes.*
0–36	No limit										0–1
36–42	Up to 3 hours										1–1½
	Over 3 hours									5	6
42–48	Up to 1 hour										1½
	1 to 3 hours									5	6½
	Over 3 hours									10	11½
48–54	Up to ½ hour										2
	½ to 1½ hours									5	7
	1½ to 3 hours									10	12
	Over 3 hours									20	22
54–60	Up to 20 minutes										2
	20 minutes to ¾ hour									5	7
	¾ hour to 1½ hours									10	12
	1½ to 3 hours								5	15	22
	Over 3 hours								10	20	32
60–66	Up to 15 minutes										2
	¼ to ½ hour									5	7
	½ to 1 hour								3	10	15
	1 to 2 hours								5	15	22
	2 to 3 hours								10	20	32
66–72	Up to 15 minutes									2	4
	¼ to ½ hour								3	5	10
	½ to 1 hour								5	12	19
	1 to 2 hours								10	20	32
72–78	Up to 20 minutes									5	7
	20 to 45 minutes								5	15	22
	¾ to 1½ hours								10	20	32
78–84	Up to 20 minutes									5	7
	20 to 45 minutes								5	15	22
	¾ to 1¼ hours								10	20	32
84–90	Up to 20 minutes								3	5	10
	20 to 40 minutes								5	15	22
	40 to 60 minutes							3	10	15	30
90–96	Up to 20 minutes								3	5	11
	20 to 35 minutes								5	15	22
	35 to 55 minutes							5	10	15	32
96–108	Up to 15 minutes								3	5	11
	15 to 30 minutes							3	7	10	23
	30 to 40 minutes							5	10	15	33
108–120	Up to 15 minutes							2	3	8	15
	15 to 25 minutes							5	5	10	23
	25 to 35 minutes							5	10	15	33
120–132	Up to 15 minutes							2	5	7	17
	15 to 30 minutes							5	10	15	33
132–144	Up to 12 minutes							3	5	5	16
	12 to 25 minutes						2	5	10	12	32
144–156	Up to 10 minutes							3	5	5	16
	10 to 20 minutes					2	3	5	8	10	31
156–168	Up to 10 minutes						2	3	5	5	18
	10 to 16 minutes					2	3	5	7	10	30
168–180	Up to 9 minutes						2	3	5	5	18
	9 to 14 minutes					2	3	5	7	10	30
180–192	Up to 13 minutes					2	3	5	7	10	30
192–204	Up to 12 minutes				2	2	3	5	7	10	32
204–225	Up to 10 minutes		2	2	3	5	7	10	10	15	58
225–250	Up to 10 minutes	2	2	3	5	7	10	10	15	15	73

Decompression Table No. 2.—*Stoppages to be made during ascent after exceeding the ordinary limits of time on the bottom.*

Depth.	Time from leaving surface to beginning of ascent.	Stoppages at different depths (in minutes). 100 feet.	90 feet.	80 feet.	70 feet.	60 feet.	50 feet.	40 feet.	30 feet.	20 feet.	10 feet.	Total time for ascent.
Feet.												*Minutes.*
66	Over 3 hours									10	30	42
72	2 to 3 hours									10	30	42
	Over 3 hours									20	30	52
78	1½ to 2½ hours									20	30	52
	Over 2½ hours									30	30	62
84	1¼ to 2 hours									15	30	47
	2 to 3 hours								5	30	30	67
	Over 3 hours								10	30	35	77
90	1 to 1½ hours								5	15	25	47
	1½ to 2½ hours								5	30	30	67
	Over 2½ hours								20	35	35	92
96	55 minutes to 1½ hours								5	15	30	52
	1¼ to 2½ hours								10	30	35	77
	Over 2½ hours								30	30	35	102
108	40 minutes to 1 hour								10	15	20	48
	1 to 2 hours							5	15	25	35	83
	Over 2 hours							15	30	35	40	122
120	35 minutes to 1 hour							5	10	15	25	57
	1 to 2 hours							10	20	30	35	97
	Over 2 hours							30	35	35	40	142
132	½ to ¾ hour							5	10	15	20	53
	¾ to 1½ hours						5	10	20	30	30	98
	Over 1½ hours						15	30	35	40	40	163
144	25 minutes to ¾ hour						3	5	10	15	25	61
	¾ to 1½ hours						10	10	20	30	35	108
	Over 1½ hours						30	30	35	40	40	178
156	20 to 35 minutes						3	5	10	20	20	61
	35 minutes to 1 hour						7	10	15	30	30	95
	Over 1 hour					20	25	30	35	40	40	193
168	16 to 30 minutes						3	5	10	15	20	56
	30 minutes to 1 hour					3	10	10	15	30	30	101
	Over 1 hour				5	25	25	30	35	40	40	203
180	14 to 20 minutes						3	3	7	10	15	41
	20 to 30 minutes					2	2	3	10	15	25	60
	30 minutes to 1 hour				3	3	7	10	20	30	35	111
	Over 1 hour				15	25	30	30	35	40	40	218
192	13 to 20 minutes						3	3	7	15	15	46
	20 to 30 minutes					3	3	5	10	15	25	64
	30 minutes to 1 hour				3	5	10	12	20	30	35	118
	Over 1 hour			5	20	25	30	30	35	40	40	228
204	12 to 20 minutes					3	3	5	7	10	20	51
	20 to 30 minutes				3	3	3	5	10	20	30	67
	30 minutes to 1 hour			3	3	5	10	15	20	30	35	124
	Over 1 hour			15	20	25	30	30	35	40	40	238
225	10 to 20 minutes			3	5	7	7	10	15	20	20	95
	20 to 30 minutes		2	3	5	7	10	15	20	25	30	121
	30 minutes to 1 hour		5	5	10	15	15	20	25	30	35	164
	Over 1 hour		10	15	20	25	30	30	35	40	40	249
250	10 to 20 minutes		2	3	5	7	10	10	15	20	30	106
	20 to 30 minutes	2	3	5	7	10	15	15	25	30	30	146
	30 minutes to 1 hour	5	5	10	15	15	20	30	30	35	40	209
	Over 1 hour	10	15	20	25	30	30	35	40	40	40	289

In selecting the decompression table for a certain dive (depth and time of exposure), the time of exposure shall include time of descent and time on bottom, and preference should be given the longer table.

PRECAUTIONS AFTER A SECOND DESCENT.

If a diver makes a second descent in deep water with an interval of less than three hours between the two dives his body will be more highly saturated with nitrogen at the end of the second dive, and extra care will be needed in bringing him to the surface. A safe rule is to take the combined time of the two dives and use a table for that exposure at the pressure at which the diver was working. The extra time is, however, only needed for the second half of the stops indicated in the tables.

EMERGENCY ASCENTS.

In case of accident or special exigency it may be essential to get a diver to the surface as rapidly as possible, even if an attack of caisson disease is threatened. Under these conditions the speed of the ascent will depend on:

(*a*) Nature of the accident or emergency.

(*b*) Depth and length of exposure at which diver has been working.

(*c*) Whether or not means for treating or preventing an attack of caisson disease can be resorted to by sending the diver down again immediately or whether there is a recompression chamber ready for immediate use.

In any case where a diver fails to answer his telephone or signal that diver should be started toward the surface immediately. A pause should be made at the first stage of decompression and an attempt made at communication; then, depending on the nature of the accident or emergency, the remainder of the ascent must be according to the judgment of the officer in charge. The emergency may be serious enough to warrant immediate ascent.

If there is reason to suppose that the diver can be sent down again immediately or if a recompression chamber is ready for immediate use, a chance should be taken on a fairly rapid ascent for the remaining distance.

In case of very deep diving, when a recompression chamber is available and a rapid ascent becomes imperative, bring the diver at once to half the absolute pressure, keep him there for a period of 20 minutes, if possible, or, if this is not possible, as long as practicable, then haul him to the surface, remove the helmet, life line, and air hose (cut them off the diver), place him in the recompression chamber, then proceed as directed under "Treatment of caisson disease," removing the diver's dress and equipment in the chamber.

ACCIDENT TO DIVERS—PREVENTION AND MANAGEMENT.

The medical officer's services are often required for treatment of divers' injuries. Deep diving is an extremely hazardous occupation. Accidents are constantly occurring, and such accidents occurring in deep water are usually serious. Constant vigilance on the part of all concerned should be exercised. It is essential that the diving apparatus should be complete, in good condition, and in good working order, and that divers and "tenders" be specially qualified. Except under unusual conditions, no diving operations in deep water should be carried out without a proper recompression chamber.

The accidents usually encountered in diving operations are as follows:

(*a*) Asphyxia.
(*b*) Squeeze.
(*c*) Caisson disease.
(*d*) Accidental blowing up.
(*e*) Fouling.
(*f*) Ear pains (bleeding from the ears).
(*g*) Bleeding from nose and lungs.
(*h*) Mechanical injuries from external violence.
(*i*) Exhaustion.
(*j*) Drowning.
(*k*) Oxygen poisoning.

In all accidents occurring in deep water it must be remembered that the diver can not, as a rule, be brought immediately to the surface on account of the danger of a quick and fatal attack of caisson disease, but may be brought immediately to the first stop or stage of decompression. On this account coolness and judgment are essential, as the effects of caisson disease may prove worse than the accident. If the recompression chamber is near and ready for immediate use, the diver may be hauled to the surface with a certain degree of rapidity, quickly placed in the chamber with an attendant, preferably a medical officer, and pressure applied to at least half the absolute pressure at which the diver was working. First aid or other treatment can then be given the diver within the chamber.

The record for apparent safe ascents, with a recompression chamber ready for immediate use, was from 150 feet after a 30-minute exposure. Men were brought to the surface immediately as a routine after an exposure of 30 minutes at 150 feet, quickly placed in a recompression chamber, pressure applied corresponding to the pressure of water at 150 feet, and then decompressed according to the tables without ill effects.

ASPHYXIA.

Asphyxia is probably the most common accident occurring when diving under present service conditions, and most of the deaths occurring as a result of diving are from this cause. Asphyxia is usually the result of a deficient air supply, but may result from supplying air containing a large per cent of CO_2, resulting from flashing of the lubricating oil in the cylinders of air compressors. It may result from the diving dress not being properly inflated, thus interfering with the diver's respiration. Its occurrence would be indicated by the diver ceasing to answer his telephone or signal after calling for more air.

In case of insufficient or bad air supply the diver should remain perfectly quiet, operate his regulating escape valve, inflate his suit, and be prepared to ascend. Asphyxiation, except in case of a squeeze, is the result of CO_2 accumulation in the helmet.

The diver is always warned of the excess of CO_2 by his increased respiration—i. e., panting, an uncomfortable feeling of warmth and sweating, headache, and clouding of the helmet windows from excess moisture from his breath.

Fortunately a diver is cognizant of increasing CO_2 long before dangerous amounts are present, and it is of value to note that unconsciousness occurs from it long before death. Attendants should always be warned of a deficient circulation of air through the helmet by—

(*a*) Decrease in the amount of air bubbles rising to the surface.

(*b*) The decrease of the noise (caused by air escaping from the helmet through the regulating escape valve) audible over the telephone. This is an excellent guide, telephone attendants becoming so efficient that by this method they are able to estimate the amount of air a diver is using.

With these two guides alone, in conjunction with the diver's own sensations, except in case of accident, asphyxia from insufficient air supply is inexcusable. The danger of supplying air contaminated with CO_2 from flashing of oil in the cylinders is very unlikely, especially if any precautions at all are observed in using a good oil of high-flashing point in lubricating the compressors and the water-cooling system is working efficiently.

Asphyxia from a slight squeeze, i. e., improper inflation of the dress, will only occur, as a rule, in case of an inexperienced diver. Divers learn to remedy this defect themselves long before they are allowed to attempt diving at any appreciable depth.

In cases where asphyxia is suspected, with the diver under water, he should be started immediately toward the surface. A pause should be made at the first decompression period, and another attempt should be made at communication. If there is no response from the diver he should be brought to the surface.

Once at the surface, in case of asphyxia, fresh air should be given the diver as quickly as possible, by getting the face plate open, or by cutting the diving dress.

In mild cases of asphyxia, where a man is still breathing, a few breaths of fresh air immediately relieves the condition. In a case where the man is apparently dead or unconscious, with feeble respiration, artificial respiration should be started immediately. Do not wait to remove the helmet and dress but get an ingress of fresh air into the helmet and start artificial respiration.

Squeeze.—Squeeze is usually the result of an accidental fall. If, through carelessness or culpable negligence, a diver should be permitted to fall an appreciable distance under water, there would be a sudden increase of air pressure; the helmet escape valve would be seated; the air within the dress would be forced from it and into the noncompressible helmet; the volume of air within the helmet diminishing with the increased pressure (Boyles's law). If this volume of air does not fill the helmet and equal the pressure of water at the depth to which the diver's body has fallen, the excess pressure exerted on the diver's body will tend to drive it into the helmet. The result is most apt to be a serious injury or immediate death for the diver. Falls from shallow to deeper depths are the most serious, as the relative difference in pressures is greater. For instance, if a diver at the surface, 14.7 pounds pressure to the square inch (absolute), should fall 33 feet under water, every square inch of his body would have an additional pressure of 14.7 pounds, or 29.4 pounds absolute pressure, suddenly applied to it, a proportion of 2 to 1 over the pressure in the helmet. As the body has an area of about 2,000 square inches, the total pressure exerted on the diver's body and tending to drive him into the rigid helmet would be several tons (14.7). If, under the same conditions, the diver should have fallen from the surface to a depth of 66 feet under water, the increase in absolute pressure would have been trebled instead of merely doubled. So from the foregoing it is clear that a long fall from a shallow depth would result in a fatal squeeze for the diver. Falls from moderate depths to deeper depths under water are not apt to be so serious as falls from shallow depths; that is, in a fall from the surface to 33 feet the relative difference in pressure is as 1 to 2, while in a fall from 168 feet to 201 feet the relative difference in pressure is as 6 to 7. In the first case the column of air is reduced one-half and in the latter case only one-seventh. The effect of a fall under water is known as a squeeze. A squeeze may occur from other causes, however:

(*a*) A diver descending ahead of his air supply, i. e., descending before the pressure within the dress is equal to the water pressure without.

(*b*) Ruptured hose and a leaky safety valve.

(*c*) Ruptured cuff of the dress and the diver raising his arm, as when trying to reach the escape valve (squeeze in this case being slight, but enough to interfere with respiration).

In cases of slight squeeze, as caused by the regulating escape valve being wide open and a minimum air supply, extra pressure is exerted on the chest (suit flat). The air within the air passages is at a lower pressure than the pressure without, and the diver is forced to breathe against this extra pressure. Respiratory embarrassment results in a short while, and often a diver struggling up his descending line (buoyancy negative) under these conditions may bleed considerably from the lungs and nose. Hemorrhage in this case is usually due to the rupture of small lung capillaries.

The injury from squeeze can cause an almost immediate death. Any injury from squeeze is usually serious and as such demands immediate treatment. Get the diver to the surface as soon as it is deemed safe and remove the apparatus as gently as possible. The patient will usually be unconscious and bleeding profusely from the nose and mouth. Extreme cases have been known where the diver has been molded into his helmet, so that it was practically impossible to remove it. Treat as for any internal injury, with shock.

On account of the seriousness of this accident "tenders" must always observe the utmost caution to protect the diver from falling. The life line and air hose should never be permitted to skip through the hands by the run. If for any reason the diver finds himself in danger of falling he should signal for more air, or open wide his air-control valve and signal to the surface to "Hold on." The moment the danger is over, again regulate the air to prevent the counter accident of "blowing up." Although the effects of squeeze are much more serious than those of "blowing up," both should be avoided; but if it is a matter of two evils, choose the latter.

CAISSON DISEASE OR COMPRESSED AIR ILLNESS.

In all deep-water diving with adequate air supply caisson disease is the commonest accident that the medical officer is called upon to treat. Caisson disease is the result of improper decompression; i. e., in the case of divers it is due to ascending too rapidly to the surface. The disease has many symptoms, at times manifesting itself in attacks of dyspnea and unconsciousness, which may result in death in a few minutes or hours; at times with paralysis of the motor and sensory nervous systems, involving as a rule the lower extremities and bladder. Mild attacks are more frequent, consisting of pain in the extremities and various parts of the body, vertigo, and so forth. The disease rarely occurs unless the pressure exceeds 20 pounds excess pressure (45 feet sea water). The greater the pressure and length of exposure the more frequent and severe will be the attacks of the disease, unless proper decompression has been resorted to.

The accepted theory as to the cause of caisson disease is that bubbles of nitrogen are liberated in the various body tissues, including the blood, upon a decrease in pressure.

In the anaylsis of over 3,500 cases of caisson disease the following classification was made:

	Per cent.
1. Cases showing pain in various parts of the body	88.78
2. Cases with pain, also having local manifestations	.26
3. Cases with pain and prostration	1.26
4. Cases showing symptoms referable to the central nervous system:	
(1) brain	.11
(2) spinal cord—	
(*a*) Sensory disturbances	
(*b*) Motor disturbances	2.16
(*c*) Sensory and motor disturbances	
5. Cases showing vertigo (staggers)	5.33
6. Cases showing dyspnœa and sense of constriction in the chest	1.62
7. Cases showing partial or complete unconsciousness	.46

The fatal cases, of which there were 20 in number, occurred in those cases showing symptoms under 3, 4, and 7.

Pain in abdomen, vomiting, subcutaneous hemorrhage, and girdle pains in the trunk are considered dangerous symptoms.

With immediate recompression, and a gradual decompression, properly conducted, even in severe cases, the outcome is, as a rule, complete recovery. Without decompression, the number of recoveries is remarkable even in a very short while for low pressures, up to 50 pounds. Insufficient data are available on extreme pressures.

PREVENTION OF CAISSON DISEASE.

The prevention of caisson disease consists of—

(*a*) Limiting time of exposure to high pressure.

(*b*) Proper stage decompression.

(*c*) Proper physical standard in the selection of divers.

An attack of caisson disease may be delayed as long as 15 hours after the ascent. For this reason divers should always remain about the place where recompression can be applied until dismissed by the officer in charge. Symptoms vary from a slight attack of the "bends" to complete respiratory paralysis and death. If any untoward symptoms are noted, as pains in the joints, cramps, staggers, weakness, or paralysis of the arms or legs, inability to talk, asphyxia, or difficult respiration, the diver should be given immediate treatment.

In all deep-diving operations a compression chamber of some sort is essential, as there is no efficient means of treating caisson disease without one. Immediate recompression usually alleviates all symptoms. A submarine boat fitted with a diving compartment may be used to advantage for this purpose. In case a recompression chamber is not obtainable, the only recourse left to the officer in charge is to cause the diver to be recompressed as quickly as possible by sending him down again to at least half the absolute pressure at which he had been working.

If recompression, with a proper decompression, does not result in recovery, the case resolves itself into treating conditions that arise, remembering in all cases of paralysis there is practically always bladder involvement.

THE MANAGEMENT OF THE MEDICAL AIR LOCK.

For the prevention and treatment of caisson disease a portable recompression chamber might be had upon application. No diving operations in deep water should be carried out without a recompression chamber of some sort except in case of special exigency.

The maximum safe working pressure of the portable chamber at the diving school is 120 pounds per square inch, but it is rarely necessary to subject a patient to a pressure greater than 60 pounds.

It is desirable that a medical officer, or at least somebody with experience in the prevention and treatment of caisson disease, should go into the chamber with the patient. It is of the utmost importance that there should be no delay in getting the patient under pressure. For this reason the attendants should be trained to take pressure quickly. Dry clothing, blankets, medicines, etc., shall be kept in the chamber. In case of stoppered bottles, small openings through the corks should be made, so that pressure within and without the bottles may be equalized, and thus prevent them from breaking as the result of unequal pressures. No volatile or dangerous liquids shall be stored in the chamber.

An air lock is provided through which small articles may be passed in and out of the chamber.

In case a diver has made a rapid ascent from deep water, but shows no symptoms of caisson disease, he must be hurried into the chamber as soon as possible and pressure raised to 60 pounds or less, this pressure being at least half the absolute pressure at which the diver has been working. He must be kept at this pressure for at least five minutes, after which, if no symptoms have developed, he can be decompressed according to the tables, corresponding to the time and depth of the dive, with an extra five minutes added to the total diving time for time in selecting the table.

If symptoms of caisson disease develop, the patient should be taken immediately into the recompression chamber and pressure run up to 45 pounds with as little delay as possible. In most cases this will be sufficient to revive him. If, however, the patient does not show marked improvement, the pressure must be increased to 60 pounds. In one instance 75 pounds was necessary after a 300-foot dive. The patient must be kept at this pressure until any symptoms of circulatory embarrassment or dyspnœa have disappeared. Such symptoms disappear almost immediately; and if no other serious symptoms are present, decompression may be begun at once.

If paralysis is present and does not pass off in two hours, it is useless to wait longer at high pressures. It must be remembered that exposure in the chamber exceeding 30 pounds is likely to delay decompression very much.

Decompression should be started as soon as the patient is relieved. pressure being allowed to fall at the following rate:

When pressure in the chamber is—	Pressure may be allowed to fall at a rate not faster than—
Above 60 pounds	Rapidly.
Between 60 and 45 pounds	1 pound in 1 minute.
Between 45 and 30 pounds	1 pound in 3 minutes.
Between 30 and 15 pounds	1 pound in 5 minutes.
Below 15 pounds	1 pound in 10 minutes.

No hard and fast rule can be laid down for a decompression rate, which will depend on the condition of the patient, how he stands the decompression, and also the pressure at which he was saturated. If the patient becomes ill again while the pressure is falling, decompression must be stopped, and, if necessary, the pressure raised; when the patient is better, pressure may be allowed to fall again but at a slower rate. If after decompression the patient again develops symptoms, the process of recompression and subsequent decompression must be repeated.

ACCIDENTAL "BLOWING UP."

Accidental "blowing up" may be injurious in various ways, as:

(*a*) From deep depths, an attack of caisson disease may result.

(*b*) From any depth, mechanical injury may result from striking some object, as the ship's side, etc.

(*c*) From the possible fall back into deep water, with resulting "squeeze."

Blowing up is caused by overinflation of the dress, or by the drag of the tide on the diver's lines, etc., sweeping the diver to the surface.

In case of blowing up from depths beyond safety limits, the diver's valves should be regulated for him, as he will be unable to regulate them himself, and he should be sent down again as rapidly as possible (without subjecting him to a squeeze) to his first stage of decompression, at least. Decompression should then be commenced in accordance with the tables. A diver who has been "blown up" should never exhaust air from his helmet or dress until he is certain that the attendants have secured hold of his lines.

FOULING.

Fouling is caused by the diver's lines and hose becoming entangled with some obstruction under water, a situation which prevents him from ascending. It usually requires the services of another diver to clear the one fouled.

Divers should be warned of the dangers from fouling. When a diver has become fouled and unable to ascend, death has resulted from shock and exhaustion. Also, prolonged exposure at deep depths may be followed by a fatal attack of pneumonia.

EAR PAINS.

Ear pains are due to inequalities of pressure on either side of the ear drum. They are experienced while descending under water, and are usually the result of inexperience, the diver not knowing how to clear his ears, i. e., equalizing the pressure in the Eustachian tubes and the outer side of the ear drums. Where the pressure on the outer side has been sufficient to rupture the drum, bleeding from the ear and nose usually occurs.

BLEEDING FROM THE NOSE AND LUNGS.

These conditions are caused by the effects of a squeeze, but may result from great respiratory efforts when the dress is unusually flat or the air supply deficient. Treat as for "squeeze."

MECHANICAL INJURIES FROM EXTERNAL VIOLENCE.

There are many varieties of injuries which call for no special comment. The diver should be brought to the surface as soon as it is deemed safe and necessary treatment given.

DROWNING.

There are two cases on record of drowning in the diving dress in which the helmet became detached from the breastplate. This accident can not happen if the safety catch at the back of a helmet is properly turned down. It is a common superstition among divers that if the dress is ruptured drowning will result. Such is not the case.

Diving with helmets only has been accomplished in depths up to 140 feet as readily as with the complete apparatus, but the practice is deemed unsafe. As long as the air pressure within the helmet is maintained and the diver remains in the erect position, water can not enter the helmet and the diver will not drown. By simply closing the escape valve, air is forced down into the dress and will escape at the side of the vent. In case the dress becomes too full of water, it may be necessary to slip the weighted belt to facilitate ascent.

OXYGEN POISONING.

Air composed of 20 per cent oxygen exerts one-fifth of an atmospheric oxygen pressure. At 10 atmospheres, the oxygen being one-fifth, would exert 2 atmospheres of oxygen pressure. Hence 2, 3. and 4 atmospheres of oxygen would equal 10, 15, and 20 atmospheres of air.

Exposure of animals to a pressure of 170 to 180 per cent of an atmosphere of oxygen caused in a short time diminution in the power of the lungs to absorb oxygen. The tissues of the lungs showed intense congestion and an exudate into the alveolar spaces.

High partial pressure of oxygen produces a marked irritant effect on the lungs, producing, first, congestion, and shortly afterwards hemorrhagic exudation and consolidation, i. e., a typical pneumonia. The pneumonia is patchy if quickly developed, and general if slowly developed.

It requires about 24 hours' exposure to plus 7 atmospheres of air, or 168 per cent atmospheres of oxygen, to produce marked symptoms of pulmonary congestion.

Experiments on monkeys showed no lung troubles in sequent exposures every day for four or five hours at a time at this pressure.

With exposures to oxygen pressure of 300 to 400 per cent, symptoms of oxygen poisoning quickly intervened and, in addition to the lung irritation, convulsions, tetanic in character, are likely to occur.

There is but one case of oxygen poisoning known in the Navy, and this may have been a complication of caisson disease which resulted after a long exposure to high air pressure—three hours of it at 120 pounds excess pressure. The diver developed a double bronchopneumonia.

The prevention consists in limiting time of exposure at deep depths. Treatment is that of an ordinary pneumonia.

HEALTH CONDITIONS OF THE NAVY.

There has been little change in the health conditions of the Navy during the past month. The annual admission rate for all causes, entire Navy, for the five-week period ending September 9 was 576 per 1,000, as compared with 540 per 1,000 per annum for the four-week period ending August 5. The morbidity rate for diseases only during the same period was 510 per 1,000 per annum and for accidents and injuries 66 per 1,000 per annum.

The communicable diseases were slightly more prevalent during the past five weeks than at any time during the past four months; the annual admission rate for communicable diseases, exclusive of influenza and the venereal diseases, for the five-week period ending September 9 was 47 per 1,000 per annum. Of the communicable diseases malaria continues to cause the greatest damage; the morbidity rate for this disease for the five-week period ending September 9 was 39 per 1,000 per annum.

The following table gives the annual admission rate per 1,000 for certain communicable diseases for the current month of August, 1922, in comparison with the mean annual admission rates, month of August, for the four-year period 1918–1921, inclusive:

Disease.	August—	
	1918–1921	1922
Cerebrospinal fever	0.11	....
Diphtheria	1.68	0.10
German measles	.80	.50
Influenza	20.19	8.36
Malaria	16.68	25.79
Measles	3.02	.50
Mumps	11.34	.91
Pneumonia	3.90	1.11
Scarlet fever	.69	....
Smallpox	.08	....
Tuberculosis	4.80	2.32
Typhoid fever	.18	....

Although the Navy has commenced an active campaign of recruiting and there are now more recruits at the training stations than there have been at any time during the past six months, it will be seen from the above table that the admission rates for the common communicable diseases, such as measles, mumps, etc., have not risen to any appreciable extent. This may be better seen by comparing the table of communicable diseases for August with the tables published in previous issues of the BULLETIN.

During the past five weeks there has been a decided rise in the morbidity rates for the venereal diseases, the admission rate for this period being 142 per 1,000 per annum as compared with an average rate for the year of 114 per 1,000 per annum.

The mortality rate for all causes, entire Navy, for the five-week period ending September 2 was 3.23 per 1,000 per annum. The annual death rate per 1,000 for diseases only was 1.83, for accidents and injuries, other than drawning, 0.61 per 1,000 per annum, and for drowning, 0.79 per 1,000 per annum.

VENEREAL PROPHYLAXIS IN EUROPEAN WATERS.

By W. E. Bradbury, lieutenant, Medical Corps, United States Navy.

Several articles have appeared during the past few months on the venereal-disease problem, and it is believed that the accompanying chart gives a very good picture of the subject, the result of one year's work under the most adverse conditions.

The figures are taken from the activities of 1,051 men composing the crew of the U. S. S. *Utah* during one year, practically all of which time has been spent in ports of Europe and northern Africa. where there is very little if any attempt made by local authorities to institute any proceedings tending to combat the venereal problem. The men are nearly all under 25 years of age, the majority much younger. Prostitution has been unrestricted in all ports with the exception of two, alcoholic beverages comparatively cheap, and both available as soon as the men stepped ashore.

Opportunity for wholesome recreation of any kind was not available to any extent. Athletics could not be indulged in, owing to the lack of time in ports, lack of suitable grounds, and lack of competition. Moving pictures or other shows were not patronized, because of unfamiliarity with the language, except in English ports. Sight-seeing was the principal amusement, but the novelty of that soon wore off, except for a small minority, and that minority are not in need of prophylaxis of any kind, as they do not expose themselves; for the vast majority there remained only the café and dance hall.

Every method available was used to combat the problem. The men have been given frequent talks on the subject. Literature on the subject has been liberally distributed. Sight-seeing trips have been arranged in nearly every port, athletics whenever possible. moving pictures on board ship when available, and medical prophylaxis was provided.

Naturally the medical prophylaxis has been the most important, as under the existing conditions there have been a large number of exposures. In practically every port a prophylactic station has been established ashore, located as accessible as possible. The hospital corpsmen go ashore with the first patrol, and the station is open until liberty has expired.

Each patrol is able to instruct anybody the nearest way to the station. These stations are not utilized as often as they should be; nevertheless a great many men take the trouble to go to them, and it is believed their establishment is a very desirable procedure.

The prophylactic station on board ship is the most popular, as it is easier and the man can get his name on the book with the least amount of inconvenience to himself. This station is open at all hours when men are returning from liberty. It is believed that nearly all treatments after six hours are taken for record only, as the men who have developed disease and have not a record of having taken prophylaxis are severely punished.

Convenient packets of calomel ointment have been available at all times, which are given to the men free. They have been placed at the gangway without supervision, have been distributed to each liberty party by a hospital corpsman and left in a convenient place in the sick bay. and every effort has been used to educate the men as to their use. However, they are not used as much as they should be.

The last six months of the year was not as bad as the first; part of this, I believe, is due to the men themselves. Drunkenness is decreasing, and the men in general are better behaved. This was made more noticeable by a new draft of about a hundred men who recently came from the United States who immediately got into trouble from overindulgence in alcoholic liquors. There have also been a large number infected with venereal disease. There are now about 60 men under treatment for syphilis, and their propaganda among the crew must have some good effect on the rest, at least through the element of fear.

It is not believed that, while the number of prophylactic treatments is very high, it even approximates the truth as to the number of exposures.

In conclusion, it is believed that under any condition, comparatively good or bad, one must use every available method to combat the problem, and that by constant effort we have reduced the incidence of disease by from 15 to 20 per cent under the existing conditions from what it would have been had we been indifferent to the question or ignored it entirely. The following table represents the venereal statistics for the year:

Month.	Number of liberties.	Number of prophylactic treatments.	Number of admissions for gon. inf. urethra.	Number of admissions for chancroid.	Number of admissions for syphilis.	Ports visited and number of days in each port.
July	5,673	634	5	1	0	Boston, Mass. 8 Lisbon, Portugal 3 Cherbourg, France 6
August	6,325	1,285	32	6	1	Cowes, Isle of Wight 7 Cherbourg, France 5 Gravesend, England 5 Le Havre, France 14
September	5,287	774	26	5	3	Gravesend, England 5 Copenhagen, Denmark 8 Danzig, Free City 3 Cherbourg, France 2
October	5,858	1,560	39	3	2	Cherbourg, France 19 Gibraltar 7
November	5,875	1,520	20	13	4	Tangiers, Morocco 4 Constantinople, Turkey 18
December	6,200	1,761	21	13	2	Constantinople, Turkey 5 Pola, Italy 2 Spalato, Gravosa, and Cattaro, Jugoslavia 7 Naples, Italy 11
January	4,700	921	26	4	1	Malta 8 Bizerta, Tunis 7 Tunis, Tunis 4 Sfax, Tunis[1] 14
February	5,250	691	3	2	0	Malta 2 Villefranche, France 14
March	12,400	834	21	4	4	Villefranche, France 27 Toulon, France 3
April	6,100	808	17	6	5	Toulon, France 3 Salinas de Hyers, France 6 Algiers, Algeria 11 Gibraltar 6
May	5,419	597	4	2	3	Gibraltar 5 Cherbourg, France 8 Portsmouth, England 14
June	6,075	172	7	1	5	Portsmouth, England 22 Gravesend, England 7
Total	75,162	11,557	221	60	30	

[1] Target practice, at sea.

Average complement for year	1,051
Percentage of infection	29.59
Number of days in port	288
Number of days at sea	77

USE OF FISH FOR CONTROL OF MOSQUITOES IN NORTHERN FRESH WATERS OF THE UNITED STATES.

The following is quoted from the United States Public Health Engineering Abstracts from an article entitled "Use of fishes for control of mosquitoes in northern fresh waters of the United States." by J. Percy Moore, professor of biology, University of Pennsylvania, temporary investigator, United States Bureau of Fisheries:

The author discusses the value as agents for mosquito control of the roach or golden shiner (*Abramis crysolencas*), the goldfish (*Carassius auratus*), the mud minnow (*Umbra pygmaea*), the common killifish (*Fundulus herteroclitus*), the translucent killifish (*Fundulus diaphamus*), the common top minnow of the South (*Gambusia affinia*), the blue spotted sunfishes (*Enneacanthus gloriosus* and *E. obesus*), the long-eared sunfish (*Lepomis auritus*), and the common sunfish (*Eupomotis gibbosus*). The geographical distribution of the species discussed is given in the report, and it is shown that all of them occur, either generally or in some parts of the malarious districts of the South. The results of the investigation, therefore, are probably in part applicable also in the South.

Methods of investigation.—The investigations were carried on during the three summers, 1918, 1919, and 1920, principally in Philadelphia and Delaware Counties, Pa., and Palisades Interstate Park, N. Y., but observations and minor experiments were also conducted at other points in Pennsylvania and New York and in Maryland, Delaware, and New Jersey. The plan of procedure consisted in preliminary examinations of many ponds, swamps, and streams, during which collections of the fauna and flora and ecological data were made. Thereafter certain waters, chiefly small ponds, were selected for detailed study. These waters, as far as possible, were visited at weekly or fortnightly intervals, and usually during the visits fish and other organisms were collected. The fish taken were at once dropped into 4 per cent formaldehyde to stop digestion of foods in their stomachs. The density of mosquito breeding was determined in the usual way, i. e., by taking water samples with a dipper and counting immature mosquitoes and egg boats. Adult mosquitoes also were collected. Numerous experiments were tried by modifying conditions in such a manner that fish were admitted to places from which they had been absent previously and vice versa, and the actual transplanting of certain species to small ponds and pools was practiced to a limited extent. The conclusions arrived at concerning the various species studied were based upon their observations and experiments and upon examinations made of stomachs of fishes preserved during the inspections of the waters.

Conclusions.—The conclusions with respect to each species studied are as follows:

(*a*) The roach or golden shiner does not push its way into the "very shallow plant-grown waters where mosquitoes breed," and the investigations, although not conclusive, indicate that this fish has been much overrated as a mosquito destroyer.

(*b*) The goldfish has a very restricted value and is useful only in containers or small waters where foods other than wiggle tails are scarce.

(*c*) The mud minnow consumes mosquito larvæ, but its chief deficiency appears to the author to be in numbers, i. e., it usually does not appear to become numerous enough to furnish complete control, but since the fish is very hardy he recommends experiments in the direction of artificially propagating this fish. Of 50 stomachs examined, 22 were found to contain mosquito larvæ, constituting about 4 per cent of the total contents.

(*d*) Concerning the common killifish, the author says, "The value of this species in limiting the numbers of the salt-marsh mosquitoes is thoroughly established and attested by scores of antimosquito workers in New Jersey, New York, and Connecticut."

(*e*) The translucent killifish was found to feed to some extent on mosquito larvæ, and the author recommends it in preference to the common killifish for muddy ponds and sluggish streams.

(*f*) Gambusia, although not occurring naturally in the area in which the experiments were conducted, was introduced. It did not survive the winter in ponds in the vicinity of Philadelphia where it was planted, but it was found that this minnow can be used to a limited extent by carrying a brood stock through the winter in a greenhouse or other suitable place for release the following spring. These fish, under favorable conditions, increase with "astounding rapidity," and mosquito breeding may be controlled by this method in small ponds.

(*g*) "Enough is known of the blue-spotted sunfishes to recommend placing them on the list of species for stocking plant-grown ponds and streams," is the author's conclusion concerning these handsome fish.

(*h*) Insufficient detailed attention was given to the long-eared sunfish to determine its exact value, but the author thinks it probable that the young, at least, may be of value.

(*i*) The common sunfish was found to be the most valuable of all the sunfishes, the young being particularly effective because they are the ones that visit the extreme margins of the ponds. Stomachs of 224 examples, the majority under 80 millimeters in length were examined and "mosquitoes in all stages" constituted 9 per cent of the food present. The author says that it is undoubtedly an important antimosquito agent, and he believes it to be very nearly equal to Gambusia. In my own work in the South I have not found it anything like equal to Gambusia, and numerous times I have found it necessary to introduce Gambusia into ponds already populated by this sunfish and by the bream or blue-gill sunfish.

As a general conclusion the author makes the following statement: "The relatively small number of mosquitoes produced by such waters (ponds, lakes, and sluggish streams under natural conditions) result from this influence. Indeed, it may safely be said that were these fish suddenly wiped out mosquitoes would immediately and generally become intolerable nuisance." This is in entire accord with the statement made by me in a number of public lectures and elsewhere.

viz, that several large, prosperous cities in the South never would have been built had it not been for the check on mosquito production provided by fish, chiefly top minnows.

NOTES FROM THE MARINE BARRACKS, QUANTICO, VA.

The health of the command has been excellent, notwithstanding the severe strain to which the men were subjected during the Gettysburg maneuvers. Malaria was more prevalent in July than during the previous month, but this can be accounted for to some extent because of the fact that the personnel was rapidly increased in preparation for the maneuvers; men being drawn from various posts and from detachments arriving from the Tropics to fill up the organizations going on the maneuvers. The majority of these cases of malaria were of tropical origin.

Venereal disease, especially gonococcus infection, showed a slight increase over last month. This probably was due to the opportunity of exposure of the men who went on the hike to Gettysburg.

Mosquitoes.—A great many more mosquitoes are present this year than in previous years. This is due to the fact that practically the entire command was in preparation and on the maneuvers to Gettysburg during the latter part of June and the early part of July, leaving no labor available for mosquito-prevention work, and as a result the work stopped entirely. Brush was allowed to grow up in the ravines, the drainage ditches which had all been gone over and put in condition earlier in the season were filled up, and the water was blocked off in most of the laterals. Culicinæ larvæ were found to be breeding in great numbers in all of them. The personnel of the medical battalion was immediately set to work cutting down brush, opening and oiling the ditches in the confines of the camp and in adjacent territory.

The larger creeks, Quantico, Little Creek, and Chappawamsic were given two treatments of arsenic and dust, 1 part to 100, but it is too early as yet to determine the efficacy of this process.

NOTES FROM THE UNITED STATES NAVAL AIR STATION, PENSACOLA, FLA.

During the latter part of July an epidemic of gingivitis occurred, which was first discovered by the dental officer, among the marines. The marine command was examined and about 20 per cent of the personnel were found infected. A large fusiform bacillus and a delicate spirillum, similar to those found in Vincent's angina, were found to be the cause of the epidemic. No amœbæ have been found in the pyorrheal cases.

The rather prevalent use of common drinking cups evidently favors the spread of gingivitis. The medical officer again recommends that drinking fountains of the bubbling spring type be installed in buildings where a considerable number of men are quartered; this is also very desirable for the buildings where the civilian employees work.

NOTES FROM THE UNITED STATES NAVAL ACADEMY, ANNAPOLIS, MD.

The sanitary condition of the *Reina Mercedes* and the *Cumberland* was excellent during the month of July.

A special antivenereal campaign, including lectures on morale and venereal prophylaxis, distribution of literature, and instruction concerning the use of the new collapsible venereal prophylactic tubes, was conducted among the mess attendants attached to these two ships. It is interesting to note that among the men who used 64 prophylactic tubes within six hours after the time of exposure no cases of venereal disease occurred, whereas among the 9 men who took silvol prophylactic treatments six hours or more after exposure 3 developed gonorrhoea, 1 chancroid, and 2 syphilis.

INSTRUCTIONS TO MEDICAL OFFICERS.

Circular letter, serial No. 204–1922. RFJ–LMT SD 132687–0(81).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 7, 1922.

To: Commanding officer, U. S. S. ——.
Subject: Educational material dealing with the prevention and control of accidents and disease.

1. There are forwarded herewith a set of posters dealing with the prevention and control of accidents and disease which have been approved by the commanders in chief of the Atlantic and Pacific Fleets. It is requested that these posters be displayed on bulletin boards in such manner as the commanding officer sees fit. Additional posters will be forwarded to your ship at approximately monthly intervals. In accordance with the suggestion of the commander in chief of the Pacific Fleet it is thought best that the posters dealing with the control of venereal disease be displayed in such places that they will not be conspicuous to visitors coming aboard ship.

2. The Bureau of Medicine and Surgery is forwarding to the commanders in chief of the Atlantic and Pacific Fleets a 12-reel motion-picture film entitled "The Science of Life," which may be obtained by individual ships from their respective commander in chief. Copies of this motion picture have also been forwarded to the commanding officer, United States naval training station, Hampton Roads, and the commanding officer, United States naval training station, San Francisco. As soon as possible this motion picture will be forwarded to the commander in chief of the Asiatic Station.

3. The Bureau of Medicine and Surgery has had made lantern slides dealing with the prevention and control of accidents and disease which will be furnished to any ship or station making request for the same. Samples of the lantern slides have been furnished the commanders in chief of the fleets.

4. Comment or criticism of the posters now being forwarded by the Bureau of Medicine and Surgery to ships and stations is desired; and if the officers or men of the ships or stations can suggest types of posters for use throughout the service in the prevention and control of accidents and disease, the bureau will have such material printed and distributed.

E. R. STITT.

Circular letter, serial No. 205–1922. WRJ:THC 124716(82).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 11, 1922.

To: All naval hospitals and hospital ships.
Subject: Ration memoranda—Hospital Form No. 36.
References: (*a*) Hospital Form No. 52, Nurse Corps subsistence report.
(*b*) Hospital Form No. 53, Hospital Corps subsistence report.
(*c*) Bureau's circular letter No. 129733(54), serial No. 47–1920, of July 20, 1920.
(*d*) Bureau's circular letter No. 129733(54), serial No. 63–1920, of October 22, 1920.
(*e*) Bureau's circular letter No. 132685, serial No. 129–1921, of October 11, 1921.
(*f*) Bureau's circular letter No. 125884(22), serial No. 163–1922, of February 11, 1922.
Inclosures: (1) Ration memoranda—Hospital Form No. 36.

1. Hospital Forms Nos. 52 and 53, statements of subsistence of Nurse Corps and Hospital Corps, respectively—(refs. (*a*) and (*b*))—will be discontinued, and these numbers will be given to other forms about to be instituted.

2. Instructions contained in paragraph 6 of reference (*c*) and paragraph 5 of reference (*d*) are hereby revoked and quarterly report required under said letters discontinued.

3. In lieu of the tabular statement required by paragraph 5, reference (*d*), a report will be made on the "report of expenditure card" and paragraph 15 of reference (*f*) will be amplified by adding, as subparagraph (*h*), the following:

"(*h*) 'Report of expenditure cards' covering expenditures for care of the dead will show, in the case of Veterans' Bureau patients, the name of the deceased, date of death, place of burial, and itemized cost."

4. Reports submitted under reference (*e*), "Care of supernumerary patients during fiscal year," will be discontinued.

5. In lieu of the reports required by reference (*a*), "Nurse Corps subsistence report," (*b*) "Hospital Corps subsistence report," (*c*) "Report of Veterans' Bureau patients," and (*e*) "Care of supernumerary patients," it is directed that, beginning with the month of July, 1922, each hospital and hospital ship submit Form No. 36, "Ration memoranda," prepared in the manner outlined on inclosure.

6. Hospital ships will report only the personnel subsisted by "naval hospital fund."

F. L. PLEADWELL, *Acting.*

Circular letter, serial No. 206–1922. WJCA: ESK 129733(74).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 7, 1922.

To: All naval hospitals.

Subject: Monthly report of United States Veterans' Bureau beneficiaries in United States naval hospitals.

Reference: (*a*) Letter to the Surgeon General, United States Navy, from the Assistant Director, United States Veterans' Bureau No. ADH-fac-6-MSS of 28 July, 1922.

1. For your information there is quoted herewith the first paragraph of reference (*a*):

"In order that the United States Veterans' Bureau may be kept more adequately informed in regard to the current hospital situation in naval hospitals, it is respectfully requested that there be prepared each month and transmitted to this bureau, attention medical statistical section, a report by individual hospitals of the number of admissions of United States Veterans' Bureau beneficiaries classified by tuberculosis, neuropsychiatric, and general diseases; the total number of discharges, unclassified as to type of disease, but separating deaths from discharges; and the total number of patient days of treatment rendered at each hospital, unclassified."

2. You are directed to forward on the first of each month, on forms similar to the accompanying form, original report direct to the United States Veterans' Bureau, attention medical statistical section, and a duplicate report direct to the Bureau of Medicine and Surgery. The copy forwarded to this Bureau should be marked "Copy for the Bureau of Medicine and Surgery."

3. These forms will not be furnished by the bureau and should be prepared by the hospitals. Reports covering the month of July, 1922, shall be submitted immediately.

F. L. PLEADWELL, *Acting.*

Circular letter, serial No. 207–1922. HBS/DRG 132609-0(72).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 16, 1922.

To: All medical officers.

Subject: Surveyed medical department property recommended by survey board for disposition by "G. S. K." (supply officer).

1. When a survey of property of the Medical Department which recommends certain items to "G. S. K." (supply officer) "for final disposition," has been approved by this bureau and copy returned to activity concerned; a separate list of items thereon recommended for disposition by supply officer will be prepared by the survey board on Form Ca-1 sheets, with the following signed note appended:

"Above items Nos. xxxx recommended to be turned over to supply officer for sale to highest bidder.

"(Signed) ________________________."

2. The commanding officer will forward above list to supply officer, together with instructions that the recommendation of the survey board, as approved by the bureau, be complied with.

E. R. STITT.

Circular Letter, serial No. 208-1922. FLP-DRG 124920-O(83).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 17, 1922.

To: All medical officers.

Subject: Arsphenamine; administration of, on board ship forbidden and stock on hand to be turned in.

Reference: (*a*) Bu. M. & S. circular letter No. 44-1920 of July 10, 1920.

1. Attention is called to reference (*a*) (quoted below), which has not been rescinded or modified:

> To: All medical officers.
>
> Subject: Arsphenamine and neoarsphenamine.
>
> 1. The following letter of Rear Admiral E. R. Stitt, Medical Corps, United States Navy, is approved by the bureau and published for the information of the medical officers of the United States naval service:
>
> "July 7, 1920.
>
> "To: Bureau of Medicine and Surgery.
>
> "Subject: Recommendation that neoarsphenamine be substituted for arsphenamine in connection with use on board ships and at certain stations of the Navy.
>
> "1. I would recommend that the use of arsphenamine be discontinued on board ships of the Navy and in its place to substitute neoarsphenamine. This same recommendation would apply to stations and smaller hospitals.
>
> "2. In the larger hospitals, where facilities for the administration of arsphenamine are satisfactory, the choice between arsphenamine and neoarsphenamine should be left to the discretion of the commanding officer.
>
> "3. This recommendation is made for the following reasons:
>
> "(*a*) In discussing fully this matter with the director of the hygienic laboratory he is of the opinion that most of the accidents attending the use of arsphenamine have been connected with errors in technic. In view of the simplicity of technic when using neoarsphenamine, many untoward results would be eliminated.
>
> "(*b*) In the clinic of the Brady Institute, neoarsphenamine is used exclusively, and Doctor Young and his associates are unable to note any lessened therapeutic efficiency with this drug than when arsphenamine is used.
>
> "E. R. STITT."
>
> 2. The commanding officers of the United States naval medical supply depots will be instructed to include neoarsphenamine on the supply table and requisitions on Form 4 will be filled at the supply depots.
>
> 3. Requisitions from the larger hospitals will be approved for either arsphenamine or neoarsphenamine as the commanding officers prefer, but it is recommended that commanding officers of the larger hospitals continue to requisition arsphenamine until the present supply is exhausted.
>
> W. C. BRAISTED.

2. In connection with the bureau's circular letter quoted above, it appears that the medical departments of some ships are still carrying both arsphenamine and neoarsphenamine. It has come to the attention of the bureau recently that an instance of the accidental use of arsphenamine occurred under an impression on the part of the medical officer that he was using neoarsphenamine, with serious results. This confusion of one variety of arsphenamine with the other has in some instances been enhanced by the similarity of labels

on the containers, but steps have been taken by the manufacturers to differentiate more carefully the two varieties by distinctive labels.

3. Since the instructions contained in the bureau's circular letter No. 44–1920 contemplated that only one variety of arsphenamine should be maintained in stock on ships, stations, and smaller hospitals in order to avoid the difficulties referred to in paragraph 2, it is directed that all arsphenamine now in stock in the medical stores of all ships, stations, and smaller hospitals be immediately returned to the nearest naval medical supply depot. It is further directed that in medical departments of hospitals where both varieties of arsphenamine are retained in stock care be taken to differentiate sufficiently the two varieties so that no confusion can result in selecting the appropriate technic for the variety intended to be used.

4. No. 31, volume 37, Public Health Reports, dated August 4, 1922, contains "standard instructions for the preparation and intravenous administration of arsphenamine and neoarsphenamine for use by the Medical Departments of the Army, of the Navy, and of the Veterans' Bureau, and by the Public Health Service." These instructions should be followed.

E. R. STITT.

Circular letter, serial No. 209–1922. DCC: SMS 128586(84).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 21, 1922.

To: All naval hospitals.
Subject: Retention of patients in naval hospitals.
References: (*a*) Section 22, Veterans' Bureau act of August 9, 1921 (42 Stat. 155).
(*b*) Circular letter 109–1921, July 11, 1921, 128586(72).

1. Reference (*b*) is hereby canceled.

2. Reference (*a*) states: "SEC. 315. That no person admitted into the military or naval forces of the United States after six months from the passage of this amendatory act shall be entitled to the compensation or any other benefits or privileges provided under the provisions of Article III of the war risk insurance act, as amended."

The Judge Advocate General (26510–1481) commenting on this provision states: "In view of the foregoing, you are advised that as the law now stands enlisted men entering the service either in a first enlistment or through a reenlistment since February 9, 1922, do not come within the purview of the Veterans' Bureau act or within the provisions of the pension laws unless their rights under said pension laws accrued prior to October 6, 1917."

3. In view of the above-quoted law and decision of the Judge Advocate General, this bureau feels that it is incumbent upon it to retain for a reasonable period those members of the personnel who enlisted after February 9, 1922, especially until Congress passes some measures for their relief. This applies particularly to cases of tuberculosis and other diseases where the patient will require institutional treatment if he were discharged.

4. It is requested that persons so retained be surveyed after each three months and that the board of medical survey state the necessity for their retention. If the person surveyed desires to be discharged from the service, he should be informed of his status and that fact stated on the medical survey form recommending his discharge from the service. In the case of persons reenlisting after February 9, 1922, who are surveyed for disease or disability

occurring after their reenlistment, the survey board should state the relation, if any, between the present disability and their service subsequent to October 6, 1917.

5. The bureau does not desire the retention of persons whose disability is discovered soon after enlistment, if "not in line of duty," and who are able to care for themselves if discharged.

6. Patients who enlisted prior to February 9, 1922, should be surveyed, recommended for discharge from the service, and retained as supernumeraries until taken up by the Veterans' Bureau.

F. L. PLEADWELL, *Acting*.

Circular letter, serial No. 210–1922. DCC: SMS 128586(84).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 22, 1922.

To: All naval hospitals.
Subject: Tuberculosis patients who have enlisted subsequent to February 9, 1922.
Reference: (*a*) Circular letter 127–1921 (128586) (101) of October 10, 1921.

1. Reference (*a*) is hereby canceled.

2. In order to prevent the transfer of tuberculosis patients to the Fitzsimons General Hospital, Denver, Colo., who will not be benefited by the treatment there, it is requested that the following instructions be observed:

(*a*) Only patients who have a positive sputum diagnosis will be transferred to the Fitzsimons General Hospital, Denver, Colo.

(*b*) Of those mentioned in paragraph (*a*) only those who in the opinion of the board of medical survey will be benefited by the high, dry atmosphere of Colorado.

(*c*) Those patients whose sputum is negative for tubercle bacilli will be retained for treatment.

3. The bureau expects the cooperation of the commanding officers of the various naval hospitals in observing the above instructions, as it appears to be the opinion of many specialists in the treatment of tuberculosis that tubercular patients can be satisfactorily treated in a general hospital.

4. Paragraphs 4, 5, and 6 of circular letter serial No. 209–1922, 128586(84), August 21, 1922, apply to cases of tuberculosis.

F. L. PLEADWELL, *Acting*.

Circular letter, serial No. 211–1922. WRJ: THC 124842(84).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., August 24, 1922.

To: All medical officers.
Subject: Blank forms.

1. Hereafter blank forms will be issued to the service at a cost value and will be accounted for on the "report of expenditures" in the same manner as are other supplies issued from the naval medical supply depot.

2. Requests for blank forms, Forms "O" and "41," will be prepared and submitted in duplicate. The duplicate copy will be priced by the medical

supply depot and returned, with the forms supplied, for the information of the activity.

3. It has been brought to the attention of the bureau that blank forms are requested by the various activities in quantities far in excess of actual requirements, sometimes in such amounts as to require rail shipments. It is directed that care be exercised in preparing such requests and forms requested in quantities only as may be shipped by mail.

F. L. PLEADWELL, *Acting*.

Circular letter, serial No. 212-1922. WHM-HCM SDS 124842(91).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 1, 1922.

To: All medical officers.
Subject: Re the reporting of disabilities occurring among naval personnel attached to and actually serving on submarines.

1. It is directed that in the future when personnel attached to and actually serving on board submarines are admitted to the sick list, all submarine bases, tenders, and other stations to which submarines are attached will, on line 10 of Form F. card, add after the name of the particular base, tender, or station the name of the submarine in parentheses, e. g., Submarine base (U. S. S. *Ortolan*), San Pedro, Calif. (U. S. S., *L-6*).

2. The cases will, however, be reported in the usual manner on Forms F and K, the above designation appearing only on Form F cards.

F. L. PLEADWELL, *Acting*.

Circular letter, serial No. 213-1922. WSG: ESK 125884(64).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 7, 1922.

To: All naval hospitals.
Subject: Navy property not to be loaned.
Reference: S. & A. "Memoranda," No. 239, July 1, 1922, page 6454.

1. The following letter from the Acting Secretary of the Navy to the Chief of the Bureau of Supplies and Accounts, dated June 28, 1922, is quoted for the information and guidance of all concerned:

"Confirming oral instructions, Government property in the custody of the Navy shall not be lent to anyone or any organization, public or private, except by express authority of the Secretary of the Navy transmitted through the Paymaster General.

"Such items of material as the Secretary of the Navy considers legal to issue to governmental, humanitarian, and boy scout organizations, or organizations of a corresponding philanthropic nature, shall not be issued as loans, but shall be sold to such organizations at a price fixed by the Paymaster General, subject to the approval of the Secretary of the Navy. In the case of special articles, such as boats, engines, and ordnance matériel, the Paymaster General will refer the matter to the bureau concerned before presenting his recommendation to the Secretary of the Navy."

2. Especial attention is invited to the above order and to the fact that no loans of Government property may be made "except by express authority of the Secretary of the Navy."

3. The alleged loan of Medical Department tentage has recently been unofficially brought to the bureau's attention.

E. R. STITT.

Circular letter, serial No. 40-22.

N-14-RRME-KVS 55399-79
NAVY DEPARTMENT,
BUREAU OF NAVIGATION,
Washington, D. C., August 24, 1922.

To: All ships and stations.
Subject: Activities of the American Red Cross for the benefit of Navy personnel.
Inclosures: Two.

1. There are attached inclosures (2), two papers which indicate clearly the work The American Red Cross is constantly performing for the benefit of the personnel of the Navy.

2. It is directed that these inclosures be brought to the attention of the personnel, in order that they may know and appreciate the very large amount the work The American Red Cross is constantly performing for the benefit form for the benefit of themselves and their families.

THOMAS WASHINGTON.

[Inclosure 1.]

RED CROSS ACTIVITIES FOR UNITED STATES NAVAL PERSONNEL.

JULY 25, 1922.

The national headquarters American Red Cross maintains in their organization a department called the bureau of naval affairs, to which a medical officer of the Navy is regularly assigned and detailed. Through this office all correspondence from the Red Cross chapters concerning naval personnel, ex-Navy men and families of naval men, is routed. Through this office matters pertaining to emergencies arising in families, financial affairs, etc., can be taken up immediately with the proper authorities in the Navy Department and information furnished the local chapters.

The Red Cross activities in naval hospitals are as follows:

(a) Providing supplemental entertainment for patients. (This consists of motion pictures, vaudeville shows, dances, etc.)

(b) Regular visiting (under commanding officer's direction).

(c) Stimulating in adjacent community welfare activities which can be beneficial to the patients.

During the World War and subsequent demobilization the Red Cross activities at naval stations and bases were very helpful to the Navy and were greatly appreciated. At the present time Red Cross personnel under the direction of a field director is maintained at each naval station and large marine post where valuable services, especially in connnection with the home service conditions and contact between an enlisted man and his family, etc., are rendered.

The social service department of the Red Cross in relation to Veterans' Bureau patients in naval hospitals has to do with—

(a) Securing social histories and other significant data for use of tuberculosis specialists and psychiatrists.

(*b*) Securing reports on home conditions for help of physicians in deciding whether or not to discharge a patient to his home.

(*c*) Correspondence with home communities to adjust home situations, thereby making it possible for patients to remain in hospitals. This sometimes involves financial aid to families.

(*d*) Arranging through local communities for men who return home to have proper care and assistance in adjusting themselves to civilian life.

(*e*) The Red Cross maintains an information service which deals with—

(1) Communicating with family doctors and others to assist in securing affidavits necessary to substantiate Government claims.

(2) Information to families regarding patients' personal and family affairs when advised to do so by the commanding officer.

(3) Furnishing information to patients regarding Government legislation.

(4) Furnishing information regarding Government insurance.

(*f*) The Red Cross also assists in the matter of following up Veterans' Bureau patients who leave the hospitals A. W. O. L. or against advice to see that they return, or if leaving against advice that they are placed under proper supervision in a home community.

The Red Cross maintains Red Cross convalescent houses at each of the large naval hospitals where patients may avail themselves of the opportunity to read, play such games as their physical conditions permit, write letters, etc.

The Red Cross has accomplished a great deal in filing with the proper offices information and data necessary for Veterans' Bureau patients to receive compensation from the bureau. There are at present nearly 800 Veterans' Bureau patients in naval hospitals, a large number of whose claims for compensation have not been settled. Through the investigations by the Red Cross and data furnished settlement of these claims is greatly expedited.

The Red Cross Society maintains in practically all of the large naval hospitals personnel to instruct the patients in occupational therapy. This consists of bead work, basketry, weaving, metal work, toy making, etc. (These departments are practically self-supporting.)

One of the most commendable works of the Red Cross for naval, marine, and Veterans' Bureau patients in naval hospitals is to keep their families advised as to their condition, and to help, often financially, to make arrangements for parents to visit their sons whose conditions are critical.

[Inclosure 2.]

REPORT OF SERVICE RENDERED BY AMERICAN RED CROSS FOR MEN OF THE NAVY AND MARINE CORPS, INCLUDING VETERANS' BUREAU PATIENTS IN NAVAL HOSPITALS, DURING THE MONTH OF JUNE, 1922.

I. Men in camps and stations last day of month:	
(*a*) Number of stations covered	26
(*b*) Approximate number of able-bodied men served	75, 565
(*c*) Approximate number of service patients served	3, 635
(*d*) Approximate number of Veterans' Bureau patients served	1, 946
II. Record cases:	
1. Brought forward from preceding month	3, 135
2. New record cases	2, 188
3. Reopened record cases	789
4. Total open during month	6, 112
5. Cases acted on during month	3, 864
6. Closed during month	3, 274
7. Remaining open at end of month	2, 838

III. Analysis of new and reopened record cases:

1. Soldier and sailor claims (allotment, allowance, insurance, compensation, etc.)	945
2. Other difficulties regarding Government's program	250
3. Investigations—	
(a) Discharge	137
(b) Furlough	61
(c) A. W. O. L. or A. O. L	64
(d) Medical, social	322
(e) Other, social	374
4. Requests for family service—	
(a) Relief	118
(b) Social	173
5. Connections with relatives reestablished	115
6. Men's other personal problems (preparing affidavits, obtaining needed clothing; miscellaneous friendly aid; legal; business problems, etc.)	659
7. Number men given loans during month	149
IV. Nonrecord (individual information cases involving elements listed in Group III)	5,852
V. Hospital recreation and entertainment conducted or produced by the American Red Cross for patients in Navy hospitals:	
1. Motion picture shows	28
Approximate attendance	4,050
2. Vaudeville and plays	14
Approximate attendance	3,950
4. Speaking and musicals	15
Approximate attendance	1,125
4. Athletic events	16
Approximate attendance	450
5. Miscellaneous (dances, outings, card parties, etc.)	28
Approximate attendance	3,198
VI. Services to patients (not elsewhere specified):	
1. Friendly visits to patients	8,519
2. Number of instances of definite services rendered patients	2,728
3. Letters written by hospital worker—	
(a) Communication service	669
(b) Personal	339

VII. Supplies distributed for comfort and welfare of patients in hospitals includes a variety of items. A few of those articles distributed generally throughout all divisions are listed below:

Brushes, tooth		170
Cards, playing		76
Cigarettes		35,400
Cream, shaving	tubes	90
Envelopes		11,240
Matches	books	650
Matches	cartons	6
Paper, writing		16,950
Socks	pair	112
Sweaters		104
Tooth paste	tubes	141

VITAL STATISTICS.

In the future the "Monthly Health Index," which will be published on the fifteenth of each month, will contain statistical data for individual ships and shore stations. The statistics appearing in this bulletin are summaries compiled from those published in the "Monthly Health Index."

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. Stitt.

Table No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of August, 1922.*

	Entire Navy.	Forces afloat.	Atlantic Fleet.	Pacific Fleet.	Shore stations.	Atlantic stations in United States.[1]	Pacific stations in United States.	Marine Corps.
Average complement	[2] 119,118	[2] 75,388	[2] 24,760	[2] 24,432	[2] 43,726	[2] 25,038	[2] 6,180	22,056
All causes:								
Number of admissions	5,418	2,656	1,219	902	2,762	1,603	396	1,301
Annual rate per 1,000	545.81	422.76	590.79	443.02	757.98	768.27	768.93	613.45
Disease only:								
Number of admissions	4,748	2,282	1,048	788	2,466	....	....	1,148
Annual rate per 1,000	478.31	363.23	507.91	387.03	676.74	....	....	541.31
Injuries and poisons:								
Number of admissions	670	374	171	114	296	....	....	153
Annual rate per 1,000	67.50	59.53	82.88	55.99	81.23	....	....	72.14
Communicable diseases, exclusive of venereal disease:								
Number of admissions	475	108	....	....	365	67	9	267
Annual rate per 1,000	47.85	17.19	....	....	100.17	32.11	17.48	125.89
Venereal disease:								
Number of admissions	1,455	[illegible]	379	272	437	218	64	238
Annual rate per 1,000	146.58	[illegible]	183.68	133.59	119.93	104.48	124.27	112.22

[1] Does not include ninth naval district.
[2] Includes Navy and Marine Corps personnel.
Note.—Asiatic and unassigned ships not reported.

Table No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of August, 1922.*

	Forces afloat, Navy and Marines (complement, 75,388).		Forces ashore, Navy and Marines (complement, 43,726).		Total (complement, 119,118).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases	2,282	363.23	2,466	676.74	4,748	478.31
Injuries and poisons	374	59.53	296	81.23	670	67.50
Total admissions	2,656	422.76	2,762	757.98	5,418	545.81
CLASS III.						
Appendicitis, acute	39	6.21	47	12.90	86	8.66
Autointoxication, intestinal	17	2.71	7	1.92	24	2.42
Cholangitis, acute	17	2.71	17	4.67	34	3.43
Cholecystitis, acute	1	.16	7	1.92	8	.81
Cholelithiasis	0	....	1	.27	1	.10

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of August, 1922*—**Continued.**

	Forces afloat, Navy and Marines (complement, 75,388).		Forces ashore, Navy and Marines (complement, 43,726).		Total (complement, 119,118).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Colitis, acute	2	0.32	2	0.55	4	0.40
Constipation	17	2.71	20	5.49	37	3.73
Enteritis, acute	25	3.98	17	4.67	42	4.23
Gastritis, acute catarrhal	2	.32	22	6.04	24	2.43
Gastroenteritis	34	5.41	67	18.39	101	10.17
Hemorrhoids	29	4.62	30	8.23	59	5.94
Pharyngitis, acute	7	1.11	11	3.01	18	1.81
Ulcer of duodenum	0	....	1	.27	1	.10
Ulcer of stomach	2	.32	1	.27	3	.30
Total admissions	192	30.56	250	68.61	442	44.53
CLASS VII.						
Varicocele	13	2.07	19	5.21	32	3.22
CLASS VIII.						
Chicken pox	3	.48	0	....	3	.30
Diphtheria	0	....	1	.27	1	.10
German measles	5	.80	0	....	5	.50
Influenza	46	7.32	37	10.15	83	8.36
Measles	4	.64	1	.27	5	.50
Mumps	4	.64	5	1.37	9	.91
Pneumonia, lobar	6	.96	5	1.37	11	1.11
Total admissions	68	10.82	49	13.45	117	11.79
CLASS IX.						
Dysentery, bacillary	0	....	1	.27	1	.10
Dysentery, entamebic	1	.16	6	1.65	7	.71
Total admissions	1	.16	7	1.92	8	.81
CLASS X.						
Dengue	9	1.43	60	16.47	69	6.95
Malaria	23	3.66	233	63.94	256	25.79
Total admissions	32	5.09	293	80.41	325	32.74
CLASS XI.						
Tuberculosis (all forms)	7	1.11	16	4.39	23	2.32
CLASS XII.						
Chancroid	256	40.75	85	23.33	341	34.35
Gonococcus infections	693	110.30	279	76.57	972	97.92
Syphilis	69	10.98	73	20.03	142	14.31
Total admissions	1,018	162.04	437	119.93	1,455	146.58
CLASS XVIII.						
Bronchitis, acute	100	15.92	105	28.82	205	20.65
Laryngitis, acute	4	.64	0	....	4	.40
Pleurisy, acute fibrinous	5	.80	5	1.37	10	1.0
Rhinitis, acute	17	2.71	20	5.49	37	3.73
Tonsillitis, acute follicular	159	25.31	88	24.15	247	24.88
Total admissions	285	45.36	218	59.83	503	50.67
CLASS XX.						
Herniæ	21	3.34	24	6.59	45	4.53

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for July and from various shore stations for the five-week period, July 30 to September 2, 1922, inclusive.*

	Annual rate per 1,000, July.			Average rate since Jan. 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All ships	0	173.89	1,636.36	0	136.82	840.33
Battleship and cruiser force—						
Atlantic Fleet	36.06	160.58	484.47	47.02	115.82	235.09
Pacific Fleet	71.57	144.01	229.50	69.41	101.02	129.70
Asiatic Fleet	130.43	381.45	871.97	32.81	240.71	377.58
Destroyer force—						
Atlantic Fleet	69.76	207.22	1,636.36	17.49	152.42	575.12
Pacific Fleet	65.48	139.24	521.73	17.04	95.57	292.68
Asiatic Fleet	831.68	831.68	831.68	18.43	318.86	625.00
Miscellaneous—						
Atlantic Fleet	32.43	126.34	1,200.00	28.91	127.02	769.23
Pacific Fleet	0	139.61	352.94	0	88.80	221.05
Asiatic Fleet	0	352.94	1,411.76	0	321.40	840.33
Unassigned, including ships on special duty	50.00	399.38	1,100.91	24.39	185.06	313.13

	Annual rate per 1,000, July 30–September, 1922.			Average rate since July 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All naval districts in the United States	0	96.28	415.53	0	88.75	349.84
First naval district	0	65.25	415.53	12.57	78.71	279.72
Third naval district	20.39	105.20	146.03	11.32	112.51	171.47
Fourth naval district	0	265.95	301.63	5.43	299.22	335.52
Fifth naval district	16.37	74.61	361.43	18.46	77.51	349.84
Sixth naval district	38.11	50.98	156.98	35.44	47.71	144.00
Seventh naval district	0	0	0	0	0	0
Eighth naval district	0	105.58	124.55	0	102.30	113.32
Ninth naval district	96.16	96.16	96.16	99.85	99.85	99.85
Eleventh naval district	21.66	39.97	83.75	20.00	40.25	65.12
Twelfth naval district	73.91	131.22	172.71	49.99	231.29	193.73
Thirteenth naval district	0	27.44	167.74	0	31.55	97.56

RATIO OF GONOCOCCUS AND SYPHILIS TO TOTAL CASES OF VENEREAL DISEASE.

	Per cent July, 1922.		Per cent since Jan. 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All ships	70.78	6.29	67.38	9.53
Battleship and cruiser force—				
Atlantic Fleet	58.51	6.66	68.16	10.70
Pacific Fleet	86.30	9.58	83.33	9.22
Asiatic Fleet	41.66	16.66	49.03	15.38
Destroyer force—				
Atlantic Fleet	85.18	4.62	67.63	8.70
Pacific Fleet	80.80	7.07	79.64	6.38
Asiatic Fleet	0	0	51.87	7.70
Miscellaneous force—				
Atlantic Fleet	61.53	5.12	64.21	9.47
Pacific Fleet	79.03	3.22	79.08	10.03
Asiatic Fleet	53.84	3.84	53.84	16.26
Unassigned, including ships on special duty	58.71	3.66	60.26	9.05

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for July and from various shore stations, etc.*—Continued.

RATIO OF GONOCOCCUS AND SYPHILIS TO TOTAL CASES OF VENEREAL DISEASE—Continued.

	Per cent July 30-Sept. 2, 1922.		Per cent since July 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All naval districts in the United States	79.93	7.26	68.49	7.54
First naval district	76.19	9.53	76.74	9.30
Third naval district	81.48	11.11	77.35	9.43
Fourth naval district	88.05	4.48	86.66	3.70
Fifth naval district	74.07	4.93	69.79	6.71
Sixth naval district	83.33	0	72.22	5.55
Seventh naval district	0	0	0	0
Eighth naval district	90.00	0	88.22	0
Ninth naval district	100.00	0	100.00	0
Eleventh naval district	100.00	0	92.30	7.69
Twelfth naval district	70.90	16.36	75.00	16.66
Thirteenth naval district	100.00	0	100.00	0

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the five-week period, July 30 to September 2, 1922, inclusive.*

	Navy (complement, 97,062).		Marine Corps (complement, 22,056).		Total (complement, 119,118).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases of blood	2	0.21	1	0.47	3	0.26
Diseases of circulatory system	26	2.79	9	4.24	35	3.06
Diseases of digestive system	578	61.93	171	80.63	749	65.39
Diseases of ductless glands and spleen	4	.43	1	.47	5	.44
Diseases of ear	113	12.11	24	11.32	137	11.96
Diseases of eye and adnexa	92	9.86	23	10.84	115	10.04
Diseases of genito-urinary system (non-venereal)	133	14.25	38	17.92	171	14.93
Communicable diseases transmissible by oral and nasal discharges	135	14.46	10	4.72	145	12.66
Communicable diseases transmissible by intestinal discharges	7	.75	3	1.41	10	.87
Communicable diseases transmissible by insects and other arthropods	96	10.29	252	118.82	348	30.38
Tuberculosis (all forms)	25	2.68	2	.94	27	2.36
Venereal diseases	1,327	142.17	238	112.22	1,565	136.62
Other diseases of infective type	280	30.00	85	40.08	365	31.86
Diseases of lymphatic system	72	7.71	29	13.67	101	8.82
Diseases of mind	23	2.46	4	1.89	27	2.36
Diseases of motor system	71	7.61	27	12.73	98	8.56
Diseases of nervous system	31	3.32	11	5.19	42	3.67
Diseases of respiratory system	673	72.11	122	57.53	795	69.40
Diseases of skin, hair, and nails	105	11.25	41	19.33	146	12.75
Hernia	50	5.36	9	4.24	59	5.15
Miscellaneous diseases and conditions	65	6.96	29	13.67	94	8.21
Parasites (fungi and certain animal parasites)	194	20.79	16	7.54	210	18.33
Tumors	12	1.29	3	1.41	15	1.31
Injuries	532	57.00	145	68.37	677	59.10
Poisons	61	6.54	8	3.77	69	6.02
Total	4,707	504.31	1,301	613.45	6,008	524.50

TABLE No. 5.—*Deaths reported, entire Navy, for the five-week period, July 30 to September 2, 1922, inclusive.*

Causes.	Navy (complement, 97,062).	Marine Corps (complement, 22,056).	Total (complement, 119,118).
Malaria	0	1	1
Pneumonia, broncho	1	0	1
Scarlet fever	0	1	1
Tuberculosis, chronic pulmonary	3	0	3
Tuberculosis, acute pneumonic	0	1	1
Tuberculosis of liver	1	0	1
Tuberculosis, other forms	1	0	1
Syphilis	1	0	1
Malignant growths	1	1	2
Other diseases	9	0	9
Drowning	7	2	9
Accidents and injuries	6	1	7
Total	30	7	37
Annual death rate per 1,000, all causes	3.21	3.30	3.23
Annual death rate per 1,000, disease only	1.82	1.89	1.83

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VOL. XVII NO. 5

UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

ISSUED BY
THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF INSTRUCTION AND PUBLICATIONS
COMMANDER H. W. SMITH, MEDICAL CORPS, U. S. NAVY
IN CHARGE

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LIEUTENANT COMMANDER W. M. KERR, MEDICAL CORPS, U. S. NAVY

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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
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TABLE OF CONTENTS.

PREFACE.

The United States Naval Medical Bulletin was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comments on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. Stitt,
Surgeon General United States Navy.

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When contributions are typewritten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

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U. S. NAVAL MEDICAL BULLETIN

VOL. XVII. NOVEMBER, 1922. No. 5.

SPECIAL ARTICLES.

THE HISTORY OF THE UNITED STATES NAVAL HOSPITAL, FORT LYON, COLO., AND THE ACTIVITIES OF THE NAVAL MEDICAL CORPS IN THE DEVELOPMENT OF THE HOSPITAL FOR SANATORIUM PURPOSES.

By F. W. F. WIEBER, Captain, Medical Corps, United States Navy.

HISTORY OF THE NAVAL HOSPITAL, FORT LYON.

Fort Lyon, also known as New Fort Lyon, was built by the Army in 1867 following the abandonment of what was known as Fort Wise and later as Old Fort Lyon, which was located about 8 miles west of Lamar and 22 miles east of New Fort Lyon, on low land close to the Arkansas River. A flood of the Arkansas River at that time caused such destruction of the original Fort Lyon that it was abandoned and a new site on a higher bluff westward was chosen. This post was a comparatively large one (the entire reservation covering an area of a little over 9 square miles), as it was the only other permanent fort besides Fort Massachusetts, which has been erected at an earlier period farther westward in the mountains. The new fort formed one of the most important frontier posts and commanded the entire territory of western Kansas, eastern Colorado, and western Oklahoma (then the Indian Territory). Of the original buildings put up by the Army quite a number are still standing and in use, among these being ths entire officers' row on C Street; the Kit Carson house; the west subsistence building, which was formerly used as barracks; the stable, the south storehouse, the administration building; and one part of the men's infirmary, which was even then used as a hospital. Two barracks buildings to the east of the present parade grounds were torn down when the Navy took possession and were replaced by lean-tos for the accommodation of ambulatory patients. The following description of the quarters at the fort, picturing the conditions that existed during Army days, is quoted from the book entitled "Kit Carson Days," which may serve as a comparison to the condition of these same quarters as they now appear and are available for duty-officer personnel.

"New Fort Lyon was at this time (Kit Carson time) one of the rudest and dreariest of frontier posts. It was uninclosed after plains fashion of Army days, its buildings being grouped about the sun-baked parade grounds. The officers' row was composed of small four-room houses, some occupied by two families, built of rough stone, chinked with mud, the floors of unfinished lumber, the wood partitions being in many instances only 8 or 9 feet high, with the remaining space to the rafters filled in with flour sacking. There were no ceilings. The roofs were of long boards in the rough and untrimmed, so that their ends projected irregularly as eaves."

The Kit Carson house, spoken of as one of the original buildings, might give the impression that Kit Carson himself was on duty at this fort. This is not correct. The so-called Kit Carson house was the residence of the surgeon of the fort, Doctor Tilton, who took Kit Carson to his home from his ranch at Boggsville, near Las Animas, during the last few days of his life, where he died about 10 days later from ruptured aneurism of the aorta.

The establishment of the Army post of Fort Lyon at its new site resulted in the founding of the town of Las Animas on the opposite side of the river. The town was connected with the fort by a toll bridge, and it is stated that it soon possessed a livery stable, hotel, restaurant, and several saloons. Between the cowboys of the plains, the hunters, travelers, and soldiers, a typical western frontier town arose that rivaled many of the western towns for trouble and bloodshed. The town was finally abandoned in 1876 on the coming of the railroad, and the present city of Las Animas was built some 4 miles farther west.

In 1889 the need for the upkeep of a military establishment had disappeared and Fort Lyon was abandoned by the Army and placed in the hands of a caretaker until 1906, when it was taken over by the Navy for sanatorium purposes.

CONDITIONS FOUND AT FORT LYON AND NECESSARY WORK UNDERTAKEN TO FIT IT FOR MODERN SANATORIUM PURPOSES FROM 1906 TO 1922.

The first Navy detachment ordered to Fort Lyon arrived there on November 17, 1906, and was composed of Surg. T. A. Berryhill, Surg. James G. Field, Civil Engineer A. L. Parsons, and Pharmacist Phillips. When this party arrived they were confronted with a sorry sight. The buildings were dilapidated and falling to pieces. There was not a sound roof nor even a part of the old buildings which could safely be used for a temporary shelter. A great deal of the damage was the result of natural deterioration, but the Colorado blizzards, sand, and rainstorms had been assisted in their work of destruction by human agencies. The buildings had been systematically looted and gutted. Doors, windows, and even structural timbers had been carried away, and it is said that this material may still be found in many of the old ranch buildings in the vicinity. Cattle and horses roamed about freely on the grounds and in the houses, rattlesnakes were encountered not infrequently, and signs of destruction were everywhere.

In view of these conditions, temporary office rooms were secured in the courthouse of Las Animas. On November 20 the naval party was joined by Civil Engineer W. R. Murphy and two assistants, both civilians, and Paymaster Ammen, U. S. Navy.

In January, 1907, Surg. B. L. Wright arrived as the first patient. He was immediately placed on a duty status.

At the fort, naturally, the first work started was the establishment of a temporary tent camp with sanitary facilities. Then a large labor force was employed for the clearing away of rubbish and for making temporary repairs to dangerous roofs and walls of buildings; others were employed in the construction of a more permanent camp of rubberoid sheds and in the erection of tent quarters for duty personnel and patients. The first plan of the reservation was completed in December, 1906, and is still on file in the public works office.

The duty personnel moved to the fort into tents during the middle of February, 1907. On February 25, 30 bundles of hospital tents were received for the accommodation of patients, who, however, it seems, did not arrive in any large numbers until about September 16, 1907, at which date 24 arrived from Fort Bayard.

Of the 24 buildings found on the reservation about 10 were torn down, among these being the barracks at the east of the parade ground and a number of buildings north of the officers' row. The others were repaired. These included the administration building, two west wards (formerly used as barracks), the barn, the south storehouse, the officers' quarters, ward C, the operating section of the men's infirmary, and the "Kit Carson house," which is used at present as a schoolhouse.

The reservation was devoid of trees and was covered with weeds; roads did not exist; tumbleweed predominated everywhere. The water supply was derived from shallow wells.

The work of remodeling the buildings and of constructing sewers, digging wells, constructing a heating system and a power plant was mostly accomplished by contract from plans prepared at the hospital and at the Bureau of Yards and Docks. While this work was progressing, plans were prepared for new necessary buildings, viz: Leantos 4, 5, 6, 7; east subsistence building; bakery; pharmacists' quarters 304 to 309; civilian quarters 321, 322, 323, 324, and 376; bowling alley; west subsistence building (center wing); laundry; north storehouse, officers' infirmary and cottages; wards E, F, and G of the men's infirmary; commissary store; disinfecting building; pump house; and reservoir at the main gate. A 100,000-gallon fresh-water pressure tank was completed in June, 1908. Until that time the water was supplied to the houses in barrels. The building period for these structures, which were also erected by contract, extended over several years. Simultaneously with the above construction a number of small farm sheds, shops, and storehouses were built; in addition, roads and walks were laid, many trees were planted, lawns were established, and farm and irrigation systems were developed and put in operation. By 1911 the hospital was a well-organized institution of approximately 200-bed capacity. Civil Engineer Parsons was then detached and no public works officer was attached to the fort until the summer of 1919. Between 1911 and 1917 there were no public works activities, no new construction, and few important changes were authorized. As a result of the lack of available funds the buildings and grounds began to appear ill kept and shabby.

Beginning about 1917 new construction again became active. The commanding officer was authorized to purchase a dairy herd, which required a dairy barn and sheds. These, as well as four s los and a house for the dairymen, were contructed by station labor. The area of the reservation, which when turned over to the Navy consisted of only about 500 acres of land, was more than doubled by the purchase of the West Farm, and work was begun there on sheds, corrals, and also on the irrigation systems. As the year advanced a great influx of patients—in consequence of the great expansion of the naval forces—took place, and th s demanded increased accommodations for patients and duty personnel. Wards A, B, D, H, I, J and Lean-tos 1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 were built by station labor. The construction of a nurses' home was also authorized; 36 ready-cut cottages were obtained for speedy erection. Increase of quarters for attendants, mess halls, and storehouses were needed; the heating, lighting, and power-plant utilities soon became overtaxed and demanded expansion. By 1919 the hospital was buzzing with construction activity, the work being accomplished by the station force. At about this time the need of technical supervision for coordination and organization of this work became apparent; the old buildings had become dilapidated; grounds and roads needed attention. During the summer of 1919 the Bureau of Med cine and Surgery took cognizance of these conditions, reorganized the administrative personnel, and ordered a public-works officer to Fort Lyon to assist the commanding officer in his work. Assistant Civil Engineer Andrew S. Bisset was detailed for this work.

A public-works organization of draftsmen, inspectors, and engineers was established and surveys and inspections were begun. Much of the work done between 1917 and 1919 had been done, as a result of the lack of proper technical supervision, in a haphazard sort of a way, and water, heat, and light service had been extended without plan record. This made a complete resurvey of the reservation necessary before revision and coordination could be attempted. In the meanwhile a definite program of overhaul and repair to the buildings was started. This work included new slate roofs on the principal buildings, new floors, new electric lighting, plumbing, plastering, and painting. The mess halls and kitchens of the subsistence buildings were improved with tile wainscot and floors, and new equipment was installed. The buildings which were under construction were completed with certain changes, a number of others which had been completed were altered to improve the fire protection, lighting, and utility.

Extensive new construction and additions, to round out the hospital as a 700-bed unit, were then undertaken. This work was done by contract and station labor, in accordance with plans prepared by the public-works officer and approved by the Bureau of Yards and Docks. The projects included power-plant improvements, new sewers, extension and revision of water mains, new water-storage tank of 400,000-gallon capacity and a 200,000-gallon pressure tank, revision and extension of light and power lines, concrete pavements and sidewalks, and new heating mains. Among the new structures are the pharmacists' quarters 310 and 311, four sets of quarters for medical officers, the nurses' infirmary, the main gate and guardhouse, a new Ward K for the men's infirmary, the marine barracks, and a number of civilian quarters on the northeast road and at the West Farm. A Red Cross house was built and paid for by the American Red Cross. Additions were constructed to the east subsistence building, bakery, laundry, cold-storage building, garage, and to 18 sets of quarters. Eleven ready-cut cottages were moved from around the administration building to the northeast road and converted into quarters for chief petty officers and for patients. The farm buildings, particularly the dairy barn, were greatly improved, and the piggery was moved from the vicinity of the hospital to the West Farm. The refrigerating capacity was enlarged from the original 8 tons refrigeration and 2 tons ice-making capacity in 24 hours to a refrigerating capacity of 55 tons and an ice-making capacity of 19 to 20 tons (in 24 hours).

The boiler power was increased from a capacity of 400 horsepower to one of 930 horsepower. This is furnished by six boilers. The original electric plant consisted of two 20-kilowatt generators; this was gradually increased to one of a total of 318 kilowatts.

An abundance of surface water for flushing, fire protection, irrigation, and sprinkling purposes is supplied by four electrically operated pumps. The water is taken from a swamp at the northeast of the station. A pumping test in 1917, kept up for 40 days, which drew 1,500 gallons per minute, did not appreciably affect this supply. To this was added a new steam-driven pump having a capacity of 750 gallons per minute. This supplies the flushing system. The drinking water is supplied by three artesian wells from a depth of about 300 feet and by five other wells from a depth of about 100 feet. These furnish about 300,000 gallons in 24 hours. The water is potable; it has a slightly alkaline taste, but is not injurious in any way.. The fresh-water storage capacity is 700,000 gallons.

For fire protection there exist nine fire-alarm boxes, with sufficient hydrants to protect the entire reservation.

Of all this repair or expansion work in connection with the power house, only the 400,000-gallon storage tank, the 200,000-gallon pressure tank, and the power-house chimney (having a height of 155 feet) were erected by contract work; everything else was done by station labor.

The last large project (which is now nearing completion) is the new steam and heat distributing system for the northern part of the reservation buildings. This supplies heat to 28 new buildings and revises the heat supply to 21 additional buildings.

There are about 180 buildings on the reservation; the population during Navy days numbered about 1,000 persons, including patients.

The cost of the work accomplished under the direction of the public works' officers from 1907 to 1911 is approximately $565,000; of that completed from 1917 to 1922, is $1,850,000.

The approximate valuation of the hospital property is as follows (September 28, 1921):

Buildings and structures	$2,200,000
Land	120,000
Pavements, roads, walks, lawn, sewers, pipe lines outside of buildings	580,000
Power-plant equipment and mechanical equipment, piping in buildings and shops, tools	340,000
Ambulances and garage equipment	50,000
Farm implements, live stock, tools, etc	40,000
Stores and building material on hand	30,000
Hospital equipment, linen, furniture, instruments, etc	445,000
Mess gear, foods, culinary supplies	55,000
	3,860,000

PRESENT HOSPITAL ACCOMMODATIONS.

With the enlargement of the station, naturally the equipment for the accommodation, care, and treatment of patients kept pace. All wards have covered porches, which are used by all but the very sick or terminal cases; the wards themselves are heated so that patients during inclement weather could move their beds indoors; at least, they could dress themselves indoors. Toilets, with shower baths supplying cold and hot water, are installed everywhere.

There are now five separate mess halls, with complete modern kitchen and dish-washing equipment, viz:

One for infirmary patients.
One for ambulatory cases.
One for duty personnel.
One for sick officers.
One for sick nurses.

There exists an operating room fully equipped and always ready for use; a fully equipped dental department, with two chairs; a dark room for eye, ear, nose, and throat cases; a fully equipped laboratory; an X-ray department, consisting of a waiting room, an operating room, a filing and study room, and a developing room. The X-ray operating room contains, in addition to the table, all the apparatus and equipment necessary for the making of pictures and for fluoroscopic work. This room is entirely in black. The developing room is also finished in black and is equipped for the development of large numbers of plates or films of any size. It is also provided with an exhaust system of ventilation, which aids in the drying out of plates and films. It contains lead-lined negative boxes, with running water conveniently arranged, and suitable sinks for the making of developer, fixing solution, and washing chamber.

As regards the equipment of the main part of this laboratory, the apparatus consists of a Scheidel Western 8-kilowatt 220-volt 60-cycle alternating-current machine of the standard rotary converter type. This primary plant derives its power from the regular power supply of the station and insures sufficient power and penetration for all routine work, and with the Coolidge system, which is exclusively used here, has been fairly satisfactory.

The low-tension or heating system of the Coolidge tube is obtained by a step-down transformer deriving its energy also from the main current supply. In addition to this last-mentioned system there is provided a battery system for the heating of the Coolidge filament, which has been of great use at such times when the fluctuations in the main current supply resulted in difficulty in maintaining a constant temperature of the tube filament.

The table used in the laboratory is the standard Victor universal type. In addition to being provided for the taking of stereoscopic pictures, it is also provided with a 10-microampere self-rectifying radiator Coolidge tube for fluoroscopic work, and may be operated in any position from the horizontal to the vertical position. The high-tension wiring system is of the overhead cable arrangement and is placed 12 feet above the table.

Duplitized films are used exclusively for the work in chest and gastrointestinal exposures, and this is reinforced by the use of the double-intensifying screen. For this part of the work the laboratory is provided with six Patterson double-intensifying screens.

Since 90 per cent of the work done in the laboratory is that of chest examination it has given rise to a technique which has been found of the most practical application to the roentgenologist and to the patient. Ordinarily the chest examinations are made standing and, to facilitate this part of the work, special arrangement as regards a plate holder or stand has been provided, which permits of the exposure with only one adjustment for the tube. This has been a great saving in time to operator, and saves weak patients the trouble of climbing upon the table.

ROUTINE AND SPECIFIC METHODS OF TREATMENT.

Fort Lyon must be considered as an ideal spot for sanatorium purposes in the care of tuberculous diseases. It has an elevation of a little less than 4,000 feet, is about 7 miles distant from the nearest town, the relative humidity is very low, the rainfall very slight, the sky is generally clear, the number of sunshiny days is very great, and the nights are cool and bracing.

Through its dairy herd, which it is still developing, it furnishes now the greater portion of the milk supply needed for its patients. By its farm products almost all the feed necessary for its herd is supplied. The waste from the mess halls is in part used for the feeding of about 300 pigs, which furnish a not inconsiderable part of the pork used in the commissary department.

One drawback to Fort Lyon, which, however, it shares with many other sanatoria in the Rocky Mountain Plateau region, is the prevalence of dust storms in late winter and early spring, before the vegetation has started. These sometimes last for a whole day; generally, however, they are of short duration. I have seen the air so thick with dust that it was impossible to see across the parade ground. Such storms, while they last, are of positive harm to patients, inasmuch as they seem to have a depressing effect on them and increase their cough.

The treatment of the patients is based on modern ideas and consists mainly of good rich food, out-of-door life, observation of rest hours, and heliotherapy.

The routine methods followed at Fort Lyon are as follows: All patients admitted are placed in bed in a receiving ward in the infirmary and kept in bed continuously for about two weeks. While there accurate temperature and pulse observations are taken and recorded. A careful physical examination of the chest is made and recorded graphically on chest charts. The urine, feces, and blood are examined; X-ray plates of the chest are made in every case; an eye, ear, nose, and throat examination; and, finally, a dental examination is made. The blood examination includes a Wassermann and a tubercle bacillus complement fixation test. The sputum is examined daily until 10 negative findings are recorded, or until one test turns out to be positive. The receiving ward is generally under the charge of one of the older and more experienced and trustworthy assistants.

After all the examinations required on admission have been made and a diagnosis has been arrived at, the case is disposed of by being sent either to a lean-to where ambulatory cases are treated, or, if further infirmary treatment is considered necessary, to one of the remaining 10 wards. This includes cases requiring further observation for the establishment of a diagnosis.

Cases considered negative for tuberculosis or any other disease, after a month's observation, before final action, would be examined by a permanent board of survey for final disposition.

All febrile cases are assigned to an infirmary ward; likewise all those with marked activity.

Rest periods are enforced as follows: Forenoon from 9 to 11 for all definitely tubercular active cases; afternoon from 1 to 3. These two periods are subject to modification by the medical officer in charge of the ward.

Only nonfebrile, quiescent, or arrested cases may be detailed for work about the ward.

All cases of tuberculosis sleep out of doors on covered porches, except during very severe weather. The wards proper are well heated; likewise the toilets and bath stalls.

For the heliotherapy treatment the graduated system of Rollier has been adopted. This line of treatment was started in a systematic manner during the summer of 1921, and the patients took to it very well. It was begun by a 5 minutes' exposure of both feet to the direct rays of the sun. On the second day 5 minutes were added to the exposure of the feet and 5 minutes exposure of legs up to the knees was begun. The third day 5 minutes' exposure from knees to hips, 10 minutes from knees to ankles, and 15 minutes for feet was required, etc. After the front had been thus gradually exposed to the sun, the back was similarly treated. The head was protected during the exposure by any sort of device produced by the patient's ingenuity.

The object sought was to bring about intense pigmentation of the body without actual sunburn and any sign of reaction, such as fever or exhaustion. The slightest sign of such a symptom should cause suspension of the treatment and resumption only after disappearance of all abnormal reaction.

In a febrile case no heliotherapy treatment was instituted. The patients were required to wear bathing trunks and stretched themselves out on canvas cots which were placed on concrete aprons in the infirmary courts or on the south side of the lean-tos. The cots were only received during the middle of the past summer and the treatment was in use only for about two months, consequently no expression of opinion as to results can be given.

Other forms of specific treatment of tuberculosis formerly used but discontinued were the following two: The treatment by hypodermic injection of sodium morrhuate, which had been first recommended by Sir Leonard Rogers, lieutenant colonel, I. M. S. When this treatment first become known, a number of the patients at Fort Lyon sent to England to procure the drug and requested that it be used on them. This led to its general use in our patients, and at first it seemed to give promising results. It was given in a 3 per cent solution in gradually increasing doses, beginning with one-fourth to one-half cubic centimeter of the 3 per cent solution subcutaneously, and increasing by 2 to 4 minims at each injection two to three times a week until a reaction occurred; then after the interval of a week a dose smaller than the one which had produced the reaction was again given. After the subcutaneous dose of 2 cubic centimeters had been reached, intravenous doses, beginning with one-half cubic centimeter, were given and gradually increased as before. In some cases doses up to 4 cubic centimeters were given. In febrile cases the doses were smaller and increased more gradually. A reaction consisted in a rise of temperature; occasionally a slight hemoptysis occurred. No harm seemed to follow such reaction. The patients were very enthusiastic and reported daily improvements. Clinically there seemed to be improvement. In some cases there was an increase of weight: in many cases gastric symptoms subsided; some febrile cases became afebrile. Many reported an increase in expectoration during the first weeks, followed by a decrease of cough and expectoration.

After following up these cases for months to a year, the consensus of opinion was that the improvement of symptoms was not actually due to improvement in physical signs, for the area of activity showed no sign of improvement. No ill effects, on the other hand, followed the use of the drug. The effect of the treatment observed seemed to be more psychic than actual. The patient felt that something was actually done for him and he felt encouraged.

The treatment by medicated sprays was likewise tried for a period and abandoned.

The use of calcium chloride in the symptomatic treatment of various complications of tuberculosis met with partial success and its use was continued up to the time the hospital was turned over to the Public Health Service. The drug was used in the treatment of pulmonary hemorrhage, its effect being based on its reducing the coagulation time of the blood when added to the blood in vitro. It seemed to have been of use in the slow oozing variety of hemorrhages.

Its second use has been in treatment of intestinal tuberculosis accompanied by profuse diarrheas. The symptoms have been considerably improved by the intravenous use of the salt. The dose used in this way has been 5 to 10 cubic centimeters of a 5 per cent solution, repeated weekly, if necessary. Following its use the patient notices a strange feeling of heat, beginning in the throat, and a tingling sensation extending over the entire body. The other effect is a lessening of the diarrhea, better formed stools, and lessening of the additional pain. How this action is brought about is not known, but the result is apparent.

The treatment of intestinal tuberculosis has been most discouraging, but this is easily explained by the multiple lesions found on the autopsy table; this also demonstrates the futility of trying to accomplish results by radical operative measures. How heliotherapy would influence this condition we have had no time to observe. In consequence of the futility of all other forms of treatment, however, this should be thoroughly tried out.

The one method of treatment of certain types of tuberculosis of the lungs which is direct and followed by almost magic results is that of compression of the diseased lung. The class of cases most suitable for this treatment are: (1) Those of unilateral or principally unilateral affections, with cavity formation and accompanied by septic symptoms, such as high temperatures, sweating, persistent loss of weight, which are not influenced by rest or other treatment; (2) those of persistent hemorrage, uninfluenced by other treatment and endangering life. The artificial pneumothorax treatment at Fort Lyon has only been applied to these two classes of patients. It is the impression of the officers who have used it that probably it could and should be applied to others than these groups, and that, possibly, there is a period in every advanced case where this treatment might have been of benefit to the patient.

The benefit of the compression is that it puts the lung to rest, that it empties the cavities that may exist and thus stops septic absorption, that contraction by scar tissue is thus made possible; further, that antibodies may be formed in the compressed lung, which bring about amelioration of the tubercular process on the less affected side. It is a fact that marked improvement has been brought about on the other side.

The effect of successful compression is in certain cases immediate and almost miraculous. The fever subsides, cough is lessened, rest is procured, the appetite improves, the whole appearance of the patient changes.

The pneumothorax apparatus used at Fort Lyon is Stahl's. This consists of a bell jar placed within a larger jar filled with water. From the top of the bell jar a glass tube leads to the manometer and to the pneumothorax needle.

The following technique is used: The site selected for the puncture is usually the anterior axillary line about the sixth interspace, where there is less likelihood of finding adhesions. This is painted over with iodine. The skin is then infiltrated with a 1 per cent solution of procaine and following this all the deeper tissues, including the parietal pleura. The pneumothorax needle, attached to the manometer by tubing, is then pushed through this infiltrated area. The perforation of the parietal pleura is indicated by the swinging of the column of water in the manometer. The air is then allowed to pass into the pleural cavity. After each 100 cubic centimeters of air has entered the manometer pressure is noted. From 300 to 400 cubic centimeters is the initial amount of air usually given. If the manometer fails to work, the needle is either obstructed or pleural adhesions exist at the point of puncture. When the needle passes through the pleura, the patient is apt to feel some pain.

The danger in this operation is slight if careful infiltration is done, but pleural shock and air embolism may occur under the best of care. During the past two years one death and one case presenting serious symptoms of collapse occurred.

Surgical methods of treatment by thoracoplasty where collapse of lung could not be brought about by artificial pneumothorax, although proposed to several patients, have not been practiced at the hospital, as the patients refused to submit to the treatment. This method of treatment, however, has an extensive field, when pneumothorax can not be given, due to extensive pleural adhesions, and would undoubtedly have been adopted had the institution remained in Navy hands.

In joint and bone disease, resections and amputations have been performed when ordinary methods, such as immobilization or heliotherapy, failed to give results, and at the requests of patients.

By Presidential proclamation the naval hospital, Fort Lyon, ceased to be a naval institution on November 1, 1921. On this date it became a Veterans' Bureau hospital but was administered by the Navy personnel until March 1, 1922, by which time, in consequence of the gradual replacement by Public Health Service personnel, it was definitely taken over by them for use as a Veterans' Bureau hospital. In consequence of this gradual change no interference in the smooth running of the institution occurred.

During the 14 years the Navy made use of the institution there have been under treatment 5,435 tuberculosis cases. Of these 4,474 were invalided from the service, 398 were returned to duty, 483 died, 8 deserted, and 72 were transferred. All these cases were in hospital 791,033 days. Cases of other diseases occurring among the duty personnel, accidents, and emergency admissions are not counted in this résumé but amounted to a high figure.

The advantages of this institution to the Navy did not only involve the care and treatment of the unfortunate victims of tuberculosis, it also brought with it the broadening of the medical personnel which became attached to the hospital. Due to the special work which they had to perform, a number of skilled diagnosticians and specialists, comparing very favorably with those in civil practice, have been produced.

THE KOLMER MODIFICATION OF THE WASSERMANN TEST.[1]

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The Wassermann test (the term "Wassermann" is used here in the erroneous but popular clinical manner to indicate any complement fixation test for syphilis) is one of the most important biological reactions used in medicine. Therefore, any modification of this test that promises to be of greater clinical value than the ones now in common use warrants thorough investigation. Apparently many of the tests now employed are not considered sufficiently sensitive, giving negative reactions in cases where the history and insufficient antisyphilitic treatment indicate that there should have been a positive result. The use of cholesterol to fortify antigens was an important step in increasing the sensitivity of the test and when first introduced was widely criticized as apt to produce a false positive reaction, but experience has shown that when properly used this has not been the case.

Notwithstanding this advance, tests employing cholesterolized antigen have been claimed by many as insufficiently sensitive to detect small amounts of the so-called "syphilitic antibody" or reagin in the blood of some syphilitics and the new Kolmer technic has been devised to increase greatly the sensitiveness of the reaction and at the same time retain practical specificity of the complement fixation and not yield nonspecific reactions.

Kolmer in describing his new method states that he has attempted to meet what he considers the essential requirements of a standardized technic, namely, (1) a high degree of sensitiveness as is permissible with specificity; (2) practical specificity; (3) technical accuracy and uniformity in results; (4) a quantitative reaction; (5) simplicity in technic; and (6) economy.

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Briefly, the requirements of sensitiveness and specificity are met by—

1. The use of an antisheep or antiox hemolytic system.

2. The use in large amounts of a highly sensitive antigen which has been carefully titrated under conditions rendering the dose employed suitable for a primary incubation of 15 to 18 hours in a refrigerator at 6° to 8° C. (This antigen is a cholesterolized and lecithinized alcoholic extract of heart muscle specially prepared.)

3. Using a mixture of guinea-pig complement.

4. Mixing the serum and antigen for a brief period before the addition of complement.

5. Using relatively large amounts of serum in varying dilutions which have been inactivated for only 15 minutes at 55° C.

6. Using a primary incubation of 15 to 18 hours in a refrigerator at 6° to 8° C., and reading the reactions with the aid of a reading scale within 3 hours after the conclusion of the secondary incubation of 1 hour in a water bath at 37° C.

7. Close adjustment of the hemolytic system to a primary incubation of 15 to 18 hours at 6° to 8° C. to avoid excessive amounts of complement and hemolysin.

8. Using serum; antigen; hemolytic; corpuscle; positive and negative serum controls in every test.

Clinically, Schamberg and Klauder were the first to employ the Kolmer technic on an extensive scale. They compared it with the older three-antigen technic in 2,000 instances and summarized their conclusions as follows:

1. The Kolmer method yields distinctly more sensitive results than the older method, being frequently positive when the latter is negative.

2. It does not appear to give false positives in nonsyphilitic subjects nor in patients who have been treated for syphilis.

3. It appears to give an earlier positive in primary syphilis, the value of which will be readily appreciated.

4. It is much slower than the old method to become negative under treatment, because it is more delicate in detecting minute amounts of reagin in the blood.

5. By reason of this it insures to patients more adequate and protracted treatment.

6. It harmonizes with the clinical findings better than the older method, which was notorious for many unwarranted negative reactions.

7. Its quantitative character permits one to better gage the effect of antisyphilitic treatment. It likewise gives suggestive evidence in connection with the so-called "Wassermann-fast" cases.

8. We regard the Kolmer modification of the Wassermann test as a most important advance, and one calculated to shed added light on the detection of obscure syphilis and in the ultimate determination of the effects of treatment.

During the past six months the Kolmer technic has been used in 120 instances at the United States Naval Medical School, and from the beginning it was clearly evident that this technic, as shown in Table 1, was more sensitive than the complement-fixation test routinely employed (a modification of the Noguchi test, using both an acetone-insoluble lipoid antigen and a cholesterolized antigen).

Table 1 compares the results of the Kolmer technic with the Noguchi two-antigen method routinely used in this laboratory on sera of known syphilitic cases.

TABLE I.

No.	Date.	Case.	Noguchi. Antigen No. 1.	Noguchi. Antigen No. 2.	Kolmer's quantitative technic. 0.1	0.02	0.004	0.002	0.001	Diagnosis.
1	Feb. 15, 1922	B, J. J.	++++	++++	++++	++++	++	−	−	Syphilis (secondary stage); no history of treatment.
2	Mar. 22, 1922	B, C.	++	++++	++++	+++	−	−	−	Syphilis (tertiary stage); no history of treatment).
3	Apr. 13, 1922	B, A. B.	+++	++++	++++	++++	+++	++	+	Do.
4	May 18, 1922	B, J.	−	−	++	+++	++	−	−	Do.
5	May 26, 1922	B, J.	−	−	++++	+++	+	−	−	Do.
6	Mar. 22, 1922	C, W.	+	++	++++	++++	+	−	−	Syphilis (paroxysmal hemoglobinuria).
7	Mar. 30, 1922	C, W.	±	±	++++	++++	−	−	−	Same under treatment.
8	Apr. 6, 1922	C, W.	−	±	++++	++++	−	−	−	Do.
9	June 8, 1922	C, W.	−	−	+++	+++	+	−	−	Do.
10	June 21, 1922	C, W.	−	±	+++	+++	+	+	−	Do.
11	July 20, 1922	C, W.	±	±	++	+	±	−	−	Do.
12	Aug. 2, 1922	C, W.	−	−	±	+++	+	−	−	Do.
13	June 29, 1922	C, A.	++++	++++	++++	++++	++++	+++	+	Syphilis (secondary stage early); no history of treatment.
14	Mar. 2, 1922	D, C. F.	++	++++	++++	++++	++++	−	−	Syphilis (secondary stage late, under treatment).
15	Mar. 22, 1922	D, F.	+	++	++++	+++	−	−	−	Syphilis (tertiary stage); no history of treatment.
16	May 18, 1922	D, F.	±	±	++	+++	+++	+	−	Same under treatment.
17	May 26, 1922	D, F.	+	+	++++	++++	++	−	−	Do.
18	June 8, 1922	D, F.	−	−	+	+	+	−	−	Do.
19	Aug. 2, 1922	D, F.	−	−	±	+	+	−	−	Do.
20	Mar. 30, 1922	F, J.	+	+	++++	++	+	−	−	Syphilis (tertiary stage); no history of treatment.
21	July 20, 1922	F, R. E.	++++	++++	++++	++++	++	+	−	Syphilis (secondary stage early); no history of treatment.
22	Aug. 2, 1922	F, R. E.	±	±	++++	++++	++++	+	−	Same under treatment.
23	May 10, 1922	G, F.	+++	+++	++++	++++	++++	++	−	Syphilis (tertiary stage); no history of treatment.
24	Feb. 15, 1922	H, G. D.	−	−	++++	+++	+	−	−	Syphilis (secondary stage late); no history of treatment.
25	.....do.	H, J.	−	−	++++	+++	+	−	−	Syphilis (tertiary stage); had treatment.
26	Feb. 22, 1922	H, J.	−	−	++++	++	+	−	−	Same under treatment.
27	Mar. 2, 1922	H, J. L.	−	−	++++	+	−	−	−	Syphilis (secondary stage late); no history of treatment.
28	Apr. 13, 1922	H, L. J.	+++	++++	++++	++++	+	+	−	Syphilis (secondary stage); no history of treatment.
29	Apr. 20, 1922	H, L. J.	++++	++++	++++	++++	++	+	−	Do.
30	Apr. 6, 1922	J, C. D.	−	−	++	+	−	−	−	Syphilis (primary stage 1 week).
31	June 8, 1922	J, J. T.	++++	++++	++++	++++	++++	++	−	Syphilis (secondary stage early); no history of treatment.
32	May 26, 1922	K, W.	++++	++++	++++	++++	++++	+++	+	Do.
33	Mar. 8, 1922	L, R.	++++	++++	++++	++++	++	+	−	Do.
34	Mar. 16, 1922	L, R.	++++	++++	++++	++++	++	+	−	Same under treatment.
35	Mar. 30, 1922	L, R.	+	+	++++	++++	+	−	−	Do.
36	Apr. 13, 1922	L, R.	−	−	++++	++++	++	+	−	Do.

37	Aug. 2, 1922	L, F...........	++++	++++	++++	++++	++++	+++	±	Syphilis (secondary stage early); no history of treatment.
38	Feb. 22, 1922	M, R...........	−	−	++++	++++	+	−	−	Syphilis (secondary stage late); had treatment.
39	Mar. 2, 1922	M, G. A.........	++++	++++	++++	++++	++++	++++	++	Do.
40	.....do.......	M, C. B.........	−	−	+++	+	−	−	−	Do.
41	.....do.......	M, F...........	++++	++++	++++	++++	++++	++++	+	Syphilis (secondary stage late); no history of treatment.
42	Apr. 6, 1922	M, F...........	++++	++++	++++	++++	++	+	−	Same under treatment.
43	May 10, 1922	M, F...........	+	+	++++	++++	++++	−	−	Do.
44	May 26, 1922	M, F...........	+	+	++++	++++	++++	+	−	Do.
45	June 8, 1922	M, F...........	−	−	++++	++++	++++	−	−	Do.
46	June 21, 1922	McK, Mr.........	+	+++	++++	+++	++	+	−	Syphilis (secondary stage); no history of treatment.
47	.....do.......	McK, Mrs........	+	+++	++++	+++	+++	±	−	Do.
48	Feb. 15, 1922	O, M. J.........	−	−	+++	++	+	−	−	Syphilis (tertiary stage); had treatment.
49	Feb. 22, 1922	O, M. J.........	−	+	++++	+++	−	−	−	Same under treatment.
50	May 10, 1922	O, M. J.........	−	−	++++	++++	+	−	−	Do.
51	June 29, 1922	O, T. J.........	−	−	++	++	+	−	−	Syphilis (tertiary stage); history of treatment.
52	Mar. 2, 1922	P, H. E.........	±	±	++++	++	−	−	−	Syphilis (secondary stage late); had treatment.
53	Mar. 8, 1922	P, H. E.........	+	+++	++++	+++	+	−	−	Do.
54	Mar. 16, 1922	P, E. V.........	±	±	++++	+	−	−	−	Syphilis (secondary stage early); local treatment.
55	Mar. 30, 1922	P, F...........	++++	++++	++++	++++	+++	+	+	Syphilis (secondary stage early); no history of treatment.
56	May 18, 1922	R, E. F.........	++++	++++	++++	++++	++++	+	+	Do.
57	June 8, 1922	S, H...........	−	−	++	+	+	−	−	Syphilis (secondary stage); had treatment.
58	Feb. 22, 1922	T, N. C.........	+	+++	++++	++++	+	−	−	Syphilis (aneurysm); no history of treatment.
59	Mar. 8, 1922	T, N. C.........	+	+++	++++	++++	−	−	−	Do.
60	May 10, 1922	V, G. H.........	++++	++++	++++	++++	++++	++	−	Syphilis (secondary stage early); no history of treatment.
61	June 21, 1922	V, G. H.........	−	−	++++	+++	+	−	−	Same under treatment.
62	.....do.......	W, W. N.........	++++	++++	++++	++++	++++	+++	++	Syphilis (secondary stage early); no history of treatment.
63	Aug. 2, 1922	W, L. K.........	±	±	++++	++++	++	−	−	Syphilis (secondary stage); under treatment.

NOTE (applies to all tables).—1. Antigen No. 1 (acetone-insoluble lipoids); antigen No. 2 (cholesterolized). 2. After May 3, 1922, at the suggestion of Doctor Kolmer, the serum dilutions were changed to 0.1, 0.05, 0.025, 0.005, and 0.0025 c. c., respectively, as experience showed that the drop from 0.02 to 0.004 c. c. was too great. The change in dosage gave better results and reduced the time for setting up the tests.

In Table 1 it will be observed that the Kolmer method is the most sensitive, being the first to give a positive and the last to yield a negative reaction, while the older method using an acetone-insoluble lipoid antigen is the least sensitive, being the last to give a positive and the first to yield a negative reaction.

Table 2 gives the results of tests performed on sera of cases that had had syphilis and received a thorough course of treatment showing that a negative reaction can be obtained with Kolmer technic, eliminating the question of false positive reactions in cases receiving sufficient treatment.

TABLE 2.

No.	Date.	Case.	Noguchi.		Kolmer's quantitative technic.					Diagnosis.
			Antigen No. 1.	Antigen No. 2.	0.1	0.02	0.004	0.002	0.001	
64	May 18, 1922	D, J. H.....	–	–	–	–	–	–	–	Syphilis: had thorough course of treatment.
65	July 20, 1922	.....do.......	–	–	–	–	–	–	–	Do.
66	Mar. 8, 1922	F, B.........	–	–	–	–	–	–	–	Do.
67	May 18, 1922	H, S. Q.....	–	–	–	–	–	–	–	Do.
68	....do........	L, C. H.....	–	–	–	–	–	–	–	Do.
69	Mar. 2, 1922	P, Mrs......	–	–	–	–	–	–	–	Do.
70	July 20, 1922	R, A........	–	–	–	–	–	–	–	Do.
71	Mar. 2, 1922	S, E. B.....	–	–	–	–	–	–	–	Do.

In addition to the tests shown in Table 2, 49 tests were performed on sera of cases which so far as could be determined from the history and physical examination were nonsyphilitic. In not one instance was a positive reaction obtained with the new method. This series was conducted for the purpose of eliminating, to a certain extent, the question of false positive reactions.

Each positive case studied could be reported in detail to show additional interesting features in favor of the new technic, but it is believed that the data presented are sufficient for all practical purposes.

In conclusion it may be stated that from the foregoing observations our results parallel those of Schamberg and Klauder, namely:

1. That the Kolmer technic gives a more sensitive reaction than the older method used in this laboratory.

2. It apparently gives an earlier positive reaction in cases of primary syphilis and is much slower to become negative in cases under treatment.

3. It apparently does not yield a false positive reaction in nonsyphilitic cases nor in cases who have had sufficient treatment.

4. The quantitative feature enables the clinician to satisfactorily gauge the effect of antisyphilitic treatment.

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A MEDICINAL GARDEN.

By G. W. CALVER, Lieutenant Commander, Medical Corps, United States Navy.

Preaching theory and practicing fact are wonderfully different! How well do I remember the first day I saw a garden where only plants of supposed or actual medicinal value were supposed to be grown. I looked here and saw burdock growing in the greatest profusion; I looked there and saw fennel, and was greatly shocked, in my innocence, to think that anyone would be so very negligent as to permit such weeds to grow in a medicinal garden. Then I scratched my head a bit and remembered that burdock was of the family *Compositæ*, its name in any scientific company being *Arctium lappa*, and that its roots are used to make a fluid extract considered to be a diuretic and diaphoretic alternative. Humph! I should have known better. Then the thought came to me that fennel is of the family *Umbelliferæ*, genus *Anethum* (Linnæus), and its name in good society is *Foeniculum vulgare*. So we learn that things are not really what they seem and that a weed after all is only a respectable plant growing in the wrong place. Now that is the way we are trying to teach medical botany to the advanced classes at the United States Naval Pharmacist's Mates School. It has been found that by taking the common weeds and showing that they are of use in medicine. we gain an interest in medicinal plants that would never be developed.

We have been attempting to develop at this school a garden where plants or several varieties of plants of certain types can be demonstrated to classes in pharmacy and advanced materia medica. We have accumulated some seed and a few plants of the more common varieties, and we are very desirous of increasing the number of medicinal plants in our garden. It has occurred to us that, as naval medical officers visit all of the countries of the world and have the greatest chances for collecting plants and seeds of medicinal value which could be sent to this school for propagation, an appeal to the service through the BULLETIN might be productive of results. A number of schools of medicine and pharmacy have medicinal gardens which have been found to be of great value in imparting to students a knowledge of plants in a way which will make the appearance and uses of the plants stick in students' minds in a manner not possible otherwise. There is another side to the garden question which presents unbounded possibilities, and that is in the development of strains of plant life which are immune to the more common garden pests. We have in our garden one row of digitalis that has to be sprayed weekly to keep down the scale, while just alongside, in the next row, is another specimen of digitalis that is immune to this scale and which is growing in the greatest profusion. Now, why should one variety be so afflicted and another immune? Altogether we have seven strains of digitalis and from them we hope to develop an immune type which can be eventually used to supplant the others.

The possibilities of the medical garden are unlimited, but the help and support of every naval medical officer and Hospital Corps man on foreign or home station is needed to make the garden a success. It is requested that everyone, whenever there is an opportunity, send the school plants or seeds of such medicinal plants as grow in the localities in which he may happen to be. If possible a description of the most desirable methods for growth, or the surroundings in which the plants were found, should be sent, as this will enable the gardener to give new plants what might be called "homelike surroundings." Seeds may be sent very satisfactorily by putting them in an envelop, folding it over and wrapping it in cotton to prevent the seeds being chrushed in transit, especially if they are sent a long distance. Plants if mailed from points in the United States should be so wrapped as to weigh not over 4 pounds per package. The dirt about the roots should be removed and the roots incased in gardener's moss, which should be dampened. The moisture will be retained for about 10 days, especially if the moss is wrapped in oil paper such as is used for a covering to wet dressings. Shipments sent by naval vessels to either the Norfolk Navy Yard or to the Naval Base, Hampton Roads, should be placed in the care of the medical officer of the vessel, who could see that plants were not damaged in transit and that they received water and did not dry up while en route. As plants will not live very long if wet with distilled water, it is better to employ diluted sea water, 1 part to 10 or 15 parts distilled water, or, better yet, bring along a little shore water in a jug for the plants. Upon arrival of the vessel, if a telephone call be sent to the executive officer of the school, a messenger or truck will be sent immediately for the specimens.

The following list is submitted to assist officers in finding plants in their localities:

Central Beds, Medicinal Garden, Pharmacist's Mates School, Portsmouth, Va.

764–1

Digitalis.

764–2

Mandrake.

Valerian.

764—3

MEDICINAL PLANTS GROUPED ACCORDING TO STATES OR COUNTRIES WHERE GROWN.

United States of America.

North Carolina:

- Pinus palustris.
- Convallaria majalis.
- Rumex crispus.
- Rumex obtusifolius.
- Verbascum thapsiforme.
- Fraxinus americana.
- Drosera rotundifolia.
- Drosera intermedia.
- Drosera longifolia.

South Carolina:

- Chionanthus virginica.
- Passiflora incarnata.
- Apium graveolens.
- Aletris farinosa.
- Chamaelirium luteum.
- Veratrum viride.

Florida:

- Turnera diffusa.
- Turnera aphrodisiaca.
- Chionanthus virginica.
- Passiflora incarnata.
- Apium graveolens.
- Stillingia sylvatica.
- Liquidambar orientalis.
- Guaiacum officinale.

Kentucky:

- Menyanthes trifoliata.
- Solanum carolinese.
- Verbascum phlomoides.
- Eupatorium perfoliatum.
- Sesamum indicum.
- Hydrastis canadensis.
- Prunus virginiana.
- Chionanthus virginica.

Tennessee:

- Passiflora incarnata.
- Chionanthus virginica.
- Thymus vulgaris.
- Verbena hastata.
- Verbascum phlomoides.

Indiana:

- Cimicifuga racemosa.
- Hydrastis canadensis.
- Brauneria pallida.
- Geranium maculatum.

Illinois:

- Iris florentina.
- Iris versicolor.
- Baptisia tinctoria.
- Fraxinus americana.
- Coptis trifolia.

Mississippi:

- Stillingia sylvatica.
- Mentha piperita.
- Mentha spicata.
- Thymus vulgaris.
- Hyoscyamus niger.
- Atropa belladonna.
- Viburnum prunifolium.
- Grindelia camporum.
- Grindelia cuneifolia.
- Grindelia squarrosa.
- Veratrum viride.
- Spigelia marilandica.
- Cannabis sativa.
- Sesamum indicum.
- Juniperus communis.
- Cimicifuga racemosa.

Missouri:

- Castanea dentata.
- Prunus domestica.
- Chamaelirium luteum.
- Trillium erectum.
- Thymus vulgaris.
- Chionanthus vulgaris.
- Cephalanthus occidentalis.

Arkansas:

- Cypripedium hirsutum.
- Cypripedium pubescens.
- Geranium maculatum.
- Hamamelis virginiana.
- Gentiana lutea.
- Podophyllum peltatum.
- Veratrum viride.
- Spigelia marilandica.
- Xanthoxylum americanum.

Virginia:

- Datura stramonium.
- Xanthoxylum americanum.
- Gelsemium sempervirens.
- Stillingia sylvatica.
- Gentiana lutea.
- Cimicifuga racemosa.
- Serpentaria aristolochia.

West Virginia:
Hydrastis canadensis.
Polygala senega.
Prunus virginiana.
Podophyllum peltatum.
Virburnum prunifolium.
Pepta cataria.

Maryland:
Spigelia marilandica.
Lobelia inflata.
Chenopodium ambrosioides.
Chenopodium anthelminticum.
Daucus carota.
Mentha p'perita.
Mentha spicata.
Centaurea benedicta.

Georgia:
Spigelia marilandica.
Melia azad rachta.
Brauneria pallida.
Iris versicolor.

Michigan:
Virburnum opulus.
Comptonia peregrina.
Tussilago farfara.
Euonymus atropurpureus.
Asclepias tuberosa.
Ulmus fulva.
Virburnum prunifolium.
Humulus lipulus.

Minnesota:
Grindelia camporum.
Grindelia cuneifolia.
Grindelia squarrosa.
Veratrum viride.
Sanguinaria canadensis.
Podophyllum peltatum.
Apocynum cannabinum.

Wisconsin:
Xanthoxylum americanum.
Xanthoxylum clava-herculis.
Prunus virginiana.
Polygala senega.
Cimicifuga racemosa.
Asclepias tuberosa.

Iowa:
Coptis trifolia.
Hydrangea arborescens.
Solanum carolinese.
Cornus florida.

New Hampshire:
Rhus glabra.
Reseda luteola.
Hamamelis virginiana.

New Hampshire—Continued.
Melilotus officinalis.
Cytisus scoparius.
Aletris farinosa.
Trillium erectum.

Maine:
Myrica cerifera.
Cypripedium hirsutum.
Phytolacca decandra.
Pinus strobus.
Thuja occidentalis.
Valeriana officianalis.
Ulmus fulva.
Veratrum viride.
Sanguinaria canadensis.
Rhamnus frangula.
Cimicifuga racemosa.

Rhode Island:
Fucus.
Mentha spicata.
Dryopteris filix-mas.
Dryopteris marginalis.

Nebraska:
Geranium maculatum.
Gentiana lutea.
Podophyllum peltatum.
Spigelia marilandica.
Chamaelirium luteum.

Alabama:
Crocus sativus.
Thymus vulgaris.
Passiflora incarnata.
Euphorbia pilulifera.
Rhamnus cathartica.
Prunus domestica.
Brassica nigra.
Rosmarinus officianalis.
Hyoscyamus niger.
Grindelia camporum.
Grindelia cuneifolia.
Grindelia squarrosa.
Veratrum viride.
Gelsemium sempervirens.
Spigelia marilandica.
Sesamum indicum.
Viburnum prunifolium.

Wyoming:
Juniperus communis.
Cimicufiga racemosa.
Mentha piperita.
Mentha spicata.
Trillium erectum.

Colorado:
Gentiana lutea.
Veratrum viride.

Colorado—Continued.

- Spigelia marilandica.
- Prunus domestica.
- Coptis trifolia.
- Hydrangea arborescens.
- Asarum canadense.

Oklahoma:

- Erythæa centaurium.
- Cactus grandiflorus.
- Podophyllum peltatum.

New Jersey:

- Arctostaphylos uva-ursi.
- Triticum agropyron.
- Mentha piperita.
- Lobelia inflata.
- Allthaea officinalis.
- Xanthoxylum americanum.
- Xanthoxylum clava-herculis.
- Ceanothus americanus.

Massachusetts:

- Chondrus crispus.
- Caulophyllum thalictroides.
- Vilburnum opulus.
- Euonymus atropurpureus.
- Helianthemum canadense.
- Eupatorium perfoliatum.
- Conium maculatum.
- Verbena hastata.

Vermont:

- Nepeta cataria.
- Rumex crispus.
- Rumex obtusifolius.
- Coptis trifolia.
- Geranium maculatum.
- Juglans cinerea.
- Baptisia tinctoria.

Connecticut:

- Dioscorea villosa.
- Bicuculla canadensis.
- Conium maculatum.
- Tussilago farfara.
- Chimaphila umbellata.
- Cornus florida.

North Dakota:

- Aralia racemosa.
- Brauneria pallida.
- Baptisia tinctoria.
- Cimicifuga racemosa.

Delaware:

- Angelica atropurpurea.
- Verbena hastata.
- Scutellaria laterifolia.
- Baptisia tinctoria.
- Geranium maculatum.

Delaware—Continued.

- Melilotus officinalis.
- Trillium erectum.
- Cypripedium hirsutum.
- Phytolaca decandra.
- Hydrangea arborescens.
- Asclepias tuberosa.
- Sambucus canadensis.
- Aralia racemosa.
- Sesamum indicum.

South Dakota:

- Triticum agropyrons.
- Coptis trifolia.
- Phytolacca decandra.
- Sambucus canadensis.

Idaho:

- Tussilago farfara.
- Cypripedium hirsutum.
- Ulmus fulva.
- Grindelia camporum.
- Grindelia cuneifolia.
- Grindelia squarrosa.

Texas:

- Podophyllum peltatum.
- Grindelia camporum.
- Grindelia Cuneifolia.
- Grindelia squarrosa.
- Stillingia sylvatica.
- Gentiana lutea.
- Liquidambar orientalis.
- Gossypium herbaceum.
- Gelsemium sempervirens.
- Spigelia marilandica.
- Serenoa serrulata.
- Cannabis sativa.
- Chionanthus virginica.
- Passiflora incarnata.
- Artemisia absinthium.
- Brauneria pallida.
- Hamamelis virginiana.

California:

- Turnera diffusa.
- Turnera aphrodisiaca.
- Menyanthes trifoliata.
- Cactus grandiflora.
- Croton eluteria.
- Euphorbia pilulifera.
- Eriodictyon californicum.
- Mentha spicata.
- Atropa belladonna.
- Grindelia camporum.
- Grindelia cuneifolia.
- Grindelia squarrosa.
- Illicium verum.

California—Continued.

Aconitum napellus

Rhamnus purshiana.

Digitalis purpurea.

Oregon:

Ricinus communis.

Gentiana lutea.

Mentha piperita.

Mentha spicata.

Digitalis purpurea.

Veratum viride.

Sanguinaria canadensis.

Pinus montana.

Polygala senega.

Xanthoxylum americanum.

Xanthoxylum clava-herculis.

Myrica cerifera.

Berberis odostemon.

Erythræa centaurium.

Delphinium consolida.

Delphinium ajacis.

Washington:

Hydrangea arborescens.

Polyporus officinalis.

Coptis trifolia.

Delphinium consolida.

Delphinium ajacis.

Prunus domestica.

Scutellaria laterifolia.

Asarum canadense.

Euonymous purpureus.

Chimaphila umbellata.

Louisiana:

Euphorbia pilulifera.

Croton eluteria.

Chionanthus virginica.

Passiflora incarnata.

Juniperus communis.

Crocus sativus.

Thymus vulgaris.

Aletris farinosa.

Gossypiun herbaceum.

Brassica nigra.

Stillingia sylvatica.

Liquidambar orientalis.

Datura stramonium.

Datura tatula.

Beta vulgaris.

Gelsemium sempervirens.

Prunica granatum.

New York:

Althæa officinalis.

Humulus lupulus.

Sanguinaria canadensis.

New York—Continued.

Polygala senega.

Cimicifuga racemosa.

Triticum agropyrons.

Pennsylvania:

Rhus glabra.

Aralia racemosa.

Viburnum opulus.

Euonymus atropurpureus.

Eupatorium perfiolatum.

Juglans cinerea.

Angelica atropurpurea.

Ohio:

Brauneria pallida.

Geranium maculatum.

Rubus nigrobaccus.

Rubus villosus.

Hydrangea arborescens.

Veronica virginica.

Cypripedium hirsutum.

Cypripedium pubescens.

Nevada:

Gelsemium sempervirens.

Delphinium consolida.

Delphinium ajacis.

Chimaphila umbellata.

Verbena hastata.

Verbascum phylomoides.

Verbascum thapsiforme.

Montana:

Brassica nigra.

Nepeta cataria.

Coptis trifolia.

Aletris farinosa.

Arctium lappa.

Arnica montana.

Asclepias tuberosa.

New Mexico:

Datura stramonium.

Ulmus fulva.

Grindelia camporum.

Grindelia cuneifolia.

Grindelia squarrosa.

Cannabis sativa.

Cimicufuga racemosa.

Xanthoxylum americanum.

Sambucus canadensis.

Utah:

Senecio aureus.

Gentiana lutea.

Asarum canadense.

Rosmarinus officinalis.

Prunus domestica.

Asclepias tuberosa.

Arizona:

Cactus grandiflorus.
Trillium erectum.
Sesamum indicum.

Kansas:

Cactus grandiflorus.
Passiflora incarnata.
Gentiana lutea.

MEXICO.

Convolvulus scammonia.
Citrullus colocynthis.
Exogonium purga.
Liquidambar orientalis.
Eriodictyon californicum.
Smilax medica.
P.menta officinalis.
Theobroma cacao.
Cactus grandiflorus.
Vanilla planifolia.

WEST INDIES.

Saccharum officinarum.
Myristica fragrams.
Eugenia aromatica.
Pimenta officinalis.
Zingiber officinale.
Gua acum officinale.
Canella winterana.
Tamarindus indica.

CENTRAL AMERICA.

Toluifera pereirae.
Toluifera balsamum.
Guaiacum officinale.
Canella winterana.
Croton eluteria.
Haematoxylon campechianum.

AFRICA.

Strophanthus kombé.
Myrrha commiphora.
Citrullus colocynthis.
Anacyclus pyrethrum.
Acac a senegal.
Physostigma venenosum.
Cassia acutifolia.
Cassia angustifolia.
Aloe vera.
Aloe ferox.
Gossypium herbaceum.
Cannabis sativa.
Juniperus oxycedrus.
Barosma betulina.
Artemisia absinth um.
Tamarindus indica.
Hagenia abyssinica.
Coffea arabica.
Cola.

SOUTH AMERICA.

Chile:

Boldo boldus.
Quillaja saponaria.
Coffea arabica.

Venezuela:

Toluifera balsamum.
Coffea arabica.

Argentina:

Aspidosperma quebracho.
Aspidosperma blanco.
Barosma betulina.
Theobroma cacao.
Pimenta offic nalis.

Bolivia:

Guarea rusbyi.
Paracoto.
Pimenta officinalis.

Brazil:

Vouacapoua araroba.
Copaiba.
Aspidosperma quebracho.
Aspidosperma blanco.
Smilax medica.
Picrasma excelsa.
Quassia amara.
Pilocarpus jaborandi.
Cephaëlis ipecacuanha.
Theobroma cacao.
Gua acum officinale.
Chondrodendron tomentosum.

Peru:

Cinchona succirubra.
Cinchona ledgeriana.
Barosma betulina.

Peru—Continued.
Theobroma cacao.
Krameria triandra.
Krameria ixinia.
Krameria argenta.
Chondrodendron tomentosum.
Quillaja saponaria.

ASIA.

India:
Taraxacum officinale.
Exogonium purga.
Ricinus communis.
Croton tiglium.
Pterocarpus marsupium.
Pterocarpus santalinus.
Strychnos nux vomica.
Cannabis sativa.
Piper nigrum.
Ourouparia gambir.
Citrus aurantium amara.
Citrus medica limonum.
Santalum album.
Zingiber officinale.
Elateria cardamom.
Ferula sumbul.
Citrullus colocynthis.

Siam:
Garcinia hanburii.
Piper nigrum.

China:
Cinnamomum camphora.
Cinnamomum zeylanicum.
Illicium verum.
Papaver somniferum.
Rheum officinale.
Rheum palmatum.

Japan:
Cinnamomum camphora.
Papaver somniferum.
Cracilaria lichenoides.
Zingiber officinale.

Other parts of Asia:
Strophanthus kombé.
Convolvulus scammonia.
Cucurbita pepo.
Astragalus gummifer.
Cannabis sativa.
Sesamum indicum.
Juniperus communis.
Aconitum napellus.
Rhamnus frangula.
Prunus amygdalus.
Hyoscyamus niger.
Datura stramonium.
Carum carvi.
Ferula sumbul.

EUROPE.

France:
Lactuca virosa.
Thymus vulgaris.
Juniperus oxycedrus.
Olea europæa.

Germany:
Lactuca virosa.
Matricaria chamomilla.
Gentiana lutea.
Glycyrrhiza blabra.
Glycyrrhiza typica.
Glycyrrhiza grandulifera.
Althæa officinalis.
Lycopodium clavatum.
Humulus lupulus.

Spain:
Citrullus colocynthis.
Olea europæa.

Great Britain:
Ecballium elaterium.
Lactuca virosa.

Mediterranean coast:
Anacyclus pyrethrum.
Ecballium elaterium.
Arctostaphylos uva-ursi.
Quercus infectoria.
Triticum agropyrons.
Claviceps purpurea.
Urginea maritima.
Linum usitatissimum.
Fraxinus ornus.
Sesamum indicum.
Dryopteris filix-mas.
Punica granatum.
Aconitum napellus.
Delphinium staphisagria.

Mediterranean Coast—Continued.
Rhamnus frangula.
Rosa gallica.
Digitalis purpurea.
Atropa belladonna.
Hyoscyamus niger.
Daphne mezereum.

Mediterranean Coast—Continued.
Carum carvi.
Coriandrum sativum.
Foeniculum. vulgare.
Valeriana officinalis.
Petroselinum sativum.

THE FUNCTIONS AND ORGANIZATION OF MEDICAL CORPS UNITS SERVING WITH THE MARINE CORPS IN THE FIELD.

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THE MEDICAL DEPARTMENT SERVICE OF THE BRIGADE.

The infantry brigade receives its medical service from two basic medical department field unites, the medical regiment and the attached medical department of the infantry regiment. The former has already been considered. The organization and functions of the latter will now be analyzed.

The attached medical department of the infantry regiment is the first unit in the evacuation system. The tables of organization provide the following personnel:

Officers:	
Major (Medical Corps)	1
Captains or lieutenants (Medical Corps)	7
Captains or lieutenants (Dental Corps)	2
Captains or lieutenants (Veterinary Corps)	1
Total	11
Enlisted:	
Technical or first sergeant (Medical Corps)	1
Staff sergeants (Medical Corps)	3
Sergeants (Medical Corps)	5
Sergeant (Veterinary Corps)	1
Corporals (Medical Corps)	4
Privates first class and privates (Medical Corps)	70
Privates first class and privates (Veterinary Corps)	3
Total	87

Transportation:
14 horses, riding.
22 mules, draft.
1 cart, water (2-mule).
1 wagon, escort (ration and baggage) (4-mule).
4 wagons, medical (4-mule).
4 motor cycles, with side cars.
1 bicycle.

The distribution of the personnel of the medical detachment within the regiment is not and can not be fixed, but must be altered to meet the needs of varying situations. At permanent camps the detachment would ordinarily be held together and administered in much the same way as an infantry company and would have its own office, mess, etc. In combat it would be split into sections and divided between the regimental headquarters and the individual battalions. Under the latter conditions it would probably be more convenient to mess the separate sections with the companies to which they might be attached.

The regimental surgeon, acting under the orders of the regimental commander, is in command of the medical detachment and has immediate supervision over all matters pertaining to the health of the regiment. He locates the aid stations and directs the care of the wounded. He will maintain an office near regimental headquarters and will leave word there as to where he may be found at all times. It is important that he keep in close touch with the regimental commander and maintain harmonious working relations with him. The regimental commander, on the other hand, must keep the surgeon well informed as to contemplated troop movements in which the medical department will participate.

In the table below is suggested a convenient arrangement of the medical detachment. It is purely descriptive and is neither fixed nor authorized. It is intended as a picture of the detachment. An arrangement exactly like this might never be found, but something like this arrangement would be found in all such organizations.

HEADQUARTERS SECTION AND REGIMENTAL AID STATION.

Major	1	Horses, riding	8
Captains and lieutenants	[1] 4	Wagon, escort	1
Technical sergeants	1	Wagon, medical	1
Sergeants	[2] 3	Cart, water	1
Corporals	1	Motor cycle	1
Privates, first class, and privates	22	Bicycle	1

BATTALION AID STATIONS (EACH).

Captain or lieutenant	1	Horses, riding	2
Staff sergeant	1	Wagon, medical	1
Privates, first class, and privates	9	Motor cycle	1

FOLLOWING INFANTRY LINE (EACH BATTALION).

Captain or lieutenant	1	Corporal	1
Sergeant	1	Privates	8

[1] 1 Medical Corps; 2 Dental Corps; and 1 Veterinary Corps.
[2] 1 Veterinary Corps.

MEDICAL DEPARTMENT DETACHMENT WITH THE INFANTRY COMPANY.

For the purpose of study, the medical detachment of the regiment may be divided into four sections—the headquarters section and the three battalion sections. The headquarters section consists of a headquarters, the regimental aid station, and the reserve. The battalion section consists of an aid station and the detachment following the line of the company. These units will be considered in the order in which they are encountered by the wounded man on his way from the front line to the last aid station at the rear of the regimental zone.

The medical detachment following the line consists of one officer (assistant battalion surgeon), one sergeant, one corporal, and eight privates. This arrangement provides two privates (one litter squad) to each company of the battalion, and one officer and two noncommissioned officers to direct and assist in the work. Ordinarily the officer will be with the company having the greatest number of casualties and one of the noncommissioned officers with each of the other two infantry companies.

The frontage of a company will average about 250 yards and the depth about 450 yards. This gives each medical department soldier a strip 125 yards long (62½ yards on each side of him) and 450 yards deep, which he must cover. On a basis of about 10 per cent casualties there will be 8 or 10 wounded within this area.

The private (medical corps) is equipped with a pouch containing bandages, first-aid packets, adhesive plaster, iodine swabs, a small instrument case and a book of diagnosis tags. He does not carry a litter. He applies first aid to the wounded, attaches a diagnosis tag to their clothing and directs them to the nearest aid station, or marks the place where they are lying in order that they may be picked up later by litter squads from the aid station.

The diagnosis tag is a card upon which is marked the name and organization of the soldier, a brief description of the injury, and the character of the assistance given. It serves a double purpose. It is an official record, and it indicates, for the benefit of later treatment, the nature of the treatment already given. It remains attached to the clothing of the injured man until the place is reached where the official record of the case is entered upon the permanent War Department forms. Its value in aftertreatment is that it indicates the probable amount of infection and whether or not tetanus antitoxin, etc., has been given.

In combat immediate transportation of the wounded from the front line will usually be impossible. It must be deferred until there is a local decrease in hostilities or until nightfall. The medical department detachment must remain with the organization to which it is attached. Assistance will be furnished from the rear so that each unit may remain in its alloted zone.

In stabilized situations, such as trench warfare, local aid posts may be established for individual companies, but in open warfare this is not often practicable. However, the wounded requiring transportation should always be assembled at some fixed place, whenever it is possible to do so, usually in rear of the inner flank, as this facilitates their collection by the litter squad.

The battalion aid station.—The aid station is the beginning of the route of evacuation. To this point are brought the wounded from the companies. From here they are collected by details from the medical regiment and are started on their way to the hospitals in the rear. The personnel of the aid station might be distributed as follows:

1 captain or lieutenant, in charge.
1 staff sergeant, assistant to the surgeon.
1 private, wagoner.
1 private, messenger and orderly (mounted).
1 private, messenger, motorcyclist, with side car.
2 privates, surgical assistants.
4 privates, dressers and litter bearers.

This distribution would, of course, be subject to modification in accordance with any special requirements.

The equipment is such as can be easily transported. It consists of (approximately):

12 litters.
2 carriers, litter, wheeled.
1 box of medicines and drugs.
1 box surgical instruments and equipment.
1 box splints and surgical appliances.
1 box food supplies for the injured.
1 bale, 20 blankets.
1 bundle, rubber coats, gauntlets, gas masks, quantities of sodium bicarbonate and sodium carbonate for gas cases.

These articles are all transported on the medical wagon. It is unnecessary to describe each of these articles in detail. The wheeled litter carrier and medical wagon, however, are new and deserve some notice.

The wheeled litter carrier, as at present planned, will be of a folding type, light but strong. It will accommodate two loaded litters and may be used for carrying equipment. It may be pushed by hand, drawn by animals, or used as a trailer.

A medical wagon, to replace the medical cart, is authorized in the new tables of organization. The design is still subject to modification, but it has now reached a stage where there will be few if any changes in essential details. It will have an adjustable top so that it may be readily converted from an equipment wagon to an ambulance capable of carrying six loaded litters. It may be animal drawn or used as a trailer.

The aid stations are located by the regimental surgeon, with the approval of the regimental commander. There are no prescribed distances, but they should be placed as close to the front as is compatible with their proper functioning. They must be protected against direct rifle fire at least, by the utilization of all possible natural and artificial shelter. Preferably they should be near the line of natural drift of the wounded and should be readily accessible from both the front and rear. It is a great advantage to have them in close proximity to roads, but they should not be so placed as to unduly interfere with traffic of other troops.

The aid station has two main functions—first, collection of the wounded: and, second, rendering first aid or supplementing such aid as has already been given. It is not an office of record, but should, if practicable, keep a list of the wounded passing through it.

During active combat there can not, of course, be any extensive transportation of the wounded, as such measures would destroy concealment, subject the wounded to additional dangers, and draw fire to neighboring troops. Under these conditions the litter squads would render local aid to the wounded in the lines, help individuals who are straggling in, or assist in the preparation of the aid station for the receipt of casualties. As soon as conditions would permit, additional litter bearers and the wheeled litter carriers would be sent forward and the search for the wounded would begin, oftentimes continuing far into the night. All possible places of concealment should be searched. Sometimes assistance would be required from the medical regiment, members of the band, or, in great emergencies, from line troops.

At the aid station only emergency treatment is given, hemorrhages arrested, bandages and splints readjusted or renewed, diagnosis tags verified and completed, and the patients sorted and prepared for further evacuation. Immediate treatment is given gassed cases. The wounded are then taken in charge by the ambulance companies of the medical regiment.

Headquarters section.—This section comprises the office of the regimental surgeon, the dental section, the veterinary section, the regimental infirmatory, and the reserve.

The regimental surgeon will maintain an office near the regimental headquarters. It will be a small affair, and will usually be located in a tent or corner of the room. The personnel will consist of—

1 captain or lieutenant, assistant to the surgeon.
1 sergeant, clerk.
3 or 4 privates, orderlies and messengers.

Messages pertaining to medical department activities will be sent to this office. The surgeon will leave word with his assistant as to his whereabouts at all times and will authorize his assistant to act for him, in his absence, on matters of routine.

Two dentists are assigned to each regiment. Each will be given a private, first class, as assistant. Routine dental treatment can only be rendered in quiet sectors and in cantonments, and this will be of the simplest character, being limited to the relief of pain and other emergency work. During combat the dental surgeons will perform the duties of medical officers in rendering first aid to the wounded.

The veterinary section consists of one officer, one sergeant, and three privates. It has its own special equipments and is stationed with units charged with the care of animals.

The regimental aid station.—The personnel of this station would normally consist of approximately 3 officers and 20 enlisted men. If the regiment was acting alone, additional personnel would be furnished, if necessary, by the medical regiment.

The general character of the equipment is like that of the battalion aid station, but a few supplementary articles have been added. It consists of—

12 litters, wheeled.
1 medical and surgical chest.
1 chest, medicines and dressings.
1 chest, food supplies.
1 chest, dental equipment.
1 field desk.
Assortment of tools, buckets, blankets, etc.

These articles are carried on a medical wagon. The water cart and escort wagon carry mess supplies. When acting alone, ambulances would ordinarily be furnished by the medical regiment.

The purpose of the regimental aid station is to render to the injured more careful and thorough treatment than is possible at the battalion aid station. It also assists in collecting wounded from advanced stations and in delivering them to relief organizations in the rear.

At times this unit occupies an important place on the line of evacuation. At other times it is not needed and may get in the way by causing delay without rendering commensurate aid to the wounded. It is but slightly better equipped than the battalion aid station and should never attempt to take upon itself the duties which could be better performed by the larger units in the rear. It was originally intended that this station should be a sort of headquarters and clearing house for all the aid stations of the regiment. In practice, however, it has been found altogether too small for this purpose. For these reasons this station is more often used as a reserve and source of supply than as a link in the chain of evacuation. When the regiment is acting alone the regimental aid station must frequently take over the duties ordinarily performed by the medical regiment.

THE REGIMENTAL SURGEON.

Having now considered the organization, equipment, and duties of the various elements of the attached medical department of the infantry regiment, it becomes necessary to coordinate the various parts and assemble them into one machine. This may perhaps best be accomplished by studying the duties of the regimental surgeon, who commands the unit.

Before combat.—When combat is imminent, the surgeon will be informed of the general situation at a conference of the staff. Here he will learn the nature of the problem presented to the medical department and will have an opportunity to give any information regarding it which may be required.

He will then make it his business to see individually the members of the staff who can give him additional information or those to whom he should apply for instructions. He learns the planned location of offices, information regarding the strength and disposition of the enemy, the general plan of attack, and the expected location of the various elements.

He then studies his map and if conditions permit makes a personal reconnaissance of the ground to be covered. He consults with his assistants and keeps them informed as to what is to be expected of each.

His next step is to get in touch with the division surgeon, to whom he reports the action he had already taken. From the division surgeon he receives further information and instructions. At this time arrangements are made for cooperation of the medical regiment in evacuating the regimental area.

The plans of the surgeon are now submitted to R-4 (regimental supply officer) for approval or modification. At this time the surgeon submits the information as to location of aid stations, required for paragraph 4 of the battle order.

Finally the surgeon calls a conference of medical officers, at which time he informs them of the approved plan of action and assigns each officer to his specific duties. Previous to this the surgeon has consulted freely with his assistants, so all of them have been making preparations for the work they are now expected to perform.

During combat.—Long before the action begins, the surgeon must have prepared a program for his own activities. The broad requirements are fixed and unmistakable. He must bear them ever in mind and must direct all his energies toward their consummation. They may be summarized as follows:

1. Contact with regimental headquarters, in order that he may anticipate new developments and that he may promptly render required reports of his work.

2. Contact between organizations and their aid stations, in order that individual wounded may receive prompt relief.

3. Contact with relief stations in the rear, in order that the wounded may be evacuated in a steady stream and not congest the aid stations.

4. Supervision over all the units, so that each will do its full share of the work in hand and that none of them be overcrowded while others are needlessly empty and idle.

The surgeon will first proceed to his command post, near headquarters, and will assure himself that clerks and messengers understand their duties. He will arrange with the medical officer in charge to keep this office informed at all times as to his whereabouts and will establish messenger service between it and his place of station.

He will then proceed to the regimental aid station or to the aid station of the battalion where most casualties are expected. Here he will spend most of his time, but he will visit other stations at intervals, in order to inform himself of their needs. He will hold himself in readiness to proceed to any point where he may be especially needed.

At each station he must keep contact with front and rear. When wounded do not reach individual aid stations promptly, he will dispatch additional bearers to these stations, drawing the personnel from the regimental aid station and other assigned troops. When the aid stations are congested and not promptly evacuated from the rear, he will dispatch messengers to the sanitary company, ambulance company, or to the division surgeon, demanding relief. He will ascertain the cause of any deficiencies in the machinery and will exercise his ingenuity in overcoming it.

If the regiment advances, it will become necessary to advance the aid stations. They may be advanced in their order, or there may be "leapfrogging," advancing the reserve station to the front and later bringing the rear stations, successively, to the front.

When the regiment falls back, the aid stations will be brought with it, if possible. If the wounded can not be transported, they may be left in charge of medical attendants, under the protection of the flag of the Geneva convention.

The surgeon will assist in rendering first aid, when time is available, but he must not occupy himself with the treatment of individual cases, however urgent they may be, at a time when he should be watching and supervising the work of the entire unit.

After combat.—Upon the conclusion of the engagement, the outstanding duties of the medical detachment are three in number:

1. Collection of the wounded.
2. Preparation of records.
3. Closing of aid stations and reassembling of equipment.

Following the well-established procedure of working from rear to front, the aid stations will occupy themselves with the removal of wounded from the advanced areas, and the medical regiment will collect those in the rear and will also evacuate the aid stations. This division of duties can not be absolute; one unit must supplement and assist the other in every possible way, but, to avoid confusion and duplications, each must have its special zone of action.

The need of speedy collection and evacuation immediately after the battle will tax all of the resources of the detachment, and outside help must usually be supplied. Detachments from the sanitary company and the ambulance company will work in front of the aid stations. Empty ammunition and supply wagons will be pressed into service. Details from the line may be required, but these should be avoided if possible, as such troops are already fatigued and may still have work to do elsewhere.

The evacuation of the extreme front will be done chiefly by litter. A thorough search of the ground must be made, as wounded will have sought shelter in out-of-the-way places. Part of the field may still be under fire, and much of the collection will be deferred until nightfall.

The wounded from the regimental area will ordinarily be brought into the aid station, from which they will be evacuated by the medical regiment, but ambulances and wagons should work as far forward as possible, at times even conveying the wounded past the aid stations directly to larger units in the rear.

The records which must be kept consist of the names of the wounded and the nature of their injuries. This information must be furnished the regimental commander at the earliest practicable moment. These data are not easy to assemble, as each aid station will have treated men from other organizations and the wounded from the regiment will have gone to other aid stations. The best immediate check will be obtained from the stubs of the diagnosis tags in the possession of the men who rendered first aid. Additional data are furnished by the lists which have been kept at the aid stations, but these lists, if they have been kept at all, can not be complete if the aid station has been crowded and overworked, as is usually the case. The sorting hospital of the medical regiment will have the best early records. From here a list will be forwarded containing a list of the injured passing through it from the regiment.

From these various sources records will be assembled at the office of the regimental surgeon and forwarded to the regimental commander and the division surgeon. The preparation of the lists will be continuous during the period of collection of the wounded, and the regimental commander will be kept constantly informed as to its progress and contents.

When all the wounded have been collected, the aid stations will be closed and packed, unless they are to be retained for an expected renewal of the engagement.

SUMMARY.

1. The attached medical department of the infantry regiment is an integral part of that regiment and operates under the direction of the regimental commander.

2. The medical detachment is divided into five main sections—a headquarters section and four aid stations.

In the headquarters section are included the office of the surgeon, the regimental aid station, and the dental and veterinary services.

In the aid stations are included the troops following the line and those rendering emergency treatment at the aid stations.

3. The function of the medical detachment is to render immediate treatment to the wounded of the regiment and to convey them to the beginning of the line of evacuation.

4. The surgeon is a member of the staff of the regimental commander and is in command of the medical detachment. It is his duty to coordinate the work of the various elements of his unit, in carrying out the purposes of the regimental commander.

THE MEDICAL SERVICE OF THE BRIGADE.

This subject divides itself into two parts—one dealing with the brigade as a part of a larger force, and the other with the brigade acting alone. Essential differences in medical department organization are found under these separate conditions.

The infantry brigade as a part of a larger force.—As we have seen, the first aid and collection of the wounded within the regiment are accomplished by the medical troops permanently attached to that organization. Within the brigade, beyond the regiment, evacuation and treatment are supplied by the medical regiment of the division. The medical units of the division are in turn evacuated by the corps and army.

There is no brigade medical headquarters of record. The senior medical officer present represents the medical department at brigade headquarters when necessary, but ordinarily is not detached from the regiment with which he is serving.

The infantry brigade acting alone.—When the brigade is acting alone, the medical department, like other branches, must be reinforced to meet the increased duties and responsibilities with which it is faced. No longer does the responsibility for the care of the wounded end at the aid stations of the regiments, but a complete evacuation system must be built up extending to a fixed hospital in the rear.

The required reinforcement is furnished by the division and usually consists of a provisional medical battalion consisting of a headquarters section, a sanitary company, an ambulance company, and a hospital company. The exact size of the reinforcement would, of course, vary with the mission of the battalion. The above organization is cited as suitable for the majority of cases. It might be doubled or halved, but should always contain representatives from each of the three medical battalions.

The general scheme of evacuation would be the same as that of the division acting alone, with the notable exception that all medical department units would function under the direct control of brigade headquarters instead of coming in part under the supervision of the division.

STAFF RELATIONSHIP.

To coordinate the activities of the medical units, a medical headquarters analogous to that of the division is required. It normally consists of a brigade surgeon, an assistant, 2 or 3 noncommissioned officers, and 5 to 10 privates. The brigade surgeon is a lieutenant colonel or major. His assistant is a captain or first lieutenant.

The relationship of the medical department to the various branches of the brigade staff is as follows:

B–1 [3] is consulted in matters relating to office administration and paper work.

B–2 [3] furnishes information as to the status of the enemy forces.

B–3 [3] is especially interested in the location of the various units and in the proposed plan of their actions. He consults with the surgeon in regard to matters pertaining to the medical department, which are to be included in paragraph 4 of the battle order.

The office of B–4 [3] is directly concerned with the evacuation of wounded, the furnishing of supplies, and allotment of roads to be used by ambulances and medical wagons.

MEDICAL DEPARTMENT DATA IN FIELD ORDERS.

In paragraph 4 of the field order is a statement of the location of the aid station to which the wounded are to be sent.

[3] Correspond to G–1, G–2, G–3, and G–4 of the division.

The location of the aid stations will be given in regimental and battalion field orders.

The brigade field order will contain a designation of the locality of the collecting station. When the brigade is acting alone, the field order will designate the location of the collecting station, the ambulance station, and the hospital station.

ITINERARY OF WOUNDED.

The following description of the aid rendered the wounded soldier along the line of evacuation is given for the purpose of review, and, in the main, is based upon a lecture given at the Infantry School, Camp Benning, Ga., last year by Lieut. Col. R. H. Pierson, Medical Corps, United States Army.

1. Upon receipt of injury—first-aid packet is applied by the wounded man or a comrade.
2. Attendance by member of the battalion medical combat personnel following the line—time from receipt of injury, 30 minutes. At this time the assault platoon has advanced 1,000 yards beyond the injured man.
3. Transportation to battalion aid station by means of hand litter—distance, 800 yards; time required, 30 minutes.
4. Treatment at battalion aid station—time required, 30 minutes.
5. Transportation from battalion aid station to collecting station by hand litters and wheeled litters—distance from line of departure, 1 mile; time required, 15 to 30 minutes.
6. Treatment at collecting station—15 to 30 minutes.
7. Transportation to an intermediate ambulance station—distance, 500 yards; time from receipt of injury until loaded ambulance starts for field hospital, 2½ hours, more or less.
8. Treatment at hospital station—location of hospital station, 5 miles from front; time for ambulance trip, 30 minutes; arrival at hospital station about 3 hours after receipt of injury.
9. Treatment in hospital station—time of stay varies from a few hours to several days.
10. Transportation by ambulance to evacuation hospital, 20 miles behind the front.
11. Treatment at evacuation hospital—time of stay, 1 day to 2 weeks.
12. Transportation by hospital train to base hospital at hospital center—location of hospital, 100 miles more or less from the front; stay at base hospital, variable.
13. Transportation by rail to replacement depot in zone of service of supply.
14. Classification and reequipment at replacement depot—time of stay, a few days to 1 week.

15. Transportation by rail to regulating station near the front—time of stay at regulating station, 1 to 3 days.

16. Transportation by rail from regulating station to place of assignment for military duty.

The above outline is subject to wide modifications. It applies only to the seriously wounded who completely recover and are returned to full duty. Every wounded soldier does not pass through all these stations and some pass through additional ones.

The following are the most frequent departures from the rule:

1. When ambulances can be brought close to the front and hospital stations and evacuation hospitals are at no great distance to the rear, wounded may be sometimes carried in ambulance past intermediate aid stations directly to larger hospitals in the rear.

2. When the nature of the injury is not serious, wounded may be returned directly to their organizations after receiving treatment at an aid station or hospital station.

3. Patients whose recovery is apt to be slow may be transferred from evacuation and base hospitals to convalescent hospitals, where they are often given graded physical exercises for relatively long periods.

4. Seriously injured who are rendered physically incapacitated for full military duty are classified at base hospital or replacement depot and afterwards assigned to such light duty as they are capable of performing.

5. Individuals totally incapacitated for further military duty are transferred to hospitals in the extreme rear for prolonged treatment or discharge.

6. Individuals requiring special treatments as for tuberculosis, nervous disorders, etc., are transferred to special hospitals in the extreme rear.

7. The distance between sanitary units and the periods of time required for treatment and transportation will vary with the nature of evacuation facilities and with the character of the injury the individuals has sustained.

MEDICAL DEPARTMENT SERVICE ON THE MARCH.

The disposition of medical units will depend to a large extent upon the character of the march. Below are given some of the arrangements in most common use.

March of the regiment.—The surgeon marches at the head of the column with the regimental staff. In this position he is able to keep in touch with the military situation and to anticipate requirements for collection of casualties.

One or two medical officers will be assigned to each battalion. If only one medical officer is present, he will take position in the rear.

If two are present, one will march at the front and the other at the rear.

If marching through peaceful country where no attack is expected, two or three animal-drawn ambulances may be placed in the rear of each regiment.

Disabled men requiring treatment are provided with passes signed by an officer showing the name and organization of the soldier and told to report to the medical officer at the rear of the battalion. When the soldier has reported, the medical officer returns the pass to the company commander, with a note as to the disposition which has been made of the case.

The soldier may be given treatment and immediately returned to his organization; relieved of his pack and required to march at the rear; or placed upon an ambulance or other available means of transportation until an evacuation point is reached. The foot soldier retains his arms and personal equipment when evacuated. In the case of a mounted soldier the mount and saddle equipment are immediately returned to the organization to which they belong.

The attached medical department, other than sections detailed with special units, such as advance guard, rear guard, etc., marches at the rear of the battalion or regiment.

The march of the brigade.—When the brigade is acting as a part of a larger force, it turns over its casualties from battalions to the medical regiment of the division. The medical regiment then becomes responsible for their further treatment and disposition.

When the brigade is acting alone, its casualties are collected and evacuated by details from the sanitary company.

The sanitary company may establish one casualty clearing station at the end of each day's march or it may establish several along the route, a few miles apart.

On the ordinary march through friendly territory where casualties will be few, the simplest method of collection would seem to be the establishment of only one collecting station at the end of the day's march. Under these conditions, ambulances would be furnished each regiment and the sick would be transported with the column until camp was made in the evening. The ambulances would then bring in the casualties to a well-equipped infirmary where they could be treated or, in appropriate cases, evacuated. The surgeon should have previously informed himself as to the location of hospitals and railroad stations near the camping ground and should have planned an orderly system of evacuation.

When, on the other hand, the country is hostile and attack is imminent, other arrangements might have to be made and several collecting stations along the route might be necessary. In this case detachments from the sanitary company might be distributed at intervals throughout the column with instructions to fall out at designated places and establish small casualty clearing collection stations. One ambulance company following the column would be detailed to pick up the casualties from the various stations and transport them to a hospital station established at the camping ground ahead.

It is thought that the single casualty collecting station established at the end of the day's march is, whenever practicable, in every way to be preferred to numerous small stations along the route.

With the exception of detachments from the sanitary company and ambulance company, serving with individual organizations, the provisional medical battalion of the brigade marches at the rear of the column.

The arrangements given above are subject to wide modifications. They may be readily changed to suit conditions.

Advance guards, rear guards, and other units may be reinforced with suitable medical detachments, when necessary. Medical personnel of battalions may march with aid-station equipment at the rear of battalions or may be assembled as a unit at the rear of the regiment.

When the train is divided into two sections, the animal-drawn transportation may march with one section and motor vehicles with another.

On the march, as in combat, medical-department units are essentially flexible and susceptible to adjustment in minor details to meet the special situation in hand.

NOTE.—The subject matter of this article has been compiled from pamphlets used in the courses of instruction at the Infantry School, Camp Benning, Ga. The writer disclaims any credit for originality.

HYGIENE OF SUBMERSIBLES.[1]

PART II.

By Capt. C. M. BELLI, Medical Corps, Royal Italian Navy.

RENEWAL OF AIR.

Renewal of the inside air is accomplished in various ways, according to whether the submersible is in free communication with the atmosphere (emersion), has no communication with it whatever (complete immersion), or has limited communication (partial immersion). We therefore will make a study of the three navigating positions—at the surface, totally submerged, or partially submerged.

(A) *Ventilation while emerged.*—In this position ventilation is accomplished through a difference in temperature, internal and external, the change in consequence of currents of air being very slight

[1] From Annali di Medicina Navale e Coloniale, Rome, April, 1922.

owing to a lack of lateral openings. On this account, when the porthole of the conning tower, which is the highest compartment, can be kept open, there is good ventilation; but when it is closed the temperature becomes high through the accumulation of hot air. The ventilation of the other compartments depends upon the respective locations of the passages for the entrance of air. Generally, however, when natural means only are depended upon for the renewal of air, they are insufficient and it is necessary to have recourse to artificial ventilation.

While navigating, except in fine weather with a perfectly calm sea, the deck portholes are closed, thus limiting the renewal of air to the porthole of the conning tower and the paraperiscopic tubes; if this last porthole is closel natural ventilation is still further reduced and we proceed as in partial immergence.

Of the two systems in use, the one with pressure and suction ventilators for every compartment insures a more complete renewal of air than the central system, by which the useful effect is different in the various compartments, and zones of stagnant air remain at points where the current is more feeble. Against the advantage stated there remains the fact that the detached system can be employed only in the position of emergence and when the sea is quiet. For this reason the central system, which may be put in operation even with partial immergence, using only the emerged ventilating pipes and vent holes to furnish pure air to all the compartments, is indispensable.

(B) *Ventilation while partially immerged.*—In this position the means for ventilation are the two paraperiscopic tubes and the two ventilation tubes for the admission and exhaustion of air of the heat engines.

In submersibles employing the central system, one of the bow suction ventilators is joined to the paraperiscopic tube to provide for the introduction of the external air, which is sent to all the compartments of the ship by means of general ventilation piping. One of the exhaust ventilators of the stern is connected with the other paraperiscopic tube and with the corresponding section of piping. We thus have a renewal of air which, though limited, is most useful.

(C) *Ventilation while totally immerged.*—The ship can navigate in this position with the paraperiscopic tubes completely submerged, or out of the water, but closed by means of a sluice valve. From the point of view of air renewal, all communication with the external atmosphere being interrupted, there is no possibility of a change of air.

Supplying pure air is an effective method for prolonging immersion. However, before total immersion is accomplished, the impurities thrown off by the gas engines should be removed. When this is thoroughly done, in total immersion the physicochemical state of the inside atmosphere depends exclusively upon the presence of men and the functioning of the electric motors.

Ventilation in the true meaning of the word signifies a change of the inside air of a compartment through introduction of outside air. With the submersible closed we have a circulation of the existing air inside the ship, or we have a partial or total renewal of the air; but this is brought about by different means from those ordinarily employed for the replacing of vitiated air by the air outside. Properly speaking, we do not treat here of true ventilation, but nevertheless we use this term for lack of a better one.

With immerged submersibles there are certain means for promoting the circulation of air, others for restoring to it its normal chemical composition, and still others for removing corrupt elements and introducing those that are healthful.

We must therefore study: (*a*) Circulation of air; (*b*) purification of air; (*c*) renewal of air.

(*a*) *Circulation of air:* In immerged ships the same air is breathed in and out of the lungs, always, over and over again, with the result that respiration becomes a rumination of the air, in the same way that the ruminants chew their cuds which have been regurgitated from the stomach. In ships equipped with a centralized system the air circulating inside the piping becomes stirred up, and passing through the intervening spaces undergoes a lowering of temperature. Through such changes the physicochemical condition of the air tends to become uniform in all the compartments; the temperature, humidity, and barometric pressure place themselves in equilibrium in the various compartments, and likewise the content of oxygen, carbon dioxide, and extraneous gases become about equal in all the spaces. This uniformity is advantageous for some compartments and disadvantageous for others. One advantage common to all, however, is that the movement of air promotes an evaporation of the perspiration with a corresponding sensation of comfort. Men shut up in a submerged submersible after a few hours become depressed and lethargic, perhaps more from the temperature and stillness of the air than from its impurity. The circulation of air by its movement has the same effect as a blower in a confined and crowded space; that is to say, it produces reanimation.

(*b*) *Purification of air:* The offensive capacity of a submarine and the principal means of defense of these instruments of war is their power to travel under water, the duration of which depends on the length of time that the crew can live and work under such conditions.

The air inside the habitable portion of the hull, after subtracting the space required for the engines, materials, and men, is sufficient only to maintain respiration for a short time under physiological

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conditions, and because of this the duration of immersion would be limited to a few hours if something were not done to make respiration possible.

This problem arose with the first attempts to navigate under the water. Without entering into well-known historical particulars, Fulton carried on his *Nautilus* compressed oxygen in a metal receptacle, and Philipps in 1850 remained immerged in a submersible of his own invention for 10 hours with his wife and two children, using an air tube which permitted a change of outside air.

When, therefore, the construction of submersibles for the war was started, the problem of furnishing the crew with respirable air in a feasible manner was diligently investigated. As with ordinary vessels, the first thought was to purify the existing air rather than to obtain it from the outside, so in like manner on board submersibles the first idea was to purify the air, freeing it from gaseous impurities and replacing the useful element consumed, namely, oxygen.

To purify the atmosphere we must restore it to its normal condition; that is, gradually introduce oxygen until it has reached its natural proportions and then free the air of all gaseous impurities. The introduction of fresh oxygen may be easily accomplished. The process of purification, on the contrary, encounters serious difficulties through the complexity of the noxious gases, the action of which must be annulled—an excess of carbon dioxide, hydrocarbons, sulphurated hydrogen, sulphurous anhydrid. These substances are not poisonous in an equal degree. It was therefore proposed to disregard those that are but slightly injurious, freeing the air of the more poisonous, treating each one separately, through special reactions. But these operations, while possible in a laboratory, are not practicable on board submersibles, where simple, automatic means are needed which do not crowd the spaces or interfere with the work of the personnel. The practical thing to do, however, is to begin purifying the air by the removal of carbon dioxide and at the same time by introducing fresh oxygen.

The absorption of carbon dioxide may be effected through the action of various chemical compounds, the principal ones of which are soda-lime, potash, soda, and barite.

Soda-lime (mixture of one part caustic soda with two parts quicklime), potash, soda, and barite, combining with carbon dioxide and at the same time absorbing water vapor, produce liquid products which attack metals, thereby rendering them difficult to handle on shipboard. To effect the absorption of carbon dioxide on board a submersible of large displacement and during lengthy submergence, such large quantities of these compounds would be needed that they would occupy too much space. These substances are very hygroscopic and it is under humid atmospheric conditions that they more easily absorb the carbon dioxide; but this constitutes an obstacle to the complete development of the reaction, so that when these substances are found in a liquid or pasty form the chemical combinations occur only on the surface. For this reason a special apparatus is required for such substances in order to produce reaction in inclosed places, causing the air which is to be purified to pass through the absorbing compounds.

The Dräger purifier and that of Boldrocchi are the best known of these devices.

The Dräger apparatus is composed of a battery of small metallic cylinders connected with the piping for the interior air circulation. When the ventilators are functioning the air is obliged to pass through the cylinders, each one of which contains 20 metallic cups with lids, full of impure sodium hydrate in granular form, and so placed that the air which penetrates the lower aperture of the capsule must pass through the granules before passing out at the top.

The Boldrocchi purifier takes the form of a small cabinet with a square base, inside of which little metallic boxes are placed, one above the other, containing an alkaline compound in the form of somewhat large granules. The bottom of the cabinet is raised from the floor and perforated to permit the air to enter. The top is furnished with an electric suction device. The apparatus is movable and the exhauster may be connected with the electric current at different points on the ship and it may also be placed in adjustment with the ventilation piping.

The charges in both of the purifiers are changed when upon shaking no sound is heard because of the softening and swelling of the granules on account of the water vapor they have absorbed. The composition of the absorbing substance is a commercial secret; but from what we know of the carbon dioxide being absorbed by the more active alkaline substances, it may be deduced that the number, hence the weight and also the volume, of the charges necessary to absorb all of the carbon dioxide generated during long immersions is a great obstacle to the complete success of the operation.

Other compounds used for the purification of the air are the unstable salts of sodium and potassium which, besides absorbing carbon dioxide and water vapor, set free oxygen. The most important are the dioxide and peroxide of sodium and their derivatives, which chemical terms in commerce are disguised under the trade names "ossilite," "oxono," and "epurite."

The one most used is ossilite, which is a peroxide of sodium. It is very hydroscopic and is handled commercially in metal boxes tightly closed in order to permit no contact whatever with the outside air; it is compressed into small blocks, protected by asbestos, each block corresponding to a gas-meter charge.

The oxygen coming from the ossilite has been largely applied in medicine and the industries where it is necessary to improve the air to be breathed, and it is used by divers in their work.

Belli and Olivi in a series of experimental researches upon ossilite have found that 500 grams of ossilite develop 65.89 liters of pure oxygen, calculated at 760 millimeters and 0° temperature, in 30 minutes' time.

The oxygen is developed by means of a gas meter in the form of a varnished metal cylindrical vase, half filled with water and inside of which is immersed another similar cylinder, but smaller in diameter, open at the two bases, and containing suspended inside a small metallic container, also cylindrical in form, intended to hold the small blocks of ossilite.

Belli and Olivi found ossilite to develop a goodly supply of oxygen, but the process is of very little use in the absorption of carbon dioxide from the air. The operations for the reaction of ossilite are not easy to perform on a submersible, because after every reaction the apparatus must be wiped and polished; this necessitates the employment of two persons exclusively assigned to this work, since ossilite is a caustic chemical compound and difficult to handle. The amount of ossilite necessary on board a submersible would be inconvenient and dangerous. Belli and Olivi conclude that an apparatus using ossilite would not be useful or practical for purifying the air of a submersible in order to prolong the period of human habitability on board.

The methods for the purification of the air are based upon a false estimate of the importance of carbon dioxide in the air. Due to the fact that this gas is commonly cited by hygienists as an index of the corruption of air, the unscientific are led to believe that it is only necessary to remove the carbon dioxide from the air in order to have it pure. But as a matter of fact all of the substances which render confined air unwholesome have not as yet been determined with precision. Under such conditions, methods for purifying the atmosphere which do not take into account the true causes for its alteration are of necessity empirical.

Nevertheless, the purification of air by means of chemical reactions is of special interest on board submersibles as an expedient held in reserve in case of an immersion prolonged beyond the anticipated limit of time, or in the event of accident, so that the crew may be kept alive while awaiting succor. For this purpose individual air purifiers are more useful. Capsules from certain purifying apparatuses may be used separately, through which by means of a rubber tube or piece of cloth the air to be breathed passes and is purified partially. Improvised methods may also be employed, dissolving a capsule of ossilite or similar substance in a bucket and pouring this solution repeatedly from bucket to bucket at different points on the submersible.

Another method of purification consists in the replacement of the oxygen consumed. The limit of the supply of oxygen for organic changes never reaches a minimum, except in case of disaster, and the air on board submersibles always contains enough oxygen to supply the needs of respiration for a longer period than the limit of toleration of carbon dioxide; we need, therefore, to rid the air of carbon dioxide sooner than we need to renew the oxygen. Nevertheless, the introduction of oxygen is useful because it furnishes the organism with a stronger defense against the toxic action of chemical impurities.

Oxygen may be produced on board the submersible itself by "oxygenite" or it may be carried on board in the form of compressed gas, liquid oxygen, or ozone. Oxygenite is perchlorate of potassium to which has been added a small quantity of charcoal and catalytic oxide (oxide of manganese, of iron, etc.). The compound, subjected to an elevation of temperature in the open air, is spontaneously consumed without flame, developing oxygen, about 300 liters per kilogram. This fulfills but one of the demands in the renovation of the air—that is, a furnishing of a new supply of oxygen—and the preparation is not to be recommended, first, for the reason that a high temperature is necessary to produce the reaction; second, a small quantity of carbon dioxide is developed; and, finally, because it is inferior to the other methods for the renewal of oxygen.

The second method for restoring the consumed oxygen to the air is the employment of compressed oxygen. This is stored in a cylindrical container with pressure gauge outlet in order to show how many liters have been drawn off so that a fixed supply of oxygen may be regularly provided in proportion to the calculated consumption. The increased atmospheric pressure thus produced may be corrected by the expulsion of an equal amount of impure air. One thousand liters of compressed oxygen under a pressure of 150 atmospheres weighs 17,050 kilograms, including the container, which has a volume of about 7 liters. Ordinarily these cylinders are joined together by means of a common piping so that the oxygen may be distributed to any compartment desired. The piping has an outside cock so that the cylinder may be refilled without removing it from its place. During the distribution of oxygen the air is put in circulation so as to produce a uniform diffusion of the gas in all the compartments.

The third method for the introduction of oxygen is the use of liquid oxygen. The liquid oxygen is carried in silver-plated bottles with double walls of the Dewar type and would have the advantage of supplying through evaporation and in parallel amount the oxygen consumed on the submersible. In this process there are, however, defects: the liquid oxygen lasts too short a time; it is easily transformed into ozone; it may cause explosions; and the exceedingly low temperature (—187.5° C.), although not capable of causing a relative lowering of the surrounding air of the submersible owing to the small number of calories which it absorbs, may cause accident (freezing).

Finally, we may produce oxygen through ozone which we obtain from an electric ozonizer, a method now in use on English, German, and Japanese submersibles. Ozone may offer some advantage in keeping the air pure aboard an open submersible; with a closed submersible it can not be formed except at the expense of the oxygen content of the air, and thus the latter becomes deprived of a large part of its oxygen. While useful as a disinfectant and air purifier, in portions of 0.070 gram per hundred, it has an irritating effect like chlorine, provoking coughing, rhinitis, and hemoptysis, while in stronger proportions it produces death through its effect on the central respiratory center. Moreover, its oxidizing properties cause it to injure all metals and thus harm the engines.

In conclusion, in purifying the air by these methods the same error is committed as with the first artificial ventilation plants on warships; that is, instead of introducing fresh air from the outside, which would have been much easier, the idea was to purify the existing air. This plan, however, has failed, inasmuch as a sufficient quantity of pure, respirable air is not furnished.

(*c*) *Renewal of air:* The solution of the problem of habitability aboard submersibles is to be sought in a complete renewal of the air inside, whereby the impure air being removed, the nonbreathable gases are removed and fresh air is furnished.

Of course, a complete renewal in the sense that all of the impure air is expelled and fresh air substituted is not possible; it is always understood that a portion of the air is taken off and replaced by fresh air; or, in other words, there is a dilution of the impurities. But we must consider also that with ventilation on ordinary ships there is not a complete renewal of the air; hence we may consider the former as a true process of ventilation in reduced proportions.

At first it was believed possible to employ liquid air, 1 volume of the same corresponding to 800 volumes of gaseous air. This, like liquid oxygen, is a very unstable product, which is kept pure in Dewar bottles at a temperature of —193.5° C. It presents all of the inconveniences of liquid oxygen, with this in addition, that in renewing its gaseous state it collects with its immense quantity of droplets, as large as the fifth of a red corpuscle, all the gaseous impurities. as is done by rain and snow. Moreover, in evaporation the development is not in the same proportion as that of atmospheric air; instead there is at first a preponderant development of azote (nitrogen), a more volatile gas, so that in the end the liquid that remains is pure oxygen.

Rejecting liquid air, we have recourse to compressed air. To this end we take a group of tanks of compressed air connected with a pipe which runs the whole length of the boat with branch piping leading into every compartment. The introduction of compressed air increases the atmospheric pressure inside the vessel, which is relieved by a like expulsion of foul air. This is accomplished by means of compressors, and the air is driven outside through the siren tube or is introduced into the empty tanks, always under the guidance of the barometer. The particular features of the measures adopted in the various navies are held secret; but they all originate in the same concept, that is, for the expulsion of impure air a corresponding amount of compressed air must be substituted. The renewal of the atmosphere by means of compressed air, aside from the chemical composition of the atmosphere, improves its hygrometric condition, diminishing its humidity in proportion to the dryness of the compressed air which is introduced. This method is unquestionably the best for prolonging immersions up to and beyond 24 hours, keeping the crew in fit physiological condition. It offers no technical difficulties and completely insures a habitable condition aboard submersibles under ordinary conditions of immersion, because it permits the removal from the air of all gases which when accumulated would have an injurious effect upon the human organism.

LIGHTING AND HEATING.

Daylight is admitted through the glass of the porthole. In immersions of slight depth, up to 12 meters, the natural light imparts to objects a green color and a newspaper may be read by this light; in deeper immersions the natural light is faint and scarcely as clear as deep twilight. For this reason all vessels carry electric-light plants which derive their power from storage batteries. Until the present time little attention has been paid to the position of the lamps, which are located specifically with a view to throwing light upon certain determined points. On account of the low ceilings of the compartments these lamps occur on a level with the eyes, producing a dazzling effect which disturbs the function of vision. To lessen this glare the lamps are usually covered with ground-glass globes which improve conditions somewhat, though not altogether. Indirect lighting, as adopted aboard English submersibles, is much more satisfactory. The lamps are attached to the ceiling beneath flat, white varnished reflectors. The lower half of the lamp is hidden behind a bowl, whitened inside, which reflects light on the reflector, from which light is in turn reflected through the compartment. A similar arrangement is used for the side wall lamps. Both walls and ceiling are covered with a dull white varnish which tends also to diminish the glare.

The air is somewhat cold in the winter and artificial heat is indispensable. Electric stoves are provided for this purpose, but on account of their consuming so much electric current and thereby reducing the running capacity of the submersible, this method is used only in case of extreme cold.

FOOD SUPPLY.

Submersibles make short cruises of from two to three days, interspersed with long stays in port.

In port the personnel live in barracks or on mother boats, enjoying ordinary fare, as special rations are necessary only while at sea. On the first day the crew usually consume prepared food carried on board from shore, keeping it on ice; sea rations are issued from the second day on.

At sea submersibles remain stationary, lying in wait, or navigate immerged or on the surface. In the first position, the crews lie down for complete rest; in the second, they watch the running of the motors and steer the vessel. From the point of view of the potential energy derived from food rations, the crew may be considered as subjected to moderate labor. But the rare use of rations lends importance to the question as to thermogenic values, and the conditions of living and of work are so peculiar that in the composition of food tables great weight must be given to two factors especially related to life on board submersibles, one being the preparation and the other the conservation of foods.

In Italian submersibles cooking is done altogether on small electric stoves for the boiling of *pasta* (macaroni, etc.), and one or two electric ranges on which only simple food preparations may be cooked. The kitchen plant can not be too large, as the consumption of electric energy would be too great. The cooking of food, however, presents two difficulties; the first being the small size of the cooking utensils, and the second the formation of water vapor, which increases the atmospheric humidity on a closed submersible.

A second factor which governs the choice of rations is the difficulty of preserving the food. Fresh provisions decompose rapidly through the action of poisonous gases, water vapor and high temperature, and even cheese, coffee, and dry provisions are soon spoiled. It is therefore necessary that the foods shall be mainly in preserved form. A diet of preserved foods presents two difficulties. The first is that the volume of the food is less than usual, on account of which the stomach is not satisfied and a feeling of hunger is aroused. In practice, however, the men complain of insufficient food only on the first day; during the successive days there is a surfeit, either because it being more nourishing less is assimilated or there is loss of appetite. The other difficulty is that the Italian sailor has an unconquerable dislike for preserved vegetables, and therefore they are entirely excluded from the rations or given in small quantities. On this account the diet has too large an amount of fat and nitrogen and there is an inevitable excess of potential energy over what is required.

Notwithstanding the excess of rations and the consequent over-nourishment, it is for so short a time that it can be productive of little harm, or at any rate only that of supplying food that is not required or that will be wasted. In fact, on account of the youth of the crew and the consequent activity of the organs assigned to the disintegration of catabolic products and their changes, the disturbances arising from a too copious diet, and particularly that containing an excess of nitrogenous substances, do not occur. In a like manner, a person traveling on a railroad who is obliged to eat cake does not worry over the fact that he is exceeding his ordinary diet; and in the same manner, during the brief period of navigation on board a submersible, the fear of digestive disturbances from a superabundant diet is exaggerated.

The question most in the controversy is that of alcohol. On Italian submersibles marsala is used in preference to ordinary wine. It is the universal verdict, when the men are exposed to cold, no matter what may be the physiological conclusions or hygienic precautions, they prefer marsala to nerve stimulants of all kinds. In cruising, particularly in the upper Adriatic and in the winter, the personnel is exposed to intense cold, not only when performing service on deck but also when in the rooms below, it being necessary to go on deck to fill the lungs with pure air. Now, the abuse of alcohol should be combated in every way, but the moderate use of it develops heat and a small glass of alcoholic beverage gives a sense of comfort and restoration which no other food or drink will furnish. On this account it is wise to allow, at the discretion of the commander, the distribution of marsala when the need of it is felt on account of the cold.

The regulation rations on board an Italian submersible are given in the following table:

Kind of food.	Unit.	Portion per person.
Sea biscuit	Kilogram	0.500
Butter	do	.050
Coffee	do	.030
Preserved meat	Can	1
Cheese relish (in place of butter)	Kilogram	.050
Sterilized milk	Liter	.50
Marsala	do	.125
Table oil (by the consumption of tunny)	Kilogram	.030
Pasta by soup	do	.200
Common salt	do	.13
Tunny in oil (in place of meat)	Can	.100
Sugar	Kilogram	.050

The daily distribution of food is as follows: Morning and evening, coffee and milk; noon, soup and meat (or tunny fish); evening, plain milk. With such a regimen the portion for the evening, consisting of milk only, is to be considered meager. To obviate the difficulties of the diet now in force it is better to include the following food composition: Breakfast, coffee (half portion) with milk (entire portion); dinner, meat or tunny fish; supper, macaroni. The other half portion of coffee is kept in reserve and a cup served during night-watch duty.

Tunny fish, according to the regimen, is given as a substitute for meat. It must be allowed in place of macaroni when on account of the weather or for some other reason it is not possible to cook the latter; so that under these circumstances tunny fish would be given for one of the meals and meat for the other, giving up soup for that day.

Such a ration allows per man, per day:

		With canned meat.	With tunny fish (in oil).
Nitrogenous substance	grams	145.8	105.6
Fats	do	82.4	111.7
Carbohydrates	do	643.9	643.9
Corresponding to calories		4,003.9	4,111.6

The entire personnel, including all ranks, require the same rations and they are easy to prepare, palatable, and relatively cheap.

The rations now given out are alike for all, easily prepared, and generally palatable. They are relatively inexpensive, and although the question of economy is one of minor importance, the number of people to consider being small and the service exceptional, the matter is not one to be overlooked. But beyond all else, the ration in question has the merit of simplicity. It has this defect, however, as first shown by Rho, which is that it is overabundant, both through its total thermodynamic value and in the excessive amount of fats and albumen. The defect may be corrected by reducing the quantity of food scheduled in the table and substituting foods containing less caloric energy, those not so rich in this respect, the former being easier to prepare and equally palatable.

WORK.

On board emerged submersibles the conditions of work do not differ from those on ordinary torpedo boats.

It has already been intimated that during immersion the work, considered from the point of view of muscular force, may be considered moderate as compared with seaman's work in general. However, from the point of view of the surroundings, it assumes a peculiar aspect in view of the atmosphere, the size of the rooms, and the arrangement of the machinery.

During immersion the spaces are closed and the atmosphere confined, notwithstanding which it is necessary to carry on all the work incident to the navigation of the vessel for a length of time varying with the capacity of the boat and the renewal of air. Regarding the size of the rooms and the arrangement of the mechanism, said surroundings exercise a considerable influence, not only with respect to the necessary physical force to be exerted but also upon the morale. Aboard the first types of submersibles—which were very small—a man was obliged to stay at his post continuously throughout the entire cruise because if he went away an uncomfortable list took place which finally became dangerous; the larger boats have much greater stability, which constitutes an incalculable advantage in habitability and acts favorably on the morale and physique of the crew. Nevertheless, the rooms are still comparatively narrow and difficult of access, the machinery parts are of relatively smaller dimensions and more complex than on ordinary boats; all of which makes the handling, maintenance, and repairs less pleasant to the operator.

PERSONNEL.

The potentiality of a submersible depends in large measure on the physical condition and morale of the personnel.

Service aboard these vessels, both on account of the narrow, close quarters as well as the danger in navigation, subjects the personnel to an extreme nervous tension. Because of this greater consumption of nervous energy, there must be a corresponding superiority in the personnel, who will have need of greater mental poise. It is on account of this that the officers and crew must be selected men, superior physically and mentally.

This selection is necessary not only in the interests of the service but for the welfare of the individual. In choosing men—without entering into particulars—what is needed, above all, is great physical strength, absence of affections of the heart, ear, and nose, and absolute perfection in the entire respiratory tract, so that a maximum resistance shall be offered against the local and general action of toxic gases. This perfection is not only with respect to grave maladies, but also includes such slight affections as catarrh, and persons suffering from the same must be temporarily excluded until cured.

During the first few days seamen on submersibles experience a sense of extreme discomfort, suffering from dizziness, ringing in the ears, and nausea, as with divers during their first immersions; but habit soon overcomes these disturbances and after a short time these men lead the same life as aboard an ordinary vessel.

When work is protracted aboard an immersed vessel an irresistible desire for sleep occurs, and the seaman must exert great will power in order to keep awake. Sleep is needed, and therefore in prolonged immersions it is recommended that all the men not on duty shall lie down and make no movement not absolutely necessary in order to diminish the emission of carbon dioxide and the absorption of oxygen, which latter should be economized just as a man traveling in the desert economizes water as far as possible.

PHYSIOPATHOLOGY.

Atmosphere exerts upon the human organism a direct influence by means of the following factors: Light, temperature, barometric pressure, water vapor, and the chemical composition of the air. These factors undergo various changes inside submersibles; hence the necessity of a study of their action on the health of the crew in order to determine the relative prophylactic measures.

This study is outlined by Belli and Olivi, who have made investigations on the principal functions of organic life (blood composition, respiration, circulation, metabolism) under the influence of an atmosphere not met with in any other habitation.

The work may stand open to criticism through the choice (obligatory, however) of the methods employed and the scarcity of the observations. However, they are not without value, if only from the fact that these are the first efforts made toward a physiological investigation of conditions quite peculiar to immersed submersibles.

1. *Blood composition, respiration, and circulation.*—From experiments made upon persons shut up for 24 hours in an immersed submersible, the authors draw the following conclusions:

(*a*) The blood does not undergo any very great modification, either in the stability of its corpuscular elements or the contents of the hemoglobins. A spectroscopic examination, meanwhile, confirms the absence of carbonic oxide in agreement with the results of researches upon this gas in the air, and on the other hand it does not show the action of sulphurous anhydrid, the presence of which in the air was demonstrated by the same chemical researches.

(*b*) Respiration increases in frequency and in fullness with the augmentation of carbon dioxide and the diminution of oxygen in the air breathed.

(*c*) The pulse keeps pace with the phenomena of respiration as regards frequency, and becomes fuller and depressible through a diminution of the tone of the vascular walls, showing phenomena allied to those of fatigue.

To sum up the matter, the human organism is endowed with great powers of resistance against the physiochemical changes of the air, because the functional activity of the organs of human growth rapidly reintegrate changes when but one injury, and that of long duration, is involved. Tolerance is the result of the functioning of various mechanisms, among which one stands for the activity of the hemopoietic organs, another the avidity of the reduced hemoglobin for oxygen; this explains maximum resistance to asphyxiation even in an atmosphere heavily charged with carbon dioxide, provided it still contains a certain quantity of oxygen.

The authors expressed the fear that continued respiration in confined air during protracted immersion, on frequently repeated occasions, would bring about lasting lesions, especially in the blood vessels. However, experience on board submersibles warrants a negative reply, because up to the present time no disturbances of this sort have been observed from prolonged breathing of confined air on board submersibles.

Experience on a large scale during the World War demonstrated that the possibility of permanent injury as suggested by the authors was not unfounded. In fact, in 1918, Thwaites, an English naval surgeon, observed that a large proportion of the men of submarine crews—those not over 32 years of age—showed a blood pressure higher than normal, and higher in those who had had more than one year of service on this type of vessel. These observations were repeated six months after the cessation of hostilities; the percentage of men with blood pressure above normal had been lowered and the departure of the pressure from the average was also less. Thwaites attributes the cause to a loss of elasticity in the arteries with an increase of tone of the muscular envelope.

2. *Organic metabolism.*—Organic metabolism has been experimentally studied by Belli and Olivi on board submersibles during immersions of long duration.

In the confined atmosphere of immerged submersibles, through the composition of the appreciably modified air, it is logical to presume that the organic change has deviated from the normal, because oxidizing catabolic processes of organic metabolism undergo variations through the proportional deterioration of oxygen and the other air gases.

These researches are without precedent. At first view the conditions of workmen in caissons under water and that of divers seem analogous to those aboard submersibles; but in reality they differ, because the predominating factor in the former is the increased atmospheric pressure, while with submersibles the confined atmosphere is very much lightened in pressure above the normal. An analogy may be found with researches carried on in physiology in pneumatic chambers for the study of organic and respiratory changes. In fact a submersible corresponds to an apparatus in which the subject is placed in a tightly closed room where the air is not renewed. Two substantial differences from this apparatus are presented by the submersible: (*a*) The men aboard the latter are under normal life conditions, while in the pneumatic chamber all is artificial; (*b*) the atmosphere is made impure not only by the presence of man but also by gaseous substances coming from the engines.

In the above researches, after an immersion of 24 hours, during which time the air of the submersible, notwithstanding a partial renewal, was supercharged with carbon dioxide, seriously lacking in oxygen, saturated with water vapor and higher in temperature, along with the material changes the following observations were noted:

(*a*) The weight of the body underwent a slight diminution attributable to the increased elimination of water through the lungs and skin.

(*b*) The appetite and the digestive functions showed no change.

(*c*) The alimentary processes were maintained in their ordinary proportions.

(*d*) Assimilation and thermic balance presented small variations in one subject and remained unchanged in another; so it may be deduced that the variations were casual.

(*e*) The nitrogen balance showed no appreciable influence derived from the breathing of confined air.

(*f*) The carbon balance did not appear changed.

(*g*) The mineral balance showed a loss of mineral substance in the body, which, however, could not be attributed with certainty to the physicochemical state of the atmosphere.

As in the greater number of the biological researches, the results were not perfectly concordant in the two subjects, because there were individual factors which affected in different ways the organic and dynamic change. The experiments were few, because the accidental causes may be considered as absolutely compensated for; nevertheless, the results merit acceptation, because they agree with the experiments made upon animals by Terray, which demonstrated that within large limits metabolism is not influenced by the composition of the air breathed and that up to the proportion of 10.5 per cent of oxygen in the air there is no effect on the elimination of nitrogen nor on that of carbon dioxide.

3. *Prevalent diseases.*—As yet no statistics of diseases have been published by means of which may be determined the influence exercised by the atmosphere of submersibles as a casual factor in sickness. From all that is known, the personnel of submersibles are subject to diseases due to their professional life in relation to the atmosphere, the most frequent of which are: Poisoning from gasoline, whether emanating from tanks or the vapor produced in combustion; auricular disturbances brought on by disturbances of pressure equilib-

rium; affections of the respiratory tract due to insufficient ventilation and the inhalation of irritating gases, etc.; skin troubles due to the effect of naphthaline on the skin; troubles due to gas and vapors from the engines and from the wind; various nervous disturbances, especially claustrophobia; finally, an affection characteristic of the profession—that is, asthenopia following a prolonged use of the periscope, especially frequent in individuals having imperfect organs of vision.

Precautions for overcoming as much as possible the affections due to life on board have been employed, little by little; there remains only to speak of asthenopia.

The periscope demands monocular vision, with great strain of adjustment, while the observer is obliged to remain in an uncomfortable position. Various causes inherent to the observer, to the instrument, or to the atmosphere may predispose the individual toward asthenopia. Inherent to the observer are refraction defects and his position; inherent to the instrument, defects of construction and errors of focusing; inherent to the atmosphere, the light conditions.

To overcome this trouble it is essential that the observer should have normal vision, that he should be in a comfortable position with respect to the periscopic lens, with the eyes protected from the glare of any near-by object; as to the instrument, the periscopic lenses should be free from spherical and chromatic aberrations.

The observer should keep the eye not in use open, because a prolonged closing of the eyelid causes muscular fatigue and disturbances of vision of a reflex nature. There has been lately invented an apparatus called a Djoptikon, which rests the eye not in use and protects both eyes from any near-by glare.

When the sun is high in the horizon the intensity of light disturbs vision; under these circumstances it is useful to cover the eye with an orange-colored or red glass.

RESCUE METHODS IN CASE OF SUBMERSIBLE ACCIDENTS.

There are three sorts of danger menacing the submersible:

1. Impossibility of returning to the surface because of injury to the mechanism which controls floatability, or from entrance of water due to a leak.

2. Gas explosion. The explosive gases are: (*a*) Mixture of hydrocarbons from the thermic motors with the surrounding air in determined proportions; (*b*) mixture of oxygen with hydrogen produced from the accumulators; (*c*) explosion of the tanks of compressed air.

3. Collisions.

The precautionary measures against these accidents are strictly technical in nature except in matters of hygiene. Nevertheless many useful suggestions may be given on the employment of means for purifying the air and as to health precautions for the crew.

The means for renewing and purifying the air so as to prolong life of the crew beyond a period of ordinary length and in case of accident should always be resorted to, never losing hope of rescue from the surface; for this reason the methods for purifying the air should always be kept in working order so as to prolong life as long as possible, while awaiting help.

Of the greatest importance in case of accident is to remain erect, avoiding a recumbent posture in the lower parts of the atmosphere, where there is a greater accumulation of carbon dioxide; every unnecessary muscular movement, all agitation and crying out, should be avoided, so as to keep till the last moment the energy which may be needed in rescue.

CLASSIFICATION, DIAGNOSIS, AND TREATMENT OF BONE TUMORS.

By J. W. WHITE, Lieutenant, Medical Corps, United States Navy.

In reviewing, even casually, the literature on bone tumors, one is impressed by the variation in terminology and classification. With these variations in use it is obviously difficult to read intelligently articles attempting to correlate pathological data with clinical findings in the hope of being aided in coming to a decision as regards the proper treatment in an individual case, which, after all, is of most interest to the practical orthopedic surgeon. Dr. E. A. Codman has assembled a collection of pathological slides from cases of bone tumors which he has sent to Drs. J. C. Bloodgood and J. Ewing for description and interpretation, in an attempt to standardize the terminology. It would be fair to state, I believe, that these pathologists represent the two opposing systems of classification.

Bloodgood's (1) classification corresponds closely to that devised by S. W. Gross (2) which he uses in his remarkable article on "Sarcoma of the Long Bones," written in 1879, and depends primarily on the various cell types or tissue types and to some extent on the anatomical point of apparent origin of the neoplasm. This classification of Bloodgood's comprises 15 divisions, all of which, save the first 4, not being sarcomas anyhow, may be included in Ewing's first group. Bloodgood's classification is as follows:

I. Osteoma.
II. Chondroma.
III. Ostitis fibrosa.
IV. Giant cell tumor.
V. Osteo-sarcoma.
VI. Fibro-sarcoma.
VII. Myxoma.

VIII. Chondro-sarcoma.
IX. Myxo-sarcoma.
X. Periosteal spindle cell sarcoma.
XI. Medullary round cell sarcoma.
XII. Periosteal small round cell sarcoma.
XIII. Periosteal round cell sarcoma.
XIV. Perithelial sarcoma.
XV. Large round cell sarcoma.

Ewing's (3) classification depends primarily upon the structure from which the tumor cells apparently originate, such as the osseous, the myeloid, and the endotheloid tissue. He states, and I believe justifiably, that Bloodgood's and all similar classifications have the tendency to confuse the issue. Ewing calls his first group osteogenic sarcoma because they originate from bone cells which give rise to tumors which retain more or less of the function of bone production. He goes on to say "malignant tumors of bone cells, although differing markedly in many features, are essentially one and the same disease." As may be seen below, he subdivides this first group into three types and states that the "anatomical varieties of this first group result from the exaggeration of bone production as in sclerosing osteogenic sarcoma, or overgrowth of blood vessels as in the telangiectatic type, or from the predominance of fibro-cellular tissue as in the so-called periosteal sarcoma. Many osteogenic sarcomas combine all three of these features."

The fact that Ewing includes benign giant cell tumors with his classification of bone sarcoma subjects it to criticism. As suggested by Bloodgood and others, it should undoubtedly be taken from this sarcoma class and listed along with other benign growths from bone such as osteoma, chondroma, or ostitis fibrosa. The following is Ewing's classification:

I. Osteogenic sarcoma.
  a. Fibro-cellular, chiefly periosteal.
  b. Telangiectatic involving medulla, shaft, and periosteum.
  c. Sclerosing, affecting medulla, shaft, and periosteum.
II. Benign giant cell sarcoma of epulis type.
III. Myeloma arising from bone-marrow cells.
IV. Endothelioma, or angio-endothelioma, arising from blood vessels of bone or marrow.

A recent article on bone sarcomas, by Greenough, Simmons, and Harmer (4), is the clearest and most illuminating publication that has yet appeared on this subject. Ewing's classification is used. They criticize his including the giant cell tumors with the sarcomas. Bloodgood's article, appearing in March, 1920, profusely illustrated and containing an immense amount of material of great interest, is rather confusing because of his nomenclature. His conclusions from a series of almost 400 cases, which is by far the largest number hitherto assembled for study, agree in general with the conclusions that were arrived at by Greenough, Simmons, and Harmer. He argues in defense of his classification that the more divisions that can be made with any degree of accuracy, the more is one enabled to learn as regards treatment and prognosis. By a careful follow-up system, he is continually attempting to correlate the clinical outcome with the gross and microscopical examination and reexamination of tissue. He has been doing this for upward of 27 years, and probably has more insight in such conditions than anyone now living. When his material is classified according to some standard method it will be found to be of much more value than it is at present. The scheme recently started by Codman for the registration of bone sarcoma had for its inspiration this system of Bloodgood's.

Other more or less complicated classifications of bone sarcoma have been offered by various pathologists, such as that of Borst and another by Buerger, but neither classification has anything particular about it to warrant further discussion here.

In diagnosing primary bone tumors, all other conditions that simulate such lesions must be definitely ruled out—tuberculosis, lues, and the results of trauma in particular. In general, little difficulty is experienced in doing this. Some conditions, such as ossifying hematoma and myositis ossificans are very confusing, however. Paget's disease and osteomalacia may be confused with ostitis fibrosa, but the age, sex, and history of the patient is suggestive. Some question has recently been mentioned as to the possibility of these conditions being different manifestations of the same entity.

The following points (5) as listed in the form employed in recording a case of bone sarcoma in the American College of Surgeon's register are of the most value in making a diagnosis: Age, race, sex, bone involved, part of bone, date of trauma if any, character of trauma, date and duration of pain, swelling, fracture, loss of function, physical examination especially as to swelling, tenderness, loss of function, involvment of joint, presence or absence of bone shell, pulsation, size and extent of swelling, evidence of metastasis, previous treatment received, X rays, and tissue excised from tumor. As few cases are being reported, an attempt is being made to have the reporting of questionable cases of bone sarcoma as near compulsory as possible in the hospitals approved by the College of Surgeons. As has been repeatedly stated, these sarcomas are so rare that no one clinic is large enough to make conclusive deductions, and there are not many men who have seen and followed 100 such cases. Consequently by making this a nation-wide investigation it is hoped that sufficient clinical material may be brought together in a few years to be of great assistance in the diagnosis and treatment of these difficult cases.

In Bloodgood's report he comes to the following conclusions as to the age of onset: "Up to the age of 15 the probabilities favor the benign cyst, with a possibility of now and then a giant cell tumor. Between 15 and 20, cysts still predominate, but the central sarcoma must be considered. After 20, cysts are very rare. The predominant tumors are the giant cell tumor and the central sarcoma with a few myxomas and chondromas, all scattered up to the age of 20. Between 20 and 30 the giant cell tumor predominates." He gives no age incidence of periosteal sarcoma, but mentions the fact that it is the most common neoplasm next to the benign exostosis, and the most fatal, there being less than 4 per cent of cures. Bloodgood has never seen a central sarcoma in an individual 15 years of age or younger, which indicates that central tumors within this age are benign. The same conclusions are arrived at in Greenough, Simmons, and Harmer's article except that the coincidence of giant cell tumors in youth is not as striking. Gross in his series reports 66 per cent of his cases of giant cell tumor as occurring between the ages of 10 and 30, and 80 per cent of his cases of periosteal sarcoma as occurring during the same period of life.

According to Bloodgood's experience, if more than two years has intervened since the onset of symptoms the probabilities are that the lesion is a cyst or a giant cell tumor. The corollary is true as well; that is, if there is less than two years, malignancy should be suspected.

It is interesting to note that in well over 60 per cent of Bloodgood's collection of periosteal sarcomas the lesion was located at the lower end of the femur. This is certainly suggestive of a traumatic origin. In Gross's series 55 per cent of his giant cell sarcomas occurred in either the lower epiphysis of the femur or the upper epiphysis of the tibia. In his entire series the femur or tibia were involved in 70 per cent of cases.

In more than 50 per cent of the cases of bone tumor reported by various authors there is a definite history of trauma. How much a factor this is is not yet understood. Whether it forms as important a predisposing factor as does continued irritation in carcinoma is very much doubted. Most writers believe, however, that there is some relation. In cases of true sarcoma it is suggestive to note, as has been stated before, that it is the long bones that are involved. In Meyerding's (6) series recently reported, 70 per cent were in the long bones of the knee, the joint that is most exposed to trauma; 75 per cent occurring between 10 and 40 years, the time when injury is most likely to occur. Seventy per cent of the cases occurred in males. He believes it is the single hard local injury that is the most often followed by sarcoma. As regarding etiology, Greenough, Simmons, and Harmer state that "the history of trauma shortly preceding symptoms is more often obtained in cases of osteogenic sarcoma than in any other classes of malignant disease (10 out of 27 cases)."

Barrie (7), of New York, has called giant cell tumors hemorrhagic osteomyelitis and believes that where such a lesion is found it is the end result of some pathological process which has been overcome by the local tissue reaction and is really only a sort of granulation tissue and that the giant cells are only foreign body giant cells. It is his opinion that osteitis fibrosa is the final end product of such a reaction and that it is not a distinct entity in itself. The fact that cysts and osteitis fibrosa may be present in a single tumor appears to bear him out, as well as the occasional presence of giant cells. It is generally held, however, that osteitis fibrosa and giant cell tumors are distinct entities.

Montgomery (8) in his classification of bone cysts divides them as follows:

I. Infections and toxins.
  - *a.* Tuberculosis.
  - *b.* Syphilis.
  - *c.* Pyogenic.
  - *d.* Echinococcus and cysticercus.
  - *e.* Mercurial poisoning.

II. Metaplasia.
  - *a.* Paget's disease (osteitis fibrosa).
  - *b.* Osteomalacia.
  - *c.* Von Recklingshausen's disease (generalized ost. fib.).
  - *d.* Localized osteitis fibrosa cystica.

III. Neoplasms.
  - *a.* Degenerated chondromas.
  - *b.* Occurring in callus, subperiosteal hematoma, etc.
  - *c.* Associated with giant cell tumors.
  - *d.* Dentigenous.

As regards the pathological diagnosis of tissue it may be said, in general, that the nearer the normal cells comprising the tumor are, the less malignant does the tumor tend to become; and, conversely, the more atypical and embryological they are, the more they indicate malignancy. Consequently the more osteoid, chondroid, and fibroid tissue a structure contains the less malignant it is as a rule. Bloodgood believes that myxoma should be classified as malignant in spite of their benign name, as it invariably recurs if not completely removed and is prone to metastasize.

Goddu (9), while he does not believe chondroma to be malignant, recommends thorough excision and cauterization of the base with carbolic acid.

Greenough, Simmons, and Harmer states that "cells characterizing a high degree of malignancy in these tumors are well recognized and depend upon such elements as irregular and distorted nuclei, hyperchromatism, marked variation in size, shape, and staining qualities of the cells, and the occurrence of tumor giant cells—cells containing a relatively small number of irregular nuclei, irregularly placed in the cell, and almost always readily distinguished from the huge typical 'foreign body' giant cells that occur in bone tumors and complicate the picture. The essential tissue from which these tumors are derived is the fibrous tissue made up of spindle cells (fibroblasts) which is the producer of bone. These cells are capable of differentiation into cells of many forms, and of producing intercellular substance varying from fibrous tissue, cartilage, and bone. This differentiation is a fundamental characteristic of these cells, and although often incomplete and atypical, almost invariably can be recognized even in the most irregular and rapidly growing types of tumor in which pleomorphic growth is most conspicuous."

With very few exceptions, sarcomas metastasize by way of the blood stream and not by the lymph channels, as is the case in carcinomas, making excision of the neighboring lymph glands of no particular value. This observation was made by Gross in spite of the fact that in many instances the glands were swollen. With keen insight, he attributed this to local inflammation in the region of the tumor, and tissue reaction to the tumor itself. In only one case in Bloodgood's series has there been metastasis to a neighboring lymph gland, and in this case there was some question as to there being an error in diagnosis and that the tumor itself was not a metastatic carcinoma. Patients suffering from pure sarcoma die usually in a matter of a few months, two years at the outside from pulmonary metastasis, unless their life is happily cut short by some less torturing condition. It is interesting to note in such cases how often pulmonary tuberculosis has been given as the cause of death even in the presence of a previous diagnosis of sarcoma. In carcinoma metastasis along the general lymphatic channels, without involvment of the lungs, is to be expected because of the method of extension, but it is difficult to understand how there can be metastases in sarcoma without pulmonary involvement, inasmuch as all the blood from such a lesion must pass through the capillaries of the lungs before it can get into the general circulation. Plenty of cases of generalized sarcomatosis have been reported without involvement of the lungs, but it will be noticed that the distribution of the supposed metastases in most of these cases is confined to other osseous tissue, suggesting strongly that they are not metastases but manifestations of another entity entirely, such as osteitis fibrosa or multiple myeloma (10).

In general, one may say that there are four methods of handling bone tumors. There is no specific medical treatment. Coley's fluid, which was employed rather extensively for a while, has gradually been superseded by more scientific procedures, save locally in some New York clinics. Some prominent surgeons, notably Ashurst and Meyerding, continue to recommend it, at least in publications. In general, it is fair to say, I believe, that it is given more as a placebo or on a patient's request than with any hope that real benefit will result.

The four methods of treatment employed are, first, radium or X ray; second, curettage of the tumor material with cauterization; third, excision with wide margin; and, fourth, amputation. Roughly speaking, in Bloodgood's classification, which is the easiest one to use in this respect, Groups I and II may be simply excised; Groups III and IV should be curetted; Groups V–IX must be respected; while the others should be treated surgically only for local symptoms with no expectancy of eradicating the disease.

It is in this last group that the actinic rays from radium and the X ray have been found to be of definite value. This method of treatment is still in the experimental stage. Some cases that have been positively determined, from the examination of excised tissue, to be in this group have been at least temporarily relieved. It is too soon to know how permanent this may be. I have seen one such case myself. Incidentally it may be of interest to state that practically all recent publications that have mentioned the point have come to the conclusion that exploratory incision for the purpose of obtaining tissue for examination does not tend to hasten metastasis. The Rockefeller Institute has recently reported the result of exhaustive experiments on sarcomatous rats. The percentage of rats that had metastases without operation was 32, while it was 31 in the cases whose sarcomas were explored and tissue removed. Greenough, Simmons, and Harmer state "that it does not seem unreasonable to maintain that an exploratory incision diminishes but little, if at all, the patient's chances of cure by radicle operation." In many articles a special technic is recommended which has for its object the prevention of infection of the freshly cut tissue by tumor cells.

In this last group the chances of cure are so remote that it may practically be disregarded, and unless there is severe swelling causing local symptoms in the part involved, severe local pain, or sarcomatous cachexia, there is little indication for surgical treatment. As a rule, amputation of an extremity is particularly repugnant to the average patient, and unless there are indications as noted above, the better course is not to amputate but to allow the individual to retain his limb during the short time of life that remains to him before he succumbs to pulmonary metastasis.

Exostoses, not growing, or which have been growing slowly over a long span of years, should be left alone unless they mechanically interfere with function. Should this be so, they should be removed with no fear of recurrence save where trauma, direct or indirect, serves to continually stimulate the periosteum. An example of this is the formation of spurs on the os calcis.

Bloodgood states that when a chondroma is suspected, it should be immediately resected in toto because of the possibility of its containing some myxomatous tissue. In excising it as much care should be used as in removing a known myxoma. Goddu, as has been previously mentioned, emphasizes complete excision to avoid recurrence, and does not mention the danger from myxomatous tissue.

Practically all other types of tumors should be operated, with the possible exception of bone cysts (usually the result of degeneration of neoplasmic tissue) not sufficiently involving the shaft to create danger of pathological fracture or where the cyst is so large that the danger from hemorrhage during and after excision is severe. In this latter instance amputation must sometimes be resorted to.

Next to radium and the X ray, the most conservative method of treatment is by curettage, with or without cauterization. This method is employed in dentigenous cysts of various types, bone cysts, and especially in giant cell tumors of the epulis type of structure. When this is done, however, Bloodgood recommends that the cavity, after being curretted, must be thoroughly cauterized either with the actual cautery or with pure carbolic acid. In simple cysts or osteitis fibrosa, curetting is sufficient; however, one should be on guard against severe hemorrhage.

The third method of treatment is by local excision where the boundaries of the growth make this possible. This treatment is to be used in such tumors as osteo-, fibro,- or chondrosarcoma, and in myxosarcoma if one is sure that the tumor may be removed intact; otherwise, in this last condition, one should invariably amputate.

This method may be used as a palliative measure to relieve local pain or prevent the increase of sarcomatous cachexia and so prolong life. The chances are that the growth will recur locally, but by that time the patient is about to succumb to pulmonary metastasis.

The last method in caring for these cases is to amputate where such procedure is mechanically possible. Amputation is employed in myxomas, as noted above, where local excision, leaving a generous margin of uninvolved tissue, is not possible. In other particular circumstances, such as in large cysts, involvement of important structures, and the other instances stated previously, amputation is employed.

In conclusion it may be stated that the method of choice in the treatment of bone sarcomas, in view of the universally discouraging results following radical treatment, is conservative treatment with the use of radium or massive X rays. Radical treatment, however, in the hope of eradicating the disease must not be disregarded.

The reporting of all suspicious cases to the commission on bone sarcoma of the American College of Surgeons of which Doctor Codman is the chairman, is strongly urged, both from the benefit to the patient and for the information of the committee to help them in proper recommendations.

The concluding remarks in Bloodgood's paper are quoted as the final statement of this summary of the present status of this subject.

"If there is any doubt as to the diagnosis of malignancy, the lesion should be treated as if it were benign.

"In the past there is no question that many amputations and extensive resections have been done for benign lesions, especially the bone cyst and giant cell tumor, and many surgeons have gotten a wrong impression as to the probabilities of a cure, because these patients have remained well with a diagnosis of sarcoma."

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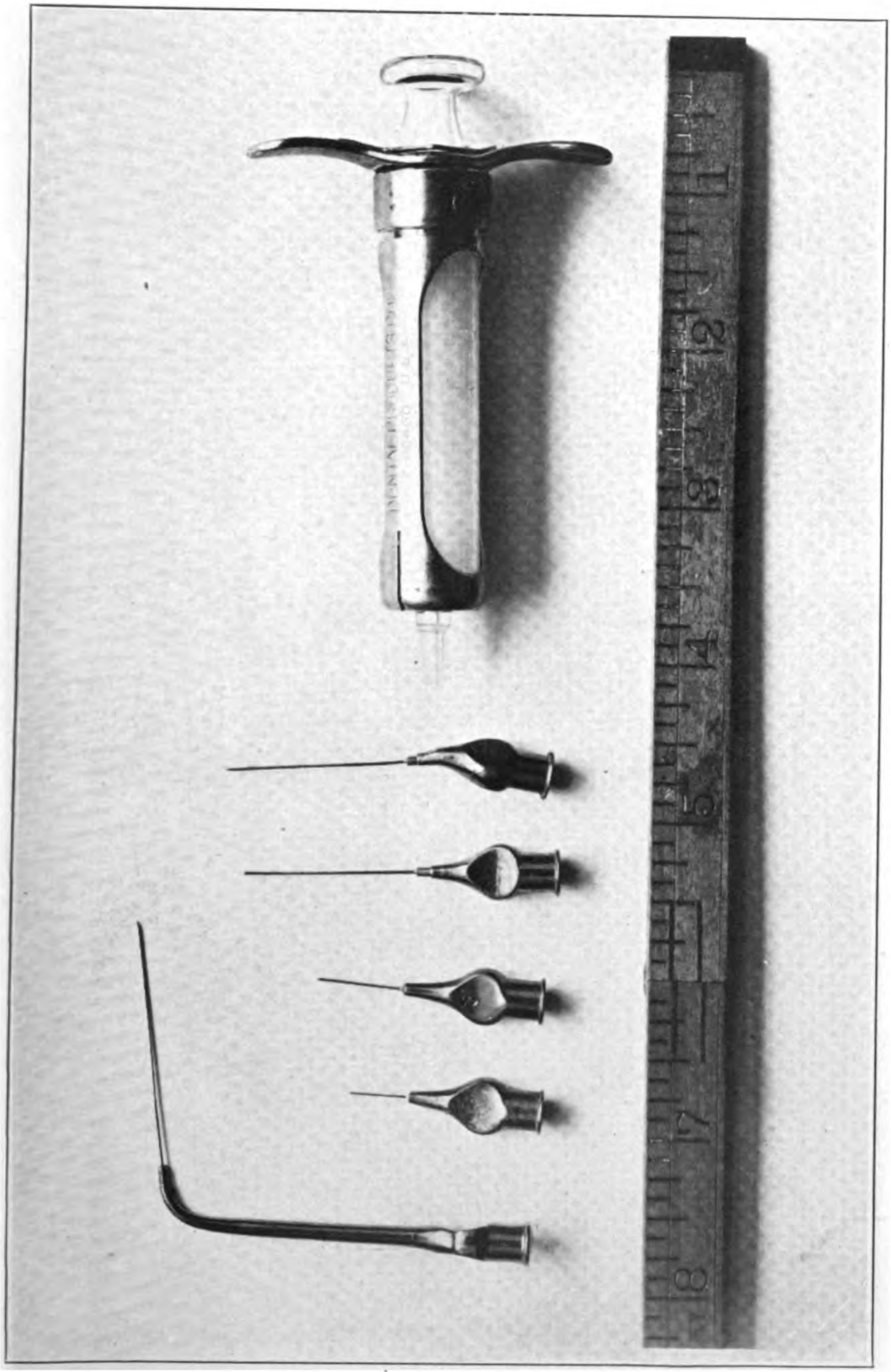
STERILIZATION OF GLASS SYRINGES.

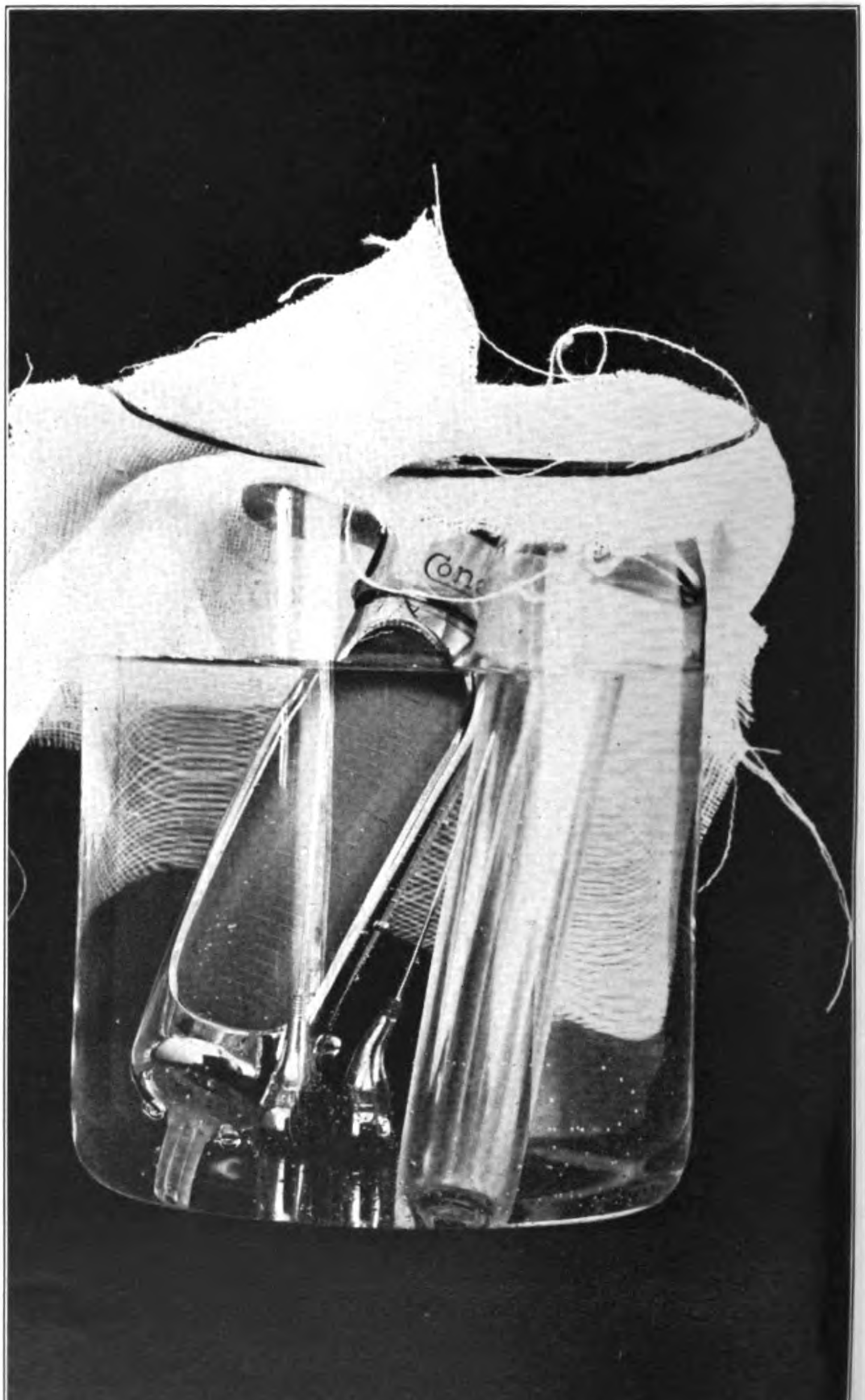
By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

A modification of the 5 cubic centimeter Luer all-glass syringe, designed by Dr. Arthur E. Smith for block anesthesia, would seem to be the syringe of election for oral anesthesia. This model, shown in the illustration, consists of a glass barrel, glass plunger, and a metal



All glass syringe with metal holder and some friction hub needles.

810–1



Napkins raised to show syringe parts in beaker.

casing which binds the barrel only as the thumbpiece is screwed well down on the casing. A few reverse turns of the thumbpiece allows the barrel to become free in the casing, thus taking care of the difference in expansion of the two materials upon temperature changes. Two clip springs on the thumbpiece clasp the plunger; the tension of these can be adjusted by bending slightly, and they serve to prevent the plunger slipping in or out from its own weight. An all-glass syringe offers several desirable features, among these being the perfect adaptation of plunger, visibility of the barrel contents, and absence of washers. The syringe in question is larger in diameter than those in common use; this permits of a shorter plunger, which consequently presents less difficulty in the placing of the thumb on the piston after the needle has been inserted.

The question of sterilizing syringes composed wholly or partly of glass is always with us. To those who depend for sterilization upon immersion in the various antiseptic liquids the idea herein presented may not appeal, but to those who demand sterilization by boiling, the following method is offered as a suggestion which will, no doubt, be found capable of improvement. The operator without a trained assistant is handicapped in many ways in his efforts to sterilize implements, and the writer has endeavored in all branches of dental work to develop a technique which will effect results without depending upon an assistant and with a minimum expenditure of effort and time. It has been found expedient to keep the water in the sterilizer always at the boiling point; but the placing of a glass syringe into such a medium is an unsafe procedure, aside from the fact that the boiling water is usually a solution of sodium carbonate or sodium borate, traces of which if permitted to remain in the syringe will decompose the suprarenin of the procain solution. The glass plunger of the syringe is ground to fit the barrel so accurately that an appreciable elevation of temperature is not permissible while the plunger is engaged in the barrel. This precludes washing the remains of an alkaline boiling solution from the syringe with boiling distilled water, as is advocated when an all-metal syringe is used.

The following method was devised to overcome these difficulties:

The special apparatus needed is a thin glass laboratory beaker about 3½ inches in height and a rubber band. The plunger is removed from the syringe and placed in the beaker, as is also the barrel after the metal casing has been loosened sufficiently by turning the thumbpiece to allow free motion of the barrel within it. The needles to be used are next placed in the beaker, which is then filled to within a half inch of the top with distilled or preferably sterile distilled water. Two dental napkins are placed across the top of the beaker and secured over the edge with the rubber band. The beaker is then placed in the boiling water in the sterilizer, the lid closed, and the water permitted to boil for 30 minutes. The gradual increase in the temperature of the water within the beaker prevents subjecting the glass portions of the syringe to a sudden temperature change and at the same time permits of the immediate utilization of the heat of the boiling water in the sterilizer. After the syringe is sterilized, the beaker is lifted intact from the sterilizer, the hot water is poured off through the undisturbed napkins, and the syringe is placed on a towel to cool. It is advisable to prepare the procain solution and let it cool to body temperature before removing the napkins from the top of the beaker. In assembling the syringe, care is used to avoid contaminating any portion with the fingers—except the thumb end of the plunger and the metal casing on the barrel. The only substance which comes in contact with the piston and the inside of the barrel is sterile water, rendering the syringe ready for immediate use when body temperature is reached.

The procedure as outlined above may be adopted as the routine preparation of the syringe each morning, leaving the napkins intact until it is needed, or the sterilization can be effected during the operation preceding the appointment for block anesthesia.

Nickel plating upon repeated exposures to water often becomes unsightly through rust stains from cracks in the plating. To avoid this possibility monel metal could be used as material for the casing or it might be gold plated.

When the syringe is purchased the etchings on the barrel which indicate the volume content are filled with a red material. This, however, boils out, leaving the markings difficult to see, particularly while injecting.

A suggestion might be offered to the manufacturers that for the convenience of the operator a graduation of the plunger be also employed.

No numbers or filling material is needed, such marking as four fine lines, each completely encircling the plunger, would give the barrel content in 1¼ cubic-centimeter graduations, no line being necessary to indicate the position when the syringe is filled to its capacity of 5 cubic centimeters.

EDITORIAL.

THE PLACE OF SPECIALISM IN THE NAVY.

Although a restrictive specialism has existed, we know, throughout historical medicine, it was not until the comparatively recent advent of modern scientific medicine that specialization acquired a rational basis and began to elaborate extensively. The same forces that led to its rise are still at work, producing more and more extreme differentiation, and bringing about radical changes in the organization of the profession and in the distinctive and fundamentally important relationship previously existing between physician and patient.

These forces in their operation have already effected so marked departure from former practice that many observers have felt impelled to inquire into their working, weighing critically their results as now apparent, and seeking to apprehend their natural trend in order to forecast what they may be expected to yield in the future. The prophecies emanating from their surveys, quite as diverse as might be anticipated, can be set aside as of less immediate concern than their analyses of the past and the present, which, moreover, have the merit of being mutually supported by general agreement. It appears that few to-day are disposed to deny that the growth of specialism was at once an unavoidable corollary of the expansion of medicine and the means whereby further progress was enormously accelerated, and it is certain that the stage of specialism has marked an extraordinarily fruitful period in medicine, the end of which is not yet in sight; so that most criticism is directed not to the fact of specialism but to certain of its features that were not generally foreseen but which were in fact inevitable and have now become manifest to all.

These alleged faults are, in their nature, it is agreed, not peculiar to medicine, but obtain wherever in social or economic life the process of specialization has been carried to a high degree, and they may justly be regarded as but ephemeral imperfections, incidental to evolution, that will be eliminated in due time. But there are those who, while admitting the probable truth engendering this comfortable view, are nevertheless not content to await the slow natural outgrowing of these imperfections and are active in pointing out the measures medicine should take forthwith if it is to escape the charge of willfully failing to make the best use of its talents.

The evils too often attendant on specialization are universally recognized. To have intensive knowledge of one thing may be well, but it can not compensate for extensive ignorance of most other things. When there prevails narrow specialism such as I have suggested, the power to act together for the attainment of a common end is lost. When each man is an authority only in his little corner, and is ignorant of all but a small part of the marvelously complex being he serves, intelligent service degenerates into purposeless tinkering and progress ceases by dispersion of its forces. Then the structure of higher knowledge is broken into fragments. And as long as a heap of stones does not suffice to make a temple, so long will an assemblage of specialists fail to constitute a diagnostic unit. The facts of specialists, even as the stones, need a mind to marshal them into ordered unity and thereby give them significance.

It may be that medicine will eventually arrive at a deeper understanding of disease that will enable it to extract from the present multiplicity of entities a conception so fundamental, and hence so simple, that an individual may be capable of preventing, diagnosing, and curing all departures from a state of health. Unfortunately, such consummation must be very distant, the movement toward ever-increasing differentiation apparently being still in full swing; and in the meantime we must necessarily seek, as a means of arresting the prevailing separative tendencies, an expedient that may be temporary but yet is practicable and promises to be effective.

Such an expedient is the generally recommended adoption of a coordinating agency for effectively integrating the otherwise imperfectly related results of the work of the several specialists. Thus, paradoxically, the remedy commonly proposed for the evils resulting from specialism is the creation of yet another specialty, a super-specialty, that of the integrator or coordinator, who is a man of large vision with the "ability to gather together the various tangled threads of forces, conditions, and affairs which make up the elements of any potential human accomplishment, and to weave them into a perfect fabric."

The expedient quoted as promising to furnish a corrective for the admitting failings of unrestricted specialism, simple though it appears, is not easily put into operation, since its maintenance postulates a supply of men possessing rare attainments and endowed with unusual qualities of mind. Few men so gifted arise spontaneously, and hence, if men measuring up to the standard set are to be made generally available, it would seem necessary to take steps to augment the sparse natural crop by thoughtfully planned methods of cultivation, perhaps also introducing such changes in the organization of the profession as will favor the development and persistence of the type.

The Medical Corps of the Navy has, of course, not escaped the perplexities experienced by its parent profession in the era of specialism, the same problems having successively arisen there as in civil life, and been met in much the same way. Thus, the limitations imposed on an individual by pursuit of one subject were overcome in a measure by complementary association, balanced groups having been organized for duty at naval hospitals as early as 1905; and the necessity of correcting the disjunctive functioning of these groups has been recognized more recently by the appointment of matured chiefs of service, whose duties approximate those of the coordinator already mentioned.

But such changes, however much they may have contributed toward betterment of conditions, are in fact merely improvements in organization. They can never adequately compensate for deficiencies in the constituent personnel, nor release individuals from the canons of a profession. So for the benefit of younger officers, especially those who entered the service at the outbreak of war too soon after graduation to have acquired either general experience or special knowledge, it may be well to remind them of the bond of duty that rests on them in respect to their professional development, to acknowledge the equally binding responsibility of the bureau to encourage such development, and to outline briefly how the bureau proposes to discharge its accountability.

In formulating its educational plans, as being one step in fulfilling its part of the reciprocal obligation existing as between the department and the individual, the bureau has been guided by certain convictions concerning what constitutes the orderly progress of professional advancement in the Navy, and its real purpose.

It is held, first, that at graduation a young man is equipped with only the elements of a medical education, and that several years are needed for him to correlate these components into a useful fund of knowledge. These years are well spent, too, in becoming acquainted with that shifting group of mankind which we term "the patient"; in acquiring something of the art of medicine, without which the science is sterile, and in learning where his permanent interests may lie and where his talents may be most profitably employed. The period so occupied in securing groundwork is an indispensable stage. Indeed, it is axiomatic that the broader and deeper the foundation, the more lofty the structure that can be erected on it.

Secondly, it is held highly important that, once the foundation is laid, a specialty should be selected, not only because some degree of specialization is necessitated by the requirements of contemporary practice, but also because specialism supplies an essential step in the course of education, since complete mastery of one field of knowledge, however contracted that field may be, is probably the best means of inculcating standards of exact learning and habits of critical inquiry.

Thirdly, it is believed that the continuing process of education imposed on one who has been well grounded in general medicine and subsequently trained in the minutiæ of a single subject furnishes the best procedure for equipping him with the fund of fact, the breadth of view, and the faculty for synthesis that should characterize the coordinator. Since in medical schools the instruction is given almost entirely by specialists, and almost certainly from a specialist's point of view, it may be said that a professional education should proceed in cycles, two being required for its complete evolution, the first succession of specialism and general work designed to qualify an individual to practice medicine, the second to develop to the full his powers and usefulness.

Fourthly, closely as the practice of medicine in the service may parallel that in civil communities, so-called military necessities often compel wide departure from model. An instance in point is furnished by the limits set on specialism in the Navy. There it must always be an anomalous specialism in which the particular is not pursued to the exclusion of the general. Therefore, the bureau, desirous as it is of fostering the spirit of research and the precision of specialism, nevertheless will be governed in framing its educational program and in making assignments to duty by the principle that specialism with us can not be followed exclusively. The acquisition of a specialist's information in one field is altogether admirable, but it must always be superposed on a working knowledge of all the duties which a naval medical officer may be called on to perform. Specialization can not be allowed to unfit a medical officer for general duty or to exempt him from it.

Fifthly, the mission of the Medical Corps is "to contribute its special knowledge to the end that there may be no avoidable loss in personnel or diminution in its effectiveness." For the fulfillment of this mission preventive medicine is the major instrument, general curative medicine a minor tool, and the medical specialists but gleaners who save for the service a few units that without them would be lost.

Since the plans adopted are the outgrowth of the views just enumerated, in fact their concrete expression, a brief outline will suffice to make their main features clear. A more detailed description would be of little value, inasmuch as such plans in actual operation must always be subject to modifications dictated by current conditions in the spheres of personnel, finance, and departmental policy.

Rarely, and then only under special circumstances, will officers just graduated from the Naval Medical School be launched forthwith on a career of specialism. Instead, those officers who have been in the service for a period of several years will at the expiration of a cruise be given instruction in the subject which they have chosen, and subsequently will be ordered to duty where they may practice it as a specialty. Similarly, men who have served longer and who have had opportunity to manifest aptitude will be given instruction of a more advanced character; for example, a man who is known to be an able general surgeon may elect a course of study in the surgery of the brain. From among men who have been able to follow this progression will be drawn our chiefs of service, "professional executives," and coordinators.

The bureau, however, does not feel compelled to extend active aid to all officers equally, believing that it should grant unusual opportunities for development only to those who have expressly signified their intention to remain in the service and who have already been in the service sufficiently long to have demonstrated their initiative, ability, and industry. Conversely, medical officers need not fear that the display of these qualities will fail of reward, for nowhere as in a military service are ability and accomplishment so sure of gaining recognition. In making its selection of officers for training and appropriate duty afterwards the bureau will have as guides its knowledge of officers and such information as may be obtained from records, reports of fitness, and the (new) personnel sheet of the inspection report. Further, it will be of assistance if individuals desiring training will see that their applications are on file and if those possessing special experience will make that fact known to the bureau.

The specialties referred to in the preceding paragraphs are those intimately associated with the practice of medicine. Besides these, there are other subjects that are undeniably of greater importance in the naval service, such as aviation medicine, field service with marines, chemical warfare, public health, and industrial medicine, subjects that may carry a strong appeal to those who by temperament, inclination, or lack of opportunity fail to follow the lines of professional development laid down. Some of these subjects, in the present state of medicine, are commonly regarded as collateral specialties, or of minor importance, and for this reason many officers exhibit hesitation in identifying themselves with them, alleging that they do not pertain directly to the career of a naval surgeon and that their pursuit may in the long run prove unprofitable. The bureau dissents strongly from this view, regarding the attitude taken as not founded on a just estimate of relative values and as unfortunate in its effects on the mission of the Medical Corps.

The practical objection also is sometimes raised that a young man may follow some line of work with credit to himself for several years, but his promotion is made contingent on his successfully passing examinations in the conventional subjects, which are more or less foreign to his occupation. This apprehension need not exist, inasmuch as the bureau, without modifying its position that specialization can not be exclusive, is disposed to allow special knowledge and experience in one of these branches to compensate for deficiencies in other subjects of such extent as might reasonably be considered to be inseparable from absorption in the specialty.

The bureau notes with disapproval a tendency among younger officers, who are approaching what should be the most productive stages of their professional careers, to regard the administrative duties sometimes devolving on officers of the upper grades as constituting a specialty which is the goal of all service and for the successful practice of which preparation should be started early.

Although hospital administration exists as a recognized field, the conditions which have led to its development elsewhere do not obtain in the Navy and there is no need with us for the services of administrators highly trained in interpreting the health needs of heterogeneous communities, in the raising of money for endowments, in institutional planning, and in accounting, purveying, and other purely business activities. These several functions either have no place in the Navy, or are by law delegated to other agencies; and the naval medical officer can best prepare himself to undertake administrative duties in a naval hospital by making himself proficient in those studies that are most closely related to the purpose for which our hospitals exist, namely, the care of the sick.

In the foregoing discussion medical officers alone have been mentioned. The failure to include officers and members of other corps, so far from representing a designed omission, was accepted solely to avoid cumbersome and distracting repetitions of corps designations. The principles laid down and the plans announced are to be held applicable to all other corps in equal measure—to specialism in the Dental Corps and to the development of technicians in the Nurse Corps and the Hospital Corps. With the Medical Corps these others share responsibility: with it they deserve opportunity. (H. W. S.)

YELLOW FEVER.

In connection with an article on the elimination of yellow fever in St. Thomas, which appeared in the last issue of the BULLETIN, a review of the salient points in a paper on "Researches on Yellow Fever," by Hideyo Noguchi, which appeared in The Lancet of June 17, 1922, may not be without interest. Yellow fever, once the horror of settlers and travelers along the coasts of the Americas, remarks the writer, has been reduced to a rank of secondary importance among infectious diseases. Early observers had come to the conclusion that the disease was noncontagious, and about the middle of the nineteenth century Blauperthuy announced his suspicion that mosquitoes carried the virus from man to man. It was in 1881 that Finlay specifically accused the *Stegomyia calopus* of acting as intermediary host. Finlay's theory was corroborated by Reed, Carroll, Lazear, and Agramonte, who established the following fundamental facts: (1) That yellow fever is transmitted to nonimmune persons by means of the bite of infected stegomyias or by direct infection of the blood of yellow fever patients; (2) that the yellow fever virus is present in the blood during the first three day of the disease; (3) that fomites are not infectious; (4) that the virus is a filter passer; and (5) that the mosquitoes which have fed on yellow fever patients do not become infective in a tropical climate until after about 12 days.

This incubation period suggested that the virus of yellow fever might be of nonbacterial origin and eminent observers prophesied that it would be a spirochaeta. So it proved to be when, in 1918, a commission sent to Guayaquil, Ecuador, by the international health board of the Rockefeller Foundation brought the following facts to light:

(1) Injection of the blood of yellow-fever patients into young guinea pigs produced in 25 per cent of instances a symptom-complex of fever, jaundice, and nephritis, and hemorrhages into the gastrointestinal tract as well as into various other visceral organs. The course of the experimental infection was much the same as that of human yellow fever.

(2) In the blood and organs, particularly the liver and kidney, of the infected guinea pigs a minute, actively motile, ultramicroscopic organism, subsequently designated *Leptospira icteroides*, was demonstrated both in fresh and stained preparations. Pure cultures of the organism were obtained from the infected animals as well as from human cases. Direct microscopic detection of *Leptospira icteroides* in human blood and organ emulsions occurred only in a few instances, and even in the materials from experimental animals microscopic demonstration was inconstantly successful, notwithstanding subsequent proof of the infectiousness of the material. *Leptospira icteroides* was found to be a filter passer, and a single infection with the organism proved to confer lasting immunity, as does yellow fever in human beings.

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(3) The immune substance was found to be present in varying degress in the blood of individuals convalescent from yellow fever, as demonstrated in the blood of animals which had recovered from the experimental infection.

(4) Female stegomyia mosquitoes were found to become infectious about 12 days (in one instance as early as 8 days), after having fed upon the blood of yellow fever patients or experimentally infected guinea pigs. *Leptospira icteroides* was demonstrated under the dark-field microscope in the emulsions of the infective insects, and the injection of these materials into guinea pigs produced a typical infection.

(5) The pulse rate in the experimental animals became relatively slow after the first few days, the well-known Faget's sign of human yellow fever being thus reproduced.

During the three following years numerous transmission experiments were successfully carried out in various endemic areas and the question naturally arises why previous investigators had failed in an undertaking seemingly so simple. Noguchi attributes the failure largely to the fact that guinea pigs are not uniformly susceptible, especially if old or reared in tropical countries. Guinea pigs, puppies, and marmosets are susceptible, but they can be infected only with difficulty under the most favorable conditions. Furthermore, he maintains that very little systematic effort on a large scale to transmit the disease to animals was ever carried out.

There is a close relation between yellow fever and infectious jaundice, in that they are produced by two distinct but closely related species of the genus Leptospira. The morphological features of *Leptospira icteroides* are almost indistinguishable from those of *Leptospira icterohaemorrhagica*, yet the organisms are by no means identical, as has been shown by their immunological as well as pathological properties.

The differences in the effects of these two organisms are chiefly of degree. The *icteroides* is predominantly icteronephritic, with a great tendency to produce fatty degeneration of the parenchymatous cells of the liver and kidney, and according to Noguchi the existence of complete agreement in the degree and distribution of fatty degeneration of the liver and kidney in human yellow fever and in experimental animals affords additional evidence that *Leptospira interoides* is the cause of yellow fever. The hemorrhage in the mucous membranes is more marked in experimental *icteroides* than in the experimental infections of jaundice. Yellow fever is in general more rapid in evolution and higher in mortality than infectious jaundice. While a typical case of yellow fever is not readily confused with typical infectious jaundice, yet there are border-line cases in which careful epidemiological considerations alone may decide the diagnosis. A severe case of infectious jaundice with "black vomit," jaundice, nephritis, nervous symptoms, and relative brachycardia can not be clinically differentiated from yellow fever of similar severity. Mild cases of the two diseases are especially apt to be confused. Careful comparison of the leucocytic formulæ in the two diseases shows that slight leucocytosis is usual in infectious jaundice while in yellow fever the leucocytes are but little increased, while the differential counts in the two diseases are similar.

Assuming that the *Leptospira icteroides* is the cause of yellow fever, an attempt was made by Noguchi to determine whether the cultures of this organism could be utilized for the purpose of protecting nonimmune human beings by prophylactic inoculation or for the production of sufficiently potent immune serum for the treatment of yellow fever patients. Preliminary experiments in animals showed that one or two subcutaneous inoculations of killed cultures of the organism render guinea pigs immune for a period of about six months. Highly potent immune sera were developed in horses by immunizing them with the live cultures for periods of months or years. The titer of the serum reached a point at which 1 cubic centimeter neutralized about 5,000,000 minimum lethal doses of *Leptospira icteroides*, and it was found that guinea pigs experimentally infected with several hundred lethal doses can be saved from death when a sufficiently large quantity of the serum is administered within three or four days after the onset of the symptoms. When administered during the incubation period the serum altogether prevents the development of any infection.

During the years 1920 and 1921 over 10,000 nonimmune individuals residing in infected areas in Central America were vaccinated, with the result that none who received two injections of 2 cubic centimeters of the vaccine contracted yellow fever. In comparison with the number of cases which developed among the nonvaccinated population during the same periods and in corresponding localities, this result offers good evidence of the value of the vaccine.

It has been noted that vaccinated individuals are perhaps as susceptible as the unvaccinated during the first 10 or 15 days following the last injection. The protection becomes effective only after the lapse of that period which is undoubtedly required for the development of immunity in the body of the vaccinated individual.

With regard to the effect of the anti-icteroides immune serum upon human cases of yellow fever, observations on 187 cases treated at varying stages of the disease reveal results which are very encouraging if treatment is instituted before or on the third day of the disease.

For the complete eradication of yellow fever the antistegomyia campaign is the ultimate measure to be relied upon, and this disease is no longer an actual menace to those countries where modern sanitary organization makes it impossible for *Stegomyia calopus* to thrive in large numbers and where every precaution is taken to prevent the introduction of infection. There still exists many localities where climatic and economic conditions are not favorable to carrying out an antistegomyia campaign. In such places prophylactic vaccination seems to be of practical value. (W. M. K.)

DIAGNOSIS OF LESIONS WITHIN THE PERITONEUM FROM THOSE OF THE URINARY TRACT.

Certain primary symptoms are common to most of the acute intra-abdominal disorders. Intense pain, varying degrees of collapse, and vomiting or nausea are present in such very different conditions as appendicitis, renal and gallstone colic, torsion of a movable kidney, general peritonitis, intestinal obstruction, and acute thoracic infections. The confusion of symptoms and the difficulty of exact diagnosis is not of such grave importance when the decision lies between two intraperitoneal lesions as it is when it lies between an intraperitoneal condition and a disorder of the urinary tract. In the first case an incision near the midline of the abdomen allows accurate diagnosis and operative correction of the condition, whatever it may be. In the latter case the avenues of approach are very different and the symptoms that might make operation imperative if the lesion were within the peritoneum might not require surgical interference if it were in the urinary tract.

There is plenty of evidence that an incorrect diagnosis is frequently made. Caulk reports that in making an analytical study of 200 cases of renal infections it was found that the patients had appeared with a positive diagnosis in only 9 per cent of the cases, although practically 100 per cent gave definite evidence of urinary disease on urinalysis. In a series of renal and ureteral calculi 27 per cent had had appendectomy for the pain, without relief. Green, writing on stricture of the ureter as an explanation of some obscure abdominal conditions, states that such patients generally present themselves with a history of abdominal pain referred to the back, the sacroiliac joint, or the epigastric or gall-bladder areas and have usually been operated on at least once, without relief. In a series of 50 cases 34 had been operated on, and of these 7 operations were classed as necessary and 27 were unnecessary and done as a result of incorrect diagnosis. Sanes reports 3 cases, each of which had been subjected to several operations for relief of pain which was found to be due to stricture of the ureter. The appendix is the organ most commonly involved in such diagnostic errors.

An acute right-sided pain from an impaction of a calculus at the middle ureteral constriction may be interpreted as an appendiceal pain, the ureter being situated immediately to the inner side of the appendix and, in some cases, crossed by it. A ureteral inflammation resulting from extension of an appendiceal inflammation may be entirely overlooked and the symptoms of the ureteritis may be ascribed to postoperative adhesions. The pain of ureteral stricture may be referred to the back; to the sacroiliac joint; to the epigastric and gall-bladder areas. This accounts for the condition so frequently being confused with appendicitis, gastric disorders, pelvic conditions, sacroiliac joint conditions, and gallstones. Buerger mentions seven cases of impacted ureteral calculus in which the symptoms were those of intestinal obstruction. In one case laparatomy was performed, nothing was found wrong, and the patient died of uremia, due to suppression of urine, a calculus blocking the left ureter. The classical pain of gall bladder, appendix, and kidney are familiar to all, but they do not always observe the hard and fast lines which have been assigned to them. There frequently occurs the association of renal with intraperitoneal lesions. The presence of both gallstones and renal infections is quite common. Another symptom which may lead to an erroneous diagnosis and faulty surgery is bladder irritability. An appendix may produce bladder symptoms.

Caulk believes that the mistaken diagnoses, particularly between intraperitoneal and extraperitoneal lesions, are usually those of insufficient investigation. He takes the rather extreme stand that all patients having abdominal pain should be radiographed and most of them should be cystoscoped. Sanes states that good clinical histories, physical examination of the urinary tract and organs adjacent to the ureter, careful urinalysis, cystoscopy, and urography will lead, in the majority of cases, to a correct diagnosis.

The fever in an acute kidney lesion is much higher than in intraperitoneal lesions; 104 to 106 is common. Chills are much more common at the advent of the fever. With such an elevation of temperature the pulse runs much lower, as a rule, than in intraperitoneal lesions. The leukocyte count, which is quite fluctuant in intraperitoneal lesions, is quite stable in acute kidney disease and is seldom over 15,000 to 18,000, even in the presence of high fever, unless there be perinephritis, in which case it runs extremely high. Nausea and vomiting are far less common in acute kidneys with fever and pain than in intraperitoneal lesions. By far the most important clinical feature is the location of the muscular spasm. This is almost invariably present over the seat of the inflammatory reaction and when present is a most valuable guide, more substantial than pain or tenderness, which are frequently deceptive. A most important aid is to be secured by urinalysis. This alone will often solve the problem. There still exists an idea that a few leukocytes in the urine are normal and that there is a distinction between leukocytes and pus cells. Caulk states that, as far as modern urological ideas are concerned, both of these conceptions are entirely erroneous. The presence of red blood cells in the urine should always make one suspicious of urinary tract lesions, as they seldom occur in anything else that would cause confusion with intraperitoneal lesions.[1] (L. W. J.)

ARE HERNIÆ EVER ACQUIRED?

At present the attitude of industry toward herniæ is best described as being chaotic. The attitude of the Government is that it is easier and cheaper to repair the hernia at Government expense than to fight the matter in the courts and at the polls.

Russell, of Australia (Brit. Journ. Surg., Vol. IX, No. 36, April, 1922, p. 502), contends that all varieties of oblique inguinal hernia are determined by developmental variations in the anatomy of the scrotal peritoneum (processus vaginalis). About, or soon after, the time of birth, the funicular portion of the processus vaginalis normally closes and disappears throughout its entire length. When this closure is perfect the individual is safe from the occurence of oblique inguinal hernia of any kind. In oblique inguinal hernia the failure of the funicular peritoneum to close must be regarded as evidence of developmental deficiency. If we study the phenomena presented by developmental defects elsewhere we find always that the arresting influence involves not merely an individual structure but a region, and that all the structures of the region are liable to be implicated in varying degrees. Thus the muscles of the inguinal region are liable to participate in the same arresting influence that determines nonclosure of the funicular peritoneum. So we may have an open funicular peritoneum with perfect muscles; we may have congenitally weak muscles with a perfectly closed funicular peritoneum; and we may have them separately or together in infinitely variable gradations. And as the hernia resulting from the open funicular process will be an oblique hernia, so the hernia resulting from muscular weakness will be a direct hernia.

A report of the special committee of the medical section of the American Railway Association (Ann. Surg., Vol. LXXV, No. 4, April, 1922, p. 467) contains many points of interest on this subject. It is stated that the very large group of cases which are ordinarily designated as traumatic herniæ and which should more properly be called occupational herniæ, or, better still, herniæ of effort, furnishes the basis of nearly all the medico-legal or compensation cases of hernia. At present it is almost universally conceded that the all-important cause of hernia is the presence of a preformed sac of peritoneum, the processus vaginalis.

[1] Caulk, J. R.: Southern Med. Jour., Vol. XV, No. 1, January, 1922. Green, T. M.: Surg., Gyn. and Obstet., Vol. XXXIV, March, 1922. Sanes, K. I.: Journ. Amer. Med. Assoc., Vol. 78, No. 7, Feb. 18, 1922, p. 475. Buerger, L.: N. Y. Med. Journ., Vol. CXV, No. 9, May 3, 1922. Fort, F. T.: Kentucky Med. Journ., Vol. XX, No. 5, May, 1922.

Mock (Industrial Medicine and Surgery, Saunders) states that the great majority of herniæ develop slowly, the gradual dilatation of a preformed sac. Moschcowitz (Med. Sci., April 3, 1915) believes that traumatic hernia is exceedingly rare and may occur in any part of the abdomen but usually not at the site of the normal hernia openings.

The California Industrial Commission has ruled that "The consensus of medical and surgical opinion runs to the effect that hernia is very rarely, in any proper sense, the result of an accidental injury; that the accident is at best no more than the occasion, instead of the cause, of the malady; that the origin of the difficulty is congenital and more in the nature of a disease than an injury; that every claim for compensation based upon an alleged rupture is to be viewed with suspicion.

"Hernia is practically always due, first, to the presence of a preformed sac of peritoneum; and, second, to the presence of structural weakness in the neighborhood of the hernial orifices due to poorly-developed muscles or fasciæ. The actual hernia may develop by reason of a great variety of exciting causes, such as straining at stool, coughing, sneezing, or lifting. In many cases a person who claims that his hernia is due to an accident or injury may sincerely believe this to be the fact, because he was unaware of the presence of a swelling prior to the accident, although it had really existed for months or years before. Frequently the contrary is true and large damages are claimed for a hernia which has existed for a long time and for which a truss has been worn."

The main point emphasized by the committee mentioned above is that hernia is never the result of a single strain or single increase in intra-abdominal pressure. It is the cumulative effect of a great number of strains spread over a considerable period of time.

(L. W. J.)

HOOKWORM DISEASE IN BRAZIL.

In contrast to the work carried on by Cort and his coworkers, who laid particular emphasis on the biological aspect of the hookworm disease problem in the West Indies, Darling and Smillie, working in Brazil, have approached it from a different standpoint, namely, from that of diagnosis and treatment. Two reports, monographs of the Rockefeller Institute for Medical Research, have been published with regard to the work done in Brazil—one in 1921, by Darling and Smillie, and the other in May, 1922, by Smillie.

These workers have contributed some valuable additions to our knowledge of various features of this very important disease. Technique of diagnosis and method of treatment are probably two of the most important clinical features with which a director of a hookworm campaign is concerned, and these have indeed been studied in great detail by Darling and Smillie.

The rural Brazilian is apparently a simple sort of a person. He lives in a primitive house and is by nature or necessity a vegetarian, although when occasion offers he eats meat. Two cotton garments are enough to clothe him, and if not aged or well to do he does not wear shoes. His child begins to work in the field soon after he or she is 8 years old. The use of latrines is more or less unknown, defecation being performed in the field wherever the laborer is working. No wonder hookworm disease is so common.

Darling and Smillie showed that there was a much wider variation in infection rate between different stations of life in the same location than there was of individuals of the same station of life in different locations. For example, plantation owners and their families have about the same infection rate, regardless of the community; administrators of plantations, storekeepers, bookkeepers, and their families have more hookworms than the wealthy owners and fewer than the overseers, and so on down the scale, the individuals who are closest to the soil having the heaviest infection.

This feature was further investigated by Smillie, and his work emphasizes the fact that hookworm disease is primarily a disease of the soil, infection taking place through contact of the skin with moist infected earth, and that the possible infection through food and water is entirely unimportant. Smillie also shows that it is perfectly possible to live in a heavily infected community and yet remain free from the serious effects of the disease. "In general, we may state that the degree of hookworm infection of an individual in Brazil varies directly with the number of hours that he spends barefoot in the fields."

The distribution of hookworm disease in relation to age and sex also follows this general rule. Children under 4 years have almost no infection and should never be treated, at least in Brazil. Children between 5 and 8 years have very few hookworms and should be treated only exceptionally. About the age of 9, however, the boys begin field work, the girls a year or so later, and from then on the infection rapidly becomes massive and should receive proper attention.

Smillie shows in a very convincing manner how the infection in the case of men grows, quite rapidly, more and more severe up to the age of 25 and is then followed by a gradual, slow, but steady increase through the active period of the laborer's existence. Then, between the fortieth and forty-fifth years, an abrupt fall in the infection rate is noted, due to the fact that the physical condition of the man is such that he is unable to perform the duties of a full-time field worker and often is compelled to quit all work in the field.

The infection rate of the girls grows parallel to that of the boys up to the age of 19, when the women begin to lose their infection. The reason for this diminution is that at this age the women, as a rule, marry and assume household duties and, as a consequence, come to a less extent in contact with the infected soil.

Smillie has shown how dependent the infection is on continuous contact of the skin with infected humid earth and has further demonstrated this fact by examination of people who habitually wore some kind of footwear but otherwise were exposed in the same manner as the other members of the group. The infection of the former was only one-tenth of that of the latter. Hence any factor, however crude and simple, that prevents the bare skin from coming in contact with infected soil is of definite value in preventing infection with hookworms.

From his study of the hemoglobin index in relation to the number of hookworms harbored, Smillie concludes that hookworm infection up to 25 hookworms, more or less, can not be considered as hookworm disease, for such an infection does not disturb bodily functions seriously enough to lower the hemoglobin even a fraction of 1 point. An average infection of 75 hookworms, however, is heavy enough to disturb the balance; in the average individual it causes a distinct lowering of the hemoglobin. Infections higher than 75 hookworms affect children and the aged very severely, especially children under 10 years, while growing adults between 15 and 39 years of age are extremely resistant even to higher infections of 500 or more hookworms.

With regard to the influence of nutrition on hookworm disease, the investigations of Smillie tend to prove, what seems an obvious fact, that as ample food builds up resistance against the ravages of hookworm disease, starvation markedly increases the effects produced by the worms upon the body.

The investigations carried on (in 1919) by Darling and Smillie with regard to the value of the routine microscopic examination of stools in field treatment were continued by Smillie. The limitations of the microscope are brought out when it is realized that an accurate diagnosis of a case harboring 10 hookworms or fewer is mostly a matter of chance. The important thing from the standpoint of the individual is, however, that the case with many worms be accurately diagnosed. As seen from the findings noted above, it is the field workers between 8 and 50 years of age who are most heavily infected. Smillie believes that reexamination of the stools of this type of laborer will reduce the microscopic error to a very large degree and thus prove that the microscope is a very valuable aid in the campaign treatment of hookworm disease.

In discussing the value of oil of chenopodium treatment, Darling and Smillie state: "Under usual conditions in Brazil, that is to say, with an average hemoglobin index of 60 per cent or more and an average infection of 50 to 200 hookworms per case, the routine field treatment of 1½ cubic centimeters of oil of chenopodium in divided doses, given twice at 10-day intervals by a nurse, is an entirely satisfactory field method. In very heavily infected districts, when the average worm count is 200 or more or where the hemoglobin of a nonmalarial individual is below 60, we believe that two routine treatments of 1½ cubic centimeters are not always sufficient to remove the hookworms, and a third is advisable. In lightly infected communities even two treatments are not necessary."

The divided doses of the oil of chenopodium should be given at 6 and 8 a. m., respectively, followed by a saline purge at 10 a. m. No preliminary purge is necessary. No food should be eaten from 8 p. m. of the day before treatment until the treatment is completed and the bowels have acted well.

In the general discussions of the findings obtained in this investigation, Smillie emphasizes the fact that hookworm disease is an occupational disease and should be treated as such, care being taken to distinguish between incidental infection and disease. This knowledge is of great importance in a campaign in order not to waste money, time, and effort in treatment of casual infections. The common methods which are familiar to health officers in combating any industrial disease should be used; namely: General methods to prevent dissemination of infecting material; special methods to protect the worker while at work (use of shoes, latrines in the field); and treatment to eliminate the infective agent in those workers who have the disease.

Carbon tetrachloride, recently discovered by Hall to be an efficient agent in treating hookworm disease, is receiving marked attention at the present time the world over. Smillie and Pessoa in Brazil have treated 34 cases under field conditions; 98 per cent of the hookworms were removed and there were no apparent signs of discomfort following the treatment. Other workers in Ceylon, Fiji, Dutch Guiana, and the Philippines are also reporting very favorably indeed on the efficiency of this remedy. A prisoner in Ceylon condemned to hang received 10 cubic centimeters of carbon tetrachloride. Subsequent autopsy showed complete cure of the disease and no evidence of toxic effects from the drug.

The average dose of this remedy is 3 cubic centimeters, administered in hard gelatin capsules. (E. P.)

ON VACCINATION AGAINST ASIATIC CHOLERA.

Vaccination against cholera has been practiced for a long time, but it was not until recently that the procedure has been accepted unconditionally as a measure of great value in the prophylaxis of this disease.

Since Ferran, in 1885, conceived the idea of vaccinating people against cholera and nearly up to the present time, the epidemiologists have never lost hope in the efficiency of cholera vaccination in spite of the unfavorable reports from the laboratory. Facts and figures have accumulated which can not but convince even the most pronounced skeptic of the value of anticholera vaccination.

In a recent number of the Bulletin de L'Institut Pasteur, Besredka gives a very interesting account of the development of this prophylactic measure. Ferran and later Haffkine both used living cultures. Due to the influence of Pfeiffer and his school, heat-killed cultures were to a very large extent substituted for the living ones. Pfeiffer showed how the serum of vaccinated people had a bactericidal property which he advanced as the basis for the subsequent immunity.

Metchnikoff and his pupils believed, however, that this bactericidal property was not a true criterion of the immunity present but that the phogocytes determined the fate of an infected animal. Mechnikoff proved his contention in a manner that apparently would withstand any scrutiny. Newly born rabbits are the only laboratory animals that can be infected with cholera by mouth. Subcutaneous inoculation of vaccine does not protect these animals against the effects of the virus introduced *per os*. By analogy Metchnikoff concluded that anticholera vaccination in man by the subcutaneous route protects the individual against extraparietal infection (as shown in the guinea pig) but not against infection through the bucco-intestinal route (as shown in the newly born rabbit), the only form of infection to which man is exposed. According to Metchnikoff, the criterion of the value of a vaccine should not be the acquired bactericidal property of the serum, but the power to withstand actual infection. His rabbit experiments proved to the scientific world that cholera vaccination did not accomplish this.

The field workers, however, did not accept this statement as the final word. If one attack of cholera gives a comparatively marked immunity against the disease, which experience has taught them, they argued that cholera should belong to that class of diseases against which we should be able to immunize by means of vaccination. The epidemiologists also proved their point by practical application of this theory. Besredka and his coworkers have now shown that the apparent antinomy which for a long time existed between the clinical and laboratory points of view can be very well explained. These investigations prove that Metchnikoff's criterion of the value of a vaccine, namely, that it should protect against the actual disease as encountered in man, in this case, intestinal cholera, is a sound one.

Masaki has shown that a guinea pig injected subcutaneously with living vibrios will die from intestinal cholera and that the distribution of the organisms in the body of the guinea pig corresponds to that in the body of young rabbits infected by the oral route.

Sanarelli had found this to be true when vibrios were injected into the peritoneal cavity of guinea pigs. Cantacuzène states in this regard as follows (from Trop. Dis. Bull.):

"By whatever point the cholera vibrio enters the body it makes for the intestines and always finally reaches the walls of the small gut (as in nearly all initial infections of human beings). There it pullulates. * * * One is struck at autopsies of acute cholera cases by the fact that vibrios are often rare in the contents of the small intestines. Investigate the mucous membrane deprived of its epithelium: there they pullulate and at the same time undergo a vibriolysis, the more intense as the toxic phenomena are more acute. It seems that the mucous membrane contains some substance which acts upon the cholera vibrio in such fashion that it increases both virulence and its power to produce toxin."

This would indicate that the conflict between the cholera toxin and the body cells is more or less confined to the small intestines.

The results obtained during the last few years from cholera vaccination are striking indeed. Cantacuzène, describing the "Rumanian experience" (1916) during the World War, brings out some very interesting observations.

One regiment, comprising 4,500 men, was severely hit by the epidemic. In the course of 6 days 386 cases of cholera developed, of which 166 died. Vaccination was then commenced. In the interval between the first and second injection new cases still appeared. No changes were instituted from a sanitary standpoint. Two days after the second injection had been given the epidemic suddenly stopped. No new cases followed.

In another regiment 280 cases, with 120 deaths, occurred during the first few days of the epidemic. The first injection had no influence on the epidemic. After the sixth day the epidemic suddenly stopped; no new cases developed except a captain, who alone had refused to be vaccinated.

In one barrack with 180 men vaccination was performed as a preventive measure. Only 4 men escaped. Some time later three cases of cholera occurred in the barrack; they were 3 of the 4 men who had not been vaccinated. All the others escaped the disease.

In another regiment the commanding officer refused to have his men vaccinated. A group of Jewish soldiers, 200 in number, insisted on being vaccinated, which was done. Later the regiment was stricken by cholera and 450 cases developed. None of the vaccinated Jewish soldiers contracted the disease.

At the Italian front the menace of cholera was made negligible by vaccination and proper hygienic measures.

In the Polish armies cholera vaccination was found to be one of the best measures to prevent the spread of the disease.

It is to be noted that in these various European countries heat-killed cultures were used. Two injections were given and repeated every four to six months.

Besredka is a strong believer in the use of sensitized living vibrios. He considers the opinion formerly held that untoward accidents and generalized infection might occur are no longer justified. Masaki, working under Besredka, has according to their opinion proved that the sensitized living vibrio is perfectly innocuous.

Masaki found that if guinea pigs were killed by intraperitoneal injection of one-fiftieth of the ordinary culture or by subcutaneous injection of one-thirtieth of such culture, animals of the same weight would withstand the injection of an entire or even two cultures of the sensitized vibrios without fatal results. Masaki also found that when death resulted from the intraperitoneal injection of massive doses of the sensitized vibrios the mechanism of the death was entirely different from that which was observed in case of nonsensitized vibrios. The infection did not become generalized; no vibrios were found in the intestines. The sensitized vibrios did not break through the zone of inoculation, and when they caused death it was due to peritonitis or to the direct action of the toxin. (E. P.)

IN MEMORIAM.

JAMES SPOTTISWOODE TAYLOR—1870–1922.

The Medical Corps of the United States Navy suffered a distinct loss in the death of Commander James Spottiswoode Taylor, which occurred at the naval hospital in Philadelphia on August 27, 1922.

Doctor Taylor was born at the University of Virginia, December 10, 1870. His childhood was spent in Rome, Italy, where for many years his father, the Rev. George Boardman Taylor, was the superintendent of the work of the Southern Baptist convention in Italy. He inherited from his father an aptitude for languages and spoke Italian and French fluently. He possessed an excellent working knowledge of German, Spanish, Latin, and Greek. He received his medical education at the University of Virginia, where his father was the chaplain for a number of years. He was a highly accomplished medical officer, possessed of rare charm of manner, and, like most Virginians, was fond of horses, being an expert equestrian.

Shortly after the outbreak of the Spanish-American War, Doctor Taylor entered the Navy as an acting assistant surgeon. He was appointed an assistant surgeon on November 7, 1899, while attached to the U. S. S. *Independence* at Mare Island, Calif. A few months later he was ordered to the Asiatic Station, where he served successively on the *Scindia*, the *Petrel*, and the *Manila* until June, 1901. In July of that year he was ordered to duty at the United States Naval Hospital, Yokohama, Japan, where he remained until December 24, 1902. During his tour of duty in Yokohama he was promoted to the grade of passed assistant surgeon and married Miss Louise Bemis Draper, of Holyoke, Mass., who journeyed to Japan to wed him.

Returning to the United States, at the completion of his cruise, he was ordered to duty at the Bureau of Medicine and Surgery, Navy Department, and some months later to the United States Naval Laboratory at Brooklyn, N. Y., the precursor of the present naval supply depot, where he remained until March, 1904.

Doctor Taylor's next tour of sea duty again took him to the Orient. Accompanying a detachment of marines overland to San Francisco, he joined the U. S. S. *Relief*, to which vessel he was attached until January 11, 1905. After a short tour of duty on the U. S. S. *Ohio*, then flagship of the Asiatic Fleet, he was ordered to Peking, China, as medical officer of the Legation Guard. In Peking his official duties were not confining and he devoted the spare time at his disposal to medical work, among the Chinese. He remained in China until April, 1907. The next two years found him on duty at the United States Naval Hospital, New York, where for a time he was the executive surgeon.

During Doctor Taylor's third tour of sea duty he served on the U. S. S. *New York* from April 17, 1909, to December 31, 1909, and on the U. S. S. *Mississippi* until November 22, 1911. At the expiration of this cruise he was ordered to duty as senior medical officer of the United States Naval Training Station, Great Lakes, Ill., then recently established. Here he remained until May, 1914, when he went once more to sea, serving on the *Illinois*, *Rhode Island*, *Alabama*, and *Connecticut*.

Early in his service career Doctor Taylor displayed remarkable literary talent and a fondness for the history of medicine. This bent was instrumental in his selection to the editorship of the United States Naval Medical Bulletin in January, 1917.

Over four years were spent in this capacity, during which time he raised this publication to a high standard of excellency. He established an enviable reputation as an essayist and medical historian, being a contributor not only to the Naval Medical Bulletin, but to the Atlantic Monthly, the Annals of Medical History, and other periodicals.

Last year he contributed to the Annals of Medical History a series of essays on Montaigne and Medicine, which are in process of publication in book form by Paul B. Hoeber, of New York. A series of essays on popular subjects, published originally in various magazines, were to have been published by Brentano. For some months prior to his last illness he was engaged in writing a history of medicine which was to have embodied the results of much original research.

Doctor Taylor possessed a keen mind and a remarkable memory for historical detail. He had many plans for the future and often remarked to the writer that there was so much he wished to do but the time in which to do it seemed so short. Like many scholars, he burned his candle at both ends, working far into the night over his notes and manuscript.

Doctor Taylor's health showed signs of failing when in June, 1921 he gave up the editorship of the Bulletin and went to Philadelphia as medical officer of the navy yard. Anemia of a pernicious type developed and he gradually lost ground. That he faced death bravely is evidenced by his remarks in a letter concerning his condition and the treatment outlined by his medical advisors: "I feel rather solemn over the prospects, but I have tried to follow the consensus of opinion, and one must keep in the road and go whither it leads."

NOTES AND COMMENTS.

In the Lancet of June 24, 1922, there appeared the following comment on Captain Belli's discussion of the Hygiene of Submersibles which was translated from the Italian and printed as a series of two papers, the first appearing in the October number of the BULLETIN and the last elsewhere in this issue:

"Last year we gave some account of the hygiene of British submarines, but so little has yet appeared about life on board these mysterious boats that we welcome an article upon them by Surg.-Capt. C. M. Belli, of the Royal Italian Navy, which he has contributed to recent numbers of the Annali di Medicina Navale. He tells us that all submarines now have a buoyancy greater than 10 per cent, and that they are continually getting larger and are now up to 5,000 tons, 250 feet long, with a crew of 40, and a surface speed of 25 knots; they can submerge in 2 or 3 minutes and sink to 15 or 20 fathoms and stay there for 24 hours or more; while under water they can travel at 15 knots. They have a cruising radius of 6,000 miles and can stay away for 30 or 40 days. All nations are a little shy of publishing facts about their submarines, but a German submarine, captured in the war by the Italians, had for each man of the crew on an average 600 cubic feet of air, a large allowance in a ship, but then there was here no chance of exchange of air when submerged, and the great hygienic trouble in all submarines is stuffiness. Carbonic acid increases even to 20 parts per 1,000, there is greatly increased humidity, and much smell of engines, men, food, and paint. According to the season, they may be excessively hot or extremely cold, and there is always the risk of a disaster which may admit sea water to the accumulators and consequently suffocate everyone with chlorine gas thus produced, because all navies but the American fill their accumulators with sulphuric acid; the United States boats use an accumulator, proposed by Edison, with an alkaline fluid; these accumulators are smaller, require less attention, and do not ever give off chlorine, but they are thought to be less effective.

"Ventilation is the chief problem and has been attacked in three ways. At first by mere electric fans which circulated the air and only made the worst part of the ship as good as the best. Then it was hoped to purify the air, removing moisture, as snow, by refrigeration, while it was attempted to remove carbonic acid by soda lime in granules through which the air was passed. But the damp air as it passed changed the soda lime quickly to sludge, and the surface was consequently so much reduced that the action came quickly to an end. It was hoped that peroxide of sodium, which when moistened gives up oxygen, would help, but it must have very careful handling, and that would have required two men to be added to the crew, and for them there was no room. Perchlorate of potassium mixed with charcoal and peroxide of manganese, when heated enough, glows and gives off a great deal of oxygen, was tried, but it so quickly evaporates out of the Dewar flasks, in which alone it can be stored, that it too proved impracticable, so recourse had to be made to cylinders of compressed oxygen, but they do not help to reduce the impurities already in the air. In the British, Japanese, and German Navies ozone was made electrically, but the ozone is made at the expense of the oxygen present, and it is, besides, irritating to the lungs and rusts metallic surfaces and harms the engines. The third method, that used at present, is a true ventilation. The fouled air is condensed by pump into cylinders, while fresh compressed air is gradually allowed to escape from other cylinders taken on board in harbor. The drier this air when compressed the better the effect on the atmosphere of the submarine. By this method all hurtful gases are equally reduced, and thus the crew can be maintained in good physiological condition for 24 hours or longer. The main oil engines drive the boat on the surface and, on the surface, actuate the electric motors which charge the accumulators; these, when the boat is submerged, drive it, ventilate, heat or cool it, and do the cooking for the crew.

"Food supply presents special difficulties. Little cooking is done on board. In the Italian Navy, where boats are generally at sea for instruction for only a couple of days, the food for the first day is prepared ashore and kept in an ice box. The feeding of the men for the second and subsequent days requires thought, as dry food, even coffee and cheese, are apt to go bad, the atmosphere being so damp; consequently all food supplied must be preserved in tins. Fresh vegetables can not be used, for to boil them would take too much current and would make the air far too damp. All the cooking that can be undertaken is the warming up of soup or coffee and milk. As there is little vegetable supplied, the food is concentrated and apt to be unsatisfying, and it has too much proteid and fat; still, as the cruise lasts only for a few days, this does no harm. In practice the meals are: Morning and evening, coffee and milk and biscuit; at noon, soup and meat or tunny fish; also coffee in the middle watch. Three and a half ounces of marsala may be issued at the captain's discretion in cold weather. Cheese, butter, oil, and sugar are also issued, and the ration gives in all 4,000 calories. Careful examination has failed to show any material alteration in metabolism. No statistics of illness in submarines have yet been published, and the diseases mentioned are those already reported from the British service—dermatitis from petrol and eyestrain from use of the periscope; the latter is being reduced as better lenses are being fitted and the position of the observer made more comfortable. Surgeon-Captain Belli tells us, too, that the men concerned are under the age of 32. He cordially approves the new system for lighting British submarines.

"We may conclude that submarine life, though not exactly comfortable, is, at any rate in peace time, not unhealthy."

In connection with an article on the medicinal garden at the United States Naval Pharmacist's Mates School at Portsmouth, Va., which appears elsewhere in this issue, the following editorial which appeared in the Journal of the American Medical Association for June 10, 1922, is of interest:

"While synthetic medicaments have held the focus of medical attention during the last two decades, those which may be obtained from medicinal plants have continued to be of great utility, and many even irreplaceable. Such plant derivatives as cinchona, aconite, opium, rhubarb, and senna still command a wide range of use in medical practice. For this reason the exhibit at St. Louis by the Missouri Botanical Gardens of a reproduction of the old Chelsea Physic Garden attracted a large number of the physicians who visited the annual session of the association. A recent issue of the bulletin published by this organization[1] is devoted to a historical discussion of the famous garden which was reproduced. Even in 1673, as shown by this report, it was found necessary to protect the physician and dealer in drugs against unsatisfactory and inefficacious counterfeits of valuable drug substances, and this necessity led to the establishment of the Chelsea garden. A greenhouse, heated by so-called 'subterranean heat,' conveyed by means of a brick flue under the conservatory, was erected in 1681, and in 1732 the garden was visited by Linnaeus, who states in his diary that he collected many plants in the garden and that he was given several dried specimens from South America. The Chelsea garden is still maintained, although now administered by the trustees of the London Parochial Charities. In the exhibit as made in St. Louis, the reproduction followed the plan of the Chelsea garden drawn by John Hayes in 1753. To complete this demonstration, the authorities of the Mis-

[1] Missouri Botanical Garden Bulletin 10: 55 (April), 1922.

souri Botanical Garden gathered in the museum building copies of old works on materia medica and other incunabula on botanic subjects of medical interest, and also provided demonstrations on the diseases of plants. The medical profession is greatly indebted to the authorities of the Missouri institution for this practical historical demonstration of botanic therapy."

The following remarks on the incidence of filariasis in the Western Pacific which appeared in the Lancet of June 17, 1922, are of interest in connection with service in Guam and Tutuila:

"The incidence of filarial infection and its manifestations display considerable variation in different groups of islands in the Western Pacific. Manson-Bahr, in 1910, showed that in nonperiodic filariasis prevailing in the Fiji Islands, the insect host of the filarial larvæ was *Stegomyia pseudoscutellaris*, and that the distribution of this type of filariasis lay to the north of the Bismarck Islands, whereas farther south, as in North Queensland, the periodic *F. nocturna* was found. At a recent meeting of the Royal Society of Tropical Medicine and Hygiene, Dr. F. W. O'Connor gave an account of the results of researches undertaken during 1920 and 1921 among the Polynesian natives of the Samoan, Tokelau, and Ellice groups of islands. *S. pseudoscutellaris* was verified as the most important carrier of filarial infection in these islands. The close relationship between the prevalence of this mosquito and the amount of filariasis was established, and also the nonperiodicity of the microfilarial invasion of the blood stream. In the Ellice group, where stegomyia was abundant, the microfilarial incidence yielded an average rate for the nine islands of 67.3 per cent for males and 55.9 per cent for females in 1,169 of both sexes out of a total population of 3,000; the elephantiasis rate amounted to 8.5 per cent in 1,417 examined, the proportion of males affected being nearly double that of females. In one island, Nui, the percentage of infected males was as high as 83.8 and of cases of elephantiasis 21.2. Among the Tokelau islanders, however, numbering 1,000 in the four islands of the group. Doctor O'Connor saw no cases of elephantiasis, and found the incidence of blood infection to be only 41.6 per cent among males and 33.3 per cent among females. In the Samoan group, out of a total of 2,500 natives examined in eight of the islands, 66.6 per cent males and 50 per cent females were found to be infected; elephantiasis was relatively uncommon, with a rate of 5 per cent males and 1.5 per cent females among 3,500 inspected.

"The Ellice and Tokelau groups are composed exclusively of lagoon or swamp coral atolls of varying size, and the extent of their vegetation is confined to irregular patches of coconut palms and jungle growth dotting the circle of coral reef. The greater density of bush and shelter afforded to the stegomyia, in contrast to the more open and wind-swept character of the islands of the other group, explains the marked mosquito prevalence and consequent high rate of filarial infection existing in these islands. There, too, in consequence of the freer pollution of the bush inclosing the villages, the incidence of ankylostomiasis and other helminthic infections of the bowel are correspondingly higher than in the other island groups. The principal breeding haunts of stegomyia Doctor O'Connor found to be in the heaps of waste coconut shells and in the holes excavated in the tree trunks by the natives for the purpose of collecting rain water. Though filariasis is not at present curable, measures of prevention by destruction of the recognized breeding places of stegomyia and clearance of sheltering jungle and bush growth in the coconut palm plantations would obviously go far to check the spread of infection."

In the Place Emile Zola in Tours, France, opposite the venerable Cathedral of Tours, which is hallowed by some of the stirring events in the life of Joan of Arc, stands a very artistic monument. It consists of a beautiful bronze figure of Tours enthroned and in the act of crowning with laurels three of her sons whose heads appear in bas-relief on a plaque fixed to the pedestal below. The names of these heroes of Tours are Bretonneau, Trousseau, and Velpeau. In the art gallery of the Archbishop's Palace, near by, is a painting of the latter operating in his surgical clinic at Paris. A writer in the Nation's Health of June, 1922, commenting on these three men, remarks that Velpeau is a name known to all physicians, some know something of the brilliant Trousseau, but of Bretonneau, whose apostles they were and to who the entire world of medicine owes an enormous debt, few know anything at all. Yet it was he who ushered in and prepared the way for the discoveries of Pasteur and who deserves first rank among the men of genius who by their brilliancy and importance of their work have illumined the route of scientific progress.

Recent French medical journals announce that, under the auspices of the School of Medicine and Pharmacy of Tours, there was held a centenary celebration on June 24, 25, and 26, to do homage to the memory of the great clinician and epidemiologist, Pierre-Fidele Bretonneau, who in 1822 set forth the doctrine of the specificity of disease, thus giving to the science of medicine an enormous forward impetus and directing its progress into a new path for the everlasting benefit of the human race. A modest physician, beginning his professional life as health officer of the market town of Chenonceaux and practicing later in provincial Tours, too busy with his researches to give afterthought to glory or renown, neglecting to publish many of the results of his observations, never receiving the official title of Professor de Faculté, never having more than a dozen students at a time, he was nevertheless able to make discoveries which reversed the scientific dogmas of his time and to stamp his genius indelibly on such men as Trousseau, Velpeau, Goraud, Moreau de Tours, and Baillarger. His early work as a health officer naturally turned the current of his mind to the epidemic and contagious diseases and he devoted himself chiefly to the study of two of the most redoubtable infections which attack infancy and adolescence, diphtheria and tyhoid fever, to both of which he gave the names which they now bear. He made a study of the affections of the throat and pharynx and recognized the symptom-complex of diphtheria in 1821, and the following year he classified typhoid fever as a separate disease entity always characterized by the same pathological lesions, and localized at the same point.

While he was still at Chenonceaux, he observed that the fluids secreted by the cantharides and other biting insects provoked a skin lesion which varied according to the species of insect. He concluded that the product of the secretion of each species is specific and always produces the same organic lesion. Applying this method of thought to human medicine, he evolved the doctrine of the specificity of disease. This work, which has never been published but which will appear in print in connection with the forthcoming celebration, would probably have remained forever hidden had it not been for his devoted pupils Trousseau and Valpeau. It is difficult for us of to-day living as we do in an age when every school child accepts as an article of faith the bacterial causation of disease, to realize the enormous importance of the principles which Bretonneau laid down and the gigantic scientific courage which their evolution represents. They were embodied in two statements whose clarity and precision merit the admiration and respect of all ages. (1) That each disease is determined by a special living being foreign to the individual. (2) That this living being always produces similar inflammations; that is to say, specific. He compared this living being to an entozoa, thus foreseeing and announcing the microbic theory 30 years before Pasteur.

Some of his aphorisms in support of his doctrine are equally illuminating:

> A multitude of inflammations are determined by material, extrinsic causes, by purely poisonous beings from without and certainly foreign to the normal state of the organic structure.
>
> It is the cause which stamps a lasting, particular characteristic upon the inflammation.

Each disease runs through various periods in a determined time and follows a constant and regular order in the development of the successive phases.

One should consider as specific every kind of inflammation which presents constant characteristics and possesses the property of transmitting itself from one individual to another.

During the centenary celebration, a suitable plaque was placed upon the house where he was born in 1771 and where his ancestors practiced surgery in the tiny market town of Saint-Georges-sur-Cher (Loir-et-Cher), while in Tours, to whose general hospital he devoted himself until his death in 1862, there was held appropriate ceremonies to honor the man who with Laënnec, Bichat, and Cruveilhier at the beginning of the nineteenth century founded contemporary French medicine.

The Division of Venereal Diseases of the United States Public Health Service has issued a series of abstracts from recent medical and public health journals from which the following have been taken:

Dold's reaction in diagnosis of syphilis.—A cholesterinized antigen is used prepared according to the method of Sachs. It is mixed slowly in an Erlenmeyer flask with physiologic sodium chlorid solution in the proportion of 1:10, the result being a fluid slightly opalescent. The blood serum to be used should be clear, although if it is only slightly cloudy the reaction is not affected. The blood serum is inactivated for one-half hour at 55° C.; then 0.4 c. c. is added to 2 c. c. of the antigen and salt solution mixture. For control 0.4 c. c. of the serum is added to 2 c. c. of physiologic sodium chlorid solution. If the amount of serum available is slight, the proportions of the various agents may be reduced. Every step of the procedure is controlled by positive and negative blood serums. If the reaction is positive, the mixture of antigen and serum becomes cloudy, the degree of cloudiness determining the positiveness of the reaction, as in the case of the Wassermann reaction. Within an hour the various mixtures of known positive and negative serums and the controls are compared with the serum being tested. If the latter remains clear, it is negative; if it becomes cloudy, it is positive for syphilis. Dold asserts that 93 per cent of a large number (600) of serums tested by the Wassermann and Sachs-Georgi tests agreed with his test. The advantages of his test are that no special apparatus is required, and the result can be determined macroscopically in from one to four hours, thus making it available for the general practitioner. (Journal A. M. A., May 20, 1922.)

The Wassermann test performed with chancre fluid as an aid to the early diagnosis of syphilis.—From the Dermatological Research Institute. Klauder and Kolmer performed the Wassermann test with fluid obtained from the surface of the chancre. A positive reaction was obtained in the cases of 12 of the 14 patients examined, from chancres which were treated locally as well as from those untreated. Local treatment apparently did not inhibit the local formation of the Wassermann fixing substances, though treatment caused the disappearance of spirochetes from the surface of the chancre and hence make the dark field examination negative. It is important to note that a positive Wassermann with chancre fluid is obtainable before the reaction appears in the blood. (Joseph V. Klauder and John A. Kolmer, Archives of Dermatology and Syphilology, May, 1922.)

The effect of serial administration of silver arsphenamine on the kidney.—From the Department of Dermatology and Physiological Chemistry, Jefferson Medical College. Sidlick and Mallas conclude: Silver arsphenamine when given intravenously does not cause functional disturbance of the kidney. (D. M. Sidlick and M. L. Mallas, New York Medical Journal and Medical Record, May 3, 1922.)

The effect of mercury in syphilis.—Heller brings forward statistical evidence against the recent views: (1) That mercury is only a symptomatic remedy and does not influence the course of syphilis and at the best leads to a symptomatic cure, whilst salvarsan alone can produce a true cure; (2) that all cures of syphilis before the salvarsan period are instances of spontaneous recovery. The statistics of Glück in Bosnia show the high percentage of tertiary syphilitic cases in some districts and their great reduction under the influence of mercury given in the early stages of syphilis.

Heller concludes that mercury is not only a symptomatic remedy, but that it favorably influences the course of syphilis. So long as it has not yet been proved that salvarsan or other remedies do the same or more (and this can only be proved by pathological anatomy in the next 20 years) the medical man is not justified in discontinuing the use of mercury. (Heller, Klinische Wochenschrift, March 11, 1922; British Medical Journal, May 13, 1922.)

Salvarsan—Jaundice: Its causation, incidence, and treatment.—Chamberlain makes a study of 64 cases of jaundice (at London Dock Hospital) and compares divers methods of treating the jaundice. The cases fall naturally into four groups: (1) Jaundice occurring some time after a course of salvarsan, 54 cases; (2) jaundice occurring immediately after injection or accompanied by a recurrence, 4 cases; (3) cases where no salvarsan had been used, 2 cases; (4) fortuitous jaundice, 4 cases. The article is devoted largely to the first group.

Two tables are given, one showing the salvarsan substitutes employed in percentage of all syphilis cases, and the other the drug used in actual number of cases, which indicate that novarsenobillon and galyl were used in the largest proportion of cases. The proportion of novarsenobillon-treated to galyl-treated cases is approximately as 9:5, i. e., less than twice as many; but there were rather more than twice as many jaundices from billon as from galyl. The high proportion of novarsenobillon is difficult to explain except as directly due to the drug. Means of administration, dosage, and periodicity are discussed.

The facts enumerated suggest that the possible noxious factors are, in order of importance: (1). A "sensitizing" dose or course of salvarsan; (2) irregularity in intervals between injections; (3) use of more than one arsenobenzol compound in the same course; (4) storage of the drug in a warm place; (5) gravity method, unless a new rubber tube is used after every few injections; (6) relative insolubility of the drug; and that all these factors are rendered immeasurably more noxious if the patient be degenerate, uncared for, or an alcoholic.

In discussing the treatment of Groups 2, 3, and 4 the author substantiates his view that intramine is the most satisfactory individual drug to use by a comparative table of the duration of jaundice in intramine and nonintramine treated cases. No cases died, and all seem to have recovered completely, so the time factor seems to be the only available standard of comparison. (References: Frederick Chamberlain, Lancet, London, April 15, 1922.)

On the two fundamental forms of syphilis.—Dercum states that there are two distinct forms of syphilis, the gummatous and the parenchymatous. These two forms differ in their symptomatology and clinically. Author calls attention to the fact that not all syphilis of the brain is paresis. In gummatous syphilis of the brain the predominate symptoms are different from symptons in paresis. The contrast between gummatous syphilis of the cord and tabes is equally great. The clinical histories of the two forms also differ widely. These facts suggest a possible difference in the character of the infection in the two forms. These are instances of so-called conjugal paresis or conjugal tabes, but author has never found an instance in which one marital partner suffered from paresis or tabes and the other from gummatous syphilis. It has always been the same form in both. Of the same significance are the cases in which a number of men were infected from the same source and all suffered from the same form of syphilis.

Experiments by Levaditi and Marie upon monkeys and rabbits demonstrate that in syphilis there are two different strains of spirochetes which result in two different diseases, one the gummatous form of syphilis and another which gives rise to parasyphilis. (Francis X. Dercum, New York Medical Journal and Medical Record, May 3, 1922.)

Syphilitic diabetes insipidus.—Lhermitte's diagnosis in a case reported was polyuria secondary to syphilitic meningitis at the base of the brain, and this was confirmed by necropsy, the meningeal lesions being restricted to the region of the infundibulum and the tuber cinereum. He reviews the experimental, clinical, and necropsy data that have been published on this region in relation to diabetes insipidus, and its connection with syphilis, tuberculosis, and trauma, the effect of spinal puncture and of pituitary treatment, and gives photomicrograms from his case. The patient was a tabetic of 65. The final conclusion from all this material is that diabetes insipidus must be regarded as a derangement of kidney secretion; and that this derangement is conditioned by a severe pathologic condition limited to the tuber cinereum and its infundibular prolongation. The threshold for water is lowered, and there is nothing surprising in the fact that this lowering of the threshold is secondary to a primary lesion in the vegetative center at the base of the brain, the center regulating the hydration of the organism. The endocrine system can be exculpated. (J. Lhermitte, Annales de Médicine, Paris, February, 1922; Journal A. M. A., May 20, 1922.)

The coexistence of syphilis and tuberculosis in lymph glands.—Frei and Spitzer state that long before the discovery of the Spirochaeta pallida the coexistence of syphilis and tuberculosis had been observed in a number of cases. The grounds for such a diagnosis in the absence of histological examination were a focal reaction to tuberculin, the presence of tubercle bacilli, and a positive result from animal inoculation indicating tuberculosis, and the undoubted but incomplete success of specific treatment (mercury and potassium iodide) indicating syphilis.

The present writers report three cases in which the enlarged glands (cervical, epitrochlear, and inguinal) showed the Spirochaeta pallida as well as tuberculosis infection which was proved by inoculation of guinea pigs. A control inoculation of guinea pigs with the puncture fluid derived from the enlarged glands containing Spirochaeta pallida of eight syphilitic subjects was negative as regards tuberculosis. (Frei and Spitzer, Klinische Wochenschrift, January 1, 1922; British Medical Journal, May 13, 1922.)

Experimental investigation on the resistance of spirochaeta pallida to various treatments.—Rubin and Szeutkiralyi selected for their purpose locally untreated condylomata in women. Darkground illumination of the carefully protected spirochaetes was used to determine the length of time during which active movements could be observed. According to their results this varied with the treatment undertaken in each case. Four types of accepted syphilo-therapy were chosen: (1) Mercury salicylate (intragluteal injection). (2) Two mercury followed by one neosalvarsan injection. (3) Neosalvarsan only. (4) A mixture of neosalvarsan and sublimate in solution. (Linser.)

Cases under (1) lost their clinical symptoms slowly, and the spirochaetes disappeared or died pari passu with the healing of the lesions; (2) the preliminary injections of mercury did not seem to influence the results of the succeeding arsenical injection as regards the life period of the Spirochaeta pallida, although they seemed to inhibit Herxheimer reactions in cases of profuse exanthemata in which they might have been expected to occur; (3) and (4) the rapidity of disappearance and short period of survival under a cover glass (2 to 4 hours only, as opposed to 20, 30, and 50 hours in untreated or mercuralized cases) was very striking. (Rubin and Szentkiralyi, Derm. Wochenschr., January 28 and February 4, 1922; British Journal of Dermatology and Syphilis, April, 1922.)

Prophylaxis of venereal disease.—Walker reviews the history of prophylactic treatment. He believes that the knowledge of prophylaxis will not tend to increase sexual exposures. He also quotes statistics as to the results of prophylaxis. His conclusions are as follows:

The observations in the American Expeditionary Forces, together with the studies which have been made in America, have proved beyond a doubt that prophylaxis is of the utmost value, and the fact has been established beyond doubt that when taken within one hour it is almost 100 per cent effective.

The fundamental principle in preventing disease is to prevent exposure to that disease. But it is known that no prohibitive measures of any kind or forces of moral suasion will be effective with a certain group. It is for this group that prophylaxis should be insisted on.

With this aid, covering 30 or 40 per cent, which can not otherwise be reached, we are able to talk in terms of the abolition of venereal disease. (George Walker, Journal A. M. A., May 20, 1922.)

In the Hygienic Laboratory of the United States Public Health Service, during the last three years, examination has been made of all of the lots of commercial arsphenamine and neoarsphenamine manufactured in the United States to note deterioration. In no instance was a lot of arsphenamine encountered which could be definitely said to have deteriorated, whereas a rather large percentage of the lots of neoarsphenamine were found to have deteriorated since their first examination. Therefore, the following conclusions have been drawn: (1) That commercial neoarsphenamine is relatively unstable substance in the ampule. (2) Temperature is a potent factor in causing its deterioration. (3) It is advisable to keep it under storage conditions similar to those required for vaccines, until all the factors concerned in causing the deterioration of the compound are understood.

A board of medical officers composed of representatives of the Army, Navy, and Public Health Service, appointed to investigate safe methods of administering arsphenamine and neoarsphenamine has recently recommended the following standard instructions for the preparation and intravenous administration of these preparations for use by the Medical Department of the Army, of the Navy, and by the Veterans' Bureau and the Public Health Service.

Reasons for Issuing Instructions.

Reactions following the use of arsphenamine and neoarsphenamine are still occurring in the Government services, although experience has shown that these reactions can be reduced to a minimum by the use of proper methods of procedure. Practically all the serious and fatal reactions which have occurred in the Government services during the last five years have been specially investigated and, in nearly every instance, it has been shown that the reactions were due (1) to some error in the technique of the preparation and administration of the drug or (2) to faulty examination of the patient, especially in relation to the effects of previous injections. In no case has it been possible to prove that the reactions have been due primarily to inherent toxicity of the drug itself. It therefore seems indicated to issue a complete set of instructions on technique.

Instructions are issued by each manufacturer which vary in some details with each product. In general these instructions are satisfactory for the particular brand concerned, but as the same standard of relative nontoxicity is required by the Government for all brands, it is not considered desirable in these instances to individualize the products.

The following instructions may seem unnecessarily explicit and the technique outlined may differ from others which give satisfactory results. However, every essential statement contained herein is based on the results of the study mentioned above. The procedures given are designed to make the treatment safe and at the same time not to make the technique unnecessarily exacting or cumbersome for the clinician.

Medical officers are directed to follow these instructions, and are cautioned that they will be held responsible for the untoward results following the use of procedures which are essentially different.

Any of the specified apparatus which is not on hand will be furnished upon request through regular channels.

CHOICE OF DRUG.

Although neoarsphenamine is more popular than arsphenamine on account of ease of preparation and administration, which constitutes a real advantage under some circumstances, attention is called to the fact that neoarsphenamine is a much less constant and less reliable preparation than arsphenamine. Not only do certain batches of all brands of neoarsphenamine show a tendency to deteriorate with age, but there is also a pronounced irregularity in the therapeutic activity of different batches of neoarsphenamine, regardless of the age and source of the preparations. As a result of these variations the physician may obtain a much less satisfactory therapeutic result than when arsphenamine is used. The latter, regardless of age, brand, or lot number, shows a more uniform therapeutic activity. It is probably also inherently more potent. Arsphenamine should, therefore, be used whenever practicable and neoarsphenamine should be reserved for situations in which it is difficult to give arsphenamine.

Other numbers of the arsphenamine series are considered to be still in the experimental stage and not for routine use.

In regard to different brands, any product which has passed the requirements of the United States Public Health Service can be used. The labels of duly licensed products bear imprint to this effect and license number.

ARSPHENAMINE.

I. METHOD OF INJECTION.

Only the gravity method should be employed in administering arsphenamine.

II. MATERIALS REQUIRED.

A. Erlenmeyer flasks, 500 to 1,000 c. c. capacity.

B. Funnels, glass, 4-inch.

C. Cylinders, graduated, 500 to 1,000 c. c. capacity.

D. Gravity apparatus, consisting of—

1. Gravity graduated glass cylinders, 300 c. c. capacity; long graduations at the 100 c. c. marks; medium long graduations every 25 c. c.; short graduations for each 5 c. c.; the zero point to be at the top and the 300 mark to be at the bottom of the cylinder.

2. Rubber tubing, pure gum, heavy wall, inside diameter, $\frac{5}{32}$ inch (about 4 mm.) of lengths to limit height of the cylinder to 3 feet above the patient's arm.

Caution.—Before being used the first time the tubing should be filled with normal sodium hydroxide solution for not less than six hours. It should then be thoroughly rinsed in water, sterilized by boiling, and then be thoroughly rinsed with sterile water again just before using.

3. Needles with slip joint, 19 standard gauge, medium bevel, length of cannula 1½ inches. While not necessary, the Fordyce type of needle is a great convenience. The correct gauge is highly important, as it influences the rate of flow. Proper care of the needles is important. They should be cleaned immediately after use and precautions taken to prevent rust. Just before sterilization the point should be freshened on a stone, if necessary. A dull needle tends to make a dissatisfied patient.

4. Glass tubing, 6 mm. in diameter, for windows, which should be inserted in the rubber tubing so as to be a few inches from the lower end.

5. Adapters for attaching needles to end of tubing. These may be of metal or glass. If of glass they will serve as extra windows as well as adapters.

6. Pinch cocks (Mohr's) for cutting off the flow to be applied a short distance above the needle.

E. Sterile gauze, cut in small squares for filtering the solution.

F. Sterile freshly distilled water. This water should be distilled in glass or block tin and should be sterilized immediately by autoclaving or boiling in Erlenmeyer flasks. These flasks should be stoppered with a gauze-wrapped cotton plug and capped with paper or tin foil. Preparation of the water should preferably be carried out on the day before use so that it will be both fresh and cool at the time needed.

G. Sterile salt solution. This should be made with water prepared as above and chemically pure sodium chloride. Sterilization should be carried out as given above. The strength of the salt solution should be the usual 0.85 per cent. The use of salt solution in the place of distilled water for the dilution is considered a refinement which is not necessary in routine work, but it may have some advantages, since a solution of arsphenamine in distilled water is not isotonic.

H. Normal sodium hydroxide volumetric solution (U. S. P. IX, p. 573). Enough of this can be prepared at one time to last for a month or longer, provided it is kept in a rubber stoppered wax or paraffin lined bottle. There is danger of deterioration on account of absorption of CO_2 from the air and of reactions with the glass container. A wax-lined bottle can be prepared by placing wax or paraffin in a bottle, melting it with dry heat, and spreading the melted wax by rotation over the inside of the bottle as it is cooling. If precipitate is found in the alkali, it is probably an evidence of deterioration of the solution, which should be discarded.

I. Burette or pipette. A graduated burette or pipette for accurately measuring the alkali.

All the glassware mentioned above should be of chemical standard. All apparatus should be surgically clean, freshly sterilized, and cool at time of using. The apparatus should be sterilized by dry heat or autoclave with the exception of the tubing and the needles, which should be boiled.

If the medical officer has any doubt about being able to obtain pure normal sodium hydroxide solution the same will be supplied on request to the Naval Medical School, Washington, D. C.

III. INSPECTION OF DRUG.

A. Note and record manufacturer, lot number, and particularly the dosage stated on the label.

B. Examine ampules critically and do not use any which are cracked or in which the powder is not freely mobile and is not of a pale yellow to a lemon yellow in color. Forward any suspected ampules, with explanatory letter, directly to the Hygienic Laboratory, Washington, D. C., for examination.

C. The ampules, having satisfactorily passed preliminary inspection, should be immersed in 95 per cent alcohol primarily to detect any minute cracks in the glass not visible on preliminary inspection, and also to cleanse the ampule. Lay ampules on sterile towel to dry, or wipe off alcohol with sterile gauze.

IV. PREPARATION OF SOLUTION.

A. The amount to be prepared at one time will depend on the number of patients, but unit batches of more than 10 average doses should not be prepared.

B. Place in Erlenmeyer flasks about 10 c. c. of freshly distilled sterile water for each decigram of arsphenamine to be used, e. g., 100 c. c. for 1 gram. Open ampule and sprinkle—do not dump—contents on surface of water. The temperature of the water is of great importance. For all brands of arsphenamine, except for arsenobenzol manufactured by the Dermatological Research Institute, the water should be at room temperature and, as a rule, the drug should go into solution with little or no agitation within a few minutes. A slight amount of shaking is permissible with any product, but should always be kept at a minimum.

Exception.—The arsphenamine manufactured by the Dermatological Research Institute requires either hot water alone, or it can be dissolved in cold water, if the powder is first thoroughly moistened with ethyl alcohol (about 1 c. c. to 0.6 gram). This amount of alcohol is harmless.

When the arsphenamine has completely dissolved, forming a perfectly clear solution with an absence of any gelatinous particles, when viewed by transmitted light, it is ready for alkalinization. If for any reason the arsphenamine fails to form a perfect solution it must be discarded.

C. Correct alkalinization is extremely important; failure to alkalinize properly causes more reactions than any other error connected with the use of arsphenamine.

1. The exact method consists in the addition, all at once, of 0.85 c. c. normal sodium hydroxide solution for each 0.1 gram of arsphenamine used, e. g., 8.5 c. c. for 1 gram of drug. This is the correct amount necessary to form the disodium salt of arsphenamine, the form which is best tolerated by the patient.

2. Approximate method of alkalinization. An exception to the rule that only standardized normal alkali should be used may be made in case this is not obtainable. Under such circumstances, the exact concentration of alkali being unknown, the operator should keep in mind the following facts: Arsphenamine as it appears on the market is the dihydrochloride of the arsphenamine base which is soluble in water, but the solution is strongly acid and highly toxic. Upon the gradual addition of sodium hydroxide, a precipitate at once begins to form and then redissolves. This property of the drug, not understood by some physicians, has caused them to mistake the end point. This mistake is especially apt to occur when the operator thinks he is using a 15 per cent solution, when in reality the solution is only 4 or 5 per cent. The drug when injected in this still strongly acid state, the monohydrochloride, produces serious reactions and sometimes death.

When a little over one-fourth of the amount of alkali indicated under (1) has been added, the precipitate no longer redissolves. From this point on until there has been added almost three-fourths of the amount of alkali necessary to form the disodium salt, the precipitate remains and does not redissolve on shaking. But when three-fourths of the total amount necessary has been added the precipitate redissolves.

It is at this point, when just enough alkali has been added to dissolve the precipitate, that the solution has very frequently been injected. *This solution of the monosodium salt is the most frequent cause of reactions.* At this point 75 per cent of the correct amount of sodium hydroxide solution has been added and hence an additional one-third of the total amount of alkali used up to this point should now be added. This last addition is the remaining 25 per cent of the correct amount corresponding to a total of 0.85 c. c. per 0.1 gram of standardized N/1 NaOH solution as mentioned under (1) above; e. g., if 3.3 c. c. of an unknown solution were required for completely clearing a solution containing 2 grams of arsphenamine, 1.1 c. c. more should be added. With a thorough understanding of the above the operator may roughly standardize his alkali against the arsphenamine. No two brands of arsphenamine vary greatly in the amount of alkali required, while various alkali solutions vary in strength by several hundred per cent.

The pH of a proper solution is about 10, and it is impossible to buffer it to neutrality by common buffers without precipitation. Moreover, the alkaline solution is well tolerated if given slowly and well diluted.

3. "Haphazard method" of alkalinization, or drop method. This is mentioned only to condemn it. It is inconceivable that the operator will be unable to secure some sort of a graduated measuring device in order to measure the alkali instead of guessing at the amount. Numerous reactions from underalkalinization have occurred with this method, particularly where several doses of the drug are prepared at one time. The alkali has been added with a dropper until clearing occurred, and then a few additional drops have been added regardless of whether the solution contained 1 or 10 doses. Less frequently overalkalinization has also occurred. The injection of an overalkalinized solution causes pain along the vein and thrombosis.

D. *Filtration and dilution to proper strength* of the alkalinized solution. With sterile forceps, place four layers of sterile gauze in the funnel. Wash with sterile water. Pour alkaline solution through into a graduated cylinder and then rinse the filter with enough sterile distilled water to bring the total for each decigram of drug up to 25 c. c.; e. g., for 1 gram of arsphenamine 250 c. c. of solution should be made. This washing the drug through the filter with the water insures full dosage. If a saline solution is desired, it is used at this point in place of the distilled water, at usual strength, 0.85 per cent.

E. *Time the solution should be allowed to stand.*—The *properly alkalinized*, *filtered*, and *diluted* solution should now stand for at least 30 minutes before being injected, to allow complete stabilization of the reactions. The toxicity is considerably reduced by this delay. The solution may stand as long as three hours without undergoing any increase in toxicity, provided it is protected from the air,

8554—22——8

not shaken, and provided the temperature does not exceed 30° C. The solution is now ready for administration.

F. *Temperature.*—30° C. is the correct temperature at which the drug should be introduced; in no case should it be warmed above this point.

G. *Dosage.*—As a rule the initial dose should be small. The average dose used is about 0.4 gram for 150 pounds body weight, but no hard and fast rule can be laid down; each case should be considered individually by the clinician. When a radical cure is being sought and the patient tolerates the injection well, full doses should be given.

V. ADMINISTRATION.

A. Emphasis should be laid on the complete physical examination preliminary to administering arsenical treatment for evidence of renal, cardiovascular, or visceral changes, in the presence of which it should be used cautiously. Weekly urinalyses should be made during treatment. The patient should be questioned concerning any reactions following the last treatment, with special reference to any toxic skin eruptions as danger signals against further treatment. Any evidence of an exfoliative dermatitis is an absolute contraindication against any further treatment with any arsenical. Evidence of jaundice should also be looked for and if present is an indication for caution. In late cases the possibility of a Herxheimer reaction following a large injection should be remembered. This may be fatal should vital structures be involved. *Each patient should receive individual consideration and not simply be run through the mill.*

B. *Preparation of patient.*—He should be given a mild cathartic the night before and should eat no food within two or three hours before the injection. Only a light meal should be taken a few hours following the injection. Ambulatory patients should rest for a short time after the injection. If large doses are being given, the patient should preferably be kept in bed until the following morning.

C. The patient should be placed in a recumbent position.

D. The gravity apparatus should be arranged to provide a column of solution not over 3 feet in height. The tubing should be rinsed with sterile water, then the cylinder and tubing should be filled with the solution and the air expelled by elevating the end of the tube above the level of the fluid in the cylinder. Apply pinchcock.

E. Select a suitable vein in either arm and sterilize the overlying skin by applying tincture of iodine, which should preferably be removed after a minute or two with 95 per cent alcohol.

F. Apply rubber turniquet.

G. Insert needle, bevel up, in two stages, and allow a few drops of blood to escape to indicate entrance to the vein. The needle should be slid well into the vein, in order to avoid escape of the point from the vein on further slight manipulations. Now connect adapter attached to gravity apparatus. Open pinchcock and snap it over window.

H. *Rate of injection.*—If the specifications as to the gauge of needle, etc., have been followed, the correct rate of injection is practically insured, i. e., by the size of the needle and the length of the tube; however, this should not be taken for granted, but the exact time should be observed and in no case should the rate exceed 25 c. c. in one minute or 0.4 gram dose in four minutes; five minutes is preferable. A graduated sand glass which runs for five minutes is a convenient timer. The rate of flow should be even as well as slow. Should patient show any signs of reaction, stop. It is highly desirable, in sensitive patients, to wait a minute or two after injection of first 0.1 gram before proceeding with rest of injection. When the necessary amount has been injected, cut off flow with pinchcock, disconnect tubing, allow a few drops of blood to escape, and then withdraw needle and place sterile gauze over the puncture, instructing the patient to hold it there for a few minutes. If another injection is to be given immediately, run a little fluid out of the tube; if any blood shows, empty cylinder and start over with a new sterile tube.

VI. REACTIONS.

Following the above methods, reactions should be rare. If a serious reaction does occur, a complete account should be forwarded to the Surgeon General, including clinical history, dose injected, lot number, and manufacturer of the drug. Samples should also be sent of the same lot of drug, also samples of the sodium hydroxide, distilled water, and saline used, for purposes of investigation.

The prevention and treatment of reactions is very important. A discussion of this subject is not undertaken here except to call attention to general hygiene, diet, foci of infection, dosage, etc., as well as care in preparation and administration of the drug in prophylaxis of these reactions. Patients that continually show immediate reactions should receive prior administration of atropine or divided doses of arsphenamine or combinations of both. In the clinical control of the immediate or nitrotoid types of reactions the chief preparation of value is epinephrin sol. 1/1,000, about 1 c. c. intramuscularly. This is also of value in the very severe type of reaction—hemorrhagic encephalitis. In the severe types of skin reactions, as exfoliative dermatitis, rapid alkalinization of the patient is indicated. In all these delayed types of arsenical poisoning excellent results are said to result from the use of sodium thiosulphite given by mouth or intravenously.

The chemical transformation of arsphenamine into its disodium salt for intravenous administration by the addition of sodium hydroxide.

I. Arsephenamine dihydrochloride:

This is the drug as it appears on the market. It is soluble in distilled water, strongly acid to litmus, highly toxic, and must not be injected.

II. Arsphenamine monohydrochloride:

Arsphenamine monohydrochloride is formed when one-fourth the amount of sodium hydroxide necessary to form the disodium salt has been added, or 0.85 c. c. of normal sodium hydroxide per 0.4 gram of arsphenamine. It remains in solution, is still strongly acid to litmus, highly toxic, and must not be injected.

III. Arsphenamine base:

The base is formed when one-half the amount of sodium hydroxide necessary to form the disodium salt has been added, or 1.70 c. c. of normal sodium hydroxide for 0.4 gram of arsphenamine. A heavy insoluble precipitate is formed. This suspension must not be injected.

IV. Monosodium arsphenamine:

The monosodium salt of arsphenamine is formed when three-fourths the amount of sodium hydroxide necessary to form the disodium salt has been added, or 2.55 c. c. of normal sodium hydroxide per 0.4 gram of arsphenamine. It is just soluble in water, forms an unstable slightly alkaline solution which must not be injected.

V. Disodium arsphenamine:

The disodium salt of arsphenamine is formed when the final fourth of the full amount of normal sodium hydroxide necessary has been added, or 3.4 c. c. of normal sodium hydroxide for 0.4 gram of arsphenamine. This amount is one-third more than the amount used for the monosodium salt IV. This form is a stable alkaline solution. It is the only form in which the drug should be injected.

NEOARSPHENAMINE.

I. METHOD OF INJECTION.

The use of the gravity method is strongly recommended, especially in clinics where a considerable number of doses are to be given. It was demonstrated in one clinic that the average time required to give 100 injections was reduced, without changing the personnel, when the gravity method was substituted for the syringe method and a high percentage of reactions due directly or indirectly to the syringe method also ceased to occur. With the gravity apparatus arranged to deliver a dose in about four minutes, one operator was able to run two tables much more easily than one table with the syringe method.

It is recognized, however, that there are circumstances in which the syringe method is indicated, as in the field where apparatus must be reduced to a minimum. Under these circumstances, the use of neoarsphenamine by the syringe method is a valuable therapeutic measure. It fills a need, but technically is inferior to the gravity method, and therapeutically, either method is inferior to arsphenamine given by the gravity method.

II. APPARATUS REQUIRED.

A. When the gravity method is to be used:
1. Gravity apparatus (see Arsphenamine).
2. Erlemeyer flasks, 50–300 c. c.
3. Funnels, glass, 2-inch.
4. Sterile gauze.
5. Graduated glass cylinders, 100 to 500 c. c.
6. Sterile distilled water (see Arsphenamine).
7. Saline 0.85 per cent prepared as (see Arsphenamine).

B. When syringe method is to be used:
As above, except in place of gravity apparatus—
1. 20 to 50 c. c. all-glass syringes.
2. Rubber tubing, short, with adapters connecting syringe and needle.
3. Needles, 25 standard gauge, medium bevel.

III. INSPECTION OF DRUG.

An even more critical examination should be made than in case of arsphenamine as neoarsphenamine occasionally decomposes in the ampule, even when no cracks are present. The powder should be freely mobile and canary yellow to orange red in color. When it approaches a red color, is distinctly lumpy or solidified, do not use, but forward samples to the Hygienic Laboratory for examination.

Immerse in alcohol the ampules which have passed inspection to further eliminate the presence of cracks and to clean the ampule.

IV. PREPARATION OF SOLUTION.

A. *Amount to be prepared at one time.*—In marked contrast to the practice with arsphenamine, do not prepare any more solution at one time than can be administered within twenty minutes.

B. *Concentration.*—Preferably 1 decigram should be dissolved in 12.5 c. c. of water. This solution is then twice as concentrated as an arsphenamine solution. Concentrations as high as 1 decigram in 0.5 c. c. of water can be used in the field, or under other special circumstances. The highly concentrated solutions, however. should be given very slowly.

C. *Solution.*

1. Put in Erlenmeyer flask 12.5 c. c. sterile distilled water for each decigram of neoarsphenamine. In the field the concentrated solution can be made in the ampule itself by using water supplied in another ampule.

Caution.—The distilled water used must be at room temperature and not to exceed 30° C.

2. Open ampule and sprinkle—do not dump—powder into the water and by preference allow to go into solution with no agitation whatever. Slight rotation of the flask is permissible. *Shaking the solution increases its toxicity and should be avoided.*

In case the solution does not form a perfectly clear and transparent solution, it should under no circumstances be used. Whether it requires 1 minute or 10 minutes for the drug to form a perfect solution is unimportant, but it should not require more than 10 minutes. The important point is not the rate of solubility but the complete solubility of the drug.

3. As soon as the neoarsphenamine is in solution, *filter* through washed gauze into tall, narrow cylinders and keep stoppered. It is preferable to use a size of cylinder which the solution will nearly fill. The smaller the air column over the solution the less the danger of increased toxicity. The solution is now ready to inject, and, in marked contrast to the arsphenamine solution, which should stand at least 30 minutes before its injection, the neoarsphenamine solution should be injected *immediately*, and in no case shall it be allowed to stand longer than twenty minutes.

4. *Dosage.*—The initial dose as a rule should be small. The average dose is about 0.6 gram for 150 pounds body weight, but no attempts to lay down a hard and fast rule in this regard are made. The patient must be individualized.

V. ADMINISTRATION.

The directions made under arsphenamine apply to the administration of neoarsphenamine with the exception of the dosage, rate, and method of administration.

Rate.—If instructions have been followed, the proper rate is practically insured by the character of the apparatus, but it must be checked by using a timepiece, and in no case, *whether the gravity or whether the syringe method is used, should more than 0.1 gram of neoarsphenamine be injected in 30 seconds* or 0.6 gram in 3 minutes. This time is one-half that required for arsphenamine. In giving concentrated solutions, especial care is necessary in order to carry out this rule.

VI. REACTIONS.

See instructions under Arsphenamine.

General Order No. 87, July 10, 1922, directs that, so far as relates to the repair and supply of vessels of the Navy, the navy yard at Charleston will be considered as closed.

The bureau has directed the decommissioning of the Naval Hospital on or about September 30, 1922; from and after that date patients will be cared for in the Naval Dispensary or transferred to another hospital.

The Surgeon General announces the establishment, in the Bureau of Medicine and Surgery, of a Dental Division for the purpose of administration and control of dental affairs in the Navy.

This division has a place similar to other divisions in the bureau and will function in a similar manner, the officer in charge, designated as Head of the Dental Division, bearing the same relation to the chief of the bureau as the heads of other existing divisions.

The Surgeon General has expressed himself as realizing that this division is warranted by the marked advances made in dentistry in recent years and its value as a factor in assisting to preserve the health of the naval personnel.

The founding of a naval dental school is further announced as a part of the Naval Medical School at Washington, where advanced educational facilities are to be provided for the instruction of naval dental surgeons in accordance with accepted modern ideas in dentistry.

A course of four months' duration will be offered to officers detailed to this school in groups commensurate with existing conditions, and this course will later be supplemented in special cases, where indications of exceptional ability are observed, by postgraduate courses in special subjects at recognized dental clinics and colleges. These supplementary courses will be considered in the nature of a reward for special application and aptitude and will in no way be considered as a part of the regular course. Direct detail to these supplementary courses will also be possible in some instances.

It is expected that the school will open on or about January 1, 1923, and in connection with the Dental Division it will operate to greatly enlarge the opportunities available for improvement in the field of dental service.

NURSE CORPS.

REPORT OF THE COMMITTEE ON NURSING PROBLEMS FINANCED BY THE ROCKEFELLER FOUNDATION—Continued.

The survey of the actual field of nursing service has thus led the committee to the conclusion that the good of the community demands (*a*) the recruiting of a larger number of young women for public health nursing, for hospital nursing, and for the care of the acutely ill—these women to be of good natural capacity, and that provision of a sound and effective education be made for them; (*b*) the development and standardization of a subsidiary nursing service of a different grade for the care of mild and chronic disease.

The committee next turned to the second part of the survey problem—a consideration of existing educational facilities for the training of the two types of workers indicated as desirable for the good of the community.

The report of the committee states: "So far as the trained nurse is concerned, whether she is to function in private duty, in public health, or in institutional service, it is clear her basic professional education must be acquired in the hospital training school. We have, therefore, devoted a major part of the investigation to a somewhat detailed study of existing conditions and future possibilities in hospital training."

In reviewing the report of the committee it is not the intention of this paper to give in detail the history of development of hospital training schools for nurses. Much credit must be given to the leaders of the nursing profession for the progress which has been accomplished in nursing education under the impeding conditions that the training of nurses has, and is still in the main, directed by organizations created and maintained for the care of disease rather than for professional education. The conflict of interests, therefore, between a policy of hospital administration which aims to care for the sick at a minimum cost and a policy of nursing education which aims to concentrate a maximum of training reward into a minimum time is a real and vital conflict.

The committee believes there is some shortcoming in the avenues of approach to the nursing profession, since this field of endeavor fails to attract students in the number and of the quality desired.

The rapid growth in the number of hospitals has created a demand for a large number of students and the requirements have been kept at a low level; thereby resulting in a reduction in the proportion of well-educated applicants. There are over 1,800 hospital training schools in the United States. As the committee could not survey this vast field a group of 23 schools of typical character were chosen for intensive study. These comprised large and small, public and private, general and special hospitals in various sections. They were above the median grade and may be regarded as representative of the best current practice in nursing education. Two types of investigators were chosen: One a practical expert in nursing education, the other an experienced educator outside the nursing field, whereby the committee could secure competent criticism of nursing procedures and a broad viewpoint of general educational standards.

The training of the nurse involves certain basic knowledge of the fundamental chemical and biological sciences, theoretical instruction in the principles of nursing, and supervised practical training in nursing procedures. The report reveals conspicuous successes and equally conspicuous failures, which often appear in the same institution. Here was a training school with a good ward service, but the fundamental science courses fail because of inadequate laboratory equipment. In another school the theoretical instructor showed a hopeless lack of teaching ability, or other duties left no time for the proper conduct of classes. Lectures by physicians were informative and inspiring in one department; irregular, careless, and dull in another. Ward assignments were chiefly dictated by the need for hospital service rather than by educational requirements of the students. Of the 23 schools surveyed, 1 made no provision for obstetrical service, 5 gave no training in pediatrics, 7 no experience in communicable disease, and 18 none in mental disease.

Supervision of work on the wards was, as a rule, inadequate, being correlated with theoretical instruction. The lack of an intelligently planned progressive training was obvious in a large number of the hospitals, first-year students being found in positions of responsibility for which they were unprepared, while idle and profitless routine details were assigned to seniors. Noticeable was the time wasted in procedures essential to the conduct of the hospital but of no educational value, such as work which should have been performed by a ward maid, putting away and mending linen, running errands.

The time assigned to ward service in many hospitals was found to be an obstacle to educational achievement. A general average of the selected group showed a median day of 8.5 hours on ward duty alone exclusive of classroom instruction. Irregular, excessive, and unproductive night duty was the rule rather than the exception.

Crowded and unattractive living conditions in certain hospitals tended to impair the morale of the student body and an atmosphere of autocratic discipline frequently prevented the development of a psychological atmosphere favorable to effective effort.

The committee points out two less gloomy aspects of the situation. In the first place, these shortcomings are not chargeable to deliberate neglect but to the difficulty of adjusting the conflicting claims of hospital management and nursing education with no independent endowment for nursing education. (This difficulty is best illustrated by the fact that out of 144 registered training schools in New York State 60 changed superintendents during a single recent year.) In the second place, every one of the shortcomings discussed has been corrected in one or more of the hospital surveys.

The committee stated in Conclusion 5:

"*That, while training schools for nurses have made remarkable progress, and while the best schools of to-day in many respects reach a high level of educational attainment, the average hospital training school is not organized on such a basis as to conform to the standards accepted in other educational fields; that the instruction in such schools is frequently casual and uncorrelated; that the educational needs and the health and strength of students are frequently sacrificed to practical hospital exigencies; that such shortcomings are primarily due to the lack of independent endowments for nursing education; that existing educational facilities are on the whole in the majority of schools inadequate for the preparation of the high grade of nurses required for the care of serious illness, and for service in the fields of public health nursing and nursing education, and that one of the chief reasons for the lack of sufficient recruits of a high type to meet such needs lies precisely in the fact that the average hospital training school does not offer a sufficiently attractive avenue of entrance to this field.*

"Miss Goldmark's study made clear that only coordination and standardization of the best practices existing is necessary to place nursing education on the plane where it belongs. In the first place, a training school which aims to educate nurses capable of caring for acute disease, or going on into public health nursing, or supervising or teaching positions, must require for entrance the completion of a high-school course or its equivalent.

"The course should begin with a preliminary term of 4 months' training in basic sciences and elementary procedures with ward practice but without regular service. There should follow a period of 24 months, devoted to a carefully graded and progressive course in the theory and practice of nursing. Hospital and dispensary services in medicine, surgery, pediatrics, obstetrics, communicable diseases.

and mental diseases should be provided through appropriate affiliation."

The committee outlined the disposition of the working-day—hours of study—which would result in safely shortening the course from 3 years to 28 months which would not imply a lowering but a raising of educational standards.

It was believed there were two fundamental essentials to the success of training schools planned on these lines: First, that the school be directed by a board of committee organized for the primary purpose of education. Second, that adequate funds should be available for the educational expenses of the school and for the replacement of student nurses by graduate nurses, and hospital help in the routine work.

Conclusion 6:

"*That, with the necessary financial support and under a separate board of training school committee, organized primarily for educational purposes, it is possible, with completion of a high-school course or its equivalent as a prerequisite, to reduce the fundamental period of hospital training to 28 months and at the same time, by eliminating unessential, noneducational routine, and adopting the principles laid down in Miss Goldmark's report to organize the course along intensive and coordinated lines with such modifications as may be necessary for practical application; and that courses of this standard would be reasonably certain to attract students of high quality in increasing numbers.*"

The course of 28 months would furnish the complete education for a student desiring to practice as a bedside nurse; and completion of this course should entitle her to the diploma in nursing and to State registration. For the nurse who desires to specialize and instruct, a further perod of postgraduate training is desirable.

The committee found that 20 such courses were in operation and the course is in process of standardization; therefore, Conclusion 7 states:

"*Superintendents, supervisors, instructors, and public health nurses should in all cases receive special additional training beyond the basic nursing course.*"

The committee then reported on the subject for advanced training. "In 1899 Teachers College, Columbia University, admitted properly qualified nurses to the junior class. Since 1916 no less than 13 colleges and universities have provided combined courses that students may acquire a nurse's training and a college degree. The combined course in such a school involves two years' ordinary college work, including certain fundamental sciences basic in nursing education, followed by two years' intensive training in hospitals and, finally, a fifth year of postgraduate education in one of the higher specialties of nursing. At the close of the training the student receives a diploma in nursing and the bachelor's degree in nursing or in science."

The committee outlines the type of school, the affiliations, and adds: "It should be quite clear that the committee does not recommend that nursing schools in general should work toward the establishment of courses that a university would accept for a degree, yet it is believed the importance of this portion of the educational structure would be difficult to overestimate. The value will be to furnish a body of leaders who have the fundamental training essential in administration and teachers. One of the greatest reasons for the imperfections in the present training is that the schools have developed without the coincident development of persons properly trained to guide the pupils divining their course. Unless well taught they can not be well trained."

The committee urges in Conclusion 8:

"*That the development and strengthening of university schools of nursing of a high grade for the training of leaders is of fundamental importance in the furtherance of nursing education.*"

Referring to the training of the subsidiary worker the committee states that the existing facilities are of the most limited type. "Since the existence of this group is a concrete fact and in view of the available results to be derived from the service of this group in a definitely restricted field, it seems obvious that specific provision should be made for the training of workers of this type. The field for the training of nursing aids would seem to be extensive, and the special hospital and the small unaffiliated general hospital are suggested as training grounds."

It is essential in providing for this new type of education that hospital patients should be protected from malpractice and students from exploitation, by the establishment of an adequate graduate nursing service for the care of acute illness and for supervision of students. Again, therefore, the committee assumed a reasonable financial support before this educational enterprise could be honestly undertaken, and with these assumptions recommends in Conclusion 9:

"*That when the licensure of a subsidiary grade of nursing service is provided for, the establishment of training courses in preparation for such service is highly desirable; that such courses should be conducted in special hospitals, in small unaffiliated general hospitals or in separate sections of hospitals where nurses are also trained; and that the course should be of eight or nine months' duration, provided the standards of such schools be approved by the same educational board which governs nursing training schools.*"

In reviewing the progressive scheme outlined in the report the committee states that "The changes and developments must be made gradually, building for the future step by step upon the basis of existing facilities. It is pointed out that the attainment of these ends requires financial support at all points along the line. There is no short cut to the end in view. The establishment of a sound educational policy is the one essential to attracting students of quality and in quantity, and a sound educational policy requires specific financial support. No broadly conceived and systematic effort to obtain such financial support has yet been made."

It is obvious the plan recommended for the improvement and development of the situation which was investigated by the committee "can not be put into effect adequately in any hospital training school without additional funds for this purpose. The strategic position which the university schools of nursing will occupy with regard to the whole movement indicates their development as of special importance. An adequate endowment for a group of such university schools would establish centers of influence which could be trusted to a profound influence upon nursing education," and Conclusion 10 urges:

"*That the development of nursing service adequate for the care of the sick and for the conduct of the modern public health campaign demands as an absolute prerequisite the securing of funds for the endowment of nursing education of all types; and that it is of primary importance, in this connection, to provide reasonably generous endowment for university schools of nursing.*"

The report is concluded with the following names of the committee: C. E. A. Winslow (chairman), Mary Beard, Hermann M. Biggs, S. Lillian Clayton, Lewis A. Conner, David L. Edsall, Livingston Farrand, Annie W. Goodrich, L. Emmett Holt, Julia C. Lathrop, Isabel W. Lowman, M. Adelaide Nutting, Christopher G. Parnall, Thomas W. Salmon, Winford H. Smith, E. G. Stillman, Lillian D. Wald, William H. Welch, Helen Wood.

THE NAVY NURSE AND THE ENCHANTED ISLES.

By Miss H. M. WORKMAN, Chief Nurse, United States Navy.

Far more distant from home than is indicated by the five days' sail to the southward lie the American West India Islands—St. Thomas, St. Croix, and St. John. Surely no one can think of this garden spot without a responsive thrill to the enchantment which their situation and history arouse. Nor is this enchantment dispelled when the distance from home is covered and one finds oneself an inhabitant of these isles. This is true particularly when the "one" is a nurse. Her love for nature's beauties is satisfied by the wonderful atmospheric effects—sunset rainbows, lunar rainbows, and opalescent tints in sky and water unrivaled in their loveliness. The lure of moonlight in Guam and Samoa are known to the writer, but can not surpass the nights of indescribable soft brilliancy and mystery which one finds in the Virgin Islands. Enchantment is also found in the sports to which the nurse turns for amusement: Horseback and donkey riding; tramp and mountain climbing, which pleasure is increased by the knowledge that no harmful or hurtful animals exist on the island. Fact and fable do not indicate a St. Patrick, but it is true there are no snakes to worry the timid climber. There are moonlight picnics where one enjoys the delicious food provided; and if not caring to swim, may be stimulated or soothed by watching the vast ocean roll and wash in its eternal restlessness.

Of course, the sun is hot. Can one imagine that the enchanted isles could be other than pleasantly hot? But the sun's rays are not so scorching as in the few months of intense heat in the Northern Zone; nor is the effect of the sun as enervating and exhausting as during July and August in the Middle Western States. We in our enchanted isles are everlastingly swept by the cool and energizing sea breezes which at night make us willing to pull over us the light cover to make our sleep comfortable; nor do we waken unrefreshed because it is "too hot to sleep." One wakens in the deliciously cool, sweet atmosphere, thrilled by the exquisite colors of the eastern sky. It can not be claimed that all of us enjoy the sun's rising, but it is, nevertheless, one of our wonderful sights. In the winter, when we read of drizzling rains, sleet, and frost, we smile and enjoy our summer apparel; not having reached the plane upon which no human being rejoices in the discomfort of another.

But there are hardships in the enchanted isles, varying in degree according to the adaptability of the person. Adjustment to different methods of living may not come easily, and when this happens the distance from home and the island isolation may cause panic and may result in one's nerves getting out of hand. It may be said not everyone is fitted for life in isolated places, and this is true because such people allow themselves to believe that they can not endure the life, and self-hypnotism is very easily accomplished. Forcing a measure of adjustment, however, stimulating one's sense of humor, recognizing that occupational therapy can be given to oneself, minimizing the necessity for the luxuries of home, and life in the enchanted isle, freed from the bugaboo of isolation, is full of odd and delightful events.

All branches of nursing have outlets here—some under the Navy; some under the Red Cross. It would seem the activities of the future will be the department of infant and child welfare. In this development one finds that the problems in St. Thomas are those of a city community and are adequately solved by the free infant clinic, free hospital care, and the post partum daily attendance. The city environment gives the native people the example of better home conditions and they have freer access to medical advice and care. The conditions surrounding infant life, therefore, are not so distressful among the less intelligent people as is found in the island of St. Croix.

St. Croix is an agricultural place and has greater problems than those found ordinarily in rural surroundings. The island is dotted with small villages, but these "villages" are not such as we imagine when we hear the word; it is really a group of ill-conditioned dwellings. A family lives together usually in one room, though some dwellings comprise two, but never more than this number. Rarely are there beds; and the supplies and equipment which are so common to us are lacking. The habits are primitive and it is next to impossible to effect improvements, since there is nothing to work with.

The food substance used by the natives is peculiar; fish, a cake made of corn meal boiled to a heavy mass, bush tea, and sugar comprise the diet of the country people. They look upon other foods with suspicion. Goats are plentiful, but the people will not use goats' milk in any form. These conditions make it difficult to arrange a proper diet for the young child.

It is also difficult to inculcate our ideas of cleanliness when one is faced by the fact that water must be always economically used. The island is dependent upon the rainfall for its supply of fresh water, and even when the cisterns are full it must be carefully used. There are wells, but the water is so brackish that it kills vegetation; and this is the answer to the usual question from visitors asking why the people do not have garden plots as in other rural communities. One can not but wonder why the problem of irrigation has not been solved, which will make this otherwise delightful isle "blossom as the rose."

The majority of the women work the land as field laborers. They do a man's work, hoeing in the cane fields, cutting and hauling the cane and other commodities in carts. There is little future hope of escape from this hard life. There is a minimum of housework in the small shacks and they have had no other work offered them—the cane is there and must be gathered, and "women must work." They have babies as frequently as the laws of nature permit. "The good Lord sends the babies"; and the Lord is also indiscriminate in the removal of these numerous babies. This may be a religious but is certainly not a Christian viewpoint. We have one woman in the hospital aged 22 who is nursing her eighth child, only one of the number living! The mode of life among the women causes a high rate of infant mortality. The mother goes to the field and the baby goes all day without its natural food, cared for by some old woman or a child too young to attend school, and such feeding as is given is a concoction of bush tea with much sugar in it. The mother returns from the field, and the baby sleeps with her and nurses intermittently. The result of this usual procedure is much suffering for the baby. When the wee one is "sick enough," meaning when about to die, it is brought to the hospital, and the hospital is blamed when the little one passes on. Or if success does crown our efforts and health is restored by means of proper food and care, the babe when returned to the home refuses the bush tea and crusts to the point of starvation. The mother brings the baby back to the hospital, condemning us because "it will not eat," and we labor on, almost without success, in trying to show them the fault lies not with us or with the babe but in the food offered at home. In our work among the young children, supplemented by the teaching of the Red Cross school nurses, we are sowing seeds to grow into better house conditions for the present generation. Unawakened intelligence and superstition make the work very difficult, but we have made a good start, and if we labor on and faint not permanent improvement will be effected.

The Navy nurses in the fairly well equipped hospitals daily teach the better care of children by clinics for mothers and by sending prepared formulas for the babies throughout the country each morning. We also follow a daily routine of country visits. "The Welfare Car," as it is known, makes the trip, carrying the doctor, the Navy nurse, and a native graduate nurse. The people are instructed to gather under a particular tree or at a certain crossroad to await the coming of the car. By this means many sick children are brought to us who would evade the hospital. We go also into the villages and keep in touch with sanitation conditions. Many cases of sore eyes and sore toes are discovered and treated which would have been neglected or used only as an excuse to keep the children home from school. The director of education has placed a room in each school at the disposal of the welfare nurse to be used as a clinic. Any child or adult who may need hospital care to facilitate recovery is given free care and treatment at the hospital. Some of the deep-seated fear of hospital and opposition to treatment are being eliminated.

We have a constant problem in securing the right type of young women for our training schools, of which we have three—one in St. Thomas and two in St. Croix. Pupils have been graduated from the three schools and are employed in the municipal hospitals, working under the direction and guidance of the Navy and Red Cross nurses. In St. Croix the parents of the young women of the higher class refuse to have their daughters mingle with the type which are the great number of our patients. Caste of a degree exists in the island, and the dignity of labor is not yet accepted.

The unusual conditions offer plenty of work, the complexion of which is tragic, humorous, and perplexing. The nurse who loves her profession and who loves humanity will find a wide, fruitful field for her labors and abundant scope for executive activity in developing this work of awakening the native people of these enchanted isles.

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REVIEWER.

Lieut. Commander W. M. KERR, Medical Corps, United States Navy.

"*Have thy study full of books rather than thy purse full of money.*"

THE DIAGNOSTICS AND TREATMENT OF TROPICAL DISEASES, by *E. R. Stitt, A. B., Ph. G., M. D., Sc. D., LL. D., Rear Admiral, Medical Corps, and Surgeon General, United States Navy.* Fourth Edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1922.

In the new edition of this extremely useful book all the good features of former editions have been retained and much new material has been added. The entire work has been carefully revised and brought up to date. Of the revisions made the most important deal with advances in the study of food-deficiency diseases, especially in beriberi and pellagra. Certain paragraphs on treatment have been enlarged, the additions including descriptions of the treatment of hookworm disease by carbon tetrachloride, recently advocated by Hall, and of the methods of administering arsphenamine and antimony. It is noted that the volume contains six new chapters, namely, those on epidemic jaundice, rat-bite fever, tularaemia, tables of helminthic and arthropodan diseases, trench fever, and the diagnosis of tropical joint, muscle, and bone lesions. In the chapter devoted to the examination of the blood are presented the latest views as to acidosis, as well as a table giving the significance of the findings in blood chemistry. (W. M. K.)

LE PROBLÈME DU CANCER. Par *William Seaman Bainbridge, A. M., Sc. D., M. D., C. M., LLD., professeur de chirurgie à la New York Polyclinic Medical School and Hospital; chirurgien et secrétaire des recherches au New York Skin and Cancer Hospital. Traduit de l'Anglais par le Dr. Hertoghe, d'Anvers, Membre titulaire de l'Académie Royale de Médecine de Belgique, d'après la première édition de la Macmillan Company de New York; revue et mise à jour par l'auteur.* A. Uystpruyst, éditeur, Librairie Universitaire, Louvain, 1922.

Realizing the definite need for a book of ready reference giving, in succinct and available form, a summary of our knowledge concerning cancer, Commander Bainbridge wrote a work entitled "The Cancer Problem," the first edition of which was published in 1914 by the Macmillan Company, of New York. This book was well received at the time of its publication, but the war caused interest in the problems of malignant disease to be set aside for the consideration of more pressing questions.

With the subsidence of hostilities came a renewal of interest in the cancer problem and, as evidence that Commander Bainbridge's contribution to the literature of cancer was of real value, a French edition of the work has recently appeared.

This edition has the distinction of being the first book to appear from L'Imprimerie des Trois Rois—the Press of the Three Kings—of the University of Louvain since its reconstruction following the demolition of the university buildings by the Germans in 1914. The book was published at the request of the authorities of the university because of its intrinsic worth and in honor of Commander Bainbridge's work in Belgium after the armistice.

The first copy to be bound was acquired by the Queen of the Belgians, who has long been interested in the problem of cancer as it affects her people. The work was translated by Doctor Hertoghe, of Antwerp, and the author took advantage of the preparation of the French edition to revise the text and bring the book up to date.

The author, after commenting extensively on the general distribution of cancer, the theories as to its etiology and predisposing causes and its histopathology, gives an excellent résumé of the world's work in cancer research and a lucid description of the clinical course of the disease. It is pointed out in the discussion of the prophylaxis of cancer that a large proportion of severe and, perhaps, fatal malignant neoplasms may be traced to apparently insignificant and harmless warts, moles, and nevi which are subjected to irritation; in fact, irritation, wherever it exists, is the important predisposing factor. An important point emphasized by the author is that the most minute attention must be paid to surgical technic, as the disease may be spread by careless handling of the tissues when operating.

An interesting chapter is devoted to the various "cancer cures" which from time to time have been investigated at the New York Skin and Cancer Hospital.

The value of the various nonsurgical treatments are carefully considered and estimated without prejudice or bias.

In discussing the surgical treatment of cancer the author lays stress upon certain principles which apply with enhanced emphasis to surgery as employed in the treatment of malignant disease, among which are the following: Thorough sterilization of every instrument used in an operation for cancer before it is used for other purposes; the danger of autoinfection must be obviated by the careful preservation of nature's barriers; clean-cut incisions; complete early removal of early accessible cancer; all operative wounds should be so placed as to prevent future irritation of the scar; all manipulations of a cancer-bearing tissue should be made with the greatest care; lymph glands and vessels contiguous to the diseased area should be removed en masse, if possible; lymph glands more remotely situated should be removed before the primary tumor is excised; all sources of irritation in the wound, such as heavy ligatures, drainage tubes, tension, strong antiseptic solutions, should be avoided.

The volume ends with some remarks on the campaign of education concerning cancer necessary to impress upon the laity the importance of those symptoms which might mean the initial stages of the cancerous process. It should be generally known that the only means now available of effectively treating malignant diseases is first an early diagnosis, and then, by means of surgery, radiology, or both, the prevention to its further development. It should not be forgotten that when the disease has reached a certain stage, successful treatment is more or less problematical, as is well explained in this book, which should be of great assistance to the medical profession in the French-speaking countries. (W. M. K.)

ENDOCRINE GLANDS AND THE SYMPATHETIC SYSTEM, by *P. Lereboullet, P. Harvier, H. Carrion, and A. G. Guillaume.* Translated from the French by *F. Raoul Mason, M. D., instructor in pediatrics, New York Postgraduate Medical School and Hospital, with the collaboration of Daniel R. Ayres, A. B., M. D., assistant professor of gynecology, New York Postgraduate Medical School and Hospital.* J. B. Lippincott Co., Philadelphia, 1922.

At the present time there is no subject in medicine which has aroused such a widespread interest as endocrinology. It will be recalled that in 1855 Claud Bernard discovered the glycogenic function of the liver and in this way placed the physiology of internal secretions on a firm foundation, but it was Brown-Sequard, in 1889, in his investigations of the therapeutic action of testicular fluid who, although his original researches can possibly be criticized, understood the full value of the theory of internal secretions and who founded endocrinology. Since this time innumerable investigators have contributed to our knowledge of this subject, and we now recognize numerous grades and varieties of disturbances of the glands of internal secretion giving rise to many troublesome symptoms and pathological conditions which do not respond to our common therapeutic measures. Many of these conditions are now amenable to treatment by means of glandular extracts. However, to be successful in the treatment of these conditions, a proper understanding of the subject is necessary and, as in other phases of medicine, a proper diagnosis is important.

A review of the recent literature of endocrinology is apt to leave one rather confused on account of the mass of new evidence brought forth, as well as by the extravagant claims of certain enthusiasts. A careful reading of the volume, however, reveals the fact that the writers have condensed in a clear and sober manner our present-day knowledge of the endocrine glands and their pathology without the addition of any fanciful facts. So conservative are they that certain recent contributions to our knowledge of the subject have been omitted as not having as yet been sufficiently controlled by unprejudiced observers. For instance, the lack of small quantities of iodine in the water or food supply as the probable etiological factor in endemic goiter, and the selective action of quinine or its derivatives on the true sympathetic nervous system and its clinical application in certain cases of tachycardia, are intentionally not mentioned by the authors.

The conception of the various glands of internal secretion must be well understood before going into the study of their pathology, the complexity of which is made evident by the fact that various causes can produce disturbances in the function of the endocrine glands which result in many secondary syndromes. This fact has enlarged the subject of endocrinology considerably. Instead of limiting the study to those glands which were first considered as having only an internal secretion, such as the thyroid, the pituitary, and the adrenals, there is a tendency to extend the study to the thymus, to the spleen, and to the bone marrow, which is not a glandular organ. In fact, all cells are now believed to possess an internal secretion. The custom, however, is to limit the study of internal secretion pathology and physiology to certain glands, and this custom is justifiable. The glands which are studied from a functional and pathological point of view belong to a certain group having anatomical and physiological connections with the sympathetic nervous system, so that the study of the sympathetic system and its disturbances follows naturally that of the endocrine glands, and in this book, "very appropriately," says the translator, "the study of the sympathetic system has been included, as these two subjects are closely connected. While at first the study of the sympathetic system may seem rather tedious, the reader will be amply repaid for his efforts, as this subject, on which so little has been written, enables us to gain a better understanding of functional pathology."

It is impossible to separate the study of the endocrine glands and the study of the sympathetic nervous system, yet the knowledge of relationship between the two for a long time was rather vague and indefinite. During the last few years anatomists, physiologists, and clinicians have attempted to better understand and analyze disturbances of the sympathetic and they have shown how hard it is to dissociate the endocrine from the sympathetic system. There is a very intimate relation between the adrenal glands and the sympathetic nervous system. Histologically and embryologically a proof of this relationship has been shown by investigation of the paraganglia. Scattered throughout the abdominal sympathetic system these ganglia play a complex and important part. They have, like the adrenal medula, chromaffin cells which secrete suprarenalin, and in spite of being mixed up with the nervous system have, nevertheless, a certain epithelio-glandular nature.

It is also known that their origin is identical; the original undifferentiated cells become either sympathoblasts, from which arise the sympathetic nerve cells or phaeochromoblasts from which originate the adrenal or paraganglionic cells. The neurochemical correlation is here very evident; the activity of the paraganglionic cells is closely related to that of the adrenals. Clinically, numerous proofs of the close relationship between the sympathetic and the endocrines exist. Among the most characteristic examples is Basedow's disease, in which recent researches on disturbances of the sympathetic by means of the oculo cardiac reflex have given very suggestive results.

With this conception of the intimate relation between endocrines and the sympathetic system in mind we can readily understand why the authors have devoted one-third of the volume to a consideration of the pathology of the sympathetic system. (W. M. K.)

Diseases of the Thyroid Gland, *by A. E. Hertzler, M. D., F. A. C. S., professor of surgery in the University of Kansas School of Medicine;* with a chapter on the Hospital Management of Goiter Patients, by *V. E. Chesky, A. B., M. D., associate surgeon to the Halstead Hospital.* C. V. Mosby Co., St. Louis, 1922.

In 10 excellently illustrated chapters the authors present to their readers the substance of our knowledge of diseases of the thyroid gland as it stands to-day, together with their experiences in treating thyroid disorders in a small, but busy, hospital of a rural district in Kansas where they have been able to follow up their patients to a greater extent than the surgeon operating in a great metropolitan center.

The material which they have obtained at operation has been carefully studied and compared from time to time with the clinical history of the patient. This study, involving many cases, has convinced them that the activity of the interstitial cells is associated with a definite clinical type of thyroid intoxication.

"In many goiters there are relatively slight changes in the acinal cells or in the colloid, but the increase in the interstitial cells is marked. * * * The acini, as a rule, are but little enlarged and the colloid but little changed. The interstitial cells show an abundant increase, widening the spaces between the acini quite materially. In other sections large areas may be dominated by these cells, the acini apparently having suffered injury by compression.

"These cells do not differ greatly from the acinal cells. They differ from the cellular exudate seen in inflammations. When they are diffusely scattered, one can not tell where the interstitial cells end and the acinal cells begin. This is sometimes seen in typical Basedow cases of a very acute type. This, however, would not exclude them from a separate category. Little can be judged of a cell's function by its appearance as an isolated cell. These cells do not represent a reactive product; for the site of active reaction in glands has the interstitial tissue infiltrated with leucocytes and lymphocytes in addition to the interstitial cells, but these present the classical appearance and are not to be confused with the interstitial cells now under discussion."

The source and significance of these cells is an unexplored field. The authors have been struck, however, with the very constant association of these changes with the *forme fruste* type, so named by Charcot, in 1885, because he believed it represented an incomplete type of Graves's disease. "Since this type of disease differs essentially from the typical Basedow type of disease, it appears possible that the thyroid gland, like the testicle and ovary, may be really a compound gland, the interstitial cells representing one function, the acinal cells another. If this were true the thyroid might have a 'polyglandular' disturbance all by itself."

Considerable space in the book is allotted to a description of the symptomatology, diagnosis, and prognosis of thyroid disease.

In the chapter on diagnosis a clear picture is given of the intestitial type, the so-called *forme fruste* of Charcot, which presents a symptom-complex exhibiting evidence of ovarian hypoplasia with a neurotic tendency predominating. The impression that the condition is dominantly neurotic is heightened by the fact that operation influences the affair but little.

An excellently presented chapter deals with goiters in unusual places where, in addition to the goiterous element, one finds disturbances produced by virtue of the location of the tumor formation.

The chapter on the hospital management of goiterous patients and that on treatment of diseases of the thyroid gland emphasize the importance of attention to the details of treatment.

The volume closes with two chapters on the topographic anatomy of the thyroid gland and the technic of operations upon it. These chapters are admirably illustrated by a series of reproductions of drawings made by Tom Jones in the operating and in the dissecting room, which present the anatomical relations of the thyroid gland and the various steps of the authors' operative procedures with great accuracy. (W. M. K.)

A MANUAL OF PHARMACOLOGY AND ITS APPLICATIONS TO THERAPEUTICS AND TOXICOLOGY, by *Torald Sollmann, M. D., professor of pharmacology and materia medica in the school of medicine of Western Reserve University, Cleveland, Ohio.* Second Edition. W. B. Saunders Co., Philadelphia, 1922.

In recent years the development of pharmacology has been rapid and extensive and the new edition of this well-known work presents not only a wide view of the entire subject but the recent additions to our knowledge of this special branch of the medical sciences.

The subject comprises some broad conceptions and generalizations, and some detailed conclusions, of such great and practical importance that every student and practitioner of medicine should be absolutely familiar with them. It comprises also a large mass of minute details which constitute too great a tax on human memory, but which can not safely be neglected. With this in view the author has aimed to present both types of information without confusion, and the reader will find the matter in the larger print to give a connected and concise statement of the essentials of pharmacology, while the small print contains the more detailed data for consultation when necessary. This arrangement makes the volume serve both for study and reference. (W. M. K.)

PERSONAL HYGIENE APPLIED by *J. F. Williams, A. B., M. D., associate professor of physical education, Teachers College, Columbia University.* W. B. Saunders Co., Philadelphia, 1922.

The author planned this book for college students, but it contains information which should be common knowledge to persons in all walks of life. The aim of the book is to improve the quality of human life. "It is evident from the title," says the author, "that this aim seeks its goal by means of hygiene, but it should be clear also that no mere recitation of informational hygiene can be justified if the aim is to be achieved. To improve human life one must not only set forth the rules of health but also one must bring them in contact with that deep and ever-flowing source of human action where ideals, ambitions, attitudes, prejudices, hopes, and aspirations are born. To find the scientific rule for health is not more important than to touch the mainspring to action that will give life and meaning to the rule discovered."

Health, according to the author, means much more than perfect digestion, more than perfect bodily functions. To find what more it is constitutes an important part of the problems of hygiene, and the author devotes the first five chapters of the book to a consideration of the various aspects of this problem—the meaning of health in terms of life. The remaining chapters consider in a systematic way hygiene from its scientific side.

Throughout the book it is evident that the author has aimed to be scientific and accurate according to the latest information available. He has aimed "to present facts in human experience, to establish science and intelligence as guides and to replace superstition, cults, fads, and certain instinctive responses with true counselors." In this respect the book expresses "a dominant mood in education to-day and takes its position courageously, asking that truth shall decide, let the results seem what they may."

The reviewer knows of no work which presents the subject of personal hygiene in all its aspects so clearly and it is highly recommended to all who are interested in this study. (W. M. K.)

DISEASES OF THE STOMACH AND UPPER ALIMENTARY TRACT, by *Anthony Bassler, M. D., F. A. C. P., professor of gastroenterology, New York Polyclinic Medical School and Hospital.* Fifth Edition. F. A. Davis Co., Philadelphia, 1922.

The fact that five editions of this work have appeared since 1910 testifies as to its popularity and tends to indicate the rapid advances which have occurred in that branch of internal medicine known as gastroenterology. The first edition of this estimable publication was offered to the medical profession as a scientific yet handy book for the general practitioner, a volume which was practical rather than loaded with the discussions and the theories of different observers. We are pleased to note that in the preparation of the edition which has just come from the press of F. A. Davis & Co. the author has kept the same aim in view, while at the same time he has incorporated in the text much new material, such as the accepted work on the secretion of the gastric juice, gastric motility and sensation, and the latest view of the gastric response to foods. The now generally accepted fractional test meal method of gastric analysis and those practical features relating to duodenal and rectal feeding, which have recently been accepted as of value, have been given ample space.

Beginning with a review of the anatomy, physiology, and chemistry of the upper alimentary tract, the author continues with an excellent presentation of the most successful method of securing from the patient a history in which are marshaled the salient points of the case, and of those methods of the examination of the patient which will promptly yield findings of diagnostic importance. He devotes much space to the modern method of the chemical examination of the contents of the alimentary canal, comments on the meaning of the results obtained in the laboratory, and gives much attention to the significance and methods of examination of the feces, blood, and urine in gastric diseases.

Four exceedingly practical chapters are devoted to the therapeutics of gastrointestinal disorders in which diet, the gastric response to foods, artificial feeding, medicinal treatments, and the various physical methods of treatment are ably discussed. The latter half of the volume is devoted to a practical consideration of the various diseases which one encounters in the practice of gastroenterology and includes an interesting discussion of the indications for surgery.

A notable feature of the work is the numerous excellent illustrations and plates which the author has employed in the elucidation of the text, especially those showing X-ray findings, which are exceptionally clear. (W. M. K.)

CLINICAL DIAGNOSIS, CASE EXAMINATION, AND THE ANALYSIS OF SYMPTOMS, by *Alfred Martinet, M. D., of Paris, translated from the third French edition by Louis T. D. Sajours, M. D.* Two volumes. F. A. Davis Co., Philadelphia, Pa., 1922.

Realizing that correct and complete diagnosis is a prime necessity for national and effective treatment, the author of these two volumes has attempted to cover the entire field of clinical diagnosis and at the same time to produce a work which should be practical and well adapted to the requirements of everyday medical practice. He has succeeded in his endeavor to a remarkable degree, although, as the field covered is extensive, his treatment of the various procedures is sometimes regrettably brief.

The first volume deals with physical and laboratory diagnosis, the second with the analysis of symptoms.

In the first volume, after some preliminary remarks on the requirements of a satisfactory diagnosis and the causes of mistaken diagnoses, the author discusses the various special medical diagnostic procedures and general technical methods employed in the practice of medicine as they have been developed and are employed in France.

This volume is brought to a close by a consideration of the systematic examination of the patient, especially with reference to the application of the various diagnostic and technical procedures referred to in the preceding portion of the book.

The second volume, devoted to a consideration of the analysis of symptoms, has been carefully prepared. In it have been collected the most frequently encountered symptoms, and in relation to each of these symptoms, after a brief review of the related anatomical and physiological features, the author has endeavored to explain how with the assistance of previous or concomitant accessory symptoms a concrete diagnosis may be arrived at. (W. M. K.)

QUERIES.

Medical officers are invited to submit queries and to present their problems to the BULLETIN, *which, being in a position to draw on varied and extensive sources of information such as are not available elsewhere, will use every means of securing authoritative opinion.*

All queries will be answered by mail; and the replies, if of sufficient general interest, will also be published in this column.

To the Editor: What is the best method of ascertaining the efficiency of the cardiovascular system of the average individual, when the electrocardiograph or other such instruments are not available?

Probably the best and most simple method devised for determining the efficiency of the cardiovascular system is that developed by Schneider at the Medical Research Laboratory, Army Air Service, Mitchel Field, Long Island, N. Y. This test is used both in the Army and Navy in the examination of aviators. The following is an abstract of an article by Doctor Schneider, published in the Journal of the American Medical Association, May 29, 1920, entitled: "A cardiovascular rating as a measure of physical fatigue and efficiency." The author takes into consideration only two main factors—the pulse rate and the arterial blood pressure. The pulse rate is discussed under four different headings—the postural rate, the increase in rate on standing, the exercise rate, and the decline in rate after exertion.

The postural rate.—A high heart rate indicates poor condition and a heart rate with wide variations between the horizontal and standing positions suggests a poor vascular adjustment. All available evidence indicates that with improvement in physical fitness the heart beats less frequently and more efficiently.

Physical training extended over a long period of time may slow the resting pulse as much as 10 to 12 beats per minute.

The pulse rate increase on standing.—The pulse rate on standing is nearly universally somewhat higher than in the reclining posture. A variation of over 30 beats per minute indicates a state of debility. A slow horizontal and a slow vertical postural pulse rate with a small difference between the two are usually signs of excellent health.

Exercise pulse rate.—The pulse rate counts made after exercise for the purpose of comparison should be made at exactly the same period in each case and the subject should be placed in exactly the same position and should assume the same degree of relaxation and repose. A trained person has a less increase in pulse rate after exercise than an untrained one.

Decline in pulse rate after exertion.—The time required by the pulse rate to return to normal after exercise is the fourth observation to be taken into consideration in this test. The more rapidly this decline occurs the more favorable is the sign. The exercise adopted by Schneider is that used by Flack and Bowdler and consists in stepping on a chair five times in 15 seconds. In this article the author considers a decline to normal within 60 seconds as excellent. Recent investigations have shown, however, that this time should be reduced to 30 seconds in order to get proper correlation of the various findings.

The arterial blood pressure.—The splanchnic vasomotor mechanism compensates for the hydrostatic effects of posture and in normal individuals there is even an overcompensation, when changing from the reclining to the standing posture, resulting in an increase in the systolic blood pressure in the latter position.

Schneider has correlated the findings obtained from the above observations and has worked out a table of points which when added together give an apparently true index of the cardiovascular efficiency of the person examined.

The procedure in making observations.—" 1. The patient reclines for 5 minutes. (*a*) The heart rate is then counted for 20 seconds. When two consecutive 20-second counts are the same, this is multiplied by 3 and recorded. The score is noted according to Part A, Table 1. (*b*) The systolic blood pressure is next taken by auscultation; two or three readings are made as a check.

TABLE I.—*Points for grading cardiovascular changes.*

A. Reclining pulse rate.		B. Pulse rate increase on standing.				
Rate.	Points.	0-10 beats, points.	11-18 beats, points.	19-26 beats, points.	27-34 beats, points.	35-42 beats, points.
50-60	3	3	3	2	1	0
61-70	3	3	2	1	0	−1
71-80	2	3	2	0	−1	−2
81-90	1	2	1	−1	−2	−3
91-100	0	1	0	−2	−3	−3
101-110	−1	0	−1	−3	−3	−3

TABLE I.—*Points for grading cardiovascular changes*—Continued.

C. Standing pulse rate.		D. Pulse rate increase immediately after exercise.				
Rate.	Points.	0-10 beats, points.	11-20 beats, points.	21-30 beats, points.	31-40 beats, points.	41-50 beats, points.
60–70	3	3	3	2	1	0
71–80	3	3	2	1	0	0
81–90	2	3	2	1	0	−1
91–100	1	2	1	0	−1	−2
101–110	1	1	0	−1	−2	−3
111–120	0	1	−1	−2	−3	−3
121–130	0	0	−2	−3	−3	−3
131–140	−1	0	−3	−3	−3	−3

E. Return of pulse rate to standing normal after exercise.		F. Systolic pressure, standing, compared with reclining.	
Seconds.	Points.	Change in milimeter.	Points.
0–60	3	Rise of 8 or more	3
61–90	2	Rise of 2–7	2
91–120	1	No rise	1
After 120: 2–10 beats above normal.	0	Fall of 2–5	0
After 120: 11–30 beats above normal.	−1	Fall of 6 or more	−1

"2. (*a*) The patient stands at ease for 1 or 2 minutes to allow the pulse to assume a uniform rate. When two consecutive 20-second counts are the same, this is multiplied by 3 and recorded. The score is obtained by use of Part C, Table 1. The difference between the standing and reclining pulse rates is scored then by use of Part B, Table 1. (*b*) The standing systolic pressure is next taken. The difference between this and the reclining systolic pressure is then scored by Part F, Table 1.

"3. The patient next steps on a chair about 18 inches high, five times in 15 seconds, timed by a watch. To make this test uniform, he stands with one foot on the chair at the count one; this foot remains on the chair and is not brought to the floor again until after the count five. At each count he brings the other foot on the chair and at the count "down" replaces it on the floor. This should be timed accurately, so that at the 15-second mark both feet are on the floor. (*a*) Immediately, while he stands at ease, the pulse rate is counted for 15 seconds; this is multiplied by 4 and recorded. (*b*) Counting is continued in 15-second intervals for 2 minutes, record being made of the counts at 60, 90, and 120 seconds.

"The data from (*a*) will be scored by Part D, Table 1, taking the difference between this exercise pulse rate and the standing rate. The data in (*b*) are scored according to Part E, Table 1."

As seen from the above table, 18 represents a perfect score. Schneider assumes, with very good reason indeed, that a score of 9 or less indicates that there is something wrong with the individual and that a thorough physical examination should be made.

This test, primarily worked out for aviators, finds a useful field for its application in many other cases, particularly in athletics. But it should not be confined to that kind of endeavor that calls for extreme expenditure of energy. The average man, be he a Navy man or a civilian, will find this test a good criterion of his physical condition and will do well to heed the lesson it teaches. Proper living is inducive to a high rating in an otherwise healthy individual. Lack of sleep, excessive smoking or drinking, overwork, lack of exercise, tend to give a low rating. The lesson to be learned is obvious.

THE DIVISION OF PREVENTIVE MEDICINE.

Lieut. Commander R. F. Jones, Medical Corps, United States Navy, in charge.

Notes on Preventive Medicine for Medical Officers, United States Navy.

INSTRUCTIONS TO MEDICAL OFFICERS.

OCCUPATION HAZARDS AND DIAGNOSTIC SIGNS: A GUIDE TO IMPAIRMENTS TO BE LOOKED FOR IN HAZARDOUS OCCUPATIONS.

By Louis I. Dublin, Ph. D., Statistician Metropolitan Life Insurance Co., and Philip Leiboff.

INTRODUCTION.

Many occupations have injurious effects on the physical condition of those engaged in them. The health of those who work with the poisons, such as lead, arsenic, mercury, picric acid, etc., or those who are exposed for long periods to dust, heat, humidity, or to the infectious materials, etc., may be impaired seriously as the result of their work. The occupation is now recognized as of the very first importance as a factor in the causation of disability and even of death. Doctor Edsall has shown that in his clinic at the Massachusetts General Hospital many of the conditions for which treatment is sought by men of working ages are the effects of occupations.[1] Other industrial clinics are reporting similar results. With their attention directed to occupation as a possible factor, industrial physicians are able to diagnose a great many obscure cases which previously had puzzled even the most competent clinicians. In this way they discover a great many more cases of disease of occupational origin than had before been thought possible. Thus, in 1917 about 150 cases of lead poisoning were discovered at the Massachusetts General Hospital, which are more than were recorded by this clinic during the five-year period prior to the adoption of the more intensive methods of study. It is generally recognized that patients come to physicians with pains and complaints of an indefinite char-

[1] See Monthly Labor Review of the U. S. Bureau of Labor Statistics, December, 1917, p. 169–185.

acter, and it is only when consideration is given to the occupation and its possible effects that many of these cases are cleared up.

The medical examiner should, therefore, be very careful to see if any of the usual diagnostic signs of poisoning, dust, heat, or other hazards which are known to be inherent in occupations are in evidence among their patients where no other explanation of the case is readily available. In the case of those exposed to lead, such as employees of storage-battery plants, white-lead workers, paint mixers, painters, etc., the blue line on the gum, the pale, sallow appearance, and the trembling fingers are significant as indications of chronic lead poisoning, and the physician should look for these signs. Physical symptoms and conditions which ordinarily might be passed by in this way become very important if they point to the possible effect of the occupation.

This article has been prepared to aid physicians in general practice, industrial hygienists, safety engineers, and others who come into close professional contact with those who are engaged in industrial processes. Nine major hazards of employment are listed, namely, abnormalities of temperature; compressed air; dampness; dust; extreme light; infections; poor illumination; repeated motion, pressure, or shock; and the poisons. A separate section is devoted to a discussion of skin irritants. Long exposure to any of these will usually leave definite physical signs which the medical examiner can discover if he will look for them. To aid him in detecting the hazards and their effects on the worker, two lists are presented. The first consists of the more common hazardous occupations, arranged alphabetically; the second consists of hazards, together with their effects or symptoms, as well as the occupations affected. After each occupation in the first list is a reference in code to the particular hazard in the second list. The capital letters after each occupation, "A," "B," "C," etc., refer to the general hazard. The Arabic numerals signify the particular hazard, as "D1," inorganic dust; "D2," organic dust.

The following example will show how this guide may be of value to the general practitioner: A man, who works in a garage, suffering from continuous headaches, visits his physician. The latter can find no cause for the patient's illness. The patient shows no signs of disease other than the subjective symptoms which he describes. Perhaps the physician will recommend an examination of the subject's eyes, ears, and sinuses, which will prove negative. A puzzling diagnosis such as this becomes very simple when the occupation is ascertained and this guide is utilized. Alongside of "Garage workers" in the "Alphabetical list of hazardous occupations," the physician finds the symbols J 16, 25. "J" represents the hazard poisons and "16, 25" the particular poisons—carbon monoxide and gasoline, respectively. Upon looking up the symptoms of these poisons in the second list he finds that both produce headache when inhaled in small quantities. In such a case the effective remedy lies in the removal of the etiological factor—the two poisons.

The following procedure is therefore recommended: The medical examiner or physician should ascertain the occupation of the applicant. He should then look for it in the "Alphabetical list of hazardous occupations." If found there, it is possible that the person has been exposed to and is possibly suffering from the effects of some hazard of the occupation. The numerals will indicate the particular hazards of the occupation. The physician should then make special effort to discover the symptoms or signs referred to in the second list. By this means he can readily determine whether the person examined is in fact suffering from the effect of his occupation. His examination is in this way made more illuminating. Physicians, not specialists in occupational hygiene, can thus learn to detect the effects of industry and, conversely, can eliminate the occupation as the cause when certain symptoms are observed which do not fit the usually observed effects of the occupation.

Medical examiners should remember that it is often necessary to keep in mind not only the present occupation but the former one as well. Persons suffering from certain ailments may no longer be engaged in the industry which was originally responsible for their condition. But careful inquiry into their occupational history will sometimes result in the recording of an occupation the effects of which are clearly those from which the patient is suffering. The medical profession must give occupational findings greater weight in forming their judgments regarding physical conditions and in diagnosing and treating disease.

ALPHABETICAL LIST OF HAZARDOUS OCCUPATIONS.

Acetylene makers, D 1, J 4, 16, 43.
Acid dippers, C, J 10, 22, 26, 37, 48.
Acid finishers (glass), J 26, 28, 48.
Acid makers. *See* particular acid.
Acid mixers, J 26, 37, 48.
Acid recoverers, J 26, 37, 48.
Acid transporters, J 26, 37, 48.
Airplane-wing varnishers, J 50. *See also* Varnishers.
Alcohol distillery workers, J 5, 6.
Aldehyde pumpmen, J 1, 30.
Alkali salt makers, C, J 14, 18, 26, 46, 47.
Amber workers, J 28.
Ammonium salts makers, A 1, J 4, 15, 22, 26, 48.
Ammonium sulphate makers, J 48.
Aniline dye makers. *See* Dye makers.
Aniline makers, J 7, 10, 12, 26, 34, 37.
Animal hair dressers. *See* Hair workers.
Animal handlers, F 1, 3.
Annealers, A 1.
Antimony extractors (refiners), A 1, J 8.
Antimony fluoride extractors, J 27.
Antipyrin makers, J 31, 40.
Arsenic roasters, A 1, J 9.
Art-glass workers, J 5, 11, 27, 28, 30, 52.
Artificial flower makers, H, J 9, 21, 28, 29, 30.

LIST OF HAZARDS, SYMPTOMS, OCCUPATIONS EXPOSED, AND PREVENTION.

A. Abnormalities of Temperature.

The primary physiological effect of abnormal temperatures is the disturbance of the heat-regulating system of the body. Heat dilates the blood vessels on the surface of the body, increasing the supply of blood in this region. Cold, on the other hand, constricts the blood vessels, causing a diminished blood supply on the body surface. Continuous abrupt changes from one extreme of temperature to another may cause serious congestion of the internal organs, the heat-regulating system of the body not being capable of adapting itself to sudden variations. It is in this way that a cold draft, which causes a sudden variation of the temperature, may produce neuralgia, paralysis, and respiratory diseases. Extremes of temperature may produce pathological changes by direct action. Thus, extreme dry heat will cause conjunctivitis, cataract, and the familiar sunburn. Extreme cold may cause frostbite and eczema. With the above data in mind, abnormalities of temperature have been classified under only two headings, namely, "Sudden variations of temperature" and "Extreme dry heat." Extreme cold has not been listed as a distinct hazard, because a temperature so low as to cause the direct effects mentioned above is rarely met in industry. It is evident that the occupations listed in the division "Extreme dry heat" are exposed not only to the danger of the direct action of the high temperatures but also to the hazard "Sudden variations of temperature."

The prevention of disease due to exposure to extremes of temperature consists, obviously, in the avoidance of sudden variations of temperature. Drafts are particularly hazardous, and may be practically eliminated by the use of vestibule and storm doors. Workers in cold processes should keep active and avoid chill. The hot-process worker should allow his body to cool off gradually after completion of the day's work. He should carefully regulate his diet, drinking plenty of water and avoiding meats. As direct preventive measures for the effects of extreme heat, it is advisable to make use of shields, helmets, goggles, water-cooled furnace doors, exhaust systems, cold air, fans, etc.

A. Abnormalities of Temperatures.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Extreme dry heat.	Anemia, general debility, catarrh, stiff joints, cramps, lumbago, Bright's disease, skin eruptions, premature old age, cataracts, retinitis, conjunctivitis.	Ammonium salts makers; annealers; antimony extractors (refiners); arsenic roasters; bar-mill workers (iron and steel); benzol-stillmen; Bessemer-converter workers (iron and steel); beta-still operators (beta naphthol); billet-mill workers (iron and steel); bisque-kiln workers; blacksmiths; blast-furnace workers; blooming-mill workers (iron and steel); blowers-out (zinc smelting); bluers (revolvers); boiler-room workers; brass founders; braziers; brick burners; brick makers; burners (enameling); cappers (window glass); carbide makers; carborundum makers; case hardeners; casters (iron and steel); catchers (iron and steel); cement workers; chargers (smelting); chargers (zinc smelting); coke-oven workers; color makers; copper smelters; core makers; cranemen (glass industry); cranemen (iron and steel); crucible-steel-department employees; cupola men (foundries); cyanamid makers; dressers (glass); drop forgers; enamelers; flatteners (glass); floor molders (foundry); forgemen; foundry workers; furnace workers; gatherers (glass); glass blowers; glass-furnace workers; graphite workers; hardeners (metals); hot-rod rollers (iron and steel); iron and steel workers (all departments); junk (metal) refiners; kiln tenders; layer pullers (glass); leadfoil makers; lead smelters; leer tenders (glass) levermen (iron and steel); lifters-over (glass); luters (zinc smelting); marblers (glass); melters (foundry; glass); mercury smelters; muffle tenders; open-hearth-department workers (iron and steel); pair heaters (tin plate); pavers; petroleum refiners; pit molders (foundry); pot fillers (glass); potlifters (iron and steel); pot pullers (foundry); pot-room workers (aluminum foundry; carbide plant); pot setters; pottery workers; pourers (foundry); puddlers (iron and steel); pyrites burners; refiners (metals); rollers (metals); roll setters (iron and steel); roll wrenchers (iron and steel); roughers (iron and steel); shove-in boys (glass); skimmers (glass); slag-machine tenders (iron and steel); still (coal-tar) cleaners; stillmen (carbolic acid); stillmen operating; stokers; sulphur burners; table operators (iron and steel); takers-down (glass); tappers (smelting); teazers (glass); temperers; tin-foil makers; tinners; tongsmen (iron and steel); topfillers (foundry); tube makers (glass); turners-out (glass); welders; zinc smelters.
2. Sudden variations of temperature.	Congestion of internal organs, catarrh, neuralgic and rheumatic affections, gastro-intestinal and vesical catarrh, pneumonia, Bright's disease.	Artificial-ice makers; bakers; bleachers; brewers; butchers; caisson workers; calenderers (rubber); calico printers; candy makers; canners; cartridge shot shell parafin dippers; charcoal workers (sugar refining); clay and bisque makers (pottery); cold-storage-plant workers; cooks; digester-house workers (paper and pulp); dresser tenders (textile); drivers; dry cleaners; dryers (felt hats); drying-room workers (miscellaneo. s); dye makers dyers; electrotypers; extractor operators (soap); fat renderers; felt-hat makers; fishermen; flangers (felt hats); gas (illuminating) workers; glost-kiln workers; glue workers; hothouse workers; ice cream makers; ironers, japan makers; lasters (shoes); laundry workers; linoleum makers; lumbermen; miners; mirror silverers; mixers (rubber); motormen; packing-house employees; paper makers; patent-leather makers, phosphate-mill workers; phosphorus-evaporating machine operators; press-room workers (rubber); refrigerating-plant workers; roofers; rubber workers; sailors; salt preparers; shoe finishers; silver melters; soap makers; spreaders (rubber works); stearic-acid makers; stereotypers; straw-hat makers; sugar refiners; sulphite cooks (pulp mill); table turners (enameling); textile workers; thread glazers; tile makers; varnish makers; vulcanizers; wall paper printers; warming-house employees (guncotton); wool scourers. *See also* occupati ns exposed to extreme dry heat.

B. Compressed Air.

In building tunnels, laying deep foundations for large buildings, etc., it is necessary for the work to be carried on under increased air pressure in order to prevent the entrance of water into the excavations. The laborer is lowered gradually and at short intervals the pressure of the air in the compartment is increased. The first sensation of compression is felt on the eardrums, which may be relieved by the act of swallowing. If the air is too quickly compressed hemorrhage may occur. The greater part of the danger of working in compressed air lies in hasty decompression. While under compression the blood and tissue juices dissolve an increased amount of air, the gases of which are released when the pressure is suddenly decreased. The bubbles thus formed cut off the blood supply from various parts of the body by blocking up the capillaries. The symptoms of compressed air illness, the so-called "bends," are the result.

Workers in compressed air must follow strictly the rules governing gradual compression and decompression, especially the latter. It is not advisable for boys and for men over 40 years of age to work under high pressure.

B. Compressed air.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Compressed air......	Weakness, vertigo, pains in the back and legs, paralysis of legs and arms, painful constriction of the chest, cerebral hemorrhage and aphasia, coma, subcutaneous hemorrhages, impairment of hearing.	Caisson workers; divers; tunnel workers.

C. DAMPNESS.

The moisture content of the air is very important for the proper adjustment of the physiologic processes of the body. Damp air will prevent the evaporation of moisture from the body and will therefore affect the body temperature. High humidity tends to increase the effects of high temperature. Moist cold air has the effect of undermining the general vitality of the organism, weakening its resistance to diseases of the respiratory passages, and to neuralgic and rheumatic affections. The same effects are noticed among workers around open tanks and vats, who are continuously working in wet clothes. Excessive dampness suggests dry air as a hazard. The latter causes chapped skin and catarrhal conditions. It has not been listed among the hazards because it is not characteristic of any one occupation but is prevalent generally, especially during the winter months.

When dampness is a feature of an industrial process the following precautions should be taken to avoid ill effects:

(1) Provision of exhaust systems wherever steam is generated.

(2) Provision of floors with drain channels to prevent the accumulation of water.

(3) Provision of adequate waterproof clothing, such as rubber boots, rubberized aprons, etc.

Wherever there is dampness special measures should be taken to keep the humidity at its proper percentage. In this connection the wet-bulb thermometer is invaluable in determining the degree of moisture in the air. By circulating the air the effects of high humidity may be mitigated.

C. Dampness.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Dampness	Diseases of the respiratory passages, neuralgic and rheumatic affections.	Acid dippers; alkali-salt makers; artificial-ice makers; artificial-silk makers; auto painters; baters (tannery); beam-house workers (tanners); beatermen (paper and pulp); bleachers; bleachery dryers; blockers (felt hats); boiler washers; brewers; brickmakers; cable splicers; caisson workers; calico printers; candy makers; canners: cartridge-cup washers; cartridge felt and wad makers; cartridge shot shell paraffin dippers; charcoal workers (sugar refining); clay and bisque makers (pottery); clay-plug makers (pottery); cloth preparers; concentrating-mill workers (lead and zinc); cotton-mill workers; creosoting-plant workers; digester-house workers (paper and pulp); doffers (textile); dresser tenders (textile); drivers; dye makers; dyers; electroplaters; enamelers; explosive workers; extractor operators (soap); felt extractors; felt-hat makers; fertilizer makers; filter-press workers; fishermen; flax spinners: flush tenders (aluminum); galvanizers; glass cutters; glass finishers; glaze dippers (pottery); glove makers (leather preparers); glue workers; grinders (metals); gun-cotton washers; hair workers; ice-cream makers; lasters (shoes); laundry workers; lime pullers (tannery); linoleum makers; masons; match-factory workers; miners; mirror silverers; nickel platers; packing-house employees; paint makers; paper makers; petroleum refiners; phosphate-mill workers; phosphorus-evaporating-machine operators; picklers; plasterers; pottery workers; preparers (tannery); pressmen (oil refining); pullers-out (felt hats); pulp-mill employees; refrigerating-plant workers; roller coverers (cotton mills); sagger makers; salt preparers; screen tenders (pulp mill); sewer workers; shavers (felt hats, fur, tannery); sizers (felt hats); slip makers (pottery); smoothers (glass); soap makers; soda makers; sodium-hydroxide makers; spongers; stamp-mill workers; starters (felt hats); stone cutters (wet process); sugar refiners; sulphite cooks (pulp mill); sumackers (tannery); table hands (tannery); tank men; tannery workers; telephone linemen (trench work); temperers; textile workers; thread glazers; tile makers; tinners; tobacco moisteners; turpentine extractors; vatmen; velvet makers; vulcanizers (steam); wall-paper printers; washers; washers (rubber): wool scourers.

D. Dust.

Dusts have here been divided into two kinds, according to their chemical composition, namely, organic and inorganic. The difference in symptoms listed under each is based on the findings of recent investigators that organic dusts do not cause pulmonary lesions. Dr. H. R. M. Landis[2] has found that wherever fibrosis was present in the lungs of men exposed to organic dust, the latter was always mixed with some form of mineral or metallic dust. Tobacco workers exposed to organic dust for years showed no pulmonary changes other than those found in people living in the city. Mineral and metallic dusts, however, produce fibrosis of the lung tissue, the

[2] See article on "The Pathological and Clinical Manifestations Following the Inhalation of Dust," in The Journal of Industrial Hygiene, July, 1919, pp. 117–139.

extent of which depends on the time of exposure and the particular dust inhaled. Of the inorganic dusts, silica is the most harmful, producing serious pulmonary damage in a comparatively short period of time, while the least harmful are those which produce slight changes and then only after long exposure, for example, lime, coal, etc. The relationship between occupational dust and tuberculosis is rather a doubtful one. Authorities disagree as to the effect of fibrosis on the resisting power to the tubercle bacillus. Dust, by acting as a carrier of the bacilli, may increase their number in the lungs. In this way, men exposed to dust may be in greater danger of contracting turberculosis than others. Dr. H. R. M. Landis claims, however, that in the trades exposed to inorganic dust, mistaken diagnosis of pneumoconiosis swells the mortality statistics for tuberculosis. As a means of avoiding incorrect diagnosis of pneumoconiosis, Roentgen ray examinations of the lungs and sputum analyses are invaluable.

There are four effective methods that may be used to prevent the inhalation of dust generated during industrial processes. No one of these can apply to all conditions, but the particular method to be used must be adapted to the peculiarities of the process.

(1) The use of water to dampen the dust and thus prevent it from rising and filling the atmosphere.

(2) The use of exhaust systems which remove the dust at the point of origin.

(3) The use of inclosing chambers in which the dust-producing processes are confined, being regulated from the outside.

(4) The use of respirators and helmets.

In many cases it may be necessary to combine several of these measures effectively to prevent the inhalation of dust by the worker.

D. Dust.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Inorganic dust....	Cough, dyspnea, pleuritic pains, hemoptysis, clubbed fingers, marked flatness of chest, deficient expansion (unilateral), dullness, diminished resonance, mucous rales, fibrosis, inflammatory condition of eyes, ears, nose, and throat; colds, chronic catarrh of respiratory tract, chronic catarrh of digestive tract, pleurisy, tuberculosis.	Acetylene makers; asbestos workers; basic slag (artificial manure) workers; battery (dry) makers; bed rubbers (marble and stone); bench molders (foundry); bevellers; bisque-kiln workers; bone workers; brickmakers; bronzers; buffers; burrers (needles); burr filers; button makers; calenderers (rubber); carbide makers; carbon-brush makers; carborundum workers; card grinders (textiles); casting cleaners (foundry); cement workers; charcoal workers (sugar refining); chargers (smelting); chargers (zinc smelting); chasers (steel); chimney sweepers; chippers; clay and bisque makers (pottery); clay-plug makers (pottery); color makers; compositors; compounders (rubber); concentrating-mill workers (lead and zinc); core makers; crucible mixers; crushermen (clay and stone); cut-glass workers; cutlery makers; cyanamid makers; diamond cutters; electrotypers; emery-wheel makers; engravers; fertilizer makers; file cutters; filers; flint workers; floor molders (foundry); flue cleaners; foundry workers; glass blowers; glass cutters; glass finishers; glass mixers; glaze mixers (pottery); gold beaters; gold refiners; graphite workers; grinders (metals); gypsum workers; horn workers; jewelers; junk (metal)

D. Dust—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Inorganic dust—Continued.	Cough, dyspnea, pleuritic pains, etc.—Continued.	refiners; lapidaries; lead smelters; lime burners; lime-kiln chargers; lime workers; linoleum makers; lithographers; marble cutters; masons; match-factory workers; metal turners; mica strippers or splitters; mica workers; miners; mixers (rubber); mixing-room workers (miscellaneous); mold breakers (foundry); paint removers; paperhangers; phosphate-mill workers; pit molders (foundry); planer men (stone, metal); plasterers; plaster of Paris workers; pneumatic-tool workers; polishers; pottery workers; pouncers (felt hats); pressmen (printers); printers; putty makers; putty polishers (glass); pyrites burners; quarrymen; rubber workers; sagger makers; salt preparers; sand blasters; sand cutters; sanders; sanding machine operators; sandpaperers (enameling and painting auto bodies, etc.); saw filers; scrapers (foundry); screen workers (lead and zinc smelting); sifters; sintering-plant workers; slate workers; slip makers (pottery); smoothers (glass); spinners (asbestos); stamp-mill workers; statuary workers; stonecutters (dry); stonecutters (wet process); sugar refiners; sulphur burners; table turners (enameling); textile-comb makers; tile makers; tool makers; top fillers (foundry); tumbling-barrel workers; weighers.
2. Organic dust.....	Dryness of nose, throat, and mouth, cough, anaphylaxis, asthma, bronchitis, emphysema, tuberculosis.	Bakers; beamers (textiles); blowers (felt hats); broom makers; brushers (felt hats); brush makers; buffers; button makers; carbonizers (shoddy); carders (textiles); card grinders (textiles); carpet makers; celluloid polishers; celluloid workers; cigar makers; cobblers; comb makers (celluloid); coners (felt hats); cork workers; cotton-mill workers; cotton twisters; curriers (tannery); devil operators (felt hats); doffers (textiles); feather curers; feather workers; felt-hat makers; fiber workers; finishers (leather); flax spinners; flour workers; formers (felt hats); fur carders; fur clippers; fur cutters; fur handlers; fur preparers; fur pullers; glove makers (leather preparers); glue workers; grain-elevator workers; grinders (rubber); guncotton pickers; hair workers; harness makers; heel makers (shoe); hemp workers; jute workers; knitting-mill workers; lace makers; lasters (shoes); leather workers; linen workers; match-factory workers; mattress makers; mixers (felt hats); mixing-room workers (miscellaneous); pouncers (felt hats); rag workers; roller coverers (cotton mills); ropemakers; rubber workers; sawmill workers; scourers, wood lasts (shoes); shavers (felt hats, furs, tannery); shaving-brush makers; shoddy workers; shoe-factory operatives; sifters; silk workers; softeners (tannery); spinners (textiles); starch makers; straw-hat makers; taxidermists; textile workers; tobacco rollers; tobacco workers; upholsterers; weavers; weighers; wood-last scourers (shoes); wood workers; wool carders; wool spinners; wool workers.

E. Extreme Light.

Intense light is usually a product of a process associated with heat. Among the different kinds of light included under this heading are the arc light, furnace glare, glowing metal or glass, and X ray. Poor illumination as a hazard is treated under "G. Poor illumination." Continuous exposure to strong light is not only irritating to the conjunctiva, but may also cause a degeneration of the retina and decomposition of the visual purple. Repeated electric flashes of brilliant light have caused severe ophthalmia, retinitis, and even blindness. Glass blowers and steel puddlers, who have to look at a glowing molten mass, are apt to develop cataracts. It seems that the invisible ultra-violet rays and infra-red rays are responsible. The introduction of X rays into the medical field has brought to light the highly dangerous character of the radiographer's work. Severe dermatitis and cancer may ensue after exposure to X rays.

The following protective devices prove effective in preventing the injurious action of extreme light:

(1) Shields.

(2) Helmets.

(3) Goggles which eliminate the ultra-violet and infra-red rays.

(4) Clothing which covers the skin completely.

(5) X-ray apparatus should be inclosed as completely as possible with lead plates.

E. Extreme light.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Extreme light.......	Cataracts, retinitis, conjunctivitis, dermatitis, ulceration and e foliati n of the skin, electrical ophthalmia, cancer.	Blacksmiths; electricians; electric linemen; furnace workers; glass blowers; glass-furnace workers; incandescent-mantle hardeners; moving-picture machine operators; oxyacetylene cutters; photographers; puddlers (iron and steel); stokers; welders; X-ray workers.

F. INFECTIONS.

There are many infectious diseases, such as tetanus, trachoma, and syphilis, which are often of occupational origin. They are not, however, specifically occupational; that is, they do not arise from a condition caused by an industrial process. The conditions which cause these diseases in industry are identical with those which cause them out of industry. The above-mentioned diseases have not therefore been included in this list of occupational infections. Those diseases which have been included arise primarily in occupational exposure. There are a number of other diseases which occur in occupations, but these are of such little numerical importance that they also have not been included.

Besides the general rules of sanitation, the following measures are recommended:

(1) *Anthrax.*—All hides and animal hair must be thoroughly sterilized. Foreign skins or hair should not be carried on the unprotected shoulder. The hands should be frequently washed with bichloride of mercury. Hair sorters should wear respirators.

(2) *Hookworm.*—Workers in mines and others who are exposed to infected soil should make special effort to keep the skin clean. Shoes must always be worn and gloves are also of value in preventing the entrance of the hookworm through the skin. Infected soil should be disinfected and kept dry. The stools of infected individuals must be disinfected immediately.

(3) *Septic infections.*—Workers should avoid puncturing the skin. Cuts, scratches, or abrasions should be treated at once to avoid in-

fection. Men having open wounds should not be allowed to work with putrid material.

F. Infections.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Anthrax: External	1. *Malignant pustule.*—Begins as in flamed pimple or boil. Papule becomes hard, with a purple center and deep red zone of infiltration surrounding, appearance of minute vesicular areola. Central papule becomes vesicular, discharges thick, bloody serum, later forming a brown gangrene. A painful lymphangitis with hard edema extending over neck and arm. Local phlebitis in the edematous area, chilliness, anorexia, vomiting, prostration, high temperature, feeble pulse. 2. *Malignant edema.*—A spreading inflammation of loose connective tissue accompanied by sloughing and gangrene. Constitutional symptoms those of pyemia.	Animal handlers; baters (tannery); beam house workers (tannery); brush makers; butchers; carpet makers; cattle salesmen; cobblers; curriers; farmers; fertilizer makers; fur carders; fur clippers; fur cutters; fur handlers; fur preparers; fur pullers; hair workers; leather workers; lime pullers (tannery); longshoremen; meat inspectors; preparers (tannery); shavers (felt hats, fur tannery); shaving brush makers; shepherds; stablemen; sumackers (tannery); table hands (tannery); tannery workers; taxidermists; transporters of hides and wool; veterinarians; wool carders; wool spinners; wool workers.
Internal	High fever, pains in head and back, vomiting, constipation, pain and tenderness in the abdomen, rapid, feeble pulse, palpable spleen, dyspnea, cyanosis. May be hemorrhage from bowels. When lungs are involved, there are additional symptoms—cough, pain in the chest, suffocation.	
2. Hookworm (ankylostomiasis).	Anemia, pallor of the face even when the blood count is not very low; a dull, heavy, listless expression, manner, speech, and gait; increasing muscular weakness; occurrence of parasites in stool. Victims often complain of gastrointestinal pains and cramps; in exaggerated cases there are edema, ascites, progressive emaciation, protuberant abdomen, and increasing stupor.	Brick makers; construction campworkers; farmers; lumbermen; miners; quarrymen; sawmill workers; trench diggers; tunnel workers; workers who come in contact with infected soil, especially prevalent in gold mines of California.
3. Septic infections..	Skin infections such as boils, carbuncles, blood poisoning, localized lymphangitis or cellulitis.	Animal handlers; butchers; canners; feather workers; fertilizer makers; garbage workers; glue makers; hair workers; preparers (tannery); rag workers; shavers (felt hats, fur, tannery); shoddy makers; silk workers; soap makers; tallow refiners; tannery workers; veterinarians; handlers of putrid or decomposing animal products.

G. Poor Illumination.

The effects of poor illumination are not easily apparent. The hazard may be present in any plant, but is especially prevalent in a limited number of occupations because of the peculiar conditions that make it difficult properly to illuminate the workroom. Miner's nystagmus is the outstanding example of the effects of this hazard. Poor illumination is not only the cause of the conditions listed below but is also an important factor in the causation of accidents.

Artificial light is least harmful to the worker when it comes from overhead, reflected from the ceiling by inverted bowl-shaped reflectors. Light-colored walls and ceilings aid materially in properly illuminating a room. Special precaution must be taken to avoid glare. All lights should be shaded so that only diffused light reaches the eye.

G. Poor illumination.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Poor illumination...	Nystagmus, eyestrain, deficient vision due to astigmatism or hyperopia, headache, giddiness. Eyestrain contributes to neurasthenia.	Buffers; burnishers (iron and steel); caisson workers; compositors; embroidery workers; jewelers; metal polishers; miners; photographers; steel engravers; tunnel workers; watchmakers; any factory worker.

H. REPEATED MOTION, PRESSURE, SHOCK, ETC.

Under this heading are included those muscle-strain conditions which are caused by the continuous repetition of movements, pressure, or blows. This section is not concerned with the neurasthenic phenomena which are sometimes called occupational neurosis. Everyone is familiar with the muscular strain experienced in performing for the first time some exercise, such as rowing, long walking, etc. Men newly introduced into a process requiring such repeated action are affected similarly but often much more severely, so as to disable them temporarily for the particular job. The injury does not stop with muscular strain but may even cause inflammation of the surrounding sheaths or paralysis of the parts concerned.

Many types of occupational neurosis may be avoided by working at a comfortable pace, avoiding fatigue. Where continuous pressure or shock is the cause, pads or cushions are often beneficial. Workers who have to grasp tools tightly would do well frequently to change their method of holding the instrument, if this is possible. Occasional rest periods will do much toward the prevention of muscular pains and cramps.

H. Repeated motion, pressure, shock, etc.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
Repeated motion, pressure, shock, etc.	Pain of muscle used, set up by a myositis, bursitis, synovitis, or other local changes of a chronic inflammatory nature; trembling, gradual emaciation and partial paralysis of parts, acroparesthesia.	Artificial-flower makers; barbers; bicyclists; blacksmiths; carpenters; chauffeurs; clerks; cobblers; compositors; cotton twisters; dancers; diamond cutters; elevator runners; enamelers; engravers; gold beaters; hammermen; jewelers; knitters; lathe turners; letter sorters; lithographers; locksmiths; machinists; masons; microscopists; millers; miners; musicians; painters; paper-box makers; pavers; pneumatic-tool workers; porters; pressers; riveters; sailors; sawyers; scissors sharpeners; seamstresses; sewing machine operators; spinners (textiles); store cutters (dry); stone cutters (wet process); tailors; telegraphers; typists; washerwomen; watchmakers; weavers.

J. Poisons.

The continued introduction of new processes making use of new poisonous substances in industry makes this section of more and more importance. The enormous increase in the production of dye-stuffs and other chemicals will no doubt show its effects on the workmen in the form of industrial poisoning. During the war the increased production of trinitrotoluol and tetrachlorethane for airplane dope resulted in a large number of cases of poisoning from these substances. For the data presented under this heading, the revised "List of industrial poisons," compiled by Sommerfeld and Fischer for the International Association for Labor Legislation, has been drawn upon largely. The arrangement is similar.[3] The material in that list has been revised and brought up to date. Several poisons have been added and all the occupations exposed are given for each poison. The symptons are those given by recent investigators. In order to avoid swelling the list of poisons to unwarranted proportions, substances the effects of which are similar have been grouped. Thus all nitro compounds of benzol and its homologues have been included under one heading and the same procedure has been followed with amido compounds. An endeavor has been made to limit this list to those substances the actions of which are mainly constitutional. The next section (p. 912) is devoted to the substances occurring in industry which act as skin irritants. Because of the very large number of substances in the latter class, it has not been possible to treat them as fully as the other poisons.

To prevent industrial poisoning the following precautions should be taken: Personal cleanliness must be maintained. Workers must be instructed as to the toxicity of the substances handled. Frequent medical examinations of workers must be made to detect early symptoms of disease. Men should not be allowed to eat in workrooms where poisonous substances are handled. Work clothes should be removed at end of day's work. Proper lavatory facilities should be provided. Work clothes should receive special attention. The use of gloves and boots are often necessary. Mechanical devices for confining the poisons are of prime importance. (See also preventive measures, under "Dust.") Fumes and gases should be taken care of by proper ventilation, the use of exhaust systems, fans, and blowers. Men who work in an atmosphere polluted by poisonous fumes and gases should always wear gas masks properly suited for the obtaining conditions.

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[3] See United States Bureau of Labor, Bulletin No. 100, May, 1912.

J. Poisons.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
1. Acetaldehyde	Irritation of the mucous membranes of the nose, larynx, bronchi, and eyes; acceleration of the heart's action; profuse night sweats.	Aldehyde pump men; celluloid makers; dye makers; explosives workers; mirror silverers, varnish makers; vinegar workers.
2. Acridine	Irritation and inflammation of skin and mucous membranes, severe burning and itching of the skin, violent sneezing.	Dye makers.
3. Acrolein	Itching in the throat, irritation of the eyes, exciting lachrymation, conjunctivitis, irritation of the air passages, bronchial catarrh.	Bone renderers; fat renderers; galvanizers; lard makers; linoleum makers; linseed oil boilers; soap makers; stearic-acid makers; tallow refiners; tinners; varnish boilers.
4. Ammonia	Acute inflammation of the respiratory organs, cough, edema of the lungs, chronic bronchial catarrh, redness of the eyes, increased secretion of saliva, retention of the urine.	Acetylene makers; ammonium-salts makers; artificial-ice makers; artificial-silk makers; boneblack makers; bronzers; coke-oven workers; dye makers; dyers; galvanizers; gas (illuminating) workers; gas purifiers; glue workers; mercerizers; refrigerating-plant workers; salt extractors (coke-oven by-products); sewer workers; shellac makers; shoe finishers; soda makers; sugar refiners; tinners; varnish makers.
5. Amyl acetate	Nervous symptoms, headache, fullness of the head, giddiness, numbness, nausea, disturbances of digestion, palpitation of the heart, inflammation of the respiratory organs, fatty degeneration of the liver	Alcohol-distillery workers; art-glass workers; artificial-silk makers; battery (dry) makers; bronzers; buffers (rubber); celluloid makers; cutlery makers; enamelers; explosives workers; furniture polishers; gilders; incandescent-lamp makers; jewelers; lacquer makers; linoleum makers; mottlers (leather); patent-leather makers; polishers; shellac makers; shoe factory workers; shoe finishers; smokeless-powder makers; toy makers; wirers (incandescent lamps).
6. Amyl alcohol	Congestion of the head, oppression of the chest, irritation of the air passages, lowering of the blood pressure, faintness, nausea.	Alcohol-distillery workers; dye makers; fruit-essence makers; mordanters; shoe finishers.
7. Aniline and other amino compounds of benzol and its homologues.	Pallor of the skin, vertigo, unsteady gait, loss of appetite, increased frequency of respiration, anemia, slowing of the pulse, eczematous eruptions, bloody urine, spasmodic muscular pains, cyanosis.	Aniline makers; artificial-leather makers; calico printers; coal-tar workers; compositors; compounders (rubber); dye makers; explosive workers; feather workers; lithographers; millinery workers; mixers (rubber); painters; paint makers; pencil (colored) makers; photographic workers; pressroom workers (rubber); printers; reclaimers (rubber); rubber workers; tannery workers; vulcanizers.
8. Antimony and its compounds.	Itching eruptions of the skin; inflammation of the mouth, throat, and stomach; albumin in the urine, weakness of the heart, vertigo, faintness, coryza, dyspepsia, intestinal colic, nephritis.	Antimony extractors (refiners); brass founders; burnishers (iron and steel); burnishers (rifle barrels); calico printers; color makers; compositors; compounders (rubber); dye makers; enamel makers; filers; fireworks makers; glass mixers; glaze dippers (pottery); glaze mixers (pottery); grinders (metals); grinders (rubber); lead smelters; linotypers; mixers (rubber); monotypers; mordanters; pressroom workers (rubber); printers; rubber workers; shot makers; stereotypers; vulcanizers.
9. Arsenic and its compounds.	Headache, melancholia, sleeplessness, gastric disturbances, emaciation, catarrh of the mucous membranes, skin diseases of various forms, falling out of the hair and nails, melanosis, perforations of the nasal	Arsenic roasters; artificial-flower makers; artificial-leather makers; bookbinders; brass founders; bronzers; calico printers; candle (colored) makers; carpet makers; carroters (felt hats); chargers (zinc smelters); color makers; colored-paper workers; compounders (rubber); copper founders; copper smelters; curriers (tannery); cut-glass workers; decorators (pottery); dye makers; electroplaters; enamelers; feather curers; feather workers; felt-hat makers; ferrosilicon workers; fur handlers; fur preparers; galvanizers; gardeners; glass mixers; glaze dippers (pottery); glaze mixers (pottery); gold refiners;

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
9. Arsenic and its compounds—Continued.	septum, bleeding gums, peripheral multiple neuritis, paralysis.	insecticide makers; japan makers; jewelers; lead smelters; linoleum colorers; lithographers; mixers (rubber); mordanters; paper glazers; paperhangers; pencil (colored) makers; pitch workers; pottery workers; pressroom workers (rubber); printers; pyrites burners; refiners (metals); rubber-tire builders; rubber washers; rubber workers; sealing-wax makers; sheep-dip makers; shot makers; sprayers (trees); sulphur burners; sulphuric-acid workers; tannery workers; taxidermists; tinners; toy makers; velvet makers; wallpaper printers; wax-ornament makers; wire drawers; wood preservers; zinc miners.
10. Arseniuretted hydrogen.	General malaise, difficulty of breathing, fainting fits, gastric disturbance, jaundice, bluish discoloration of the mucous membrane, pain in the region of the spleen and kidney, darkened urine, fetor of the mouth resembling garlic.	Acid dippers; aniline workers; balloon (toy) fillers; battery (dry) makers; bronzers; carbonizers (shoddy) dimethyl-sulphate makers; dye makers; enamelers; ferro-silicon workers; fertilizer makers; galvanizers; lead burn-silicon workers; fertilizer makers; galvanizers; lead burners; lime burners; nitroglycerin makers; picklers; refiners (metals); shoddy workers; submarine (storage battery workers); sulphuric acid workers; tinners; towermen (sulphuric acid); zinc chloride makers.
11. Benzine	Headache, vertigo, nausea, cough, irregular respiration, weakness of the heart, drowsiness, cyanosis, twitching of the muscles, psychosis, skin lesions.	Art-glass workers; bronzers; buffers (rubber); cast scrubbers (electroplaters); celluloid makers; cementers (rubber shoes); cement mixers (rubber); compositors; compounders (rubber); curriers (tannery); decorators (pottery); degreasers (fertilizer, leather); dippers (rubber); dry cleaners; electroplaters; enamelers; feather workers; furniture polishers; gilders; glue workers; japan makers; lacquer makers; linoleum makers; lithographers; millinery workers; mixers (rubber); mordanters; painters; paint makers; pressroom workers (rubber); printers; putty makers; rubber-glove makers; rubber-tire builders; rubber washers; rubber workers; shellac makers; shoe finishers; tannery workers; type cleaners; varnish makers; vulcanizers.
12. Benzol	Headache, vertigo, anemia, muscular tremor, scarlet lips, spots of extravasated blood in the skin, irritant cough, fatty degeneration of liver, kidneys, and heart.	Aniline makers; artificial-leather makers; battery (dry) makers; benzol stillmen; bronzers; carbolic-acid makers; cast scrubbers; cementers (rubber shoes); cement mixers (rubber); coal-tar workers; coke-oven workers; color makers; compounders (rubber); decorators (pottery); degreasers (fertilizer, leather); dry cleaners; driers (rubber); dye makers; electroplaters; explosives workers; feather workers; fertilizer makers; gas (illuminating) workers; gilders; glue workers; lacquer makers; lithographers; millinery workers; mixers (rubber); mordanters; painters; paint makers; photo-engravers; photographic workers; pressroom workers (rubber); reclaimers (rubber); rubber-tire builders; rubber washers; rubber workers; shellac makers; shoe-factory workers; shoe finishers; smokeless-powder makers; still (coal-tar) cleaners; treaders (rubber); varnish makers; vulcanizers.
13. Brass (zinc)	Headache, general malaise, throat irritation, cough, nausea, vomiting, constipation, trembling, muscular pains, accelerated respiration, profuse sweating, deposit of green tartar on the teeth, metallic taste in the mouth, anemia, premature old age, respiratory and degenerative diseases.	Bench molders (foundry); blowers-out (zinc smelting); brass founders; braizers; bronzers; chargers (zinc smelting; core makers; floor molders (foundry); galvanizers; junk-metal refiners; luters (zinc smelting); pourers (brass foundry); welders; zinc smelters.
14. Carbon dioxide	Anemia, cyanosis, headache, drowsiness, vertigo, tinnitus, and general nervousness.	Alkali-salt makers; blacksmiths; boiler-room workers; brass founders; brewers; brick burners; caisson workers; carbon-dioxide makers; charcoal burners; drying-room workers (miscellaneous); fertilizer makers; furnace workers; lime burners; limekiln chargers; miners; pottery workers; sewer workers; silo workers; soda makers; starch makers; sugar refiners; vinters; white-lead makers; yeast makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
15. Carbon disulphide.	Headache, pain in the extremities, trembling, deafness, reduction of the reflexes, acceleration of the heart's action, nausea, digestive trouble, emaciation, disturbance of sense of vision, excitement and violent temper followed by depression, hyperstimulation of sexual instinct, later its abnormal decline, chronic dementia.	Ammonium-salts makers; artificial-silk makers; asphalt testers; carbon-disulphide makers; celluloid makers; cementers (rubber shoes); cement mixers (rubber); dry cleaners; driers (rubber); enamelers; glue workers; insecticide makers; match-factory workers; oil extractors; paint makers; paraffin workers; putty makers; reclaimers (rubber); smokeless-powder makers; sulphur extractors; tallow refiners; vulcanizers.
16. Carbon monoxide.	Headache (usually frontal), dizziness, sense of fullness of the head, fatigue, nausea, general weakness, polycythemia.	Acetylene makers; bakers; bisque-kiln workers; blacksmiths; blockers (felt hats); boiler-room workers; brass founders; cable splicers; calico printers; carbide makers; celluloid makers; charcoal burners; chargers (zinc smelting); chimney sweepers; coal-tar workers; coke-oven workers; copper smelters; core makers; drying-room workers (miscellaneous); enamelers; felt-hat makers; filament makers (incandescent lamps); finishers (incandescent lamps); flangers (felt hats); flue cleaners; foundry workers; furnace workers; garage workers; gas (illuminating) workers; glost-kiln workers; incandescent-lamp makers; kiln tenders; laundry workers; lead smelters; lime burners; limekiln chargers; mercury smelters; miners; patent-leather makers; phosgene makers; pottery workers; pressers; refiners (metals); sealers (incandescent lamps); silver melters; singers (cloth); soda makers; stokers; teazers (glass); temperers; tubulators (incandescent lamps); zinc smelters.
17. Chloride of lime.	Irritating cough, inflammation of upper air passages, difficulty of breathing, bronchitis, asthma, sometimes hemoptysis, conjunctivitis, lachrymation, hyperhidrosis, burning eruption on the skin.	Bleachers; chloride of lime makers; chloroform makers; disinfectant makers; dye makers; laundry workers; tannery workers.
18. Chlorine........	Pallid countenance, emaciation, decayed teeth, bronchial irritation and asthma, gastric disturbances, irritation of the skin, chloracne.	Alkali-salt makers; beatermen (paper and pulp); bleachers; broom makers; calico printers; chloride of lime makers; chlorine makers; disinfectant makers; dye makers; laundry workers; phosgene makers; photographic workers; sulphur-chloride makers; zinc-chloride makers.
19. Chlorodinitrobenzol.	*See* Nitrobenzol.......	
20. Chloronitrobenzol.	*See* Nitrobenzol.......	
21. Chromium compounds.	Pitlike, phagedenic ulcers, very difficult to heal and very painful; perforation of the nasal septum at the cartilaginous portion, irritation of the conjunctiva, small areas of inflammation in the lungs, inflammation of the kidneys, chronic gastritis, anemia.	Artificial-flower makers; battery (dry) makers; bleachers; calico printers; candle (colored) makers; chromium workers; color makers; compounders (rubber); dye makers; dyers; enamelers; glass mixers; glaze dippers (pottery); glaze mixers (pottery); ink makers; linoleum colorers; lithographers; match-factory workers; mixers (rubber); mordanters; paperhangers; pencil (colored) makers; photo-engravers; photographic workers, pressroom workers (rubber); rubber-tire builders; rubber washers; rubber workers; tannery workers; vulcanizers; wall-paper printers; wax-ornament workers; wood stainers.
22. Cyanogen compounds.	Headache, vertigo, unsteadiness of gait, nausea, loss of appetite, disturbance of gastric and intestinal functions, slowing of the pulse, albuminuria.	Acid dippers; ammonium-salts makers; blacksmiths; blast-furnace workers; browners (gun barrels); calico printers; case hardeners; celluloid makers; dye makers; electroplaters; fulminate mixers; fumigators; gas (illuminating) workers; gas purifiers; gold refiners; photographic workers; picklers; silver refiners; tannery workers, temperers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
23. Dimethyl sulphate.	**Strongly corrosive effect on the skin and mucous membranes, hoarseness, lachrymation, conjunctivitis, edema, photophobia.**	**Dimethyl-sulphate makers; dye makers; perfume makers.**
24. Dinitrobenzol...	*See* Nitrobenzol.......	
25. Gasoline.........	*See* Naphtha..........	
26. Hydrochloric acid.	Irritation of mucous membranes; conjunctivitis; coryza; pharyngeal, laryngeal, and bronchial catarrh; dental caries.	Acid dippers; acid finishers (glass); acid mixers; acid recoverers; acid transporters; alkali-salt makers; ammonium salts makers; aniline makers, battery (dry) makers; calico printers; camphor makers; carbolic-acid makers; carbonizers (shoddy); cartridge dippers; dye makers; dyers; enamel makers; fertilizer makers; galvanizers; glass finishers; glass mixers; glue workers, hydrochloric-acid makers; jewelers; petroleum refiners; picklers; pottery workers; reclaimers (rubber); rubber workers; shoddy workers; solderers; sulphur-chloride makers; tinners; vignetters; zinc-chloride makers.
27. Hydrofluoric acid.	**Intense irritation of the eyelids and conjunctiva, coryza, bronchial catarrh with spasmodic cough; ulceration of the nostrils, gums, and oral mucous membrane; painful ulcers of the cuticle, erosion and formation of vesicles, suppuration under the finger nails.**	Antimony fluoride extractors; art-glass workers; bleachers; dyers; etchers; fertilizer makers; glass finishers; silicate extractors.
28. Lead and its compounds.	**Sallow, pale, yellowish hue of the skin; metallic taste, nausea, anorexia, constipation, lead line, asthenia, lassitude, headaches, arthralgias and neuritis, weakness of grip, tremors of fingers and tongue; lead paralyses, especially of muscles used most; atrophy of optic nerve.**	Acid finishers (glass); amber workers; art-glass workers; artificial-flower makers; babbitters; battery (dry) makers; bench molders (foundry); blacksmiths; blocders (tannery); bookbinders; bottle-cap makers; brass founders; brass polishers; braziers; brick burners; brick makers; bronzers; browners (gun barrels); brush makers; buffers (rubber); burners (enameling); cable makers; cable splicers; calico printers; canners; cartridge makers; celluloid makers; chargers (zinc smelting); color makers; colorers (white) of shoes; compositors; concentrating-mill workers (lead and zinc); cut-glass workers; cutlery makers; decorators (pottery); diamond polishers; dye makers; dyers; electroplaters; electrotypers; embroidery workers; emery-wheel makers; enamel makers; file cutters; filers; floor molders (foundry); galvanizers; glass finishers; glass mixers; glass polishers; glaze dippers (pottery); glaze mixers (pottery); glost-kiln workers; gold refiners; grinders (metals); grinders (rubber); heater boys (riveters); imitation-pearl makers; incandescent-lamp makers; insecticide makers; japan makers; jewelers; junk-metal refiners; labelers (paint cans); lacquer makers; lead burners; lead-foil makers; lead miners; lead-pipe makers; lead-salts makers; lead smelters; linoleum makers; linotypers; linseed-oil boilers; lithographers; lithotransfer workers; match-factory workers; mirror silverers; mixers (rubber); monotypers; musical-instrument makers; nitric-acid workers; nitroglycerin makers; painters; paint makers; paint removers; paper-hangers; patent-leather makers; petroleum refiners; photograph retouchers; pipe fitters; plumbers; polishers; pottery workers; printers; putty makers; putty polishers (glass); reclaimers (rubber); red-lead workers; refiners (metals); riveters; roofers; rubber workers; sagger makers; sandpaperers (enameling and painting auto bodies, etc.); screen workers (lead and zinc smelting); sheet-metal workers; shellac makers; shot makers; slip makers (pottery); slushers (porcelain enameling); solderers; stainers (shoes); steel engravers; stereotypers, storage-battery makers; sulphuric-acid workers; table turners (enameling); tannery workers; temperers; tile makers; tin-foil makers; tinners; toy makers; transfer workers (pottery); tree sprayers; type founders; typesetters; wallpaper printers; welders; white-lead workers; wood stainers; zinc smelters.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
29. Mercury and its compounds.	Ptyalism: swelling, inflammation, and bleeding of the gums; blue line on the gums, rodent ulcers, pallor, mercurial tremor, digestive disturbances, localized white spots in the mucosa surrounded by pale blue or reddened area, general weakness of the hand and digital extensors, foul breath, corrosion of the teeth, furunculosis, sleeplessness and depression or drowsiness and apathy, loss of energy and initiative.	Artificial-flower makers; battery (dry) makers; blowers (felt hats); bronzers; browners (gun barrels); brushers (felt hats); cap loaders; carroters (felt hats); cartridge makers; chlorine makers (electrolytic); color makers; coners (felt hats); dentists; detonator cleaners; detonato-fillers; detonator packers; devil operators (felt hats); dye makers; Edison storage battery workers; explosive workers; felt-hat makers; fireworks makers; fulminate mixers; fur handlers; fur preparers; gold refiners; hardeners (felt hats); incandescent-lamp makers; jewelers; mercurial-vapor-lamp makers; mercury bronzers; mercury miners; mercury-salts workers; mercury smelters; mercury-solder makers; mercury-still cleaners; mirror silverers; mixers (felt hats); paint makers; photographic workers; primers (explosives); refiners (metals); sizers (felt hats); sole-stitchers (Blake machine); starters (felt hats); steel engravers; stiffeners (felt hats); storage-battery makers; taxidermists; thermometer makers; water gilders; zinc-electrode makers.
30. Methyl alcohol..	Headache, nausea, abdominal cramps, ringing in the ears, muscular prostration, insomnia, delirium, difficulty of breathing, inflammation of the throat and mucous membrane of the air passages, conjunctivitis, serious affections of the retina and optic nerve resulting in blindness, fatty degeneration of the liver.	Aldehyde pumpmen; art-glass workers; artificial-flower makers; artificial silk makers; bookbinders; bronzers; brush makers; calico printers; celluloid makers; cementers (rubber shoes); dimethyl sulphate makers; dry cleaners; dryers (felt hats); dye makers; explosives workers, feather workers; felt-hat makers; filament makers (incandescent lamps); fitters (shoes); furniture polishers; gilders; hardeners (felt hats); incandescent lamp makers; ink makers; japan makers; lacquer makers; lasters (shoes); linoleum makers; millinery workers; mottlers (leather); painters; paint makers; patent leather makers; perfume makers; photo-engravers; photographers; polishers; shellac makers; shoe-factory operatives; shoe finishers; soap makers; stiffeners (felt hats); stitchers (shoes); tyre cleaners; upholsterers; varnish makers; vulcanizers; wood-alcohol distillers; woodworkers.
31. Methyl bromide.	Vertigo, headache, staring look, pallor of the skin, retarded pulse, constipation, excitability, trembling.	Antipyrin makers; dye makers.
32. Naphtha........	Headache, vertigo, nausea, vomiting, dyspnea, palpitation, insomnia, hysteria.	Bronzers; chauffeurs; degreasers (fertilizer, leather); dyers; furniture polishers; garage workers; gilders; metal-polish makers; painters; petroleum refiners; polishers; rubber workers; shoe finishers; waterproof-cloth makers; woodworkers.
33. Nitraniline......	*See* Aniline.	
34. Nitrobenzol and other nitro compounds of benzol and its homologues.	Icterical skin which gradually becomes cyanotic, methemoglobin formation, general debility, anemia, presence of hematoporphyrin, albumin, and sometimes free poison in the urine; skin eruptions, visual disturbances, dyspnea, odor of bitter almonds in breath.	Aniline makers; dye makers; explosives workers; perfume makers; smokeless-powder makers; soap makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
35. Nitroglycerin....	Severe headache, vertigo, nausea, paralysis of the muscles of the head and eyes as well as of the lower extremities, cyanosis, reddening of the countenance, burning in the throat and stomach, disturbances of digestion, trembling, neuralgia, colic, retarded respiration and heart action, obstinate ulcers under nails and on the finger tips, eruptions on the plantor aspect of the feet and interdigital spaces, with extreme dryness and formation of fissures.	Explosives workers; nitroglycerin workers; shell fillers.
36. Nitronaphthalene.	*See* Nitrobenzol.	
37. Nitrous gases and nitric acid.	Irritation of air passages, cough, labored respiration, inflammation of the eyes, corrosion of the teeth, erosion and perforation of nasal septum.	Acid dippers; acid mixers; acid recoverers; acid transporters; aniline makers; artificial leather makers; bleachers; carroters (felt hats); cartridge dippers; celluloid makers; dimethyl-sulphate makers; dippers (guncotton); enamelers; etchers; explosive workers; felt-hat makers; fertilizer makers; fur preparers; galvanizers; glue workers; guncotton dippers; guncotton wringers; imitation-pearl makers; incandescent lamp makers; jewelers; lithographers; miners; mordanters; nitrators; nitric-acid workers; nitroglycerin workers; photo-engravers; picklers; picric-acid makers; refiners (metals); soda makers; steel engravers; sulphuric-acid workers; towermen (sulphuric acid); wringers (guncotton).
38. Petroleum.......	Inflammation of the skin, acne, suppurating ulcers; papilloma; numbness and irritation of the Schneiderian membrane; headache and sensory disturbances; affections of the respiratory organs.	Browners (gun barrels); feather workers; furniture polishers; lampblack makers; millinery workers; oil-flotation-plant workers; oil-well workers; paraffin workers; petroleum refiners; temperers.
39. Phenol..........	Erosion of the skin, eczema, irritation of respiratory organs, digestive disturbances, symptoms of degeneration of the blood, emaciation, nephritis, gangrene, icterus.	Bakelite makers; calico printers; coal-tar workers; dye makers; dyers; etchers; gas (illuminating) workers; gas purifiers; lampblack makers; picric acid makers; rubber workers; smokeless powder makers; stillmen (carbolic acid); surgical-dressing makers; wood preservers.
40. Phenyl hydrazine.	Vesicular eruptions on the skin with itching and burning, diarrhea, loss of appetite, granular degeneration of the blood corpuscles, formation of methemoglobin, a sense of general malaise.	Antipyrin makers; dye makers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
41. Phosgene	Destruction of lung tissue, emphysema and edema, myocardial insufficiency due to the emphysema, pleural thickening and adhesions, chronic bronchitis, mild diffuse bronchiectasis, nocturnal dyspnea, polycythemia.	Dye makers; phosgene makers.
42. Phosphorus	Inflammation and sclerosis of the bones and of the periosteum, necrosis of the bones of the jaw, swelling and ulceration of the gums and buccal membrane, loosening and falling out of the teeth, suppuration and destruction of jawbone with fistulous channels burrowing through the cheek, meningeal inflammation, brittleness of bones, digestive disturbances, emaciation.	Boneblack makers; brass founders; fertilizer makers; fireworks makers; insecticide makers; match-factory workers; phosphate-mill workers; phosphor-bronze workers; phosphorus-compounds makers; phosphorus extractors.
43. Phosphuretted hydrogen.	Oppressed feeling in the chest, headache, vertigo, tinnitus aurium, general debility, loss of appetite, great thirst.	Acetylene makers; ferrosilicon workers; phosphorus extractors; phosphorus (red) makers.
44. Picric acid	Itching, inflammation of the skin, vesicular eruptions, yellow pigmentation of epidermis and conjunctiva, inflammation of buccal mucous membrane, digestive disturbances, vertigo, jaundice, nasal catarrh, nephritis.	Dye makers; dyers; explosives workers; photographers; picric acid makers; shell fillers; smokeless-powder makers.
45. Sulphur chloride.	Symptoms are due to the combined effects of chlorine, hydrochloric acid and sulphur dioxide. Sulphur chloride when in contact with moisture reacts with water to form these products.	Rubber-substitute makers; vulcanizers.
46. Sulphur dioxide.	Irritation of the mucous membrane of respiratory organs and eyes, spasmodic cough, bronchial catarrh, digestive disturbances, blood-tinged mucous.	Alkali-salt makers; blast-furnace workers; bleachers; brass founders; brick makers; broom makers; carbolic acid makers; chambermen (sulphuric acid); chargers (zinc smelting); copper smelters; dye makers; fertilizer makers; flue cleaners; fruit preservers; fumigators; galvanizers; glue workers; lead smelters; mercury smelters; oil-flotation-plant workers; petroleum refiners; pottery workers; pyrites burners; refiners (metals); rubber workers; storage battery makers; sugar refiners; sulphite cooks; sulphur burners; sulphurers (hops and malt); sulphuric-acid workers; tannery workers; towermen (sulphuric acid); zinc smelters.
47. Sulphuretted hydrogen.	Headache, debility, vertigo, nausea, disturbances of digestion, sallow complexion and emaciation, slowing of the pulse, conjunctival catarrh, tendency to the formation of boils.	Alkali-salt makers; artificial-silk makers; blast-furnace workers; bronzers; cable splicers; celluloid makers; dye makers; fertilizer makers; flax-rettery workers; gas (illuminating) workers; gas purifiers; glue workers; match-factory workers; miners; oil-flotation-plant workers; petroleum refiners; pyrites burners; sewer workers; soda makers; sodium sulphide makers; starch makers; sugar refiners; tannery workers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
48. Sulphuric acid..	Inflammation of respiratory organs, injury to teeth through softening of the dentine, chronic catarrh.	Acid dippers; acid finishers (glass); acid mixers; acid recoverers; acid transporters; ammonium-salts makers; ammonium-sulphate makers; artificial-leather makers; beta-still operators (beta naphthol); burnishers (iron and steel); calico printers; carbolic acid makers; carbonizers (shoddy); cartridge dippers; celluloid makers; chambermen (sulphuric acid); dimethyl-sulphate makers; dye makers; explosives workers; felt-hat makers; fertilizer makers; galvanizers; glass finishers; guncotton dippers; hydrochloric acid makers; jewelers; linoleum makers; mercerizers; nitrators; nitric-acid makers; nitroglycerine makers; oil - flotation - plant workers; patent - leather makers; petroleum refiners; phosphorus-evaporating machine operators; picklers; picric acid makers; reclaimers (rubber); salt extractors (coke oven byproducts); shoddy workers; storage-battery makers; sulphuric-acid workers; tallow refiners; tannery workers; temperers; towermen (sulphuric acid); wire drawers.
49. Tar.............	Tar itch, diffuse acne, eczema or psoriasis, loss of appetite, nausea, diarrhea, headache, numbness, vertigo, albuminuria, edema, ischuria, conjunctivitis, bronchitis.	Battery (dry) makers; briquet makers; brush makers; chimney sweepers; coke-oven workers; cord makers; flue cleaners; gas (illuminating) workers; insulators; paint makers; paraffin workers; pavers; petroleum refiners; roofers; roofing-paper workers; still (coal-tar) cleaners; tar workers; wood preservers.
50. Tetrachlorethane (acetylene tetrachloride).	Abnormal sense of fatigue, profuse perspiration, general discontent and grouchiness, inability to concentrate, nocturia, slight polyuria, dreaming, headache, vertigo, nervousness, insomnia, loss of appetite, constipation, diarrhea, gas in stomach, general abdominal pain, nausea, eructations of gas, vomiting, loss of weight, jaundice, enlarged liver, bile in the urine, abdominal tenderness, increase of mononuclear cells, appearance of many immature large mononuclears, elevation in the white count, slight anemia, slight increase in number of platelets.	Airplane-wing varnishers; artificial-silk makers; tapers (airplanes).
51. Trinitrotoluol...	Nose and throat irritation, obstinate cough, bluish color of the lips and lobes of the ears, yellowing of the whites of the eyes, expectoration of yellow mucous, discoloration—a mixture of lividity and jaundice, rash on the skin, shortness of breath, anemia, palpitation of the heart, bile-stained urine, rapid weak pulse.	Explosive workers; shell fillers.

J. Poisons—Continued.

Health hazard.	Symptom, condition, or disease to look for.	Occupations which offer such exposure.
52. Turpentine......	Irritation of the mucous membrane of the eyes, nose, and upper air passages; cough, bronchial inflammation; salivation; giddiness, headache, irritation of the kidneys, odor of violets in urine, severe irritation of the skin, eczema, and hardening of the epidermis.	Art-glass workers; cable splicers; calico printers; camphor makers; cementers (rubber shoes); decorators (pottery); dry cleaners; dye makers; enamelers; enamel makers; feather workers; furniture polishers; japan makers; lacquer makers; linoleum makers; lithographers; millinery workers; painters; paint makers; patent-leather makers; printers; rubber workers; sealing-wax makers; shellac makers; transfer workers (pottery); turpentine extractors; varnish makers.

SKIN IRRITANTS.

Because of the fact that dermatoses form such a large proportion of all occupational diseases and are often disabling, the more important occupations that are exposed to skin irritants have been listed separately. A complete enumeration of such occupations would be impossible. Almost any foreign substance can become a skin irritant if it is in continuous contact with the skin. Thus soap and water, which ordinarily do not irritate the skin, may cause severe dermatoses in washerwomen.

The data presented below are a compilation of the literature on the subject, taken largely from Dr. R. Prosser White's compilation of "Occupational Affections of the Skin."

Skin affections caused by different external irritants often show the same clinical picture. A number of occupational skin eruptions have no specific lesions or special pathology, which makes their differential diagnosis very difficult. Most superficial industrial skin diseases show simply a difference in degree of catarrhal inflammation, depending on the intensity of the irritant. For these reasons the symptoms for each irritating substance have not been listed as has been done for the other hazards.

Occupational dermatoses are characterized by their grouping, situation, mode of appearance, spread, and evolution. They crop up in series, retaining their initial type throughout, unless they are secondarily infected. They are most often local, except when they are a differentiating sign of the toxemias. The onset and development are usually sudden. The inflammation is sharply outlined. Exudation is excessive and there is deep-seated edema. The eruption usually predominates on the right side.

There are many cases of dermatitis which are caused by physical agents, such as heat, cold, friction, etc. In this bulletin these conditions are dealt with only as they are related to the hazards listed.

Thus among the symptoms for "Extreme dry heat" and "Extreme light" we find skin eruptions.

The following is the list of the more common occupations exposed to dermatoses with the irritating substances concerned:

Occupation exposed to specified skin irritants.

Occupation exposed.	Skin irritants.
Acetylene makers	Calcium carbide.
Acid workers	Acids.
Alkali-salt makers	Caustic alkali.
Artificial-flower makers	Caustic alkali, dyes.
Bakelite makers	Formaldehyde, phenol.
Barbers	Soap, hair tonics.
Battery (dry) makers	Acids, zinc chloride, ammonium salts, charcoal.
Beatermen (paper and pulp)	Caustic alkali, dyes.
Bleachers (cloth)	Acids, bleaching powder, caustic alkali, hydrogen peroxide, sodium silicate.
Blooders (tannery)	Dyes.
Bobbin carriers	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Bricklayers	Lime.
Bronzers	Dyes.
Broom makers	Dyes, vegetable dust.
Calico printers	Dyes.
Candy makers	Sugar.
Cap loaders	Mercury compounds.
Carbide makers	Calcium carbide.
Carbolic-acid makers	Caustic alkali, phenol.
Cardboard stickers	Sodium silicate.
Carroters (felt hats)	Acids, mercury compounds.
Cartridge dippers	Acids, soap.
Celluloid makers	Dyes.
Cementer (rubber shoes)	Benzine, coal-tar products, naphtha, methyl alcohol.
Cement workers	Lime.
Cloth preparers	Acids, caustic alkali, lime, soap, potassium salts, sodium salts, sodium silicate.
Confectioners	Sugar.
Cotton sizers	Acids, zinc, chloride, arsenic salts, phenol.
Curriers (tannery)	Paraffin, benzine.
Dampers (conditioning cotton)	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Dentists	Procain.
Detonator cleaners	Mercury compounds.
Detonator fillers	Mercury compounds.
Detonator packers	Mercury compounds.
Disinfectant makers	Formaldehyde.
Druggists	Bleaching powder, soap, iodoform, sodium salts, sugar.
Dye makers	Acids, benzine, caustic alkali, coal-tar products, dye intermediates, dyes, turpentine, antimony compounds, barium salts, calcium salts, cresol, dextrins, ferrocyanides, formaldehyde, gums, hydroquinone, lead salts, phenol, potassium chlorate.
Dyers	Dyes.
Electroplaters	Acids, benzine, caustic alkali, lime, potassium cyanide, soap, nickel sulphate.
Embalmers	Formaldehyde.
Engravers	Acids, caustic alkali, ferric chloride, potassium cyanide.
Etchers	Acids, caustic alkali.
Explosives workers	Dye intermediates, explosives (TNT, etc.), ammonium salts, bromine, mercury compounds.
Felt-hat makers	Acids, mercuric nitrate, dyes.
Fish dressers	Brine.
Flax spinners	Lime, brine.
Furniture polishers	Benzine, caustic alkali, naphtha, turpentine, methyla lcohol, pyridin, rosin.
Fur workers	Dyes.
Galvanizers	Ammonium chloride.
Gas-mantle impregnators	Thorium compounds.
Glass blowers	Charcoal, pitch, rosin.
Glass mixers	Caustic alkali.
Ink makers	Dyes.

Occupation exposed to specified skin irritants—Continued.

Occupation exposed.	Skin irritants.
Lampblack makers	Soot.
Laundry workers	Caustic alkali, soap.
Lime burners	Lime.
Lime pullers (tannery)	Lime.
Linoleum makers	Dyes.
Machinists	Cutting compounds, lubricants, oils.
Masons	Lime.
Match-factory workers	Dyes, dextrins, gums.
Mercerizers	Acids, caustic alkali.
Mixers (rubber)	Accelerators (hexamethylenetetramine).
Mordanters	Acids, caustic alkali, chromates, zinc choloride, aluminum salts, antimony compounds, arsenates, chromium salts, copper salts, iron salts, lead salts, phosphates, silicates, tin salts.
Mottlers (leather)	Dyes.
Nickel platers	Zinc chloride, nickel sulphate.
Nitroglycerin makers	Acids, explosives.
Packing-house employees	Brine.
Painters	Acids, caustic alkali, paints, zinc chloride.
Paint makers	Paints.
Paper-box makers	Glue.
Paraffin workers	Paraffin.
Parchment makers	Zinc chloride.
Pencil (colored) makers	Dyes.
Petroleum refiners	Caustic alkali, paraffin.
Photographers	Acids, caustic alkali, chromates, metol, pyrogallic acid, turpentine, amidol, bronzing powder, hydroquinone, rodinal.
Photographic plate cleaners	Caustic alkali.
Pitch workers	Pitch.
Plasterers	Lime.
Polishers	Caustic alkali, naphtha.
Polishers (silver and brass)	Potassium cyanide.
Printers	Ink, benzine.
Rock-salt workers	Brine.
Rope makers	Oil, tar.
Rubber workers	Accelerators (hexamethylenetetramine).
Salt preparers	Brine.
Scratch brushers (electroplating)	Acids, benzine, lime, oils.
Shell fillers	Explosives (TNT, etc.).
Shoe finishers	Benzine, coal-tar products, naphtha, methyl alcohol.
Sizers (cotton)	Zinc chloride, aluminum salts, calcium salts, magnesium salts.
Soap makers	Caustic alkali, soap, vegetable oils, sodium silicate.
Sodium hydroxide makers	Caustic alkali.
Solderers	Acids, zinc chloride.
Sugar refiners	Sugar.
Tannery workers	Acids, lime, sodium sulphide, arsenic salts, brine, calcium hydrosulphide, chromium salts.
Temperers	Oil, brine.
Tinners	Zinc chloride.
Tobacco rollers	Vegetable dust, vegetable oils.
Tube layers (cotton conditioning)	Nitrobenzol, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Typists	Carbon paper.
Vulvanizers	Accelerators (hexamethylenetetramine).
Washers	Caustic alkali.
Washwomen	Caustic alkali, soap, sodium salts.
Watchmakers	Potassium cyanide.
Waterproofers (paper)	Paraffin.
Wax-ornament makers	Dye intermediates, potassium cyanide.
Wet-bobbin winders	Lime, aluminum salts, formaldehyde, magnesium salts, sodium fluosilicate.
Wood preservers	Tar, zinc chloride.
Zinc-chloride makers	Acids, zinc chloride.

HEALTH CONDITIONS OF THE NAVY.

Health conditions of the Navy during the month of September were excellent. The annual admission rate for all causes, entire Navy, for the four-week period ending October 7 was 578 per 1,000 per annum, as compared with 576 per 1,000 per annum for the five-week period ending September 9.

There has been little change in the morbidity rates for communicable diseases; the annual admission rate for the four-week period ending October 7 was 49 per 1,000, as compared with 47 per 1,000 for the five-week period ending September 9.

The following table gives the annual admission rate per 1,000 for certain communicable diseases for the current month of September, 1922, in comparison with the mean annual admission rates, month of September, for the four-year period 1918–1921, inclusive:

	September, 1918–1921.	September, 1922.
Cerebrospinal fever	0.18	0
Diphtheria	1.09	0
German measles	.29	0.40
Influenza	100.92	30.64
Malaria	20.97	19.01
Measles	4.00	.25
Mumps	11.65	.61
Pneumonia	5.21	1.01
Scarlet fever	.74	.25
Smallpox	.04	0
Tuberculosis	3.48	1.92
Typhoid fever	.08	0

There were 173 admissions with dengue during the month of September, 132 occurring in insular and foreign stations, 24 in the United States, and 17 among the forces afloat. The admission rate for pneumonia is somewhat higher than it has been during the past two or three months, the rate for the four-week period ending October 7 being 1.5 per 1,000 per annum. Only an occasional case of measles, mumps, or scarlet fever has been reported during the past four weeks, either ashore or afloat.

There has been a decided increase in the incidence of venereal disease during the past two months, the admission rate for these diseases, entire Navy, for the four-week period ending October 7 being 163 per 1,000 per annum. The morbidity rate for the venereal diseases for the entire Navy for that portion of the year passed is now 118 per 1,000 per annum.

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ANNUAL PHYSICAL EXAMINATION OF OFFICERS.

The annual physical examination of officers and the physical examination of men upon enlistment or reenlistment are without question the most potent measures in the hands of medical officers for the prevention of disease in the Navy. Not only is this procedure of utmost importance in protecting the Government from financial loss and in keeping its officers and men fit, but is, as well, or should be made, of equal importance to each man examined, for by this means disease conditions may be detected in their incipiency; and if there is any chance of curing the disease or arresting it, the earlier it is detected the sooner will the man be restored to full activity. The Navy must have its officer personnel, as well as its enlisted personnel, in the very highest physical condition if it expects to be at all times prepared. It was said by Napoleon "that an army fights upon its stomach," but nowadays it is well known that men must not only be well fed but must be kept in the very prime of condition. Many factors bring about lowered physical vitality; therefore, unless constant check is kept upon the physical condition of man and his methods of living, those factors that bring about lowered resistance will continue and the diseases which have commenced will gain such headway that it will be impossible to arrest them.

Until comparatively recently few men of the medical profession gave the proper attention to the periodic inspection of the human mechanism. It is difficult to understand why this important procedure should have been neglected by physicians for so many years, when it is considered that men in other walks of life, with whom they are coming into constant contact, have found it to be economical to keep constant check on their machinery or cattle, as the case may be. Frequently it will be found that even the doctor of medicine who owns an automobile actually gives more attention to the condition of the machinery of his automobile than to his own health or the health of his clientele. The same thing seems to be true for the stock raiser; he is more concerned with the health of his cattle than with his own health or that of his employees. Undoubtedly this attitude is due to the fact that when machinery or cattle are neglected there is a more or less immediate financial loss to the owner. The financial loss as a result of neglect of the human body is in all probability greater than that due to the neglect of machinery, but such losses are slow and not so apparent. In years gone by, and to a great extent to-day, the average man called a doctor of medicine, when sick, expecting to be cured of his ailment; but few men, even in this enlightened time, think of requesting a doctor to advise them as to their physical condition at periodic intervals. It is generally conceded to-day that this must change; in fact, it is already changing. The Life Extension Institute of America is now examining many thousands of men, women, and children at periodic intervals. So too, the Metropolitan Life Insurance Co. is offering such services to its policyholders. Other organizations are doing likewise.

Although the Navy has required physical examination of its personnel upon entrance into the service, and has also required annual physical examination of officers since Roosevelt was President, we, as medical officers, have never looked upon the annual physical examination with quite the proper attitude. Many medical officers look upon it as a part of their daily routine and do not seem to realize the importance of such an examination, either to the Government or to the officer being examined. For example, a medical officer recently stated that he was examined at a naval dispensatory on January 24, 1922, and that his examination was of the most perfunctory character. The medical officer carrying out the examination instructed this officer to take off his coat and then left the room. A hospital corpsman took his blood pressure, tested his eyes, took his color perception—a useless procedure, as his color perception had been tested many times—counted and recorded his pulse, and took a specimen of urine. The hospital corpsman then called the examining physician, who instructed the medical officer being examined to open his shirt, whereupon he listened to his heart. After this he was told that his examination had been completed. This medical officer then requested that he be given a thorough and proper physical examination, inasmuch as he desired to be inspected carefully at least once each year. The medical officer performing this examination must have had little interest in his work or knew little of the preventive value of such an examination. The examining doctor happened to be an owner of an automobile, so the medical officer who was being examined asked him if he ever took his automobile to the service station to have it inspected. He was informed that this was done regularly once a month to prevent an accident occurring on the road. This man had confidence in the ability of the men at the automobile service station and did not expect them to slur over their work. Still, he, whose business it was to prevent an accident occurring on the road of life, slurred over his work.

In order to show the impression made upon line officers by such negligence, the following experience of a line officer is related: Commander ——— presented himself at a naval dispensary for a physical examination. He was told to strip to the waist; his blood pressure was taken by a medical officer and his heart was examined. The only other procedure carried out was the testing of his color perception. This officer was then told to put on his clothes. The medical officer requested him to furnish a specimen of urine and then left the room. This commander stated that when he was dressed he went to the office of the medical officer, expecting that at least his eyes, ears, and mouth would be examined. When he walked into the office he was informed by the medical officer that his examination had been completed. Inasmuch as Commander ——— had had previous trouble with his eyes and was a man of about 40 years of age and was commencing to lose his near vision perception upon reading, he desired to know whether he needed a change in glasses. He had also had a middle-ear infection the previous year, and therefore desired to know if his ears were normal, or certainly whether the disease process had been entirely arrested. Upon his own request his eyes and ears were examined. This officer informed the writer that he considered the annual physical examination as worthless. He stated that as he was about 40 years of age, he realized that there must have been certain changes taking place in his body, and therefore considered it important to keep check on his physical condition, the same as he had done with the machinery of a destroyer of which he had recently been in command.

He stated that a civilian friend of his in New York had himself examined once or twice a year and that the examining doctors advised him what measures to take to keep himself in proper physical condition. This officer also stated that he was not "talked to" by the medical officer concerning his health during the past year or more. He was curious to know if this should not be an important part of any yearly physical examination.

Can we, as specialists in the field of preventive medicine, allow such an impression to prevail among our fellow officers? Quite true, only a few medical officers are so lax in the performance of their duties as those mentioned above, but the few will give a poor impression of the others.

The annual physical examination is a most important procedure and should be looked upon by the medical profession as well as the laity as of sufficient importance for every man to demand that he receive the proper examination and that he be given such advice as is found necessary. In order to show how such physical examinations are considered by the American physicians to-day the following resolution, which was presented to the American Medical Association at its last session by Dr. Victor C. Vaughan, District of Columbia, chairman of the council on health and public instruction, is quoted from the Journal of the American Medical Association:

"Whereas the need and value of periodic medical examination of persons supposedly in health are increasingly appreciated by the public, it is recommended by the council on health and public instruction that the house of delegates authorize the council to prepare suitable forms for such examinations and to publish them in the Journal of the American Medical Association; and that the county medical societies be encouraged to make public declaration that their members are prepared and ready to conduct such examinations, it being understood that the indigent only shall be examined free of charge and that all others are expected to pay for such examinations."

THE INDIVIDUAL HEALTH SURVEY.

The following is quoted from Health News, Department of Health, New York State, for July, 1922:

"The periodic physical examination stands forth every day more clearly as the fundamental requirement of modern preventive medicine as applied to the individual. We need offer no apology for again urging this subject upon the attention of the readers of Health News. In his opening address at the recent State conference of health officers at Saratoga, Commissioner Biggs gave new emphasis to the need and the growing demand for systematic examination by competent medical advisers in order to preserve health and ward off incipient disease. In this issue is also presented the thoughtful address of Dr. Thomas Ordway at a previous conference, in which he discusses the physical examination under the analogy of a well-rounded sanitary survey which should be scientifically carried out for each individual as well as for the community. Such work to meet with any considerable degree of public approval must rest on well-established scientific foundations, must avoid jumping at conclusions, eschew therapeutic fads and fancies, and beware of exaggerating minor defects until the patient is frightened into a state where he is unfit for any good work. Indeed, the whole procedure must take the fullest account of mental as well as physical hygiene, never losing sight of the duality in the unity of our make-up. Thus conceived and utilized, the personal health survey may perhaps be the means of leading twentieth century Americans back—and in this respect forward—toward the perfection of the Greek ideal of integral health of mind and body.

"Forward-looking young physicians are already turning to personal preventive medicine as a new specialty. They see the time at hand when the full equipment and energy of many well-trained practitioners will be required to advise well patients how to stay well. According to popular mythology this is the rôle of the Chinese doctor, though eastern travelers find no present foundation for the time-honored notion. Yet certainly the basic idea is worthy of the profound wisdom of ancient eastern civilization. Leaders in medical education are awake to the present trend, and some of them would say to the rank and file of medical practitioners: 'Unless you are equipped to examine and advise a well patient who seeks your counsel on how to keep well, the advancing general intelligence in matters of hygiene and the danger signals of incipient disease will soon relegate you to a place among the back numbers of our profession.'

"The whole movement is dependent on the increased knowledge and the informed free will of the individual. Through a curious misconception some critics of Doctor Biggs' remarks at Saratoga have found in his address a demand for periodical physical examinations, made compulsory by law or by Executive order. Nothing could be more inexpedient or more unsound in psychology than to attempt to make mandatory a procedure which should find its compelling motive in the enlightened self-interest of every citizen and responsible parent."

ABSTRACTS FROM THE SANITARY REPORT, FIELD HOSPITAL, FIFTEENTH REGIMENT, UNITED STATES MARINES, SAN PEDRO DE MACORIS, FOR THE PERIOD JANUARY 1 TO AUGUST 1, 1922.

Malaria is by far the most prevalent disease in the Fifteenth Regiment. The plotted curves of "Admissions—all causes," "Number of sick days—all causes," and "Admissions—malaria," are practically parallel throughout the period covered by this report. The disease is usually of the benign tertian type, but the malignant variety caused from 15 to 20 per cent of the admissions. All cases are given prolonged aftertreatment. Still there are many readmissions, due in part, no doubt, to reinfections. Quinine prophylaxis is not given except in the case of troops operating for short periods of time under unfavorable circumstances. Preventive measures in the semipermanent camps are directed toward adequate screening of sleeping men and against possible breeding places.

Smallpox is prevalent among the native population, 20 to 30 cases being the number usually present in the town. Revaccination at intervals has prevented any cases from occurring in the personnel of the regiment. One officer developed the disease within a few days after his detachment to the Policia Nacional Dominicana at Santo Domingo City.

The venereal diseases are prevalent among the native population, and as a consequence the venereal rate in the regiment has at times shown a tendency to reach an abnormally high level. More radical means of insuring adequate prophylaxis are being considered, and it is believed that the future will show a very marked decrease in the incidence of these diseases.

There have been numerous admissions for dysentery, very largely of the simple type, which has responded readily to treatment. There was one death from amoebic dysentery.

Because of the presence of dysentery, smallpox, and malaria closer cooperation with the local Oficina del Sanidad has been attempted. Unfortunately, the present incumbent of that office is inefficient and undesirable, and it is only through constant pressure and frequent inspections that progress has been made. However, it is believed that considerable improvement has taken place in the sanitary conditions of the food-handling agencies, such as bakeries, cafés, and restaurants, which might have a bearing on the health of the troops.

NOTES FROM THE MARINE BARRACKS, QUANTICO, VA.

The general health of the command has been uniformly good, except for an increase in malaria, which is not unusual during August. Most of the cases contracted their infection in the Tropics and were readmissions. However, there were 13 original admissions. Each case was investigated carefully as to whether or not the man had ever had tropical duty or had previously lived in a malarial district. Nothing definite could be determined. Some of the patients, born in the South, stated that malaria was prevalent around their homes but denied ever having had it themselves; others were born and reared in the North. Consequently these patients must be considered as having acquired their infection on the reservation.

Closer cooperation with the post laboratory has been established by an order requiring that a blood smear be taken in all suspected cases and the parasite demonstrated before a diagnosis of malaria was made. This precaution tended to reduce the number of admissions to some extent.

The water supply was found to be contaminated with B. coli once during the month. Upon investigation it was discovered that the chlorine cylinders were being changed at about the same time the sample for the test was taken, and consequently for a short while the water was not being chlorinated.

INSTRUCTIONS TO MEDICAL OFFICERS.

Circular letter. HWS: WAL 125221(93).
Serial No. 214—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 15, 1922.

To: All medical officers.
Subject: Preliminary examination of applicants for aviation training.
Reference: Bureau of Navigation Manual, 1921, page 60, paragraph C-33.

1. The following instructions are issued to define the scope of the preliminary examination of applicants for aviation training required by the above reference. It is to be noted that these instructions are supplementary to those contained in chapter 11, Manual of the Medical Department, 1917, which will remain in force until the (new) Manual, 1922, is issued. Upon receipt of the new Manual these instructions will lapse and the procedure described therein will be followed by all medical officers so far as may be possible with apparatus at hand.

2. *Eye examination.*—

(*a*) Any gross defect of the eyes or lids, squint, or any condition tending to progress that may impair vision later on will disqualify and must be recorded.

(*b*) Vision: 20/20 vision is demanded. No applicant will be accepted whose vision does not come up to this standard. Visual acuity will be tested in the usual manner in a good light and with the test types free from dirt. In case a letter or letters in any line is misread it may be offset by reading the same number of letters in the next smaller line. The best possible vision will be recorded by noting the number of the line read plus the number of letters correctly read in the next smaller line, thus: 20/20+3; 15/20+1.

(*c*) Color vision: Each eye will be tested separately while the other is covered with a suitable shield. If any hesitation or confusion is apparent, the test must be checked by the confusion skeins or other suitable color test. No defect in color vision will be waived and any existing defect must be recorded.

(*d*) Spontaneous nystagmus: Spontaneous nystagmus will be tested by having the applicant hold his head still, face forward, while following the examiner's finger with his eyes in the following directions: Right, right and down, down, down and left, left, left and up, up, up and right. Nystagmus in any except the extreme positions will disqualify and will be recorded.

3. *Ear examination.*--

(*a*) Record any abnormality of the ears or defect in hearing. Both tympanic membranes must be seen clearly when examined so that an accurate record may be made. Permanent blocking of either canal or a diseased condition that may impair hearing later on will be recorded. Perforation, inflammation, evidence of past inflammation, irreducible retraction of a membrane, or the presence of pus will be recorded.

(*b*) Hearing: Hearing will be tested as follows:

(1) Watch test: A loud-ticking watch that has been standardized on three people with normal ears will be used. The result will be recorded as 40/40, or a fraction thereof as 28/40.

(2) Coin-click test: The applicant, with his back turned, will stand 20 feet from the examiner in a quiet room. The examiner will hold a coin between the thumb and forefinger of either hand, and while an assistant closes one ear of the applicant will click the coins softly together and require the applicant to tell the number of clicks. If the applicant is unable to hear the clicks at a distance of 20 feet, the examiner will approach slowly until the clicks are heard. Each ear will be tested in turn and the result recorded as 20/20 or a fraction thereof.

4. *Past history.*—A careful examination will be made into the past history of an applicant with especial attention given to the following points, and record made of any found:

Syphilis.
Repeated attacks of hay fever or asthma.
Recent attacks of malaria.
Paroxysmal tachycardia.
Organic heart disease.
Goiter.
Nervous or mental disease in his own family or collateral branches.

5. *Height and weight.*—Height and weight will correspond to the standard set in chapter 11 of the Manual for the Medical Department, with slight variations allowable at the discretion of the bureau. The height shall be not less than 64 inches. The weight shall be not less than 120 nor more than 200 pounds. The applicant must be well proportioned and active.

6. *Pulse and blood pressure.*—The pulse rate and blood pressure will be taken after the applicant has reclined five minutes, and recorded. He will then be required to stand for two minutes and another record made of pulse rate and blood pressure. The difference between reclining and standing pulse rates should not exceed 35. A marked drop in blood pressure from reclining to standing will cause rejection. In no case should the blood pressure exceed 145 mm. Hg., and where the applicant is under 25 years of age it should not exceed 135 mm. Hg. The diastolic blood pressure is roughly two-thirds of the systolic. If the first examination indicates a high blood pressure, the applicant will be examined twice daily (morning and afternoon) until his normal is determined.

7. *Urine analysis.*—A urine analysis will be made in each case. The presence of albumen, sugar, or casts will disqualify unless three clear specimens can be obtained on successive days.

E. R. STITT.

Circular letter. DCC: SMS 128586(92).
Serial No. 215—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 16, 1922.

To: All naval hospitals.

Subject: Medical surveys in the case of enlisted men, United States Navy, with more than 12 but less than 16 years' service and more than 25 years' service.

Reference: (*a*) Act of Congress, July 1, 1922.
(*b*) Decision of the Judge Advocate General, dated August 29, 1922.

1. Paragraphs (13) and (14) of reference (*b*) are quoted for your information.

"13. Applying these decisions to the provisions under consideration, this office is of the opinion that the beneficial character of these statutes is such as to exclude discharges from the naval service except by sentence of a court-martial in the cases of enlisted men who had not less than 25 years' service to their credit on July 1, 1922, and enlisted men who had to their credit more than 12 years' but less than 16 years' service on that date.

"14. Answering more especially the question presented, you are advised that in the opinion of this office enlisted men in the Navy who had to their credit on July 1, 1922, more than 12 years' but less than 16 years' service shall be permitted to reenlist and to continue serving until they are eligible for transfer to the Fleet Naval Reserve after 16 years' service without reference to their physical or other qualifications."

2. In view of the above decision of the Judge Advocate General, it is requested that naval enlisted men with more than 12 but less than 16 years' service and more than 25 years' service on July 1, 1922, be not surveyed and recommended for discharge from the service. If it is deemed advisable to have a medical survey in these cases, it is recommended that it be held for record only.

3. Where the patient himself desires discharge from the service, and does not wish to remain in the service until his 16 or 30 years' service have been completed, he should be requested to make formal application, over his own signature, to the Secretary of the Navy to that effect.

4. It is understood that this decision does not apply to the United States Marine Corps.

E. R. STITT.

Circular letter. DCC:SMS 124680(93).
Serial No. 216—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 16, 1922.

To: All naval medical officers.
Subject: Health record.

1. This bureau has prepared for issue a revised health record.

2. The duplicate descriptive sheet (carbon copy to be forwarded to the bureau) has been left out, as the sheets can not be promptly filed owing to lack of clerical force.

3. The outline figure charts have been replaced, as the written description by different medical officers of the same man do not, in many instances, agree as to locality of marks and scars.

4. The abstract of medical history has been revised, so that the dates of admission and discharge for disease or injury may be entered for the reference of future medical officers who may treat the man.

5. Attention is called to the fact that this bureau has to conduct considerable correspondence because medical officers do not enter in the health record a note or admission for minor disabilities when they occur. Slight deafness due to gunfire, slight sprains, and other minor injuries which do not cause marked disability at the time are often the bases of claims for compensation or pension, and the man may lose the claim because there is no entry in his health record, unless the medical officer, probably years later, can recall the disability. In order to more definitely establish claim for pension or compensation, these cases should be admitted for record and the origin stated.

6. It is particularly desirable that defects noted at enlistment be recorded. Surveys received in the bureau shortly after enlistment show that many men are enlisted without a close examination by the medical officer, e. g., perforated eardrums with purulent discharge, old fractures with adherent scars, amblyopia, etc.—conditions which are manifest on careful examination.

7. The bureau desires to call attention to the large number of skeleton records received with only the man's name and rate and the words "skeleton record" written across the face of the descriptive sheet. Attention is called to paragraphs 7 and 10 of the instructions on the cover of the health record.

8. Medical officers are again requested to make a concise statement as to the reasons for assigning the origin of a disability, especially when the entry is "not in line of duty." Much correspondence could be avoided if attention is given to this matter.

9. The attention of medical officers on recruiting duty is called to the fact that the Manual for the Medical Department should be followed in examining recruits, in order that there may be uniformity in examinations throughout the recruiting service.

10. The instructions printed on the cover of the health record should be carefully followed in regard to the use, care, and disposal of the health record.

E. R. STITT.

Circular letter.
Serial No. 217—1922.

PSR-RM 127039(93).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 16, 1922.

To: District medical officers, naval districts; commanding officers, naval hospitals; medical officers, recruiting stations.
Subject: Vacancies in Naval Medical Corps.

1. The constantly increasing shortage of medical officers is becoming a serious menace to the efficiency of Medical Department activities, and it becomes necessary to make extraordinary efforts to secure suitable candidates for entrance into the corps.

2. To this end it is desired that commanding officers of naval hospitals, medical officers detailed to recruiting duty, and particularly district medical officers, make an effort to get in touch with recent graduates of Class A medical schools and those about to vacate interneships in civil hospitals, with a view to presenting to those of suitable type the advantages offered by a commission in the Naval Medical Corps and to secure sufficient applicants to fill the present vacancies in the corps, which will amount to approximately 40.

3. Those interested should be directed to make application direct to the Bureau of Medicine and Surgery either for further information or for authority to take the entrance examination, which will be arranged at the nearest naval hospital or navy yard.

4. This matter is one of vital interest to the welfare of the corps, and while it is desired that officers to whom this circular is addressed make special efforts along these lines, it is also desired that all medical officers interest themselves in the subject and endeavor, wherever suitable, to interest young men who would make desirable additions to the corps.

E. R. STITT.

Circular letter.
Serial No. 218—1922.

HWS:MFD 125561(93).

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 22, 1922.

To: All medical officers.
Subject: Venereal prophylaxis.
Reference: (*a*) Medicine and Surgery circular letter, serial No. 158—1922.
(*b*) U. S. Naval Medical Bulletin, March, 1922, pages 604–605.

1. The bureau desiring to obtain at the earliest possible moment reliable information that would serve to indicate the efficacy of self-administered prophylaxis as now largely practised, medical officers are directed to submit any statistics or other data that would aid the bureau in ascertaining the precise value of this method.

2. In this connection, medical officers are urged to instruct the personnel adequately in the application of this prophylactic method and to make clear the importance of the time element and other factors influencing its effectiveness.

E. R. STITT.

Circular letter. WSG:ESK 127401(94).
Serial No. 219—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., September 28, 1922.

To: All naval hospitals.
Subject: "Navy Day."
References: (*a*) Letters of Secretary of the Navy 3909–1124, September 12, and 3909–1124–3, of September 22, 1922.
(*b*) Bureau's letter 127401(92) of September 20, 1922, to naval hospitals within continental limits.
Inclosures: Secretary's letters (reference *a*).

1. The inclosed letters are forwarded for your information, and particular attention is invited to paragraph 2 of the first inclosure.

E. R. STITT.

Circular letter. WSD/JBC 124677–O.
Serial No. 220—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., October 7, 1922.

To: All naval hospitals (continental limits), naval submarine base, New London, Conn.; naval submarine base, San Pedro, Calif.; sick quarters, marine barracks, Quantico, Va.
Subject: Care of the dead; supervision over work of contract undertaker.
Reference: (*a*) Article 1841, Navy Regulations.
(*b*) M. and S. circular letter, serial No. 181—1922, No. 129504(44), April 24, 1922.

1. Several complaints recently have come to the bureau regarding the condition of bodies prepared by civilian undertakers under contract with naval hospitals. Investigation of the complaints leads to the belief that a more careful supervision over the undertaker's work may be necessary to safeguard the interests of the Government and of the relatives of the deceased.

2. To this end, it is desired that the inspection by a medical officer prescribed by article 1841(4), Navy Regulations, shall be sufficiently thorough to determine that the entire body has been reached and saturated by the embalming fluid. If practicable, there should be two inspections; the first after embalming has been completed, but before the body has been clothed, as to the efficacy of the embalming process; the second, after the body has been clothed and encased, as to general appearance, completeness, correctness, and condition of uniform and clothing, position in casket, and condition of casket.

3. All persons concerned in care and disposal of the remains of the dead should be required to familiarize themselves with the instructions contained in the above-mentioned circular letter regarding embalming and preparation of remains, which will assist them in determining the condition of the body. Particular attention should be given to those parts enumerated in the circular letter as less likely to be preserved by the arterial injection.

4. In no instance should a body be released for shipment until the inspecting officer is satisfied it is so preserved that it may be reasonably expected to reach its destination in proper condition, and that the clothing and encasement are in accordance with Navy Regulations and the terms of the contract. Whenever necessary, the body should be held for repeated attention until its

condition is satisfactory, as it is better that there should be complaints regarding delays in shipment than of faulty embalming or improper encasement. If for any unusual reasons, such as long immersion in cases of drowning, or where the body has reached the undertaker after long delay, satisfactory results can not be obtained, the relatives should be informed of the circumstances in advance, and the casket should be sealed, and plainly marked "Not to be opened."

5. While it is not intended that the contract undertaker shall be compelled to follow the technique of the circular letter, it is apparent that in preparing bodies for shipment there should be some modification of the process usually employed when burial is to be made locally. The undertaker will therefore be required to use such additional measures as may be necessary to insure arrival of the body in condition to be viewed.

E. R. STITT.

Circular letter. WSD/JBC 124677-O.
Serial No. 221—1922.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., October 12, 1922.

To: All naval hospitals; naval unit, Fitzsimons General Hospital, Denver, Colo.

Subject: Disposal of remains of retired enlisted men of the Marine Corps who die in naval hospitals.

Reference: (*a*) M. and S. circular letter, serial No. 152—1921, No. 124677-O (123), December 22, 1921.
(*b*) Letter from headquarters, Marine Corps, No. 28937, October 6, 1922.

1. The following communication (reference *b*) has been received from Marine headquarters:

"It has been brought to the attention of this office in several cases where retired enlisted men of the Marine Corps have died in naval hospitals that the remains have been turned over to relatives or other interested parties for interment. Payment of the necessary burial expenses involved has caused considerable correspondence in the claims for reimbursement for reasonable amounts in such cases. In order to avoid controversy with the Comptroller General's Office it is suggested that, if practicable, in the future all contracts made for the burial of enlisted men of the Navy and Marine Corps, on the active list be so worded as to include retired enlisted men of the Marine Corps, in view of the fact that such provision is made in the appropriation for the maintenance of the Quartermaser's Deparment of the Marine Corps yearly."

2. The appropriation under "Maintenance, Quartermaster's Department, Marine Corps," to which reference is made reads as follows: "*Contingent, Marine Corps.* For * * * funeral expenses of officers and enlisted men, and retired officers on active duty during the war *and retired enlisted men of the Marine Corps*, including transportation of bodies and their arms and wearing apparel from the place of demise to the homes of the deceased in the United States; * * *."

3. In accordance with the above, the remains of *retired enlisted men of the Marine Corps* who die in naval hospitals will be prepared, encased, and buried, or shipped to their homes in the United States, at Government expense, as a charge against the above-mentioned appropriation. One additional requisition will be immediately submitted by the hospital, covering the balance of the

current fiscal year (and thereafter yearly), in terms similar to the following example, providing both for local interment and shipment of the remains of deceased enlisted men of the Marine Corps. The expenditures under this requisition will be made chargeable against "Maintenance, Quartermaster's Department, Marine Corps."

EXAMPLE.

1. For the preparation and burial of the remains of retired enlisted men of the Marine Corps during the fiscal year ending June 30, 1923, including preparation of remains, embalming, encasement (casket and outside box), health department permit, etc., hearse and two seven-passenger automobiles for transportation to the cemetery, and opening and closing of grave.

2. For all services, etc., included in item No. 1, except that casket and outside box will be furnished by the Government.

3. For the preparation of the remains of retired enlisted men of the Marine Corps for shipment to their homes during the fiscal year ending June 30, 1923, including preparation of remains, embalming, hermetical encasement (including inside shell, metallic casket, and shipping box, all complete), health department permit, etc., and delivery to shipping point.

4. For all services, etc., included in item No. 3, except that Navy standard hermetical casket and shipping box will be furnished by the Government.

Services to be rendered promptly upon receipt of notification, and all services rendered and material supplied to be of a kind and character satisfactory to the commanding officer.

NOTE.—It will be advisable for purposes of practical administration to make award under this requisition to the undertaker now holding contract under hospital requisition Nos. ——— and ———, provided his terms are not in excess of his contracts for exactly similar work under the requisition just mentioned.

4. According to the statement of Marine Headquarters, no allotment of funds will be required.

5. All other provisions of reference (*a*) remain in effect.

E. R. STITT.

VITAL STATISTICS.

The "Monthly Health Index," which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the "Monthly Health Index."

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

TABLE NO. 1.—*Monthly report of morbidity in United States Navy and Marine Corps for the month of September, 1922.*

	Entire Navy.	Forces afloat.	Atlantic Fleet.	Pacific Fleet.	Shore stations.	Atlantic stations in United States.[1]	Pacific stations in United States.	Marine Corps.
Average complement	[2] 118,674	[2] 72,488	[2] 29,084	[2] 33,311	[2] 46,186	[2] 24,006	[2] 7,458	21,848
All causes:								
Number of admissions	5,491	2,512	1,028	524	2,979	1,599	258	981
Annual rate per 1,000	555.20	415.84	424.14	188.77	773.97	799.29	415.12	538.80
Disease only:								
Number of admissions	4,885	2,166	878	452	2,719	....	....	886
Annual rate per 1,000	493.92	358.56	362.25	162.83	706.42	....	....	486.62
Injuries and poisons:								
Number of admissions	606	346	150	72	260	....	....	95
Annual rate per 1,000	61.27	57.28	61.89	25.94	67.55	....	....	52.18
Communicable diseases exclusive of venereal disease:								
Number of admissions	712	135	....	....	577	208	12	237
Annual rate per 1,000	71.99	22.35	....	....	149.91	103.97	19.31	130.17
Venereal disease:								
Number of admissions	1,411	963	280	102	448	164	44	236
Annual rate per 1,000	142.67	159.42	115.53	36.74	116.39	81.98	70.80	129.62

[1] Does not include ninth naval district.
[2] Includes Navy and Marine Corps personnel.

NOTE.—Asiatic and unassigned ships not reported.

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of September, 1922.*

	Forces afloat, Navy and marines (complement), 72,488.		Forces ashore, Navy and marines (complement), 46,186.		Total (complement) 118,674.	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases	2,166	520.60	2,719	706.42	4,885	493.92
Injuries and poisons	346	56.93	260	67.55	606	61.27
Total admissions	**2,512**	**413.30**	**2,979**	**773.97**	**5,491**	**555.20**
Class III:						
Appendicitis, acute	40	6.62	38	9.87	78	7.89
Autointoxication, intestinal	10	1.66	10	2.60	20	2.02
Cholangitis, acute	17	2.81	14	3.64	31	3.13
Cholecystitis, acute	0	....	4	1.04	4	.40
Colitis, acute	2	.33	2	.52	4	.40
Constipation	15	2.48	12	3.18	27	2.73
Enteritis, acute	16	2.65	23	5.98	39	3.94
Gastritis, acute catarrhal	6	.99	9	2.34	15	1.52
Gastroenteritis	33	5.46	44	11.43	77	7.79
Hemorrhoids	12	1.99	32	8.31	44	4.45
Pharyngitis, acute	7	1.16	10	2.60	17	1.72
Ulcer of duodenum	1	.17	0	....	1	.10
Ulcer of rectum	1	.17	0	....	1	.10
Ulcer of stomach	2	.33	0	....	2	.20
Total admissions	162	26.82	198	51.44	360	36.40
Class VII: Varicocele	6	.99	16	4.16	22	2.22
Class VIII:						
Chicken pox	2	.33	0	....	2	.20
German measles	1	.17	3	.78	4	.40
Influenza	69	11.42	234	60.80	303	30.64
Measles	2	.33	0	....	2	.20
Mumps	2	.33	4	1.04	6	.61
Pneumonia, broncho	1	.17	1	.26	2	.20
Pneumonia, lobar	3	.50	5	1.30	8	.81
Scarlet fever	2	.33	0	....	2	.20
Total admissions	82	13.57	247	64.17	329	33.27
Class IX:						
Dysentery, bacillary	1	.17	1	.26	2	.20
Dysentry, entamebic	0	....	1	.26	1	.10
Total admissions	1	.17	2	.52	3	.30
Class X:						
Dengue	17	2.81	156	40.53	173	17.49
Malaria	29	4.80	159	41.31	188	19.01
Total admissions	46	7.61	315	81.84	361	36.50
Class XI: Tuberculosis (all forms)	6	.99	13	3.38	19	1.92
Class XII:						
Chancroid	267	44.20	70	18.19	337	34.07
Gonococcus infection	643	106.44	300	77.94	943	95.35
Syphilis	53	8.77	78	20.27	131	13.25
Total admissions	963	159.42	448	116.39	1,411	142.67
Class XVIII:						
Bronchitis, acute	96	15.89	118	30.66	214	21.64
Laryngitis, acute	1	.17	0	....	1	.10
Pleurisy, acute fibrinous	9	1.49	10	2.60	19	1.92
Rhinitis, acute	16	2.65	17	4.42	33	3.34
Tonsillitis, acute follicular	115	19.04	131	34.04	246	24.87
Total admissions	237	39.23	276	71.71	513	51.87
Class XX: Herniæ	23	3.81	31	8.05	54	5.46

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for August and from various shore stations for the four-week period September 3 to September 30, 1922, inclusive.*

	Annual rate per 1,000, August.			Average rate since July 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All ships	0	172.66	1,263.15	0	193.54	1,048.54
Battleship and cruiser force:						
Atlantic Fleet	63.01	154.51	515.37	49.55	157.61	427.24
Pacific Fleet	77.41	155.11	220.28	77.41	149.65	210.53
Asiatic Fleet	183.90	309.84	362.06	46.73	449.63	644.91
Destroyer force:						
Atlantic Fleet	0	217.16	907.54	0	212.55	1,004.65
Pacific Fleet	0	111.06	461.53	0	126.96	306.12
Asiatic Fleet	0	554.44	979.59	47.87	642.86	1,048.54
Miscellaneous:						
Atlantic Fleet	0	138.79	1,263.15	0	132.95	840.00
Pacific Fleet	0	150.78	567.96	0	145.88	750.00
Asiatic Fleet	0	588.23	967.74	0	343.63	904.76

	Annual rate per 1,000, Sept. 3 to Sept. 30, 1922.			Average rate since July 1, 1922.		
	Minimum rate.	Mean rate.	Maximum rate.	Minimum rate.	Mean rate.	Maximum rate.
All naval districts in the United States	0	88.84	259.99	0	95.53	291.76
First naval district	0	41.37	56.91	9.61	65.59	34.33
Third naval district	0	113.51	185.71	7.52	110.05	149.06
Fourth naval district	0	135.51	160.77	5.43	252.18	282.89
Fifth naval district	0	95.92	172.75	37.38	81.59	291.76
Sixth naval district	41.34	49.70	107.73	32.98	46.90	126.76
Seventh naval district	0	0	0	0	0	0
Eighth naval district	161.89	177.33	259.99	80.00	122.15	129.80
Ninth naval district	139.96	139.96	139.96	103.83	103.83	103.83
Eleventh naval district	14.16	27.92	58.91	20.00	35.55	67.41
Twelfth naval district	74.28	105.76	126.33	56.93	119.54	159.71
Thirteenth naval district	0	29.85	104.83	0	32.60	98.36

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASE.

	Per cent, August.		Per cent since July 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All ships	70.62	8.50	68.24	6.70
Battleship and cruiser force:				
Atlantic Fleet	78.40	2.40	68.07	4.61
Pacific Fleet	82.71	9.87	84.41	9.74
Asiatic Fleet	45.94	27.02	49.18	14.75
Destroyer force:				
Atlantic Fleet	69.46	6.10	76.56	5.43
Pacific Fleet	81.96	11.47	81.25	8.75
Asiatic Fleet	49.33	6.66	53.55	3.37
Miscellaneous force:				
Atlantic Fleet	68.04	10.30	65.14	8.00
Pacific Fleet	68.04	9.27	73.17	6.70
Asiatic Fleet	40.00	0	42.10	1.31

TABLE NO. 3.—*Summary of annual admission rates for venereal diseases reported from ships for August and from various shore stations for the four-week period September 3 to September 30, 1922, inclusive*—Continued.

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASE—Continued.

	Per cent, Sept. 3 to Sept. 30, 1922.		Per cent since July 1, 1922.	
	Gonococcus.	Syphilis.	Gonococcus.	Syphilis.
All naval districts in the United States	76.85	12.50	78.01	8.98
First naval district	90.00	10.00	79.24	9.43
Third naval district	91.30	4.34	81.57	7.89
Fourth naval district	90.48	9.52	87.17	4.48
Fifth naval district	65.90	17.04	68.35	10.54
Sixth naval district	81.81	0	76.86	3.44
Seventh naval district	0	0	0	0
Eighth naval district	69.23	7.69	80.00	3.33
Ninth naval district	100.00	0	100.00	0
Eleventh naval district	100.00	0	94.11	5.88
Twelfth naval district	75.00	19.47	75.00	17.50
Thirteenth naval district	100.00	0	100.00	0

TABLE NO. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the four-week period September 3 to September 30, 1922, inclusive.*

	Navy (complement 96,826).		Marine Corps (complement 21,848).		Total (complement 118,674).	
	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.	Number of admissions.	Annual rate per 1,000.
Diseases of blood	2	0.25	1	0.55	3	0.30
Diseases of circulatory system	34	4.21	6	3.30	40	4.04
Diseases of digestive system	427	52.92	107	58.77	534	53.99
Diseases of ductless glands and spleen	7	.87	0	....	7	.71
Diseases of ear	85	10.53	9	4.94	94	9.50
Diseases of eye and adnexa	57	7.06	7	3.84	64	6.47
Diseases of genito-urinary system (non-venereal)	127	15.74	25	13.73	152	15.37
Communicable diseases transmissible by oral and nasal discharges	304	37.67	12	6.59	316	31.95
Communicable diseases transmissible by intestinal discharges	2	.25	0	....	2	.20
Communicable diseases transmissible by insects and other arthropods	125	15.49	223	122.48	348	35.19
Tuberculosis (all forms)	14	1.74	2	1.10	16	1.62
Venereal diseases	1,145	141.90	236	129.62	1,381	139.63
Other diseases of infective type	238	29.50	57	31.31	295	29.83
Diseases of lymphatic system	60	7.44	10	5.49	70	7.08
Diseases of mind	17	2.11	4	2.20	21	2.12
Diseases of motor system	67	8.30	14	7.69	81	8.19
Diseases of nervous system	26	3.22	4	2.20	30	3.03
Diseases of respiratory system	558	69.15	92	50.53	650	65.72
Diseases of skin, hair, and nails	83	10.29	27	14.83	110	11.12
Hernia	43	5.33	7	3.84	50	5.06
Miscellaneous diseases and conditions	67	8.30	14	7.69	81	8.19
Parasites (fungi and certain animal parasites)	224	27.76	26	14.28	250	25.28
Tumors	9	1.12	3	1.65	12	1.21
Injuries	459	56.88	93	51.08	552	55.81
Poisons	24	2.97	2	1.10	26	2.63
Total	4,204	521.00	981	538.80	5,185	524.26

TABLE 5.—*Deaths reported, entire Navy, for the four-week period September 2 to September 30, 1922, inclusive.*

Causes.	Navy (complement 96,826).	Marine Corps (complement 21,848).	Total (complement 118,674).
Pneumonia, broncho	1	0	1
Tuberculosis, chronic pulmonary	2	1	3
Malaria	1	0	1
Malignant growths	1	0	1
Other diseases	12	1	13
Drowning	5	0	5
Other accidents and injuries	6	2	8
Poisons	3	0	3
Total	27	4	31
Annual death rate per 1,000, all causes	3.63	2.38	3.40
Annual death rate per 1,000, diseases only	1.75	1.19	1.64

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THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF INSTRUCTION AND PUBLICATIONS

REPORT ON CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES

BY

WILLIAM SEAMAN BAINBRIDGE
COMMANDER, MEDICAL CORPS, UNITED STATES NAVAL RESERVE FORCE

DECEMBER, 1922

(MONTHLY)

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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3 July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
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TABLE OF CONTENTS.

PREFACE.

The United States Naval Medical Bulletin was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. Stitt,
Surgeon General United States Navy.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewriten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form, such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

FOREWORD.

Belgium probably suffered as much from the devastating effects of war as did any other country in Europe. So great was the destruction of her cities and industrial establishments that it is little wonder the people of that country desire to prevent a repetition of the ravages of war, so far as is possible, by the establishment of a permanent peace among the nations of the globe which may to some extent be produced by fostering amicable relations between individuals of kindred professions or interests in the various nations.

With this end in view, and with a desire to place on record the lessons derived from the war, the military authorities of Belgium conceived the idea of convening a Congress of Military Surgeons and Pharmacists, international in its scope, which might sum up some of the practical experiences of the World War in medicine and surgery. Such a congress, it was believed, would be a real step toward the internationalization of military medical, surgical, and sanitary science. In response to the invitation of the King of Belgium, over 30 nations, either allied or associated in the late conflict, or neutral, were represented at this congress which was held in Brussels during the summer of 1921.

It was the aim of the congress to collect and standardize all available facts developed by the war for use not only in future warfare but for any catastrophe which might arise during times of peace. Obviously it would be impossible to cover completely at the meetings of a single congress all the phases of the World War; hence the organizers of the congress selected the following six topics for discussion:

1. The general organization of the medical service of the army and navy with its relations with the Red Cross.
2. Lessons of the war in the modern treatment of fractures of the limbs.
3. The campaign against tuberculosis in the army and navy.
4. The campaign against venereal disease in the army and navy.
5. Gas warfare.
6. The purification of water in the field.

The report which follows contains an outline of the proceedings of the delegates to the congress, a digest of the papers presented by them and their conclusions which are said to represent the opinion to date of the nations which participated in the congress.

So successful were the series of conferences held by the delegates to this congress that in February, 1922, arrangements were made for another congress to meet in Rome in May, 1923, at which four general subjects will be discussed, viz:

1. The general principles of evacuation of the wounded.

2. The collaboration of military and civilian authorities in social hygiene, physical education, and the prevention of disease.

3. Methods of disinfection and disinfestation in times of war and peace.

4. The treatment of wounds of the chest.

It seems not unlikely that these congresses will be perpetuated by the formation of an international association of military surgeons which would bring closer cooperation, better mutual understanding among the members of the medical profession of the various nations, and be an influence in the prevention of war.

E. R. S.

HIS MAJESTY, ALBERT, KING OF THE BELGIANS.

U. S. NAVAL MEDICAL BULLETIN

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SPECIAL ARTICLE.

REPORT ON "CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES," HELD IN BRUSSELS, BELGIUM, JULY 1921, AND MEETING OF THE "COMITÉ PERMANENT," HELD IN BRUSSELS, BELGIUM, FEBRUARY, 1922.

By WILLIAM SEAMAN BAINBRIDGE, Commander, Medical Corps, United States Naval Reserve Force, Delegate from the United States of America.

INTRODUCTION.

All who have played even a small part in any war and others who have come only in touch with some of its dire results know that it can be the greatest of all atrocities. The World War surpassed the preceding ones in every phase. But balanced against man's keenest ingenuity in discovering methods of warfare more horrible than any that have gone before and in inventing new implements to kill and maim, are the untiring efforts of the members of the medical, surgical, and sanitary departments of the armies and navies of the world in the salvaging of remnants of life and limb. One has but to read the medico-military histories of preceding wars to realize the marked effect they have had in the advance of medicine, surgery, and sanitation. These advances have proved of benefit not only during the progress of hostilities but in time of peace, when there is a continuous industrial battle between man and man-made machinery or the elements themselves.

More than 500,000 peace-time casualties occurred in continental America during 1916. Industrial accidents are constantly on the increase in all parts of the civilized world, owing to the progressive extension of human activities and the introduction of new and somewhat dangerous machinery into factories, engineering excavation, and construction work, etc. The reduction of this annual toll, in lives and limbs, is a problem to be solved like that of the reclamation of the wounded and disabled on the battle field.

The period of reconstruction following the greatest war in history is fraught with the most interesting and far-reaching problems for the countries of the Allied and Central Powers. A plan, conceived by Belgium in the summer of 1920, to obtain whatever benefits there might be hidden in the chaos which resulted at the end of the war, culminated one year later in the historical meeting of representatives of many nations; to discuss the medical, surgical, and sanitary lessons learned from over four years of conflict.

Belgium's practical keenness of vision resulted in the successful conclusion of arrangements for this meeting in Brussels of the official delegates of all the medical services of the armies and navies of the allied, associated, and neutral powers. The conception and maturation of this plan was in itself a difficult task, and still greater difficulties had to be overcome in the securing and coordinating of contributions brought from all sides.

The first "Congrès International de Médecine et de Pharmacie Militaires" was called in the summer of 1921, and not sooner, because the object was to secure the full lessons of the war, not only during the conflict, but immediately afterwards, in the reconstruction period. No better time could have been chosen than precisely this psychological moment when the allied and associated nations were still held close together by links forged in the war against a common foe. It was the opinion of a number that it would not have been wise to expose a congress of this description and purpose to the chances of time and its many possibilities. The associated and neutral powers were invited to join, as some of their representative medical men had worked with the Central Powers in an individual capacity or as military medical observers. The congress thus received the benefit of war-taught lessons on *all* sides, hostile as well as allied. It would be impossible to write a true and complete history of the war and the lessons learned, from a medical or other standpoint, without a full knowledge of the experience of all sides. A composite viewpoint is absolutely essential to a correct presentation of the medical and surgical lessons of the war.

The congress was held in the spacious halls of the Palais Mondial, in the Parc du Cinquanténaire, in July, 1921. The most stringent actual problems, which were on the program were investigated and discussed by those considered most competent to do so. Space in the hall was set aside for exhibits of special interest relating to the questions to be considered. The congress aimed at collecting and standardizing all available facts for use not only in future wars but for any exigencies that might arise during peace.

Belgium foresaw—and events proved her right—that if the representatives of the different nations could be brought together and induced to lay on a council table the individual experiences of the war, of each separate country, a general discussion would naturally result, and culminate in a number of helpful conclusions in regard to many points. This composite information then could be standardized and codified.

Twenty countries sent official representatives from the medical department of the army or navy, or both. Over 30 nations were personally represented by from 1 to 20 distinguished members. In addition to the delegates who were sent to the congress, other prominent men were invited to contribute their experiences or offer suggestions. No distinction was made between contributors, as the object was the securing of real facts. A considerable number of governments had been heard from by letter, expressing their interest, willing cooperation and intent to join future congresses in the person of their delegates. At the completion of the meetings, the conference was unanimously voted of such value that a permanent committee, composed of eight nations, including the United States, was appointed. This newly formed permanent committee will be referred to again in greater detail.

List of Official Delegates Who Participated at the First Congrès International de Médecine et de Pharmacie Militaires.

ARGENTINE REPUBLIC.

Lieut. Dr. Nicholas Guadino.

BELGIUM.

Dr. Jules Voncken, Military Hospital of Liege.
Dr. Van der Smissen, ministry of war.
Gen. Dr. Wilmaers, Brussels.
Doctor Gianolla, surgeon of the Military Hospital of Charleroi.

BRAZIL.

Dr. Joao Alfonzo de Souza Ferreira, Médecin Major, Rue Maia Lacerda, 51, Rio de Janeiro.
Dr. Joao Florentino Meira, Rio Gr. do Sal, Cruz, Alba.
Dr. Alarico Damazio, 156, Rue Miguel de Frios, Nictheroy, Rio de Janeiro.
Lieut. Pharmacien Manoel Vieira da Fonseca, Junior, 64, Rua Para, Estacio de Sa, Rio de Janeiro.

BRITAIN.

Col. E. M. Pilcher,[1] C. B. E., D. S. O., Royal Army Medical Corps, London.
Maj. A. D. Stirling, D. S. C., Royal Army Medical Corps, London.
Surg. Rear Admiral J. Chambers, C. M. G., M. B., R. N., Admiralty, London.
Surg. Commander E. T. Meagher, R. N., 84 St. Georges Road, Great Yarmouth.

CHILE.

Dr. Marcos Donzo, Rue Villaret de Joyause, 5, Paris (XVII^e).
Dr. Cifuentes, Chilean Legation, Av. du Bois de Boulogne, Paris.

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[1] Recently promoted to major general.

CHINA.

S. H. Chuan, major general, director of the Military Medical School, Peking.

DENMARK.

Dr. M. C. T. Hansen, medical inspector, chief E. M. of the medical service of the Danish Army, 42, Brigade, Copenhagen.

FRANCE.

Médecin Inspecteur Général Sieur, Boulevard St. Jacques, 54 (XIV^e), Paris.
Médecin Principal de 1ère classe Sacquépée, Val de Grâce, Paris.
Médecin Principal de 2ème classe Picqué, Cours Merlin, 39, Talence (Gironde).
Médecin Principal de 2ème classe Uzac, Rue de Bercy, 139, Paris.
Monsieur le Docteur Lapin, Direction Générale du Service de Santé de l'Armée Française au Maroc, Rabat (Maroc).

GUATEMALA.

Dr. Manuel Arrayo, Guatemala City.

HOLLAND.

Lieut. Col. A. C. Ten Hove, Stolberglann, 100, La Haye.
Capitaine J. F. Huk, Binninhaven, 104, Helder.
Capitaine De Vrize, Weteringschans, 53, Amsterdam.

INTERNATIONAL RED CROSS COMMITTEE.

Doctor D'Espine, Promenade du Pin, I, Geneva.
Dr. A. Reverdin, Promenade du Pin, I, Geneva.

ITALY.

Lieut. Col. Filippo Caccia, chief surgeon, Military Hospital, Rome.
Lieut. Col. (complementary) Mariano Carruccio, Rome.
Lieut. Col. Dante Ferraro, St. Anne Marine Hospital, Venice.

JAPAN.

Chief Surgeon Kensa Oyama, Tokio.

LEAGUE OF RED CROSS SOCIETIES.

Colonel Ritchie, adjunct chief of section on venereal diseases, Coeur de St. Pierre, 9, Geneva.

MEXICO.

Dr. Luis Rivero Borrel, Mexican Legation, Paris (in 1921) in 1922, 4a Sta. Maria de la Bibero, 138, Mexico City.

NORWAY.

Dr. Reichborn Kjennerud, divisional surgeon, Frederikshald.

POLAND.

Doctor Dzierzkowski, chief of the Medical Service of the Polish Mission in France, Rue Bugeaud, 6, Paris.

SPAIN.

Commandant Agustin Van Baumberghen, Barquillo, 15, Madrid.

Commandant Mariano Gomez Ulla, Leganitos, 10, Madrid.

Capitaine Pharmacien, Antonio Gordon Moyano.

Maj. Pharmacien Leopold Lopez Perez, San Fernando (Cadiz).

Docteur Fernandez Cuesta y Porta, Subinspector Sanidad, Anuado Asenak, 20, ento Madrid.

SWEDEN.

Dr. S. R. Erhardt, chief surgeon of the Swedish Army, Stockholm.

SWITZERLAND.

Colonel Hauser, chief surgeon of the medical service of the Swiss Army, Bern.

Lieutenant Colonel Thomann, chief pharmacist of the Swiss Army, Bern.

Colonel Nienhaus, divisional surgeon, Davos-Platz.

CZECHOSLOVAKIA.

Col. Dr. Louis Fisher, ministry of national defense, Prague.

Gen. Dr. Ch. Franz, V Brchova, 4, Prague.

Commandant Dr. Jean Levit, II Vaclavske, 49, a Prague.

Dr. Clement Zrunek, ministry of national defense, Prague V.

UNITED STATES OF AMERICA.

Commander William Seaman Bainbridge, Medical Corps, United States Naval Reserve Force, 34 Gramercy Park, New York, N. Y.

Permission to attend the congress was not granted to the Russian Soviet delegation, consisting of six members, who had arrived for this purpose at the frontier of Belgium. An invitation from His Majesty's Goverment through official channels was necessary for membership in the congress.

The following was the preliminary printed program which was changed and enlarged according to the necessities which arose at the various meetings:

PROGRAM.

"FIRST CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES," PALAIS MONDIAL, BRUSSELS, BELGIUM, 15–20TH JULY, 1921.

[Under the patronage of His Majesty, the King of Belgium.]

First day (July 15).

Inaugural meeting.

Reception by His Majesty, the King.

Address by the inspector general of the army medical service, president of the Congress.

Assignments of chiefs of delegations.

Proclamation of the opening of the 1921 congress.

Informal reception of the members of the congress by the executive committee.

Second day (July 16).

Forenoon meeting (3 hours): Topic, clinical and therapeutic study of the war gases employed during the war by the Central Powers; the sequelæ of their effect on the organism and their influences on invalidity claims.

Afternoon meeting (3½ hours): Topic, general organization of the medical service in the armies and relations of the military medical service with the Red Cross.

Assembly of the visiting ladies for automobile trips to the surroundings of Brussels.

Visit to the military hospital in Brussels.

Third day (July 17).

Excursion to Spa. Departure by special train at 7.25 a. m. Reception at the station by the communal authorities. Visit to the bathhouse. Discussion of thermal springs, by Doctor Schaltin, battalion surgeon of the reserve corps. Luncheon, offered by the College des Bourgmestre et Echevins of Spa and the administration of the springs. Excursion and visit to the Borgoumont Sanatorium. Visit to the Abri de l'Empeueur. Tea, served in the Casino. Return to Brussels by special train.

Fourth day (July 18).

Forenoon session (3½ hours): Topic, the antituberculosis campaign in the army.

Visit to the military school in Brussels.

Afternoon session (3 hours): Topic, the antivenereal campaign in the army.

Automobile trip to the outskirts of Brussels.

Visit to the military hospital and the school for the reeducation of war cripples in Woluwe.

Fifth day (July 19).

Morning session (3 hours): Topic, lessons of the war in the treatment of fractures of the limbs.

Afternoon: Departure to Antwerp. Reception at the city hall. Visit to the harbor and docks. Visit to the central pharmacy of the army and to the military hospital. Return to Brussels.

Sixth day (July 20).

Forenoon session (3 hours): Topic, purification of water in the field.

Afternoon (3 hours): General closing session.

Banquet in the Hotel Métropole.

America presented to the congress an exhibition of 4,800 feet of reel showing "Some of the activities of the Medical Corps of the United States Navy." These reels had been prepared under the direction of Rear Admiral E. R. Stitt, Surgeon General, United States Navy, and attracted much attention and favorable comment. After the original showing at the congress, the exhibition of the reels was repeated on special invitation of the Royal Society of Medicine, in the halls of the Royal Academy of Medicine of Brussels.

The unanimous conclusions of the congress will be given at the end of this report, and constitute the outcome of prolonged, earnest,

HER MAJESTY, ELIZABETH, QUEEN OF THE BELGIANS, IN THE COSTUME OF THE BELGIAN RED CROSS.

940–1

CARDINAL MERCIER, ARCHBISHOP OF MALINES, WHO RECEIVED SOME OF THE DELEGATES.

940–2

and careful deliberation. The following procedure was decided upon: In the course of the official proceedings, the contributing nations, according to their own selections of a particular field of inquiry, within the scope of the subjects selected for discussion at this first congress, presented their papers, to which other nations added their own supplementary data. A general discussion followed, upon the basis of the entire available material. A committee was then formed of all those who had furnished information and assisted in the resulting discussion, and the subject was reconsidered in all its bearings. After a subject came back the committee was enlarged by any additional members who joined the discussion. Finally, the committee withdrew and definitely drew up the conclusions indicative of the status of the inquiry under consideration. These conclusions were then brought back for comment and criticism into the conference, where they were analyzed and if necessary reframed until the final form agreed upon was the unanimous statement of the entire body.

The congress met most auspiciously under the patronage of King Albert I of the Belgians, a ruler claimed not only by his own people but, as expressed by one speaker, a purposeful personality who has become a part of the life, the affection, the history, of all countries represented at this first meeting. Attended by his ministers and a large number of deputies the King was present at the introductory address delivered by Doctor Wibin, inspector general of the medical service of the Belgian Army. Prior to the afternoon session, the King met the delegates personally, shaking hands and holding a few minutes conversation with each.

Wibin (Belgium).

Doctor Wibin in his introductory address respectfully acknowledged the honor accorded to the congress by the patronage of King Albert and Queen Elizabeth of the Belgians, and voiced his gratitude to First Minister Carton de Wiart and to the minister of national defense for their participation in the presidency of the honor committee. The organization of the congress was authorized by Ministers Janson and Deveze, and the latter liberally provided the necessary funds. The speaker also thanked all the members of the honor committee, Government officials, university professors, and others for lending their moral support. Stress was laid by him on the fact that while no war has been more murderous than the one which is called the World War, there is also none which has proved more fertile in high moral lessons and great scientific achievements. At the beginning of the war mistaken measures resulted in surgical disasters, but the truth was soon revealed, and under the expert guidance of Dr. A. Depage surgical intervention became promptly organized at the front.

Surgical automobile ambulances were created which permitted the rapid evacuation of the wounded from the various sectors. The scattered and imperfectly utilized surgical services were reorganized and centralized. The performance of surgical operations in the proximity of the front without any avoidable delay became the order of the day. At the same time the scientific foundations of modern surgery were established through the biological and bacteriological studies of war wounds, the former determining the biological evolution of these wounds and the latter investigating the development of their infectious microbic invaders. The devitalization of the traumatized tissues came to be understood as the primary condition for the development of infectious germs. The dead or dying tissues were found to undergo leukocyte proteolysis on the one hand and bacterial proteolysis on the other; these two processes passing in an inverse direction, both in time and space, leukocyte proteolysis from the periphery to the center and bacterial proteolysis from the center to the periphery. This phenomenon has a considerable bearing on the accurate determination of combative measures, and especially the exact moment of their application. Surgeons learned that the first phase of spontaneous cleansing of war wounds is actually the critical and dangerous period, and that this phase must accordingly be safeguarded or at least made as short as possible by modifying, through surgical measures, the physical and biological conditions of the wound. The infectious complications of war wounds can be successfully avoided by adequate treatment. The World War, through a number of remarkable discoveries which were made during its course, confirmed the older teachings of latent microbism and placed them on an accurate scientific basis. The distressing experiences of the early months of the war no less than the new biological and bacteriological revelations culminated in a veritable surgical revolution. Radical operative interventions were introduced with excellent effects on the condition of the wounded. "Débridement" is a term which has come to stay, and since the World War belongs to the vocabulary of all surgeons who served on the side of the Allies. Various auxiliary measures were promptly added to the new great surgical principles of wound treatment. Extensive débridement, extraction of foreign bodies, assisted by antiseptic irrigation or leukocyte stimulation, led to a marked improvement in the prospects of the wounded. Finally radical surgical asepsis of the war wound through direct excision of the hopelessly damaged tissues was recognized as the correct procedure for the arrest of the incipient anerobic process and thereby for the prevention of the development of aerobic infection.

But the war surgeon, still unsatisfied, aimed at the rapid healing of the wound by first intention, and the fruit of his labors was immediate primary wound-suture, which was followed by brilliant results in suitable cases. The great revolution of surgical treatment had an excellent influence on the various types of wounds, such as wounds complicated by bone fractures, wounds of joints, of the chest, of the skull, and penetrating abdominal wounds. Scientific orthopedic measures assisted the ultimate outcome of wound treatment, and it was realized, as a war-taught lesson, that the surgeon and the prosthetist must closely cooperate in the best interest of the patient.

The long and painful years of the World War have furthered the advance not only of operative surgery but also the development of internal medicine, both general and special; of military hygiene, and of the pharmaceutic services of the allied armies. The practical application of its sound chemical knowledge by military pharmacy rendered most valuable service to the allied armies. The pharmaceutic service not only insured the medico-surgical equipment of the armies by the activity of its great centers, but it helped essentially to safeguard the health of the troops by its numerous research laboratories, its work in water purification, and its important contributions to the campaign against poisonous gases and the neutralization of their effects. The military pharmaceutical services were gladly welcomed by Doctor Wibin as participators in the work of this congress.

He emphasized, in conclusion, that this congress is to consist of an exchange of the golden nuggets of experience acquired in the course of the war, and expresses the hope that this first meeting would be the prelude to a series of many others, which will permit military medicine to keep brightly burning the flame of vigilance and activity, for the greater benefit of the armies and of suffering humanity.

At the end of his introductory address, Lieutenant General Wibin declared the "First Congrès International de Médecine et de Pharmacie Militaires" as opened.

General Inspector Sieur, chief of the French delegation, thanked the Belgian Government for the welcome accorded the participants in the congress, and addressed a special salutation to the King and Queen of Belgium. His Majesty withdrew, accompanied by the members of his suite and the organizing committee.

The members of the congress scattered in the drawing rooms of the Palais Mondial, where a unique spectacle was presented by the mixture of nationalities and uniforms.

It is interesting to note that an official photographer was attached to the congress and some of the illustrations contained in this report are copies of the Government pictures. Moving picture reels were taken of the various activities of the delegates and are in the possession of the Belgian officials for permanent record.

The following topics had been selected by Belgium for discussion and sent with each invitation to the countries asked to participate in the congress.

(1) General organization of the medical service and its relations with the Red Cross.

(2) Lessons of the war in the modern treatment of fractures of the limb.

(3) The campaign against tuberculosis in the army.

(4) The campaign against venereal diseases in the army.

(5) Poison gas in warfare.

(6) Purification of water in the field.

GENERAL ORGANIZATION OF THE ARMY MEDICAL SERVICE AND RELATION OF THE MILITARY MEDICAL SERVICES TO THE RED CROSS.

Uzac (France). The series of individual contributions was opened by the report on the general organization of the medical service in the French Armies, by Doctor Uzac, Médecin Principal de 2e classe. The speaker considered in succession: (1) Elaboration of the orders regulating the activities of the medical service, (2) modification of the activities of the medical service in the different phases of the war; (3) adaptation and employment of the sanitary formations according to the period dealt with. The organization of the medical service underwent a continuous evolution during the war, adapting itself to the conditions in which the war itself evolved. The report aims at giving a picture of the changes of this organization with changing conditions and requirements. At the beginning of the war, the elaboration of orders with reference to the working of the medical service was under the exclusive control of the supreme command to which the directors of the medical service themselves, only authorized to give technical instructions, submitted their suggestions. The latter, naturally, could not always correspond with the intended military operations, because of varying distances between the service chiefs and the command as well as their subordination to an intermediate agent, the director general of communicating lines and services. Measures taken in 1917 placed the representatives of the medical service near the command, the authority of their delegates was increased, and consulting surgeons were appointed. The directors of the medical service interpreted their obligations on the larger scale of investing the representatives of the medical service with greater authority and initiative, as well as developing coordinated activities, with extension of their means of action by telephone and motor car assistance. The service was both improved and simplified through decentralization. As regards the working of the medical service in the different periods of the war, it must be kept in mind that the regulations in force in 1914 referred only to a war of movement and included the systematic evacuation of all the transportable wounded and disabled.

On account of the appalling number of infected wounds through artillery projectiles, the danger of long-distance evacuation with delayed primary wound treatment promptly became apparent. When the war assumed the character of trench warfare in September of 1914, large, well-equipped sanitary formations were created all along the front, where the wounded were cared for as soon as possible after the infliction of the injury and detained until the danger of infection was passed or the wound had healed. The treatment of war wounds was greatly improved during this phase of the war through knowledge gained at medico-surgical meetings and special courses of instruction in the great surgical services. The limited military operations of 1917 permitted the concentration of a large material of medical officers and sanitary equipment, with an opportunity for close study of the practical use of the latter, greatly to the benefit of the treatment of war wounds. The military operations of 1918 required new dispositions so as to permit the adaptation of the medical service to the anticipated mobilization of the fronts. Up to this time the sanitary formations were placed in a double concentric cordon, consisting of a series of divisional ambulances, having at their rear a cordon of large so-called first-line clearing hospitals, sometimes backed at a very short distance by second-line clearing hospitals. The front ambulance groups, as well as the clearing hospitals, were subsequently reduced, the latter being placed farther away from the front. In addition, large so-called secondary clearing hospitals were established at considerable distance (8 to 10 hours of travel), at points easily accessible by rail, where the transportable wounded were evacuated by entire trains, there to undergo the surgical interventions which could no longer be performed nearer the front. The establishment of these large sanitary formations at the rear, which could be utilized by several armies, permitted the avoidance of the long-distance evacuations, productive of so much harm at the beginning of the war; for by virtue of the new arrangements all wounded could be operated upon within the army zone. These formations were moreover destined to render excellent service for the short-range accommodation of seriously ill soldiers, especially the influenza cases of 1918, or badly gassed soldiers, who at certain periods of the war constituted a high number of casualties which could not be exposed to the fatigue of long transports.

Concerning the adaptation and use of the sanitary formations at the different periods of the war the speaker pointed out that the regulation equipment of military hospitals underwent only slight modifications during the war. The function of the medical service with the troops being essentially one of assistance and first aid, it was discharged in as perfect a manner as possible under human limitations. The personnel of the medical service proved no less heroic in the discharge of its obligations than the fighting force itself. The transport means of the divisional and corps stretcher-bearer groups, which did most efficient work in the first months of the war, lost in importance with the development of the sanitary motor sections, which permitted a larger scope of evacuation of the wounded and their removal to a safe distance. The ambulances which were originally constructed from an identical pattern, with the object of rendering them interchangeable, promptly became specialized, some being destined for the relief of the wounded and provided with a constantly improving surgical staff and operating equipment, while others served for the care of sick or gassed soldiers. In the course of the first years of the campaign the ambulances worked separately, but from 1916 on they were arranged in larger groups where the technical service was effected under the supervision of consulting physicians and surgeons. The clearing hospital underwent the most important changes. It was a rather small establishment at the beginning of the war, representing the equivalent of two ambulances and having for its special function the reception of the sick on their arrival at the clearing station, the make-up of sanitary trains, the judicious selection and detention of wounded or sick soldiers considered unfit for evacuation in army formations or independent hospital centers.

Due to the inadequacy of local resources, at the time of important military operations or fighting in uninhabited regions, it became necessary to create clearing hospitals comprising not only the services of selective classification of men and formation of sanitary trains, but also the accommodation service, the latter acquiring a capacity which reached two to three thousand beds in certain formations. These large clearing hospitals of the French front, excellently equipped, with capacious surgical motor ambulances, stationary or circulating surgical instruments, and improved sanitary material, undoubtedly represented during trench warfare mighty bulwarks for treatment, benefiting the sum total of the wounded. The existence of these formations was only compatible with a stationary front such as no longer existed after the military events of 1918. The advantages of the large clearing hospitals of the 1916 and 1917 type had proved so obvious that they could still serve as models for the secondary clearing hospitals which later were erected in the rear in order to receive trainloads of the wounded who could no longer be treated in front formations.

The medical service disposed of certain establishments at the regulating stations, such as local hospital centers, reserve forces of personnel as well as reserve supplies of sanitary material. The proper working of the sanitary trains and adequate performance of the evacuations were dependent upon the activity of the regulating surgeon, his affiliation with the front clearing hospitals, and the territorial distributing stations, his friendly cooperation with the senior railway transport officer.

In proportion to the increasing needs of the armies for the maintenance of the sanitary organizations grew the necessity for concentration of means and for the institution of reserves by deduction from less actively engaged armies, to be placed at the disposal of the fighting armies. These moves of personnel and matériel could only be ordered by an executive in contact with the center of advance information, and the issuing of orders in regard to these moves became the most delicate part of the functions of the representative of the medical service at general headquarters.

Pilcher (Britain).

Col. E. M. Pilcher, C. B., R. A. M. C., made a report on the organization of the medical services and their relationship to the Red Cross, as outlined in the following summary:

1. A forecast in 1913.

2. Organization based upon an expeditionary force of 180,000 men, a great expansion took place but no material change of units.

3. General functions of medical services:

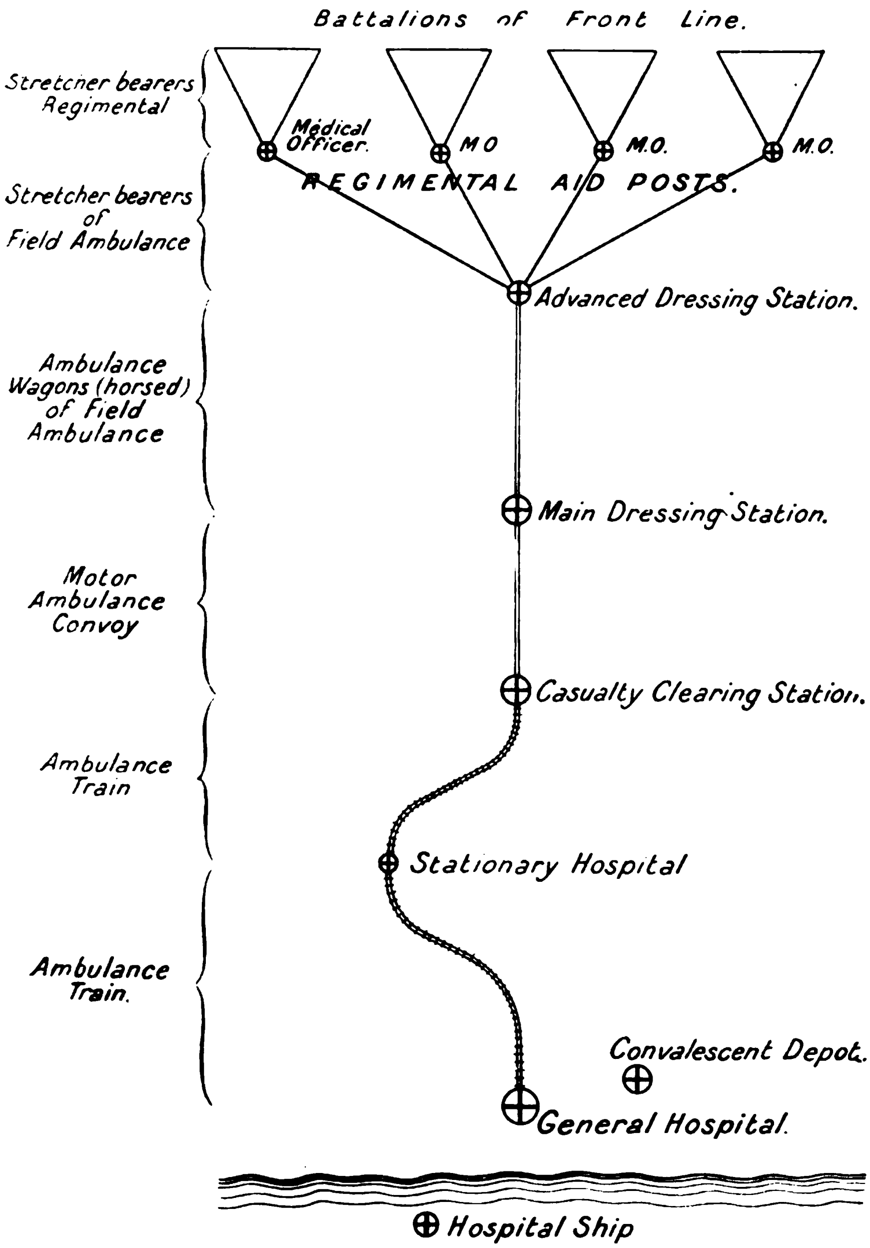
(*a*) Preservation of health of troops; valuable previous experience of preventable diseases; typhoid inoculation; sanitary officers on divisional staffs; regimental sanitary staff; sanitary sections and squads; preventive work a great success.

(*b*) Collection and evacuation of sick and wounded.

(*c*) Professional treatment and care of sick and wounded. British organization expained—diagram.

(*d*) Provision and replenishment of adequate medical and surgical equipment.

4. Comments upon this organization.


Battalions of Front Line.
Stretcher bearers Regimental
Medical Officer.
M O
M.O.
M.O.
REGIMENTAL AID POSTS.
Stretcher bearers of Field Ambulance
Advanced Dressing Station.
Ambulance Wagons (horsed) of Field Ambulance
Main Dressing Station.
Motor Ambulance Convoy
Casualty Clearing Station.
Ambulance Train
Stationary Hospital
Ambulance Train.
Convalescent Depot.
General Hospital.
Hospital Ship

No surgery in parts near front line to be attempted; rapid evacuation to base, where all necessary operations were to be done.

5. Some developments.

One man, one stretcher; improvement in splinting and dressing; formation of motor ambulance convoys; question of surgeons in front line areas; rise of casualty clearing station as a surgical center; formation of convalescent camps as centers of training.

6. The factors which led to these developments.

Influence of character of campaign on medical military units; there should be better coordination between military operations branch of general staff and medical services; also between regular medical services and Red Cross; large number of casualties made modifications necessary.

7. Value of Red Cross organizations.

(*a*) Relationship between Red Cross and regular services before the war.

(*b*) Rules relating to voluntary aid.

(*c*) Lack of coordination before the war.

(*d*) Organization of Red Cross units bad at first, but very helpful later when necessity for coordination was realized.

(*e*) Red Cross units must be an integral part of the Army.

(*f*) Work done by Red Cross societies.

i. Transport.

ii. Provision of medical and surgical equipment.

iii. Provision of gifts and comforts.

(*g*) A good record in transport work, and good results of increase in amount and rapidity of transport.

(*h*) Partial success in supply of personnel.

(*i*) Important work in helping establishment of convalescent camps.

8. Lessons of the war.

At the outbreak of the war, the British Expeditionary Force numbered approximately 180,000, and the organization of the medical services in war was based upon the requirements of this number. Under the progressively increasing demands made upon it, and after prolonged trials, the medical organization emerged with its framework at least unbroken and with the addition to its organization of only one unit, the motor ambulance convoy. Although modified to suit the needs of an unparalleled type of warfare and enlarged to an enormous scale, the general organization of the medical services did not materially change, nor were its general functions in any way departed from, as shown by a reference to the British field service regulations of 1913. These general functions may be put under the following headings: (1) The preservation of the health of the troops, (2) the collection and evacuation of the sick and wounded, (3) professional treatment and care of the sick and wounded, (4) the provision and replenishment of adequate medical and surgical equipment. The supplies of medical and surgical stores were provided by the establishment of large depots at bases and advanced depots at railheads, the arrangement on the whole working satisfactorily.

With special reference to the relationship of the Red Cross and voluntary organizations to the regular service, there was no coordination with the army medical authorities during peace time, with the result that when the war broke out the Red Cross hospitals, which eventually were of immense help in many directions, were found at first to be insufficiently organized to cope satisfactorily with their duties. Realizing the urgent need of coordination and unity of control, the Red Cross commissioners soon decided that Red Cross units must be an integral part of the Army, and the director general of the army medical service was appointed as chief commissioner. On October 20, 1914, a national scheme of coordination was evolved which enabled the society to meet the increasing demands of the armies by giving it the power of developing its work on lines calculated to secure not only economy and efficiency but the maximum benefit to the sick and wounded, both individually and collectively, whether at home or overseas, in the field, or in hospital. The supply of large numbers of motor ambulance convoys at short notice, provided by the Red Cross Society, made distances appear of less consequence, and with the ambulance trains and the hospital ships very largely influenced some of the subsequent changes in the localization of units and in the treatment of the sick and wounded. It became possible to keep the real base hospitals in England, it made the very existence of a stationary hospital less needful than heretofore, and, above all, it largely helped to localize and define the real function of a casualty clearing station, a unit over which much controversy has raged but whose usefulness in the war has been repeatedly proved and acknowledged. It enabled this unit to become the first in which the serious wounds so prevalent during the war on the western front could be surgically treated, and as a result compelled it to become not only fully equipped as regards material, but one whose personnel must always include a highly specialized surgical staff. Important work in assisting the formation and establishment of convalescent camps and depots was done by the Red Cross in its capacity as an auxiliary and supplementary organization to the regular medical services.

The speaker, in concluding, expressed the hope that as a result of the lessons, not only of this war but of others, it will be realized that the success of a campaign depends just as much, if not more, on the administration, help, and support given to the medical services as it does upon strategy.

The general organization of the medical service in the Italian Army, with reference to the administration as well as the practical execution, formed the subject of a contribution to the congress by Generale Medico, Stefano Santucci. This report included an account of the mode of assistance given to the wounded or otherwise disabled men in passing from the front lines to the interior zone. The evacuation of the wounded from the zone of military operations and their collection was described, as well as the creation of specialized surgical hospitals. Measures had to be adopted for the management and prevention of frostbite, in addition to prophylactic measures which were adopted against the spread of infectious diseases among the troops of the fighting army. The water supply to the troops in certain special zones was specially considered by the speaker with regard to the improvement of existing sanitary conditions by physical or chemical means. The desirable relationship in the war zone between the Red Cross and the military medical service formed an important feature of the report. Santucci (Italy).

In addressing the congress on the subject of the organization of the medical service in the armies, Dr. A. Van Baumberghen, Médecin-Major de l'Armée Espagnole, proposed the adoption of general rules of international Van Baumberghen (Spain).

character, in certain details, without interference with the initiative of each nation in developing its economic resources in the most appropriate fashion and in disposing of the same independently. For example, a single diagnostic card or wound tag would simplify the service, increase the well-being of the soldier, and permit the transference of the wounded into other hands without the need of another professional visit. The nature of the wound, as stated on the card, would indicate the route to be taken by the patient. In this manner, the difficulties of transportation would be easily solved, and the patients would be protected against hardships. One of the principal advantages of this agreement would consist in the avoidance of the difficulty of communicating with patients whose language is not understood. All medical officers and army surgeons should wear a single distinguishing mark.

Van der Smissen (Belgium). Belgium's contribution to this subject at the congress came in the form of a report by Dr. A. Van der Smissen, Médecin principal de 1re classe, on the general organization of the medical service in the armies, and on the relations of the military medical service with the Red Cross. The latter was virtually suppressed by the abandonment of nearly the entire Belgian territory in October of 1914. A few isolated physicians, however, followed the army in the field and organized hospitals behind the front of the Yser. One of these hospitals created in La Panne, by Doctor Depage, was a veritable model. Unfortunately the resources of the Red Cross in regard to personnel were nil—aside from the small number of eminent individuals who had taken the initiative of founding hospital establishment—so that the army was obliged to lend the Red Cross a part of its physicians and all the necessary attendants. War experience has accordingly shown that the connection of the Red Cross with the medical service of the army needs to be reorganized on a new basis. The chief rôle of the Red Cross must be to meet its peace-time obligations, through the creation of hospitals, dispensaries, sanatoria, and similar institutions. On mobilization, the medical service of the army can meet the requirements of the first days of warfare by its mobile formations and its extended stationary hospitals; but the influx of the wounded will soon exceed its possibilities, and here the intervention of the Red Cross must manifest itself in an efficient way, through the contribution of all the hospital resources which it has pledged itself to furnish since peace time. A certain number of completely equipped hospitals, as regards personnel as well as material, should be placed at the disposal of the ministry of national defense, to functionate as military hospitals. The Red Cross should also be charged in peace time with the training of auxiliary nurses, as required in the military hospitals for the needs of mobilization. Other resources of the Red Cross may be called upon in behalf of the health of the civilian population. The new statutes of the Red Cross in peace time justify the hope that it may become a wonderful instrument of hospitalization in war time, and that its connection with the medical service of the army will prove of valuable assistance in the stupendous task of the latter.

A history of the Chinese military medical service was given in the interesting contribution made to the congress by Surg. Gen. S. A. Chuan, president of the Army Medical College at Peking. Chuan (China).

The speaker briefly reviewed the primitive conditions existing in the old Chinese Army and the reformation of the military and medical service through the contact of China with the West. Military medical service first began in the navy; the first two military hospitals were established in Port Arthur and Weihaiwei, the two chief naval bases in north China. Medical officers of these hospitals had been trained by the Peiyang Hospital in Tientsin, out of which later came the Peiyang Medical College, now known as the Navy Medical College. The Army Medical College was founded in Tientsin in 1902 for the proper training of medical officers and subsequently became a national institution. The first class was graduated from it in 1906, and the men were immediately appointed as medical officers for the different army corps. A department of pharmacy was organized in connection with the Army Medical College, and in 1908 the first class of graduated pharmacists were distributed to the different army corps. In the same year an army medical supply depot was established. China sent out for the first time her accredited representatives to the Thirteenth Annual Army Medical Convention in the United States.

As emphasized by the speaker, these changes illustrate the progress of the army medical service and the important position it came to assume in the army. The medical personnel was given definite rank in 1905 by the general headquarters for army training with the title of brigadier general as the ranking officer for the doctors and colonel for the pharmacists. During the revolution in 1911 most of the medical officers in the opposing armies were graduates of the Army Medical College. In 1912, the first year of the Republic, final ranking of medical officers was decided upon; doctors have since held ranks from major general to second lieutenant, and pharmacists from colonel to second lieutenant. Below these are male nurses as noncommissioned officers, and nursing orderlies as soldiers. Provincial army medical departments were established for the direction of the army medical affairs of the Provinces under the control of the national medical department in the war ministry. The present rules concerning the public health of the army provide for army medical education of special companies and include plans for the prevention of contagious disease, physical examination, and duties at the regimental medical headquarters, and the education and training of stretcher bearers.

The development and progress made by China in military medical service may be divided into these four periods: Prior to the Chinese-Japanese War; from the Chinese-Japanese War to the Boxer movement; from the Boxer movement to the Revolution; and since the Revolution. Although much creditable work has been accomplished, a great deal still remains to be done, but with increasing trained personnel and better supplies the speaker expressed the hope that China would soon place her army medical service on an appropriate basis.

Hybbinette (Sweden).

In giving a brief review of the organization of the medical service in the Swedish Army during peace time, Dr. R. Hybbinette, Médecin de Bataillon, the delegate from Sweden, explained that the army medical service is under the direction of the army administration, which constitutes the supreme military authority from the administrative viewpoint under the department of national defense. The departments of terrestrial and naval defense have been united in a common department since 1920. The direction of the medical service constitutes a common administration for the medical and veterinary services of the Army. The head of this central service is the "Generalfältläkaren," or chief military surgeon.

who is also the chief of the entire medical personnel of the army. The direction of the medical service is assisted by a scientific advisory board, composed of a certain number of specialists in different lines (actually 22 in number) with the mission of giving advice and directions in the corresponding special branches when required.

The surgeons of the reserve of the medical corps are held to serve in war time or when the troops are called out for the defense of the country. Although the position of military surgeons is somewhat complicated, there are practically no restrictions to interfere with their right of attending to a civilian clientele in a measure compatible with the exercise of their functions in the army. Since 1916, the army, in addition to its male hospital attendants, also possesses a permanent corps of female nurses, to the number of 42, not counting those who figure on the staffs of important garrison hospitals. These nurses are at present considered as indispensable. Every corps has its own hospital or at least its section of a hospital. In important garrisons, such as Stockholm, Skovde, and Boden, there also exist special garrison hospitals provided with entirely modern sanitary equipment, in which are treated the majority of grave cases supervening in the respective garrisons. Under ordinary circumstances there are no special sections for slightly sick soldiers, and men who can not be easily cared for in a sanitary establishment of the army are evacuated into a civilian hospital. Special methods of treatment have in recent years shown a progressive tendency toward a permanent organization, so that specialists attached to the military hospitals as well as to the special sections of the Stockholm Garrison Hospital are always available and may be summoned as required, or the patients may be sent to them when this is practicable. A question on the order of the day is the eventual fusion of military and civilian hospitals, more particularly the garrison hospital and the Seraphine Hospital in Stockholm. The odontological service in the army is attended to, as far as permitted, by available resources, by appointed civilian dentists in certain important garrisons, and at certain times by the enlisted dentists during the last portion of their military service. There are no real military dentists and pharmacists. The same is true of military pharmacies, except that the Stockholm garrison hospital possess a special military pharmacy which supplies the entire garrison and is under the management of a civilian pharmacist.

The medical service of the Swedish Navy is still separate from that of the army, but an approximation between these two branches of the medical service of national defense is to be anticipated as a result of the above-mentioned fusion of the two departments into a single one. As regards collaboration with the Swedish Red Cross, the chief military surgeon assists at the meetings of the supreme council of the Red Cross, and a certain number of other military surgeons actively cooperate in Red Cross work. War-time collaboration between the medical service of the army and the service of voluntary associations is carefully regulated by provisions of a confidential order.

Kensa Oyama (Japan).

Surg. Lieut. Col. Kensa Oyama addressed the congress on the general organization of the medical department of the Japanese Army, stating that the medical department has 1,321 officers in active service, making the ratio as 1.38 as compared with over 50,000 physicians in Japan. All medical officers are members of the Military Medical Association or sanitary corps, whose president is the director of the medical bureau of the department of war. This director is the surgeon general who is the head of the medical department of the army. The bureau is divided into two sections, that of general administration and of medical service, the chiefs of both being surgeon colonels. The chief of medical affairs at divisional headquarters is a surgeon general or colonel, who controls all sanitary concerns as well as the education of medical officers and noncommissioned officers of his division. A number of female nurses are employed at the garrison hospitals. In war time the divisional medical corps includes a stretcher company. There are 81 garrison hospitals, which are classified into four grades. Each hospital comprises several wards devoted to internal medicine, surgery, ophthalmology, oto-rhino-laryngology, cutaneous and venereal diseases, infectious diseases. The education of medical officers is completed, after their appointment, by the study of military medicine and surgery in the Military Medical College, which is presided over by a surgeon major general, a number of medical and pharmaceutic officers serving as instructors. The bacteriological section of the college, besides investigating the prevention of epidemic diseases, prepares vaccines for the treatment of typhoid fever, paratyphoid, cholera, dysentery, plague, and influenza, as well as vaccine lymph, and the antisera of erysipelas and tetanus. Five military sanitaria, three in the mountains and two by the seaside, belong to the Japanese Army.

Connerade (Belgium).

In his report on the organization of the chemical services in the Belgian Army, Dr. E. Connerade, Pharmacien de 1re classe de réserve, Professeur a la Faculté Technique du Hainaut, warned against the threat of the chemical industry of Germany, which is now preparing for a dangerous increase of poisonous fluids for use in the next war. Realizing the uncertainty of peace, and the importance of the part allotted to the chemical sciences in military preparedness, all the great Allied Nations are contemplating the formation of a permanent chemists' corps in the army. Belgium being exposed to the most serious risks, it becomes the duty of the authorities to provide efficient defensive measures, which must necessarily include the new technical organization referred to above. In addition, the speaker proposed the erection of a well-equipped central laboratory for chemical investigation and experimentation, supplemented by lecture courses in applied physical and organic chemistry for the instruction of military chemists about to join the active army.

The work of the staff, composed of professors of chemistry and their assistants, is to consist in the study of all the important chemical problems which will be placed before them. So-called "circumscriptionary" or local laboratories must be established, having for their principal object the control of the army's food supply; and every hospital must be provided with a laboratory of clinical biochemistry. In the case of mobilization, a chemist is to be detached for service with the ministry of war and another for service at the general headquarters of the army. The central laboratory is to be maintained, and its staff extended by mobilized university professors and assistants, the direction of the different sections being intrusted to the most competent men. Each army division is to have a field laboratory, including a stationary research section, a movable hydrological section with several stations, and a movable defense section against poisonous gases. A military chemical pharmacist is to be detached for service with each regiment, to attend to the distribution of the antigas masks. The proposed laboratories of clinical chemistry are to be attached to the hospitalization centers and the movable hospitals.

Hansen (Denmark).

The organization of the medical service in the Danish Army was discussed before the congress by Doctor Hansen, Chef d'Etat-Major du Service Sanitaire de l'Armée Danoise, who showed that the medical personnel of the army consists of military surgeons and medical staff. The medical corps contains both regular and auxiliary military surgeons. The chief of the military medical service is the chief of the corps, with the rank of major general, and directly under the war ministry. He directs and inspects the medical organization and sanitary equipment of the army. The two senior first class chief surgeons have the rank of colonel, the others are lieutenant colonels; two are attached to the supreme army command, one is chief of the staff, one is chief of the garrison hospital in Copenhagen, and two are at the disposal of the army corps, one of them being chief of the sanitary depot. All surgeons are subservient to the medical corps, which is alone authoritative in medical questions, while other questions are decided by the commanding general of the district where the surgeons serve. They supervise the sanitary work and take care of the sanitary material delivered to the service. According to orders of the supreme command or on its authorization, they inspect the sanitary service and all that belong to it in the garrisons of the district of this command. At a time fixed by the medical corps, they prepare an annual inventory of the sanitary equipment of the different divisions and hospitals. Instructive exercises, so-called war games, and exercises in sanitary tactics, with or without apparatus, personnel, and material, are held by the regular surgeons who serve in the divisions and hospitals, the schools, the training schools for nurses, and other centers.

Military surgeons have the right to practice and to have a civilian clientele, their doing so being considered as actually in the interest of the army. The garrison of surgeons is not altered except on their own desire, so as to protect their practice. Medical students who have finished a certain part of their studies are taken for military service in the medical corps, where they serve during a period not exceeding six months. As soldiers, they attend a school for auxiliary surgeons during about six weeks. The military and medical studies of this school are concluded by an examination, after which the soldier is attached to a service in a division or hospital where the regular surgeons supervise the continuation of his medical service. In normal times the service as auxiliary surgeons lasts about two and a half months. The students may be recalled in the fourth year of their medical studies to continue their medico-military training for a period of 25 days. In war time the auxiliary surgeons may be charged with a regular service. Auxiliary surgeons who have completed their medical studies and passed a medical examination, and who are found efficient, may on request of the medical corps be raised to the rank of major adjutant surgeon by the ministry of war. In order to train as large a number as possible, these major adjutant surgeons do not as a rule serve longer than two years in the divisions and hospitals conducted by the regular surgeons. The sanitary troops are dependent upon the medical corps and consist of hospital attendants, ambulance surgeons, ward nurses, and stretcher bearers. The corps of female army nurses is also under the medical corps.

Every garrison has its own military hospital, the Copenhagen Garrison Hospital having services for all diseases except insanity which is treated in civilian hospitals. There is a medical service, a surgical service, a service for cutaneous and venereal diseases, eye diseases, diseases of the respiratory passages, ear and nose, one for gynecological diseases (wives of members of the army and their families), a service for Röntgen examination and treatment, and one for dental treatment. All these services are connected with clinics for ambulant treatment. Then there is a military epidemic service for epidemic and tuberculous diseases, the latter being treated provisionally before evacuation into a sanitarium or discharge from the army.

In war time, in order to have enough space, certain buildings are designated for possible utilization, and a detailed plan is worked out for each building, for its rapid transformation into an ambulance with services for surgery, medicine, and epidemics. During peace the army, as well as the navy, have certain relations with the

Red Cross. A military surgeon with whom the Red Cross may discuss questions is delegated by the army and navy, and the results must often be sanctioned by the war ministry. On mobilization the Red Cross becomes subjected to the supreme command of the army.

Dzierzkowski (Poland). A brief communication on the organization of the corps of sanitary troops in Poland was presented by Captain Doctor Dzierzkowski, the Polish delegate to the congress. Although the medical service is not yet completely organized, certain points still waiting for definite settlement, the bases of the organization are already firmly established, and the final achievement is only a question of time. In order to meet the many duties now incumbent on the medical service of a modern army, the Polish medical service has found it necessary to establish its organization on the basis of the two following rules: (1) Complete autonomy, permitting it to dispose of all the necessary means for the proper functioning of all parts of its mechanism; (2) the closest and most direct cooperation with the supreme command, as indispensible to coordination, especially in war time, of the sanitary measures with the work of other services under the same command. This goal was attained through the creation in 1919 of a corps of sanitary troops, according to a decree issued by the supreme command. In order to make collaboration profitable, it is indispensable for surgeons to acquire a sufficient military education, thus enabling them to do efficient work in the staffs of the great units. For the higher officers of the sanitary troops the Polish Government has therefore organized so-called staff courses, where the necessary instruction is given them.

Antonin and Balanesco (Rumania). General considerations on the organization of the Rumanian medical service during the war (1916–1919) were the subject of an address by Dr. L. Antonin, Médecin Général de Division, inspector du Service Sanitaire de l'Armée Roumaine, and Lieutenant Colonel Doctor Balanesco. This service, as pointed out by them, underwent a series of modifications during the years 1914, 1915, and 1916, more radical changes in 1917, and a third series during the Hungarian campaign, 1919–20. The service was thus shown to be in a state of continuous transformation. Their anxiety to take the best possible care of the wounded and disabled impels the chiefs to take advantage of all new methods along special lines. Technical surgical organization appears so imperative that it is necessary to hold interallied surgical conferences. In order to keep in touch with modern scientific advances and being desirous of organizing for the wounded the application of the new methods of treatment in use in the temporary Compiègne Hospital No. 21, the Rumanian medical service requested from the French Government a mission of French surgeons, which was accordingly sent, directed by Dehelly, with great benefit to the wounded. With special reference to prophylactic measures a high degree of foresight was attained, especially in the second period, 1917–18, in the form of movable prophylactic outfits, stationary and movable bacteriological and chemical laboratories, hospitals for contagious diseases, quarantines, stationary and movable vermin-destroying contrivances, sanitary regulations of soldiers' camps, and other improvements.

The Rumanian Red Cross lent its extensive cooperation to the army as well as the civilian population during the war. It placed at the disposal of the army 50 stationary hospitals with nearly 11,000 beds and 5 field hospitals with 1,000 beds. The entire medical personnel in its service was considered as mobilized and was placed under the technical control of the military medical service. After the evacuation of Valachia it was charged with the administration and maintenance of all military hospitals (150 in number) left in the occupied territories. In these hospitals 150,000 wounded and sick were cared for by the Red Cross. The humanitarian work of the Red Cross was assisted by the unfailing activity of Her Majesty the Queen of Rumania, and also by the Red Cross societies of allied or neutral countries (American, British, Canadian, French, Swiss, Swedish, Danish, and Japanese Red Cross). The International Committee of the Red Cross was undoubtedly equal to its mission, as shown by the assistance lent on all occasions.

China, through her delegate, Surg. Gen. S. H. Chuan, sent a brief report on the Chinese army medical service with the activities of the Chinese Red Cross. On account of the limited number of medical men in this country, the relations between the army medical service and the Chinese Red Cross have always been very close and cooperative. Some of the cooperative activities are represented by the fight against the so-called famine fever, and the pneumonic plague in Manchuria in 1910, which was waged by all available medical men in the army and **Chuan (China).**

navy, the Red Cross, civilians, foreigners, and Chinese. The second united activity concerned relief to the population of Wen-Chou and vicinity in 1913, at a time of inundation. Two years later, in 1915, the metropolitan Province[2] was devastated by an enormous flood, and the outbreak of epidemic of infectious diseases was efficiently prevented by the work of 120 medical officers assigned to duty by the army medical service. An extensive outbreak of pneumonic plague in Sui-Youan, district of Mongolia, the infected areas covering 10,000 square miles, was efficiently checked in the short period of four months by the antiplague work of the army medical service, as discharged by 136 medical officers headed by Surg. Gen. S. H. Chuan. In the recent famine (autumn of 1919), affecting four of the most densely populated Provinces of north China (about 30,000,000 people), the need of sanitary relief proved imminent, and the International Famine Relief Committee appointed the speaker as medical director for the whole of the famine-stricken districts. Five sanitary squads were organized, consisting mostly of army medical officers, and four sanitary stations were established in the important centers. The threatened epidemics were efficiently checked as a result of the activities and services of these medical stations and sanitary squads.

Uzac and Vincent (France). France presented a valuable contribution to the congress in the form of observations by Doctor Uzac, Médecin Principal, and Doctor Vincent, Médecin Major de la Direction du Service de Santé au Ministère de la Guerre, on certain means of transportation of the wounded. A number of considerations were pointed out as indicating the systematic establishment of the surgical services at the rear for all wounded men who can tolerate without harm a transportation of about 10 hours. Only those casualties which can not be transported or evacuated are to be kept in the proximity of the front. This arrangement necessarily involves the employment of improved means of transportation, and as these conditions change for the better the number of absolutely untransportable cases will presumably become considerably reduced. The utilization of sanitary automobile vehicles meant an enormous advance from the viewpoint

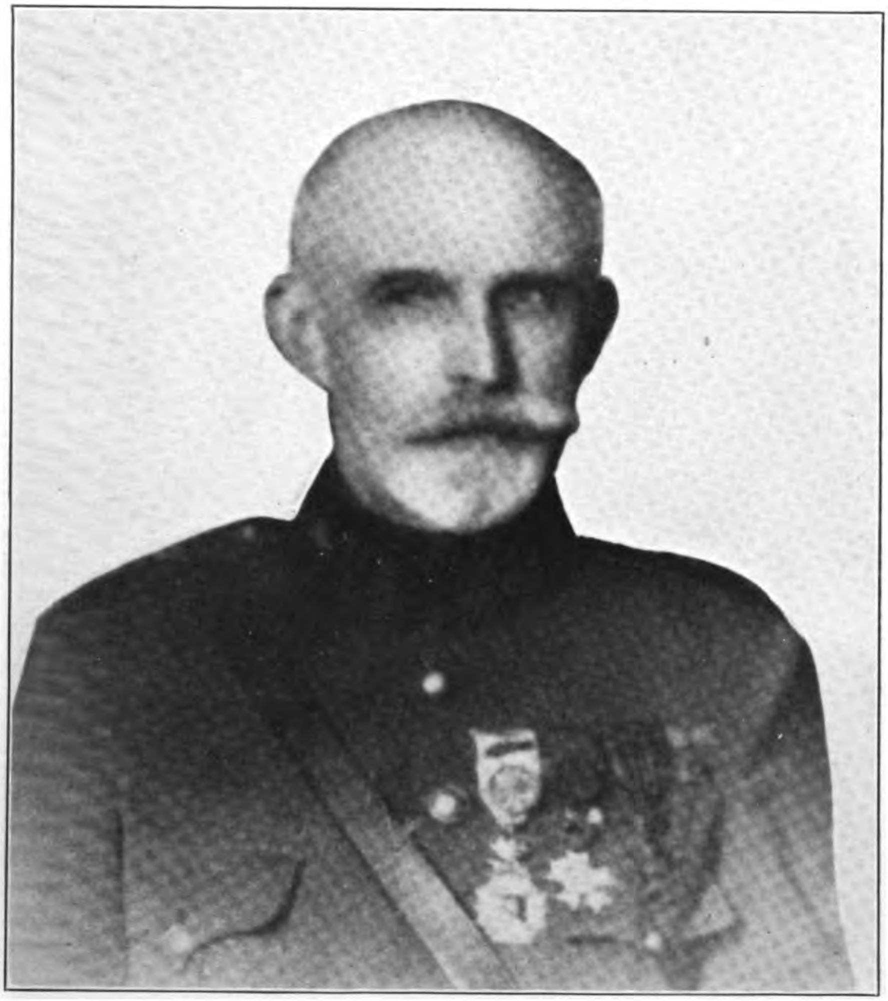
[2] The metropolitan Province of China is Chili (formerly called Pechili) which means "direct rule," and is so called because it is the Province in which the national capital, Peking is situated. It is the most northerly of the six maritime Provinces of China proper and has an area of 115,800 square miles. The population of this Province was estimated at about 32,571,000 by the Chinese census of 1910.—W. S. B.

HON. ALBERT DEVEZE, MINISTER OF NATIONAL DEFENSE OF BELGIUM, WHOSE VISION AND LEADERSHIP WERE LARGELY RESPONSIBLE FOR THE CALLING OF THE CONGRESS.

962—1

COLONEL VAN DER SMISSEN, DIRECTOR GENERAL SERVICE DE SANTÉ, WHO REPRESENTED THE BELGIAN MINISTER OF WAR THROUGHOUT THE CONGRESS.

962–2



LIEUTENANT GENERAL WILMAERS, ONE OF THE LEADERS IN THE CONGRESS.

962–3

INSPECTOR GENERAL WIBIN OF THE SERVICE DE SANTÉ OF THE BELGIAN ARMY, WHO WAS ONE OF THE GUIDING SPIRITS OF THE CONGRESS.

962–4

of efficiency, rapidity of evacuation, and actual comfort, as compared to the old horse-drawn carriages. There is still room for improvement, however, especially as regards the comfort of the wounded (by springs and air cushions), as well as better methods of heating, a very important consideration for war-wounded men, who must be transported in a state of shock. The utilization of sanitary airships as a means of transportation has already been initiated on a limited scale in certain theaters of war, and would seem to promise good results in the evacuation of wounded men under the best possible conditions of security, rapidity, and comfort.

The work of the Italian Red Cross during the war (1915–1918) as an auxiliary of the military medical service was discussed before the congress by Surg. Col. Prof. Cesare Baduel, general director of the Italian Red Cross. In describing the activities operative in the war zone, the speaker showed that since the entrance of his country into the war, the Italian Red Cross mobilized 209 units, subdivided as follows: Sixty-five war hospitals under canvas, 3 stationary hospitals, 3 movable surgical hospitals, 4 sanitary sections, 32 mountain ambulances, 80 railroad aid posts, 24 hospital trains, 15 automobile sections, 3 field sections for volunteer female nurses, 1 lake ambulance, 1 river ambulance, 6 radiological ambulances, 1 electrovibratory ambulance, 4 movable douche baths. For the services of these and other units, including a laboratory for medical research, the Italian Red Cross mobilized the following personnel: 2,225 medical officers, 1,080 volunteer female nurses, and 9,500 military attendants, male graduate nurses, and soldiers. The field hospitals had an original capacity of 50 beds, which was almost immediately increased to 100, and in some cases to 200 beds, so that 10,000 beds could be provided in the war zone. These hospitals were supplied with bacteriological laboratories, radiological cabinets, apparatus for disinfection and sterilization, etc. Altogether 426,786 patients were received by these hospitals. The movable surgical hospitals were highly important formations, capable of rendering the most up-to-date assistance in war surgery, and doing an enormous amount of work. Aside from minor interventions, amputations, or disarticulations, which were performed in large numbers, the list of operations done in these hospitals in-

Baduel (Italy)

cludes 694 laparotomies, 612 craniotomies, 45 laminectomies, and 60 thoracotomies. Very important services were also rendered by the 24 hospital trains, which from the start could transport 206 wounded in the recumbent position, later on, 300. This service proved so satisfactory that the military medical service has modified its own sanitary trains according to the modern type of the Red Cross trains. Altogether, 835,501 military passengers were carried by these trains in approximately 4,572 journeys, covering a distance of about 2,824,519 kilometers.

The Italian Red Cross was always very closely connected with the military medical service, and in entire conformity with the purposes of the latter, the Red Cross participated in all the tasks belonging to the medical and sanitary domain up to the front-line service. His Majesty, the King of Italy, decreed the silver medal for military bravery to the Italian Red Cross, with the following commentary: "In accomplishing its most noble mission of mercy, it has shown during the entire war an admirable spirit of devotion, a generous zeal, undaunted courage, and constant devotion to duty." Concerning the actual relations of the Italian Red Cross with the military authorities in warfare and peace time, its statutes place the Italian Red Cross always at the disposal of the ministries of war and of the navy, whose represenatives are by right members of the central committees and the directory council. The Royal Decrees of December 14, 1919, Nos. 2469 and 2470, regulate at present the activities of the Italian Red Cross Association in warfare and in peace time, its relations with the war ministry, the administrative and executive duties of the military medical authorities in the war zone and territorial zone, the legal position of the Red Cross personnel in case of mobilization by order of the military authority. By a Royal Decree of October 17, 1920, following the proposal of the war ministry, his Majesty, the King, has granted to the Italian Red Cross a "labarum" as to the other army corps. (A "labarum" is a standard or banner borne in ecclesiastic processions of the Roman Catholic Church, emblematic of spiritual goal and guidance.)

Depage (Belgium). The advantages of accurate organization of the medical service, more particularly its organization in "sectors," were emphasized by Doctor Depage, who laid stress on the fact that the Red Cross has become militarized and can be intrusted by the medical service with the care of a certain number of "sectors" according to conditions established in peace time. A "sector" consists of a series of hospitals, constructed at distances from the front toward the rear, placed under the direction of one surgeon belonging to the general inspectorate of the medical service. In the speaker's opinion, each sector should be autonomous, and its personnel movable from one hospital to another, according to requirements, on order of its chief.

International Red Cross Committee: Dr. Adolphe D'Espine, Ancien Recteur et Professeur Honoraire de l'Université de Génève, stated that he was delegated to the congress because the latter had placed the relations between the military medical service and the Red Cross on the program. While each National Red Cross society must arrange its exact part in warfare in conformity with its government, the International Committee, which these societies recognize as their natural center, welcomes for them the privilege of serving at the front instead of restricting their activity to formations at the rear. The idea of the Red Cross, it must be remembered, was conceived on a battle field, at Solferino. Recent war experience has shown its efficiency at the front, when help was needed. On the occasion of a visit to the Italian front in May, 1917, the speaker saw advanced posts and ambulances of the Italian Red Cross under the direction of prominent surgeons and university professors who operated upon the wounded two hours after the infliction of their injuries at Monte Luka. D'Espine (Switzerland).

LESSONS OF THE WAR IN THE TREATMENT OF FRACTURES OF THE LIMBS.

A number of useful contributions were offered at the congress on the important subject of treatment of limb fractures. The armies and navies of many nations were represented by the speakers.

Czechoslovakia brought a valuable offering in the form of a review by Dr. J. Levit, commandant médecin, professeur agrégé à l'Universitié Charles à Prague, on the modern treatment of fractures. The ideal aim and object of fracture treatment must be the perfect anatomical and functional result. In order to accomplish this object, the first requirement is exact coaptation; next, the preserva- Levit (Czechoslovakia).

tion by different methods of joint mobility, restoration of muscular function, and elasticity of the soft parts in general, by means of orthopedic measures. Surgical procedures consisting in exposure of the fragments and fixation in a variety of ways, are resorted to only in case with considerable displacement, and where small benefit is to be expected without an open operation. Mechanotherapeutic measures must be utilized after these operations, as well as in all other cases, in order to accomplish good results. This observation was made in the speaker's surgical division, when an entirely modern orthopedic section was attached to it through the efforts of Colonel Fischer, chief of the sanitary section of the ministry of national defense. No soldiers with fractures were discharged until after the maximum possible restoration of the function of the limbs was obtained.

De Souza Fereira (Brazil).

The delegate from Brazil, J. A. de Souza Ferreira, major médecin of the Brazilian Army, emphasized the need of prompt attention to war fractures, the surgical treatment to consist of thorough disinfection of the focus, according to modern methods of wound treatment (débridement). The fractured bone itself is to be treated according to the technique of partial progressive removal of the splinters, as governed by the requirements in each case. Recently acquired knowledge of osteogenesis—having shown that bone produces bone exclusively—apparently accounts for delayed consolidation, up to the establishment of pseudarthrosis, sometimes observed as a sequel of extensive subperiosteal removal of bone splinters. The orthopedic stage of rational fracture treatment must follow a parallel course with surgical interventions, and primary wound closure is to be judiciously extended to wounds complicated by fractures, in order to facilitate orthopedic procedures and promote favorable healing.

Special ambulances for fracture treatment have shown their value in improved therapeutic results, and should be permanently attached to the sanitary formations in time of war. Continuous extension, by means of modern appliances, had very satisfactory results in the experience of all who utilized this method which at the same time secures most reliably the perfect adjustment of the fragments and subsequent fixation. The Thomas splint was found to be an excellent apparatus for the transportation of soldiers with fractures.

In the treatment of fractures the rational application of osteosynthesis is capable of furnishing the best results for direct adaptation and subsequent immobilization of the fragments. T-shaped fractures of the epiphysis, certain fractures of the fore arm, patella and femoral neck, as well as those with three or four fragments, indicate the necessity for primary bone suture. The only prostheses employed during the war were of metal and were usually temporary. Procedures described as hooking, spiking, circling with hoops or on the Tarham blade, and screwed plates were utilized. Repeated open operations are at present guarded against in suitable cases by useful stationary prostheses. Osteosynthesis is an operation requiring the most rigorous asepsis, appropriate instrumental equipment, and last but not least a skilled and experienced surgeon. Attempts have recently been made to replace metallic prostheses with a substance which is prepared from bone and can be gradually aborbed.

Physiotherapeutic procedures must be instituted early, and gradually increased until active movement of the limbs can be attempted. Immediate walking, as permitted by Delbet's apparatus, improves the functional recovery of the limb, and is advantageously carried out as soon as possible. Passive and active mobilization of the joints must be instituted at an early date.

Cooperation between surgeon and radiologist in the treatment of war fractures has proved extremely valuable in securing an accurate diagnosis and good bone repair. The effect of the treatment should be controlled radiologically by means of a portable apparatus which can be transferred to the bedside. A selection of some of the best among a great variety of fracture appliances which were designed during the war would seem to be desirable, in order to standardize modern fracture apparatus for general adoption in the army surgical service.

Col. E. M. Pilcher, C. B., R. A. M. C., in his exhaustive contribution on lessons of the war in the treatment of limb fractures indicated the point from which the British Army started in its treatment of fractures and the modifications in that treatment in the light of the new and tremendous experiences. The contrast between the experience of former campaigns and the World War was dwelt upon by the speaker, who stated that British surgical opinion, and the consequent preparation made, as exemplified in the British field fracture equipment, Pilcher (Britain).

was founded largely upon experience in the South African War. The great majority of the wounds inflicted in that war were due to the blunt-nosed, small-bore bullet. Shell fractures were uncommon, and no high degree of septic infection occurred, on account of the small use of artillery and the clean prairie soil of the battle fields. Measures to meet sepsis accordingly took a secondary place.

With the advent in the World War of an overwhelming artillery predominance, a pointed bullet producing enhanced injury both in bone and soft parts, and a high degree of infectivity in the soil of the country fought over, problems in connection with bone injury took a somewhat different aspect. It soon became clear that fractures no longer conformed to any particular type of bone injury, but were highly irregular, and above all that it was not safe to assume that any wound was free from infection or so lightly infected that it could be left to nature. Shell fragments have always had a bad reputation as introducers of septic material, putting aside the fact that they often lodge in the tissues and carry in foreign bodies and portions of clothing. And the relatively sterile rifle or machine gun bullet was usually infected by passing through earth or the mud-stained clothing of the soldier.

Another tactical feature, which was the direct outcome of the supersession of open warfare by the conditions of trench fighting, was the close range at which rifle and machine-gun wounds were inflicted. Bone wounds were formerly divided into types exemplifying long, medium, and short range injury. In trench warfare, ranges are usually short and bone injury therefore maximal. A large proportion of exit wounds were of the explosive type.

Again, the change from the round nosed to the pointed bullet had all the results predicted from experiment. A much higher degree of shattering was seen, whether in compact or cancellous bone, and whereas cancellous bone was usually, and compact bone occasionally, tunneled by the round-nosed bullet, the pointed bullet was equally destructive to both, and clean tunneling, the "plaie en seton" of French writers, rarely seen.

Trench conditions of warfare also were certainly responsible for a greater number of richochet hits. M.

Delorme estimates their frequency as occurring in a proportion of 1 to 3. Whether we accept this high figure or not, it must be allowed that the oblique and lateral impact of bullets fired at short range, and losing only a small increment of their velocity by contact with loose earth and the like, was certain to lead to enhanced severity of bone wounds.

Surgeons were to some extent prepared for a state of things in which gunshot injury to bone was likely to be more severe than that to which they were accustomed, but little preparation had been made to deal with injuries in which the most terrible types of infection were hidden and in which the most extensive shattering was of less importance than gangrenous processes of a rapidly spreading and lethal character. All former ideas were upset and at first the preparations seemed inadequate. Surgeons had to tackle at once and from the beginning, the question of dealing with immense numbers of shattered and highly infected bones, chiefly at or near the front, as the battle against septic processes admitted of little delay.

Probably, therefore, the most important knowledge gained during the war in the treatment of fractures was the *realization of the true nature of a gunshot fracture.* A perusal of the reports published by the war office after the South African war shows clearly the point which has been referred to above, that the importance of the accompanying wound was considered secondary to the nature and degree of the fracture. Excellent descriptions and classifications of bone fractures are given. Curiously enough, too, it is fully realized that sepsis "threatens the life of the patient and necessitates amputation in the vast majority of cases requiring that operation. Everything else sinks into insignificance beside it, and a fracture presenting the highest degree of comminution is, if aseptic, of less moment than a trivial one in which suppuration has occurred." But this recognition and acknowledgment of the dangers of sepsis did not lead to their logical consequence, viz, the administrative attack upon sepsis. It was, as a matter of fact, hardly recognized that septic material was carried in by the missiles to the deeper parts of the wound and could not be influenced by any form of external antiseptic treatment. Attention was concentrated upon the bony fracture and not on the wound.

This fact emerges in the discussions which are recorded as to the advisability of exploring gunshot fractures and removing fragments of bone. The considerations in the minds of surgeons on this procedure were not connected with the removal of septic tissues but of bony fragments. It was the fracture and its repair which were the first consideration. It was reserved for the late war to teach us the fact that the septicity of the wound is the chief factor upon which depends the future of bone repair and the incidence of hemorrhage; and this sepsis is under the control of the surgeon and is capable of elimination, and that the questions connected with esquillectomy are of secondary though high importance.

The lessons learned in the front areas—that is, from trenches to operating area—were:

1. The application of external antiseptics, and even the attempt to treat the deeper parts of wounds with antiseptics, is useless. Rapid general cleansing of the skin and the application of dressings is all that can be done.

2. The treatment of hemorrhage is essential in the front area and should not depend upon the tourniquet, except in the actual trenches, but should have as its ideal the ligature of both bleeding ends in the wound.

3. As pathological research has shown that infection follows implantation of septic material within a few hours, it follows that complete surgical revision of a wound is necessary as soon as possible. All means, therefore, of facilitating the patient's dispatch to an operating center should be used. In the case of tetanus and possibility of some other infections, early serum-therapy should be carried out.

4. Severe shock justifies the retention of a wounded man for a few hours in the front-line area for treatment by warmth, the infusion of saline or gum solutions, sleep, and the firm fixation of his shattered limb.

5. The means of fixation in the front-line areas should be simple and efficacious. For the upper limb, splints are sometimes unnecessary. The arm, in the case of a fractured humerus, can often be bound to the side, or it can be put up in a modified Thomas splint with a swivel ring. In the case of the leg and thigh practically all wounds can be put up in a Thomas splint with as little disturbance of boots or clothing as is consistent with a thorough examination and dressing of the wound.

There is a small proportion of gunshot wounds of the thigh in which, owing to the position of the wound, the ring of the Thomas splint can not be applied. For these the long Liston's splint is applicable and the feet should be tied together so that the foot of the uninjured limb may keep the injured one from rotating outward, as it tends to do in a jolting ambulance.

Surgical interference at the seat of fracture was not popular in the British armies. The rule was to remove bone obviously separated from its surrounding and likely to die; but fragments still united by periosteum were left alone. The ends of the bones and their medullary cavities were not interfered with. This is in accordance with English teaching and was not much modified by the advocacy of primary esquillectomy in France.

Amputations at the casualty clearing stations were life-saving measures and had not much relation to the fracture itself. They had less relation still to considerations which became potent at a later stage. The kind of stump left after the amputations and its adaptability to artificial limbs became a matter of the highest importance as the war proceeded.

Infections of moderate severity were common in the casualty clearing stations and were dealt with mostly by free incision and drainage. The most successful treatment of established infections in the casualty clearing stations was that which had always in view the certainty of a brief sojourn in these stations and the certainty of a long journey in an ambulance train. Those surgeons were most successful who limited themselves to a free opening up of the wound and the use, with or without drainage tubes, of such substances as "bipp," salt packs, flavine, and the like, together with careful attention to fixation of the fracture.

For this process of fixation, the casualty clearing stations were fairly well provided. They came into existence at a period of the war when the inadequacy of the earlier methods of splinting had been to some extent realized, and they had a free hand to choose what splints they liked, always keeping in mind the fact that apparatus must be adapted for traveling by train and car. These considerations in the case of the upper limb reduced the splint used to a fairly simple type. For the upper arm a favorite appliance was a modification of the Bortchgravink splint. This consists essentially of an axillary support, connected to a rigid internal splint, at the lower end of which is attached a hook by which extension can be applied. In cases where, on account of wounds, strapping can not be applied or gauze gummed to the lower half of the arm for traction, the upper part of the flexed forearm can be utilized for counterextension, flexion of the elbow joint being maintained by slinging up the forearm. Another apparatus much used was Jones's wire splint, a device on the same principles as the above but made of stout wire and including a frame for the forearm. One of the encircling wires is looped below the elbow joint and forms a *point d' appui* for counterextension. For cases where wounds in the axillary region forbade pressure, the perforated zinc sheets supplied were very useful. A shoulder case, extending down the arm, could be molded over the point of the shoulder, and with a little ingenuity could be made to include the arm. In bad cases Thomas's splint modified in size of ring and length to suit the arm, was used, especially in fractures involving the elbow joint. These gave very excellent support and some degree of extension, but they were found to be inconvienient at first as the arm could not be brought down to the side, a serious consideration in the restricted space of a hospital train. Later, however, this difficulty was met by using a swivel ring. But often it was found that a fractured humerus traveled well with a pair of simple straight wooden splints incorporated in the dressings, the elbow flexed, and the fore arm slung well up across the chest.

Fractures of the fore arm, carpus, and hand were almost invariably put up in a pair of straight parallel wooden splints of suitable width. If a gutter was considered more appropriate, it could easily be manufactured from the perforated zinc plates. There was hardly time or opportunity to pay much attention to the necessary refinements of position which become imperative at a later stage. The prevention of synostoses of the radius and ulna, of loss of spination, and of overstretching of the paralyzed extensor muscles in wounds involving the musculo-spiral nerve, were necessarily left to the base hospitals.

For the lower limb, Thomas's splint was used for fractures both above and below the knee. Many additions and modifications were added. It was found that the ring kept its place best when the hip joint was a little flexed, so the limb was slung to an iron rest which was attached to the stretcher. The splint itself was also provided with a support at right angles to the side bars. The lower part of this support kept the leg raised for 6 inches or more; the upper part provided a loop to which the foot was suspended. For extension, ordinary strapping was used at first and applied along the sides of the leg and fixed by bandages. But Sinclair introduced the fashion of attaching gauze by a specially prepared glue to the sides of the leg, with a second application of the gummed gauze to the dorsum and sole of the foot, so that traction could be made and the foot suspended also. In place of pins to fix the flannel bands which supported the limb between the bars, special clips were used which could be rapidly applied. Where the parts below the knee were involved, Sinclair introduced a special foot piece fastened to the sole of the foot by gummed strips of flannel.

It was a most ingenious contrivance and could be rapidly applied. Moreover, it was arranged so that the foot could be fixed at any required angle. He regards the great improvement in the transport splinting of tibia and fibula fractures as a marked advance. Experience has shown that whether for secondary hemorrhage or for sepsis, fractures in this region are largely represented among amputations, and both hemorrhage and sepsis are favored by the shocks and disturbances of transport. The same may be said in a lesser degree of injuries to tarsus and ankle joint. Any contrivance by which real fixation and comfort could be obtained was a great boon and saved many limbs and lives. In cases where there were wounds about the pelvis and upper part of the thigh, so that the ring of the Thomas splint could not be applied, Jones's abduction frame was used, an apparatus in which the lower half of the body was fixed in a frame with the injured limb abducted. This abduction had to be given up in the ambulance train as there was no room for it, and this part of the frame was made with a joint which allowed the two limbs to be placed parallel at will.

As regards treatment of the fracture itself, secondary esquillectomies were no more popular with British surgeons than primary. The usual procedure with fractured cases at base hospitals—the first place where life-saving procedures gave way to functional considerations—was to give them a short rest before doing anyting in the way of operation. The splints were readjusted and a skiagram taken of the seat of fracture. After 48 hours clean wounds were sutured, suppurating wounds left open, and in either case the limb put up in the best possible position, a second skiagram being taken with the patient in bed. In fact the whole course of the case was followed by skiagrams and the necessary corrections made at intervals. Some surgeons kept a series of prints reduced in size in frames at the bed heads, and so were able to check progress at short intervals.

Some of the lessons learned at base hospitals regarding treatment of fractures may be briefly summarized as follows:

1. As regards the upper limb conservation must be the keynote of practice. Not only is a man's industrial efficiency much more crippled by the loss of part of his arm than of his leg, but the use of an artificial substitute is much more difficult to learn. The preservation of as much hand and arm as possible is imperative.

2. Wounds of the phalanges, carpus, and metacarpus did well on a splint which consisted of a palmar wooden splint applied to the fore arm and having at its lower end a loop of ribbon iron to which the extended fingers were fastened by tapes attached to gauze or cotton gloves gummed to the fingers. Another form of splint for the hand and carpus was Jones's "cock-up" splint, which maintained the wrist joint in dorsiflexion.

3. Loss of substance from the radius or a severe comminution of both bones about the center was apt to result in synostosis of the radius and ulna and in loss of the outer curve of the radius, leading to loss of supination. This was met by suitable positional treatment and movement.

4. The best position of the elbow joint in cases of fracture involving the elbow joint and leading to ankylosis was much debated. The factors influencing the situation are many:

(*a*) The nature of the patient's occupation is important. For heavy manual labor an elbow fixed at an angle of 120° is probably strongest and best, whereas a clerk would prefer an angle less than 90°.

(*b*) If the patient has lost the other arm, or has the other elbow ankylosed at an open angle, ankylosis at an acute angle would be best.

(*c*) Much was learned of the possibilities of secondary excision of the elbow joint. The tendency of the formation of a flail joint was great, but in certain cases a useful movable joint could be obtained and might suit certain kinds of work better than a fixed joint.

5. In a large proportion of gunshot injuries of the humerus the musculo-spiral nerve may be injured, and Sir Robert Jones pointed out that the muscles might be irretrievably damaged by overstretching if the wrist was left in its natural position of passive flexion. He devised a splint to correct this deformity.

6. In gunshot injuries to the upper end of the humerus, where ankylosis of the shoulder joint became a reasonable possibility, the arm must be put up in abduction. Many ingenious splints were devised to affect this end. Late in the war many excellent and useful arms could be seen in which the range of movement at the shoulder was surprisingly good with perhaps no more than 6 inches to 8 inches of the shaft of the humerus remaining.

As regards the lower limb:

1. An extreme observance of conservation is not so necessary here. Indeed the preservation of a damaged foot and ankle, perhaps stiff and painful, after weeks of unremitting attention on the part of the surgeon and at the expense of considerable pain, fever, and suppuration on the part of the patient, is in no sense a gain. The use of an artificial limb is much more easily learned than in the case of the upper limb.

2. In Pilcher's own observation no class of case benefited more by British war experience than comminuted fractures between the knee and ankle. In the early days of the war these fractures were nearly as formidable as those of the femur. They were always grossly infected and very often the seat of grave secondary hemorrhages. Moreover, those which consolidated often showed a high degree of deformity, or some paralytic disturbance like foot drop. With more rational methods of wound revision and sterilization, and with the more efficient fixation introduced by Sinclair, excellent results were obtained in the later days of the war. Sinclair used a Thomas splint as a supporting frame. If extension was required, as it often was, it was obtained by gluing the

rings to the skin of the thigh and then making traction on the foot piece which was gummed to the sole of the foot. The knee was firmly controlled by side pads and flannel bandages. He saw no apparatus equal to this one for efficiency and comfort.

3. Gunshot wounds of the femur were at first responsible for a very heavy mortality. It is true that the greater number died in the front line areas, but in base hospitals losses of life from secondary hemorrhages, long continued suppuration, and sometimes even from gas gangrene were very heavy. At the same time, amputations for these causes and to save life were numerous. The universal adoption of Thomas's splint effected a veritable revolution in the front line areas. It was preeminently the apparatus for transport. As a means of treatment, however, it was not found to be so satisfactory. The difficulty was extension. With the Thomas splint, pure and simple extension is obtained by counterextension against the tuber ischii. Now in many cases of young men with powerful muscles, a high degree of tension is required to reduce and keep reduced a fracture of the femur, and the pressure on the tuber ischii is not well borne. Consequently, the counterextension was dropped and a weight extension substituted, using the frame of the Thomas splint merely as a basis of support. Again it was found that plaster and gum extensions attached to the skin could not support the pull required and gave way or caused blistering. Alternatives were a stirrup inserted behind the tendo Achilles above the os calcis, transfixion pins like those used by Steinmann, "ice tongs" or "horseshoe" clamps taking a purchase from the bone above the knee. Then it was found that on account of the length of time required to consolidate a comminuted fracture of the femur, both knee and ankle became very stiff unless exercised. A suitable modification of the Thomas splint allowed this to be done.

In conclusion Doctor Pilcher laid stress on the importance of "the unalterable canons of Listerism, which are and, since they have been enunciated, always have been the bedrock of success in surgery in the field. To carry them out is not always easy or even possible, but the measure of our success will always be the completeness with which we can provide a Listerian atmosphere to the surroundings of our wounded soldiers."

Caccia (Italy).

In connection with a concise review of the enormous material observed in the war zone and in the territorial hospitals, Dr. Filippo Caccia, Tenente Colonello Medico, Libero Docente di Traumatologia nella Regia Università di Roma, on the basis of personal experience, finds himself in a position to formulate the treatment of war wounds complicated by fractures according to the three following methods: (1) So-called abstentional method (expectant treatment); (2) complete or partial subperiosteal esquillectomy according to a special technique; (3) amputations—complete subperiosteal esquillectomy constitutes the method of choice for presumably infected compound gunshot fractures. The procedure begins with suitable débridement of the wound and exposure of the fracture focus, ablation of all contused and damaged soft parts, removal of foreign bodies and hematomas, followed by accurate hemostasis. In case the fracture focus itself presented incomplete perforations with a retained projectile, the latter was removed and the bony bed was cleansed and cauterized with the Paquelin cautery. In comminuted fractures, especially of the femur, after thorough mechanical disinfection of the soft parts with performance of débridement according to the anatomic relations of the damaged region, complete subperiosteal esquillectomy of the detached and also of the adherent bone splinters is done, provided the two main stumps of the broken bone are long enough to guard against shortening of the diaphysis, as is usually the case, thereby safeguarding the anatomic repair of the bone. Under other conditions it is advisable to leave one or more bone splinters adherent to the periosteum so as to maintain continuity between the two principal fragments.

An essential condition consists in providing sufficient access to the medullary canal for its approximate liberation from foreign material and its radical disinfection. Also all loose fragments should be removed or scraped off until healthy bone marrow is reached. Sometimes a few stitches were applied to bring the soft parts more closely together, or complete bone sutures were done in a few cases of fracture of a bone of the leg or forearm, as well as in fractures of smaller bones, always within the first 10 or 12 hours after the infliction of the wound. A favorable outcome of subperiosteal esquillectomy (prophylaxis against surgical infections) is essentially dependent upon the correct technique and timeliness of the intervention (within the first 24, or, better, 12 hours after the infliction of the wound). The application of this method in time of war and the assurance of its success requires the establishment of special surgical units equipped with a competent staff and the means for rapid transportation. These units must, moreover, be arranged so as to have their base in the rear at a considerable distance from the fighting zone; they must be provided with about 1,000 beds and one or more surgical teams or small advanced ambulances, freely movable and ready to go to work in the fighting zone at well-selected points. Another indispensable requirement is the direction of these sanitary units by a single head, so that the properly started treatment of a given case may be carried to a successful outcome, according to the rules of the surgeon in charge.

Derache (Belgium).

The teachings of the war, from the viewpoint of the treatment of diaphysial fractures of the limbs, were discussed by P. Derache, Chef du Service de chirurgie à l'hôpital militaire de Bruxelles, who summarizes his conclusions as follows: (1) Radiographic examination before treatment, after reduction of the fracture, and during treatment is of paramount importance. (2) The immobilization of fractures must be reduced to the lowest possible minimum, and in all circumstances early mobilization is required. (3) The indications for plaster fixation apparatus are progressively becoming restricted to a few rare varieties of fracture. (4) Continuous traction is the method of choice in the treatment of the majority of fractures with displaced fragments or otherwise difficult of reduction. Continuous traction with suspension (overhead appliances) is especially recommended for fractures of the thigh. (5) Ambulant treatment of fractures of the lower extremity is the method of choice for all fractures without displacement of the fragments. (6) The indications for the open treatment of fractures are constantly extending. In certain types of fractures, osteo-synthesis is the only procedure which permits the functional restoration of the limb. It can only be performed, however, by expert surgeons, equipped with the proper tools. (7) The functional treatment of the limb must be carefully handled by the surgeon, and should be instituted from the start, in order to shorten the period of convalescence after fractures.

L. Delrez, Professeur à la Faculté de Médecine de Liége, discussed the lessons of the war, first with regard to treatment of open fractures, and second with regard to the mechanical treatment of fractures. A feat which was progressively accomplished during the war consisted in the transformation of infected fractures through secondary suture, into closed fractures, after the focus had been surgically sterilized. A decisive advance was brought about by timely trimming of the wounds, thereby permitting surgical asepsis at the time of the first operation and immediate suture. Reduction and fixation of all fractures involve a problem of muscular physiology; the correction of deviations and displacements is greatly simplified by the physiological resting position of the muscles having their insertions on the separated bone fragments. Accordingly, the best position for fractures of the femur is flexion of the thigh on the pelvis, with flexion of the leg on the thigh. The physiological resting position of the muscles, suspension of the limb, and traction applied to the peripheral fragment furnish a maximum guaranty of good reduction. Delrez (Belgium).

What the war has taught in the physiotherapy of the sequelæ of fractures of the limbs is epitomized in the instructive contribution of Doctor De Marneffe, médecin principal, who discussed medical gymnastics of the muscles, with the use of apparatus: mechanotherapy, active in the form of medical gymnastics with suitable apparatus, or passive, through pneumatic mobilization. The Bier method of passive hyperemia is a physiotherapeutic procedure, and may be divided into (*a*) general hyperemia, by means of the Esmarch bandage; and (*b*) local hyperemia, in the form of cupping. Thermotherapy means the application of heat in any form by suitable vehicle (air, water, steam, sand, etc.). Physiotherapeutic measures in a general way are to be directed against the cause; when the cause is obscure the treatment becomes symptomatic. De Marneffe (Belgium).

Physiotherapy surpasses chemical therapy in the possession of an abundant store of remedies and modalities, including some specific agents against the various sequelæ of fractures of the limbs. It would be well for all surgeons to follow the example of certain masters of war surgery who emphasized from the beginning of the campaign that the anatomic result in these cases is unimportant as compared to the functional result. In order to accomplish the best possible functional result, they learned to appreciate the necessity of teamwork and close cooperation with both physiotherapeutists and orthopedists. It is only by means of this practical, reasonable, and rapid method that the wounded, immediately after the infliction of the injury and directly after the performance of the operation, are enabled to take advantage of all the scientific appliances at the disposal of current physiotherapy and modern prostheses, the efficiency of which is very great provided they are applied at an early date.

Reynders (Belgium). The importance of appropriate facilities for transportation of the wounded, more particularly of soldiers with fractured long bones, was emphasized by Doctor Reynders, Mèdecin de Bataillon de 1re classe Hôpital Militairè de Liége, who presented the subject in his contribution to the lessons of the war in the treatment of fractures of the limbs. Men whose fractured limbs have been properly handled in transit reach the hospital in better condition for surgical interference, from the local as well as from the general viewpoint. This desirable safe transportation is provided by the Thomas splint, which should therefore form part of the equipment of all the emergency services. Open fracture foci constitute compound wounds, in which it is imperative to keep in mind the existing tendency to contamination and the necessity for creating a sufficient resistance against infection by means of thorough wound asepsis. This is accomplished through the timely removal of all tissue or wound constituents exposed to infection within eight hours after the infliction of the injury. Concerning the soft parts, the cellular and muscular tissue must be sacrificed until healthy tissue is reached, and this should be unhesitatingly done, as war experience has taught the remarkable extent of muscular repair. The skin, on the other hand, should not be extensively removed without necessity, for it is fatally damaged only in the close vicinity of the traumatism, and the fact must never be lost sight of that the skin is the be t protection for the wound and plays an important part in the process of cicatrization. As to the bone itself, although all dead or devitalized material must necessarily be removed, it is especially important to remember the desired consolidation, to realize the value of a bone splinter in regard to the life of the bone.

to preserve it as a possible graft by virtue of its living periosteal and muscular pedicles.

A fracture focus which has had its vitality restored and been equipped for its fight for survival can be transformed into a closed fracture focus by means of primary suture. In case there is any doubt as to adequate asepsis, or the efficiency of local and general resistance, the wound phenomena and general manifestations on the part of the organism should be watched, and the following procedures be adopted according to their behavior: (1) Application of delayed primary suture; (2) expectant measures until sterilization has been obtained, under control by the microbian curve, followed by application of secondary suture; (3) establishment of the Carrel method of treatment in infected cases.

Prior to the war, the three available methods of dressing fractured bones consisted of: (1) Immobilization of the fragments, after reduction, in a rigid cuff or trough, usually of plaster of Paris; (2) traction of the limb, for the purpose of obtaining end-to-end approximation of the fragments, through continuous extension; (3) direct surgical intervention on the fragments, with repair of the bone, in the form of osteosynthesis. The war has brought no new methods, but the customary procedures were tried and accepted, rejected, or improved upon. Plaster has had its day, and its use has been practically abolished by the war. It gives a false security from the viewpoint of anatomic repair; the limb is immobilized, and its entire function remains to be restored after consolidation has taken place. Delbet's plaster apparatus is a walking appliance, based upon mobilization of the limb.

Continuous extension is applicable in the majority of cases, with favorable results. It permits inspection of the limb, its management, and early mobilization in bed. In order to make extension efficient, the affected segment of the limb must be at its maximum of muscular relaxation. A more nearly perfect extension is obtained by means of Steinmann's pins and Willems's screws, which act upon the bone itself.

Osteosynthesis is indicated only in suitable cases, and its performance should be restricted to (1) cases in which extension can not yield results or has failed to accomplish the desired end; (2) cases in which a perfect anatomic repair is absolutely essential from the functional viewpoint; (3) open fractures, where osteosynthesis constitutes merely a supplementary operative procedure, provided that its performance does not dangerously prolong the intervention, and that the intervention on the soft parts leaves no doubt, from the viewpoint of an aseptic condition of the parts.

The diagnosis of a fracture is clinched by radiography. While a diagnosis of fracture can be based upon the findings on clinical examination, radiography alone can confirm this diagnosis by furnishing the picture of the fractured bone, showing the shape and arrangement of the fragments, their mutual relation, their exact position toward the axis of the bone, and their general situation. In certain circumstances, stereoscopic radiography may be required for more accurate information, anterior and lateral radiography simply showing the presence of anterior, posterior, or lateral displacements. The selection of the proper method of dealing with a given fracture is based upon the radiographical findings, and radiography also serves as an indispensable control for the efficiency of the treatment in the course and continued care of fractures of the limbs.

Hendrix and Petit (Belgium). The contribution of M. Hendrix, Médecin de B^on^ de 1^re^ classe, Chef du Service de Prothèse du SS. de l'Armée Belge H. M. de Woluwé-St.-Pierre, Bruxelles, and M. Petit, Médecin de B^on^ de 1^re^ classe, Chef du Service de la Restauration Fonctionelle par le Travail H. M. de Woluwé-St.-Pierre, Bruxelles, to the subject of war-taught lessons in the treatment of fractures of the limbs is strictly limited to the *prosthetic aspect* of this problem, irrespective of the surgical or orthopedic treatment of fractures. The authors point out the part of the prosthetist in modern fracture mechanics and his intermediate position between the surgeon and the physiotherapeutist. Their object is to call attention to the employment of temporary appliances before the institution of permanent apparatus. The part of the prosthetist is emphasized in its importance for the reeducation of the motor powers of war cripples who have been fitted either with temporary therapeutic appliances or with permanent apparatus for existing incurable deformities. In connection with the different types of appliances devised for the various complications of fractures, the announcement was made of a demonstration to be held during the congress at the military hospital of Woluwé-St.-Pierre, near Brussels, in the prosthesis workshops of the Belgian Army medical service, promising the demonstration of an original method devised by the authors for measuring deformities of the lower limbs with the object of correcting the faulty statics by means of special boots, manufactured according to a procedure based upon a mathematical calculation of the existing deformity.

Picqué and Rouvillois (France).

The primary and secondary treatment of diaphysial fractures, on the basis of experience during the World War, is discussed in the address of Doctor Picqué, Médecin principal de 2e classe, Professeur agreégé d'anatomie à la Faculté de Médecine de Bordeaux, and Doctor Rouvillois, Médecin principal de 1re classe, Professeur de chirurgie de guerre à l'Ecole d'application du Val-de-Grâce. Their analysis of the various techniques evolved in the course of the war culminates in the following suggestions for the rendering of more definite indications. There is no diversity of opinion as regards the treatment of infected fractures at the start. In the secondary period, extensive esquillectomy is required as a minimum operation, unless excision is rendered imperative by sepsis or gas gangrene. However, following drainage of the site of fracture, the customary fixation or immobilization by means of fracture apparatus has been improved upon in certain cases by the performance of secondary osteosynthesis, a noteworthy innovation opposed to the former notion of danger from foreign bodies in infected wounds. On the other hand, there are emergency cases in the primary stage which hardly call for discussion, such as shattered bones with or without complicating vascular or nervous lesions, or already in a stage of incipient infection. All are agreed in these circumstances as to the necessity of saving life through the sacrifice of the limb, by means of amputation, with flaps, where practicable, or a straight circular incision when quick work is required on account of shock. Small punctiform perforations by rifle bullets permit expectant measures, unless threatened by the onset of infection. The bones may also be shattered by glancing or short-range bullets, which have an excessive penetrating power and sweep all free or adherent splinters together with the periosteum out of the fracture focus, which presents only an enormous loss of substance between the fracture ends. The soft tissues are damaged throughout by projecting splinters and fragments of projectiles and are seriously threatened by infection, so that simple cleansing is the most imperative intervention.

Subsequent pseudarthrosis in these cases is due to the traumatic resection of the diaphysis and separation of the parts through the projectile; but a considerably improved functional prognosis is sometimes obtainable by means of primary bony osteosynthesis or bone grafting to one or two bones, according to the character of the limb segment. Whereas operating surgeons are fairly well agreed concerning the cases referred to above, conditions seem to differ as regards the very common cases of diaphysial fractures through shell splinter with medium sized openings. There are two distinct and apparently opposite methods: (1) Moderate, sometimes very reduced, esquillectomy, with employment of chemical disinfection according to the Carrel method, in preparation for secondary suture. (2) Extensive esquillectomy, with or without osteosynthesis, followed by primary suture. The opposition is apparent rather than real and is greatly lessened in actual practice. With special reference to esquillectomy, the gap between the adherents of extensive and moderate procedure is bridged over by the universal concession that the aim and object must be the purification of the medullary focus under the best possible preservation of the diaphysial continuity. Concerning primary or secondary suture, with or without osteosynthesis, although both methods have yielded good results in stationary formations and at the hands of skilled surgeons, it is certain that at the time of widespread offensive movements, with large numbers of wounded and delayed surgical interventions, it is advisable to restrict the performance of suture. But the World War has raised the standard of a new ideal of fracture treatment. In certain offensive movements in Flanders, as the result of excellent organization and coordination from the medical as well as tactical viewpoint, the treatment of fractures could be carried out in field hospitals as in the stationary formations in the rear. Picqué emphasizes, in concluding, that in the midst of admirable development of the technique, such observations confirm the axiom that organization everywhere takes precedence over technical factors.

In discussing the teachings of the war in regard to apparatus for diaphysial fractures, Rouvillois points out that from a rudimentary state in 1914 fracture appliances in general have undergone a series of improvements during the war concerning: (1) The appliances themselves, through the adoption of numerous models, which, however, are for the most part merely old, renewed, or transformed models. Irrespective of their configuration, they all belong to one of the four following classes: Simple fixation apparatus, continuous extension apparatus, suspension apparatus, walking apparatus. (2) Organization of special services, intercoordinated from the technical viewpoint, in the army zone and in the zone of the interior. These advances must be considered as representing modern acquisitions not only for the transitory time of warfare but also in a permanent way in civil practice. As to lessons for war time, it was found that appliances for *transportation* must be reduced to a few elementary types; they must be simple, strong, interchangeable, and easily adjusted by trained attendants without special education in this line. These appliances must also be light, of small volume, and as a rule should permit continuous extension. Apparatus for *treatment* must, on the contrary, be of highly variegated configuration and involve the application of many principles in the choice of which the surgeon should be left the greatest option. The most commonly required apparatus are walking appliances and those for continuous extension, with or without suspension.

The management of broken bones by fracture apparatus is closely related to the question of supreme organization, as dominating the general problem of fracture treatment. The plan adopted during the war has been sufficiently tested to justify its permanent retention.

With special reference to war-taught lessons for *civil practice*, the obsolete pre-war appliances should now be abandoned and replaced by those which have proved satisfactory in the armies, especially walking appliances and appliances for continuous extension, combined with or without suspension. Provided their employment is consistent with the existing lesions, the walking appliances permit the early restoration of the functions of the limb, while extension apparatus permits traction in every required direction, radiographic control at the bedside, frequent and easy change of dressings, insuring a maximum of comfort to the patient. Concerning organization in time of peace, the establishment of at least one service analogous to the fracture centers in the armies is to be desired in large cities and important industrial centers where accidents of all kinds are extremely common. This specialized service should be equipped with the necessary appliances, in order to give the patient in times of peace the benefit of the progress which has been accomplished during the World War.

de Santamaria (France).

By means of his tried and tested special apparatus, Dr. A. S. de Santamaria, of Paris, states that the functional capacities of the upper or lower limbs, after fractures, can be easily and reliably preserved without open operations. Reliable fixation is a purely mechanical question, the maintenance of reductions or corrections depending upon the strict stability of the procedure which is utilized for the purpose. The Santamaria fixation apparatus has been in use for over six years, "without accidents or failures," in a great variety of difficult cases, and is brought to the attention of the congress on the basis of extensive experience. A series of radiograms of articular, juxtarticular, and diaphysial fractures which had been successfully treated by means of this apparatus were exhibited at the meeting. The results show that the unreliability of fixation can be avoided, so that loss of function from this cause is not excusable. According to the findings, this apparatus provides an absolutely reliable fixation, even in the most difficult cases, while permitting early mobilization, from the first days of the treatment, no matter which limb is fractured, and irrespective of the kind or site of the fracture. It appears that without risk of any kind, and with reasonable certainty of success, the patient may be promised a minimum of functional disablement, or even the complete preservation of all functions, in favorable cases. The speaker emphasized the essentially practical aspect of this surgical question, and its vital interest for the patient, the State, or the insurance companies which bear the indemnity costs, as well as for the physician, upon whom rests the responsibility for the final outcome.

Kensa Oyama (Japan).

Surg. Lieut. Col. Kensa Oyama, of Japan, spoke of the recent management of fractures as one of the lessons given by the war. Although disposing of but a small number of important fractures, incurred in the battles of Tsingtau and Siberia, he is ready to emphasize the efficiency as well as frequent necessity of reducing and

COMMANDANT VONCKEN, SECRETARY OF THE CONGRESS. CHIEF SURGEON OF THE SERAING INDUSTRIAL HOSPITAL AND SURGEON TO THE MILITARY HOSPITAL AT LIEGE.

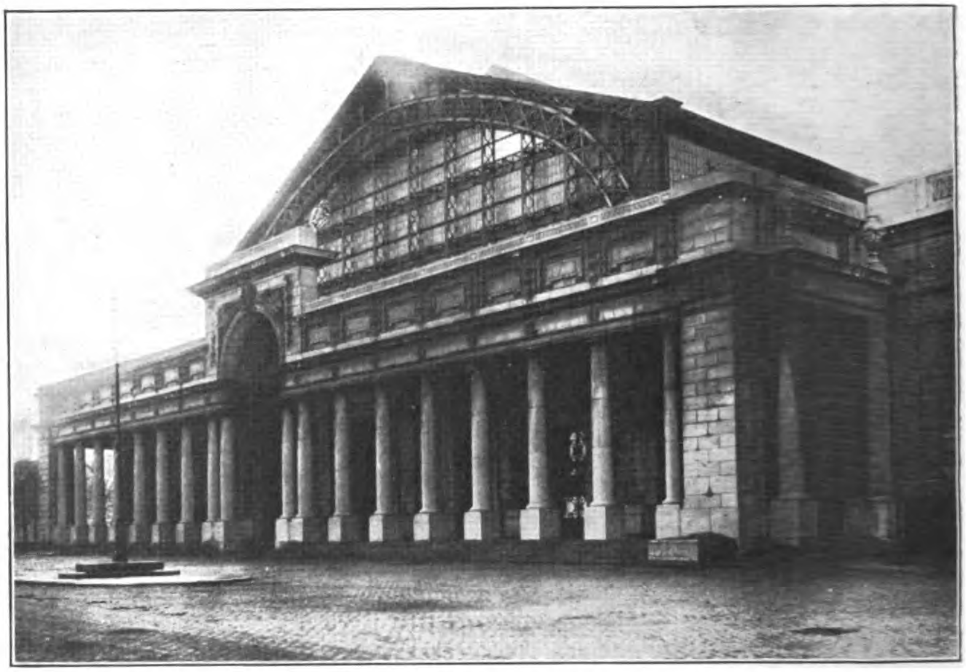
986–1

LOUVAIN. THE MILITARY HOSPITAL—ONE OF THE FEW BUILDINGS IN THE CITY WHICH THE GERMANS DID NOT DESTROY.

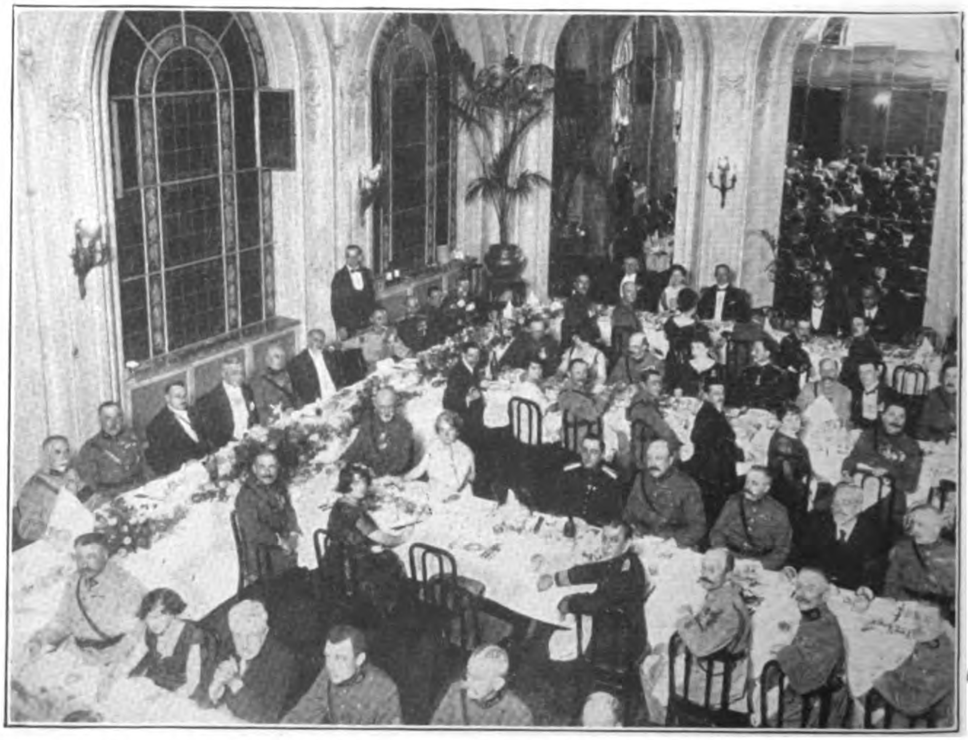
986–2

BRUSSELS. ENTRANCE TO THE PALAIS DU CINQUANTENAIRE.

THE ROYAL PALACE AT BRUSSELS.



BRUSSELS. PALAIS MONDIAL, WHERE THE CONGRESS MET.



BRUSSELS. DINNER GIVEN TO THE DELEGATES TO THE CONGRESS.

correcting the bone fragments with the patient in bed, utilizing a portable X-ray apparatus. He is furthermore convinced that a good restoration of physical function is best obtained by means of prompt employment of massage and institution of gymnastic exercises, fully indorsing the modern principles of early mobilization after fracture.

Under the title of "Some Factors in Bone-Repair,"[8] Commander William Seaman Bainbridge, Medical Corps, United States Naval Reserve Force, the American delegate to the congress, enumerated and discussed a great variety of conditions which influence the healing of a fractured limb. After passing in review the current methods of modern fracture treatment, and emphasizing that there is no method of fixation at our disposal which directly favors or hastens bone union and repair of fractures, the speaker pointed out the necessity, based on recent discoveries, of looking for improved results of fracture treatment in some new directions. Surgeons must keep in mind certain conditions under which there is more or less interference with bony growth. Modern experience teaches that infectious processes are to be reckoned with in numerous obscure conditions, and delayed bony union after fractures, for which no satisfactory explanation can be found, often is one of these conditions. Endogenous infectious processes in the bone marrow may lead to congestion and disintegration. Bainbridge (United States of America).

The fact must not be overlooked that lesions of infectious origin, both from without and within, are of frequent occurrence in bone. External infections may extend inward through the cortex of the bone, an internal infection traveling by the opposite route. The tendency of bone infection is to extend widely beneath the periosteum or through the marrow spaces, causing more or less extensive necrosis. Aside from the staphylococcus aureus, which is the most common pathogenic agent in bone infection of endogenous origin, other germs may be responsible, such as the streptococcus pyogenes, the pneumococcus, the gonococcus, or the typhoid bacillus. In certain cases of acute inflammatory atrophy of bone following upon secondary infection of adjacent joints, the presence of the gonococcus has been demonstrated.

[8] At the request of the head of the British delegation, this contribution was published in full in the Journal of the Royal Army Medical Corps.

As regards focal infection and its rôle as a factor in the repair of bone, it is suggestive that according to recent investigations of Pemberton (1920), on the nature of arthritis and rheumatoid conditions, the Army furnished 400 cases of chronic arthritis, 298 of which showed demonstrable surgical foci, mostly in the tonsils (208), the remainder in the teeth or in the genito-urinary tract. Removal of the focus of infection and correction of the altered metabolism by regulation of the diet were found to have a beneficial effect on these disturbances.

Constitutional diseases, such as tuberculosis and syphilis, are undoubtedly responsible for delayed union in a certain number of cases. It is noteworthy in this connection that syphilis, according to recent investigations, appears to have such a pronounced structural effect upon metabolism of bone tissues as to often leave more convincing proof of an old luetic infection on the X-ray plate than is afforded by the Wassermann or Noguchi tests.

The gastrointestinal tract, with its many side pouches, recesses, culdesacs, and extensions, such as the gall bladder and appendix, represents an important center of dangerous foci of infection, and incidentally for delayed bone repair after fractures. Other important and dangerous strongholds of infection are represented by the mouth cavity, the tonsils, and the nasal accessory sinuses.

At the time of the speaker's visit in the fall of 1915 to the British front, his attention was called to many interesting facts. He was informed, for example, that early in the war, during the transportation of the native troops from India, the medical staff was scrupulously careful in the observance of all dietetic religious regulations, special food and cooks being provided for the men. The failure of fractured bones, as well as soft parts, to heal as promptly as should have been the case, led to a careful investigation of existing conditions, with the result that the men's teeth were found to be very defective and in a state of rapid decay, while the mouth cavity was fetid and the gums were the seat of pyorrhea alveolaris. The cause of these lesions was ultimately traced to the fact that the men, who at home cleaned their teeth with olive sticks had refused to use the toothbrushes furnished, for fear of contamination with pig's bristles, which are un-clean according to their religious teachings. A comparison of these early troops with those who arrived later in the war, after this omission had been corrected and the buccodental hygiene improved, showed not only that the men's teeth now remained free from decay but that fractured bones and wounds of soft parts healed more rapidly. This fact was called to the speaker's attention by several medical officers.

The callus for the repair of the fractured bone is expected in a measure to form from the hematoma. Fractures do not consist merely of a broken and more or less displaced bone but, as we know, all bony injuries are associated with a bloody extravasate which in closed fractures may remain subperiosteal or pass into the surrounding tissue or in open fractures escape to the outside. The loss of the extravasated blood has an undesirable influence upon the repair process in so far as its presence undoubtedly favors the formation of the callus. On the other hand, aside from the danger of infection from without or within the hematoma may exert an injurious pressure upon the neighboring organs, causing congestion and lymph stasis, which are further increased by muscular inactivity. This retardation of the blood and lymph current involves a more or less imperfect nutrition of the surrounding tissues and at the same time exposes them to the danger of autoinfection. The causative relation between the hematoma and the appearance of the callus is shown by certain cases of clean open fractures in which the blood has escaped to the outside, with the result that a very weak callus is formed. On the other hand, it is a familiar fact that a sluggish callus formation can be hastened by the injection of blood at the site of the fracture or through artificial production of a hematoma by rubbing the bone ends against each other.

The young callus at first has the character of granulation tissue, but later on gradually increases in solidity through deposit of lime salts. Its mechanical properties are of great importance from the therapeutic viewpoint. Newly developed callus is semielastic and yielding, so that it becomes readily deformed under the influence of relatively slight forces, resuming its original shape after these forces have ceased to act. But the semielastic callus is unable to overcome a marked deformity, which is apt to become permanent, the callus weakening and giving way under its influence. The frequent repetition of injurious factors, including irritation by endogenous pathogenic microbes and their toxins, acting upon the young callus, frequently results in a pseudarthrosis, which means that no bony, but merely a fibrous, union has occurred. Provided all mechanical rules have been observed, pseudarthrosis is probably referable to latent microbism in the majority of the cases. The solidity of the exuberant callus, which is sometimes formed as a result of latent infection, is due to its great bulk which counteracts its softness. When this mass later on undergoes a transformation into bone substance, it acquires a much greater solidity than necessary. Before these superfluous bony masses can be reabsorbed through the osteoclasts, they may exert an injurious action through pressure upon adjacent structures, impairment of articular movements, or formation of ankylosis. In other cases the abnormal callus interferes with adjacent organs, especially nerves, resulting in atrophic changes. Exuberant callus will also develop when the two bone ends are more or less displaced or imperfectly adjusted. After consolidation has taken place in these cases, the large callus serves to strengthen the bone, which always needs added support when its longitudinal axis is displaced.

The softness of the young callus requires fixation of the injured limb, at least to the degree that the slight restricted excursion does not exceed the elasticity of the callus. The rest, however, which is needed for the reunion of the broken bone retards the blood and lymph flow, while condemning the muscles to inactivity and exposing them to the danger of atrophy of disuse. As soon as possible during fixation, functional treatment (introduced by Lucas-Championnière) should be instituted in the form of exercises of the muscles, tendons, and joints. so that their recovery may proceed along with the repair of the fractured bone. A very common cause of badly healed fractures of the long bones consists in stiffening of the adjacent joints, usually associated with incomplete correction of the displacement of the broken bone ends.

Aside from auto-infection with buccopharyngeal and other microbes, there is reason to believe that a deficient or faulty action of internally secreting glands may be in part responsible for delayed union or nonunion in fractures of the long bones. The endocrinic glands undoubtedly exert some influence upon the bone system under physiological as well as pathological conditions. The growth of bone is known to be injuriously affected by the diminished or exaggerated function of certain ductless glands, notably the thymus, the thyroid, the parathyroids, and the suprarenals.

The question arises if the administration of carefully selected endocrinic extracts, known to exert a stimulating effect upon bone growth and ossification, might not be advantageously introduced as a routine feature into the treatment of fractures of the long bones. In all probability the normal function and cooperation of several internally secreting glands is essential to the utilization of the calcium and phosphorus contained in the food in the metabolism of the bones. At the present limited stage of our knowledge the subject may be tentatively approached from two viewpoints, referring the disturbances in the repair process either to general malnutrition, with involvement of the endocrine glands, or possibly to the absence of the indispensable vitamines, damaging the function of these ductless organs.

Vitamins are nitrogenous crystalline bodies of very complicated structure existing in fresh animal and vegetable foods. Aside from general nutritional disturbances due to the absence of vitamins from the diet, peculiar systemic disturbances of the bony framework of the body have recently been described in Germany and in Austria, where they assumed an endemic character. Much attention has of late been devoted to diseases due to restriction of fresh animal and vegetable foods, with absence of vitamins from the diet, and these conditions are sometimes grouped together under the heading of "avitaminoses," comprising scurvy, beriberi, pellagra, infantile scurvy, rickets, and osteomalacia. The vitamins, aside from their absence in unsuitable foods, may be destroyed by mechanical or chemical processes, or through the action of excessive heat. In experiments upon young guinea pigs and other animals, not only scurvylike conditions but actual changes of the bones have been produced through exclusive feeding with highly sterilized cow's milk. Dietetic errors in the form of a deficiency of calcium in the food are naturally capable of inducing an impoverishment of the bone in lime. Disturbances in the phosphorus metabolism also enter into consideration, for it has been shown experimentally that the bones may become decalcified through continued administration of food poor in phosphorus, leading to osteoporotic changes, proliferative processes in the periosteum and cartilages, thickening of the epiphysis, and curvature of the bones.

Empirical proof of the favorable influence of fat soluble vitamins on the growing and mature osseous system has long been furnished through the beneficial effect of cod-liver oil on rachitic children, this substance being extremely rich in these vital supplementary food constituents. Comb honey has also been shown to contain a moderate amount of fat soluble vitamin, but this is entirely lost in the commercial strained product. Denatured and so-called predigested foods, if not positively injurious, undoubtedly deprive the body of important building material and are probably in part responsible for incomplete reconstructive processes of various kinds. The harmful action of defective foods on the teeth, and their part in the production of caries, has often been discussed in the dental and orthodontic literature. Through an unsuitable diet consisting entirely of soft starchy foods distrbances in the form of ostoporosis have been experimentally produced in the growing bones of young dogs; the absorption of the bone substance increased and the formation of new bone diminished as compared to the controls.

The same factors which are concerned in the non-traumatic diseases of the bones and joints are likewise operative in bone repair after fractures. Blood chemistry no less than blood bacteriology enters into consideration in the complicated repair process of fractured bones, and the significance of chemical factors must not be lost sight of in this connection, for the normal course of bone repair is often arrested by chemical change without bacterial invasion. All fractures are accompanied by a lowered local vitality, due in part to a changed blood supply and diminished nutrition.

Absence of the normal bone salts is demonstrable in many cases, and this departure from the normal standard is visible to the experienced eye in X-ray plates of the affected bones. The speaker's own experience includes cases in which no callus had formed, although the mechanotherapy could not be improved upon. Without any other modification of the treatment, these patients were given calcium salts for a variable length of time, according to the requirements, with the result that callus formation and union were promptly obtained.

Although opinions are still at variance concerning the bearing of focal infections on bones and joints, the existence of latent microbism and auto-infection is generally conceded, so that this principle must now be applied to the course of repair processes in the body in general and in fractures of the long bones in particular.

The modifications of the regional blood supply incident to a break in the continuity of a given bone naturally play an important part in the repair of the lesion. Injury of the nutrient artery of the broken bone is often an inevitable concomitant of all fractures. A number of delicate new blood vessels are formed in nature's effort at compensation for the maintenance of a sufficient blood supply. When the extension of the contracted parts is not very carefully timed and manipulated, the stretching of all the regional blood vessels results necessarily in diminution of their caliber and nutritional impairment of the area supplied by them. A highly injurious influence may thus be exerted upon the constructive metabolism of the bone. In order to obtain the best results in the treatment of fractures, practical application must be made of the war-taught lesson that the *normal* circulation, nutrition, and mobility of the injured limb must be maintained as far as possible, thereby insuring the vitality of the parts and favoring the formation and solidification of the callus, while guarding against the wasting of muscles and the stiffening of joints.

The many concealed factors at work in the complex process of bone repair which are entitled to serious study in behalf of the improved results of fracture treatment are only beginning to be understood and appreciated, so that a promising field is thrown open for further investigation along these lines. The points touched upon in this review may be briefly summarized as follows:

Factors influencing bone repair after fractures:

I. Blood bacteriology:

(*a*) Lowered resistance of fractured bone, favoring auto-infection and deposit of infectious agents from the blood (latent microbism).

(*b*) Metastatic infection of fractured bone, from concealed foci in the tonsils, teeth, gastro-intestinal or genito-urinary tract.

(*c*) Constitutional disease, such as syphilis, affecting the structural metabolism of bone tissue.

II. Blood chemistry:
(*a*) Action of internally secreting glands.
(*b*) Metabolic dyscrasias.
(*c*) Effect of vitamines, changes in phosphorus and calcium metabolism.

III. Interference with the constructive metabolism of bone through injury to the nutrient artery and changes in the caliber of the regional blood vessels.

Chambers (Britain).

The mechanical treatment of war fractures formed the subject of a contribution by Surg. Rear Admiral J. Chambers, C. M. G., of the British Navy, who pointed out that all methods aim at the prevention of shortening and at the maintenance of the fractured limb in proper alignment, while permitting ready access to the wound. He reviewed the methods of splinting which, in his experience, proved most useful and from which, in his opinion, the best results were obtained. These accounts cover fractures of the lower limb, including injuries of the knee, fractures of the tibia and fibula and through the ankle joint; fractures of the upper limb, including the shaft of the humerus, injuries of the elbow, and fractures of the forearm. Successful management of all these war fractures necessarily requires much mechanical skill and admits of the utilization of a great variety of procedures.

In fractures through the hip joint, and those just below the trochanter, the modified Thomas splint, which Sir Robert Jones describes as an "abduction frame," is recommended. In this method extension is secured by strapping on the injured limb, with counterextension by means of a groin strap on the opposite side of the pelvis. The abduction frame secures fixed extension in abduction.

In other fractures of the femur the Thomas splint gives the best result. In the use of the Thomas splint, reduction is accomplished by a constant pull, and counterextension is gained by elevating the foot of the bed and employing the weight of the patient, there being two fixed points, viz, the tuber ischii and the distal end of the splint. There is thus a fixed long axis pull, with the limb in the position of extension. The ring of the splint ought to fit closely, pressing in the tuber ischii.

In fractures of the lower third of the femur, the leg is put up in flexion, the Thomas splint being bent at the knee.

The extension is applied either by adhesive strapping or by the glue method of Sinclair. The speaker found the glue method very satisfactory, and the suspension frames recommended by Sinclair were employed in his wards with much success and with added comfort to the patient.

The Hodgson splint was also employed, more especially in fractures of the upper third of the femur. The speaker is, however, personally of the opinion that all fractures of the femur are best treated by the Thomas splint, with the addition that the splint should be completed with flannel slings supporting the posterior surface of the limb.

In injuries of the knee, the Thomas splint is again employed; hyperextension at the knee is to be avoided, a position of slight flexion (not more than 5°) being preferred.

The skeleton foot splint, as used by Sir Robert Jones, is most useful in fractures of the tibia and fibula and through the ankle joint. When both bones are broken and there is overriding of the fragments, extension must be employed. This can be easily done when the fracture is situated in the upper half, by means of the Thomas splint, but when the fracture is near or into the ankle joint, and a wound is present, extension becomes more difficult. This difficulty can, however, be overcome by a fenestrated plaster dressing reinforced by an iron band, forming a loop from which extension can be made, a method advocated by Mayer. The speaker thinks that this method of extension is preferable to the transfixion of bone method recommended by some surgeons.

In severe cases of fracture through the shoulder joint and surgical neck of the femur, with suppuration, and where ankylosis may be expected, the arm is to be kept in the abducted position (50°), and excision is best performed. The abduction splint of Sir Robert Jones is very useful and very satisfactory in these cases.

The modified Thomas humerus extension splint was found to be the best method of dealing with fractures of the shaft of the humerus, and a modified Thomas knee splint maintaining the limb extended in the abduction position can be employed. Both of these splints were extremely useful in war fractures of the humerus, as they permit of easy dressing of the wound.

In injuries of the elbow the question of excision arises. When ankylosis is aimed at, position is one of most importance, the proper position being flexion (about 70°) and supination.

It is very important in fractures of the forearm to maintain a position of supination. In gunshot fractures of the wrist it is also of extreme importance to maintain the hand in hyperextension, which is easily done by means of Sir Robert Jones's hyperextension hand splint.

Timbrell Fisher (Britain).

While on duty with British casualty clearing stations, A. G. Timbrell Fisher, of London, the contributor of a brief but comprehensive paper on "Gunshot Wounds of Joints," had occasion to treat a large number of such cases. He gives a brief historical résumé of the treatment of gunshot wounds of joints in previous wars, from the Battle of Waterloo to the World War. Here shell wounds formed a large majority of the total of injuries, while the bullet wounds were produced by the modern conical bullet traveling at short range at the height of its velocity. With special reference to operative treatment, joint injuries are divided as follows: (*a*) Wounds of synovial membrane not involving articular ends of bones; (*b*) wounds involving the articular ends of the bones and gunshot wounds of joints with much comminution of articular surfaces; (*c*) gunshot wounds of joints complicated by serious damage to adjacent muscular or tendinous structures, blood vessels, or nerves.

Concerning the repair of breaches in the surface of the articular cartilage, Timbrell Fisher and Shattock have observed that, provided intra-articular adhesions are prevented by early movement, the repair of such a breach takes place by true cartilaginous repair; i. e., there is a formation of new cartilage from the articular cartilage on either side of the breach. It is the author's conviction that many of the stiff joints following gunshot wounds are due to ignorance and neglect of underlying pathological principles. Experiments on animals have shown that, provided movement is instituted early, healing takes place in the form of a smooth surface largely composed of newly formed articular cartilage. The after treatment of cases with slight or moderate comminution of articular surfaces rests, therefore, on the principle of gentle joint movement after the wound has healed—active movements being better than passive. Properly performed joint movements prevent the formation of intra-articular adhesions and hasten the development of a smooth healed surface of articular cartilage.

Goormaghtigh (Belgium).

In a contribution entitled "The method of immediate active mobilization in fractures with shattering of the knee." Dr. N. Goormaghtigh discussed the limits of application and the results of Willems's method in the treatment of extensive knee fractures. Following the performance of reduction, arthrotomy and surgical purification of the fracture focus, screws are inserted into the malleoli and the limb is forcibly extended, the fragments being held in place through the continuous extension. Muscular action is now possible, and active movements may begin while continuous extension is in use; from being necessarily limited at first, these movements are made progessively more extensive. In case the relative relations of the fragments are changed in the course of excursion of the limb, the return to the resting position will remove the disturbance. Patients are instructed to move the wounded joint as soon as the first day, beginning with very slight active movements which are gradually extended. The traction is stopped as soon as possible, as during its employment extension movement is merely passive, because of the weight. In a general way, a stronger traction is required in articular fractures without loss of substance than in those accompanied by a loss of substance. In all the author's cases, consolidation began about the end of the first month and was always completed at the end of the second month. Extension could accordingly be stopped after a period varying from four to six weeks. The screws were remarkably well tolerated and did not work loose, except in two cases where it was necessary to reinsert them at the end of four weeks. Immediate active mobilization was instituted in 10 and 14 intra-articular fractures with very satisfactory results.

Willems (Belgium).

One of the essential points concerning which the experiences of the war have apparently resulted in more or less complete general agreement, as emphasized by Doctor Willems, is the rule that continuous extension is in a general way to be preferred to immobilization, the use of plaster of Paris having practically had its day. Another point, which is less generally admitted, is that those extension procedures which are applied directly to the lower fragment of the fracture are preferable, other conditions being equal, to the other methods for the following briefly enumerated reasons: Accuracy of the traction, full utilization, without waste of the entire applied force, hence the possibility of accomplishing the object through a minimum force; possibility of mobilizing the joints from the start; possibility of leaving nearly the entire surface of the limb exposed, of treating the wounds if necessary, of taking care of the skin and muscles.

Willems's screw extension apparatus, a modification of Steinmann's direct extension method, was very frequently utilized by the originator and his assistants, both during and since the war. It has been adopted by other Belgian and foreign surgeons, and has proved very satisfactory; it was found to be convenient and very efficient from the viewpoint of reduction. The principal advantage of the screw extension apparatus as compared to all the other direct-traction appliances consists in the possibility of correcting angular deviations, meaning a deficient parallelism of the axis of the two fragments. These so-called angulations share the responsibility with shortening of the limb, for bad functional results after fractures, from almost complete uselessness to more or less painful claudication. The Willems apparatus is easily capable of correcting or preventing these deviations, through a change of the traction from axial to lateral, by a simple manipulatin of the stirrup, the essential working part of the appliance. The accomplishment of the desired object is easily controlled by means of radiography. In view of the serious danger of impaired final function through angulations, the advantages of the Willems screw extension apparatus would seem to be self-evident.

Ferraro (Italy). The following conclusions were suggested by Dante Ferraro, Lieutenant Colonel Médecin de la Marine Royale Italienne. As the number of amputated and crippled after bone and joint injuries is still too large (30 to 40 per cent of permanent invalidism), and as this outcome is largely due to a lack of continuity in the treatment, a single national organization is recommended in the form of a military service, coordinating the Red Cross services, university centers, and special clinics for cooperative work in the fields of radiology, traumatology, orthopedics, and prostheses.

Upon the basis of war experience, the congress was asked to recommend:

1. Mobilization at the onset of hostilities, in special traumatological hospitals, of already established surgical groups in civil practice and in the army (hospitals,

Red Cross, university centers, medical schools, surgical clinics of large cities, etc.). A list of specialists should be kept on file by the general medical administration of the war ministry, with an obligatory official half-yearly report on the changes in the personnel, as adopted by the above-named directors.

2. The hospitals, or specialized centers for lesions of the limbs, are to be placed in the rear of the fighting front (not farther than six to eight hours by train or autobus). As far as possible, fractures of the limbs should be treated in the same hospital until anatomical healing has occurred. For functional restoration and prosthetic or cineplastic appliances, the patient should be sent to physiotherapeutic centers.

3. The first-line ambulances at the front should be well supplied with apparatus and the most perfect appliances for direct immobilization, which can be left in place for transportation as well as treatment. Uniform antiseptic routine treatment of wounds is recommended, with surgical intervention only in emergency cases (shock, profuse hemorrhage, crushing of limbs). Hemostasis is to be obtained preferably by means of vascular ligature in the wound itself (mindful of the fact that the retention of the Esmarch bandage during several hours favors both gas gangrene and ischemic gangrene). Antitetanus injection should always be administered, also if necessary, antigangrene injections (antiperfringens, antivibriosepticus, antibellonensis).

4. Each traumatological center must have a complete and liberal radiological outfit, permitting the earliest possible preparation of two good radiograms of the fracture, in order to show the direction of the fragments and splinters, which assists reduction and coaptation of the fracture focus. Fractures should be set, if necessary, under general anesthesia, on the variously constructed traction beds, and the reduction be periodically controlled after application of plaster or metal appliances in order to verify the maintenance of the bone in good alignment. Walking apparatus should be employed when possible in view of the functional restoration of the limbs and joints, which is always to be aimed at. Osteosynthesis is to be performed at a late date (after extinction of the infectious focus), when it is not possible to accomplish or maintain the reduction of the fragments, and in the presence of pseudarthrosis, as well

as in defective coaptation after osteotomy of the callus. Autogenous grafts must be carried out under perfect asepsis (sterilized gloves and instruments, avoiding contact with the skin), always passing beyond the zone of eburnisation. A radiogram showing consolidation should supplement the others.

5. In case of emergency amputations or resections, the ultimate employment of cineplastic procedures and prostheses should never be lost sight of. In order to encourage patients to resume the functional use of their limbs, those who, with a cinematic or other prosthesis, succeed in restoring the normal standard of their occupational work should be given double annuities for 5 to 10 years. The suggestion was made that the conclusions as proposed for the treatment of fractures of the limbs should be embodied in an international summary of treatment.

Depage (Belgium). The necessity for the establishment of *special sections* for fractures in the surgical services of modern hospitals was once again emphasized by Doctor Depage, of Belgium, who pointed out that in the existing hospital services, the advances accomplished during the war can not be taken advantage of, new outfits being required as well as trained attendants and physicians who know how to apply modern methods. He expressed the hope that the formation of such special sections would be given as one of the conclusions of the congress.

ANTITUBERCULOSIS CAMPAIGN IN THE ARMY.

The congress found that in order to be efficacious, the fight against the great white plague in the army must be based primarily on the strict adoption of hygienic measures. The desired improvements are of a collective and individual order generally recognized as efficient, with special reference to the quarters, physical education, prophylaxis against predisposing conditions, antialcoholic campaign, and improved living conditions in general. The educational antituberculosis crusade must have for its goal not only the medical advisers but the individual trooper who should be instructed by means of pamphlets, popular addresses, lectures, moving pictures, and similar procedures. In the existing circumstances of tuberculosis incidence, it seems advisable to keep an individual sanitary register for each soldier, as well as a medical record of his personal history and state of health during the period of his active military service; preferably, also, including the time of service in the reserve. Repeated routine examinations of all the men are indispensable, especially in the course of the first months after admission to the army. Tuberculous individuals should not be admitted to the army, the selection to be made in two steps, first at the time of recruiting, then immediately after entrance into the army. From the prophylactic viewpoint, temporary or definite exclusion of all affected individuals is an imperative requirement as regards all tuberculous manifestations. It appears equally desirable to investigate the practical value of the various numerical indexes and biometric tests which have been proposed for the determination of body vigor, especially as related to tuberculosis and resistance against infection.

The organization of special services is recommended for the more efficient control of suspected cases. Members of the army medical corps should be given opportunity to attend a practical course of instruction in the diagnosis of tuberculosis.

Finally, the congress emphasized the need of permanent cooperation between the antituberculous civil administration and the military authorities. The former should be immediately notified by the army of any discharge from military service on account of tuberculosis.

Contributions to the important subject of tuberculosis control in the army were presented before the congress by 15 delegates, from Czechoslovakia, Denmark, England, Belgium, France, Japan, Sweden, Switzerland, Italy, Spain, Norway, and the Netherlands.

The first speaker, Dr. K. Franz, Professeur agrégé à l'Université Charles à Prague, Général-Médecin de l'Armée Czechoslovakia, pointed out the fact that the fight against tuberculosis in the army must be improved in several directions, and that besides general hygienic measures more importance must be attached to the individual antituberculosis education of soldiers in the ranks as well as inmates of military schools. Military surgeons should organize conferences on the subject of tuberculosis, and should be assisted by specially appointed lecturers who are provided with small transportable antituberculosis museums. Frequent holding of educational exhibitions, parallel with lectures delivered in a given locality, is recommended. Periodic courses of instruction should be organized for army physicians, in order to keep them

Franz (Czechoslovakia).

informed concerning recent tuberculosis research. It is advisable to preserve also in times of peace the selective and diagnostic stations for pulmonary diseases, which have been created and given satisfaction in different States in the course of the war, and to make them the centers of the antituberculosis compaign. The establishment of tuberculosis statistics, and also, if required, of other diseases of military interest, on a uniform basis for all States was suggested by the speaker as a future desideratum.

Hansen (Denmark).

In Denmark, as stated by Dr. C. T. Hansen, Chef d'Etat-Major du Service Sanitaire de l'Armée Danoise, according to a law passed in 1905, all men who contract tuberculosis during their military service are sent, when disabled, with their consent and at the expense of the State, to a tuberculosis sanitarium, hospital, or convalescent home, where they may stay a year or longer, as the case may demand. If the disease can be shown to have been contracted during military service, the man is entitled to a pension according to the degree of disablement. For admission to the army service, a medical certificate is required, showing that the individual is free from "contagious tuberculosis of the lungs or larynx."

Stirling (Britain).

In outlining the campaign against tuberculosis in the British Army, Major Stirling, of the Royal Army Medical Corps, stated that practically no special measures are adopted other than the effort to maintain a high standard of hygiene, both general and personal. The army is *voluntary*. Careful examination is made of all recruits on enlistment; none are accepted who show signs of tuberculosis or give a history of having suffered therefrom. Whenever the diagnosis of pulmonary tuberculosis is made, the soldier, if serving abroad, is invalided home at the first opportunity, and is discharged from the service, being transferred to a sanitarium by arrangement with the national health insurance commissioners. The speaker pointed out that whereas at one time pulmonary tuberculosis was nearly twice as frequent among soldiers as among civilians, with the building of modern barracks and strict attention to hygiene this condition of affairs is reversed, and the soldier now has much less chance of acquiring tuberculosis than the average civilian. The following form of notification is employed in these cases:

Army Form O. 1835 A.

NATIONAL HEALTH INSURANCE.

Notification of discharge of tuberculous patient.

For use in all tuberculous cases, irrespective of actual cause of discharge, except uninsured officers and uninsured nurses.

To the SECRETARY, NATIONAL HEALTH INSURANCE COMMISSION. { ENGLAND. / SCOTLAND. / IRELAND. / WALES. } See footnote overleaf.

SIR:

The patient of whom particulars are given below is leaving the service suffering from tuberculosis on__________________________
See note †
____________A medical report is furnished overleaf.

(1) Name in full { Surname_____________________________ / Christian names_________________________ }

(2) Number, rank, and Regiment __________________________

____

(3) Intended place of residence on discharge (address in full) { __________________________ / __________________________ }

(4) Were insurance deductions made from Army pay?________

(5) For use if answer to (4) is in affirmative.

Is applicant a member of an approved society?______________

If so, states—

(i) Name and number of approved society. { _______________________________ / __________ Number __________ }

(ii) Name and number of branch (if any). { _______________________________ / __________ Number __________ }

(iii) Membership number in insurance book________________

(iv) Has applicant ever received a medical card? __________

If so, by what insurance committee was it issued? ______

(6) For use if answer to (4) is in negative.

Will applicant's total income from all sources on return to civil life (including prospective pension) ‡ be more than £160 per annum? ______________________

Date________________ Hospital__________________________

____
Signature of officer in charge of military hospital.

Address_________________________________

For use only where residential treatment is considered essential (see (5) overleaf).

PART A.	PART B.	PART C.
(To be signed by applicant.) I hereby apply for sanatorium treatment, and I declare that the particulars above are correctly stated. I undertake to conform to the rules of any institution into which I am received for treatment. Signature of applicant: .... Date.......................... See footnote § below.	For use if applicant refuses to sign Part A. The patient, for whom I consider residential treatment to be essential, refuses to sign Part A. Initials of medical officer. }	For use if applicant has signed Part A. The patient † is / is not being granted furlough. Initials of medical officer } .... † Delete inappropriate words. N. B.—If furlough is being granted and patient is proceeding temporarily to an address other than that given at (3) above, particulars of the temporary address, and duration of stay there, should be given in a covering letter.

† Enter in the case insured officers, the date when commission will be relinquished, and, in other cases, the discharge from the Army will take effect.

‡ Inquiries from a patient as to the likelihood of a pension being awarded him, should be dealt with as indicated in paragraph 7 of A. C. I. 2176 of 1916.

§ Article 4 to the Royal Warrant relating to pensions provides as follows:
"Half the pension and allowances (if any) awarded . . . may be subject to the condition that the disabled man shall undergo medical treatment at a sanatorium, hospital, convalescent home, for any period during which it may be certified that such treatment is necessary in the interests."

Article 6 (5) of the Royal Warrant provides for additional allowances being made to dependents of a pensioner during his treatment in a sanitorium.

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The following extract from a report made in 1861 by the royal commission for improving the sanitary condition of barracks is of interest: "Before the soldier can be assured of having the amount of space required for health, there must be a distinct recognition that the amount given by regulation (i. e., 600 cubic feet) is on no account to be tampered with. No increase of regimental strength, no want of storerooms, libraries, or reading rooms should for an instant be permitted to interfere with it. It would never be pleaded, as a reason for reducing the soldier's ration of bread and meat, that a larger number of men had joined the regiment than the commissariat could provide for. Why should the soldier's air ration, which is equally important for his health and efficiency, be differently dealt with? In any case, overcrowding should utterly be put an end to. They have not been aware that, if above a certain number of men are placed in a given cubic space, the lives of some of these men, and the health of others, is certain to be sacrificed."

During the years 1837–1846, the mortality from pulmonary tuberculosis among the footguards reached 11.9 per 1,000 of strength. From 1864–1870 it had fallen to 2.3 per 1,000. In the British Army in 1913, it was 0.25 per 1,000. During the war, men fit to carry on were not invalided, and many who had suffered from tuberculosis showed marked improvement after a period in the trenches.

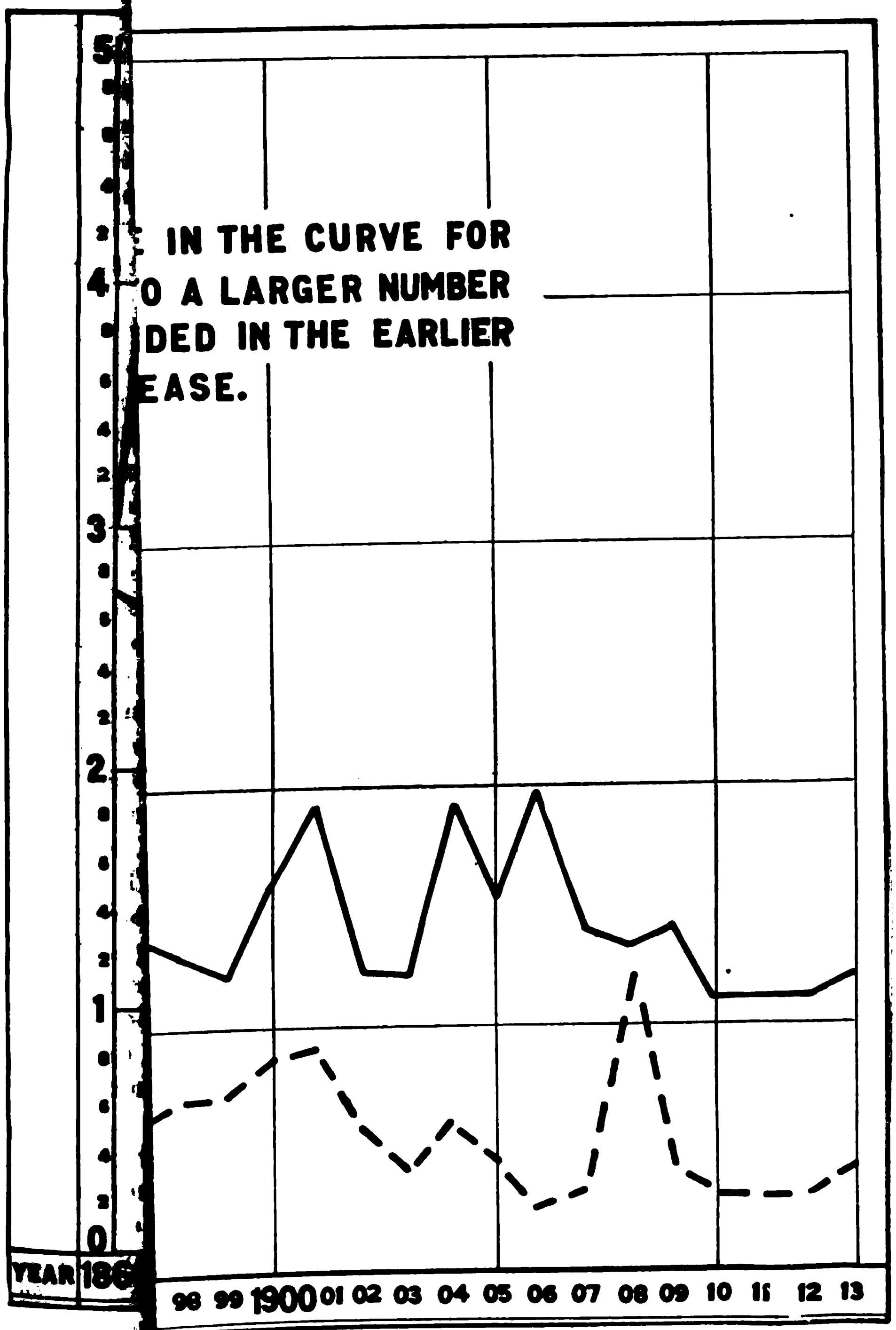
A chart showing the ratio per 1,000 of strength—invalids and deaths from pulmonary tuberculosis from 1860–1913—is a valuable addition to Stirling's interesting and very instructive paper.

Collard and Spehl (Belgium).

One of Belgium's contributions to the subject of tuberculosis control in the army, presented by Drs. Armand Collard and Paul Spehl, Médecins de Bataillon de 1re classe de réserve, Attachés a l'Hopital Militaire Anglo-Belge (Bruxelles), begins by emphasizing the necessity of protecting healthy individuals, of discovering and treating suspected and positive cases, of reclaiming the latter and insuring them the benefit of social assistance.

I. Protection of the healthy soldier is guaranteed by improved conditions in the barracks, especially as regards overcrowding, permanent ventilation of the premises, attention to cleanliness, careful destruction of filth

ARMY.
D ABROAD.



14022—22. (Face p. 1004.)

and waste matter, control of the soldier's personal hygiene. Protection of the healthy is to be further insured by: (*a*) Organization of physical training based on compulsory educational exercises. The Ling method lends itself best to the requirements of this education. (*b*) Careful supervision of the military exercises, which must be graduated so as to guard against overexertion. (*c*) Institution of appropriate measures for the control of possible direct contagion through coughing cases. (*d*) Antituberculous education of the soldiers by short popular talks by army surgeons, instructive pamphlets, cinematographic pictures, and general distribution of knowledge.

II. The earliest possible discovery of suspicious and positive cases is an urgent problem in the Belgian Army. For the time being the recruiting boards permit too readily the enlistment of tuberculous individuals, and these boards should be reorganized so as to exact a more thorough medical examination of applicants. It is necessary for this purpose: (*a*) To take into consideration the pathological past of the recruits; (*b*) to keep on file individual medical records covering the man's entire military career, including the reserve period. It is desirable for this record to include biometric measurements indicating the general nutrition and respiratory function. Biometric measurements have very recently been introduced on a limited scale with other improvements in the Belgian Army on the recommendation of the hygiene advisory board. The traditional measuring of the thoracic circumference is now supplemented by spirometry and the formulas proposed by Prof. Emil Spehl. These relations (difference between the weight and the height in centimeters, indicative of the vital capacity) are easily calculated and permit the rapid classification of recruits in a more accurate manner than by means of thoracic measurements. The examination of doubtful cases should be intrusted to a competent service, submitting to bacteriological analysis the sputum of all patients suffering from bronchitis or related conditions.

Selection centers should be organized and provided with a staff of specialists and material equipment up to the modern diagnostic standard of tuberculosis. The surgeons attached to these centers should have the final vote on exemptions from military service and also on the eventual discharge of already enlisted men. The operation of all these centers should be conducted under one general direction. The centers should serve at the same time for instructing in phthisiology, an at present neglected field, and young military surgeons should be obliged to attend these courses.

In the time interval between the recruiting formalities and the actual enlistment a man who has been found fit for service may be attacked by the disease, and another medical examination is therefore required at the time of entrance into the army to decide on his being discharged or kept under observation as outlined above. The age of 20 to 21 years seems to be the most suitable for enlistment. No semiinvalid stretcher bearers should be utilized in the auxiliary services, but this work should, on the contrary, be intrusted to especially strong and resistant men. The first months of military life demand a specially careful medical supervision based on repeated clinical examinations and periodic measurements of the body weight and respiratory function.

III. As regards the handling of tuberculous patients, the most favorable therapeutic conditions exist in a medico-surgical hospital restricted to the treatment of tuberculosis in all its stages. Seaside hospitals, sanitariums in the plains or mountains, are indispensable adjuncts. In order to ascertain the contagious or predisposing factors which may have been effective in the case of tuberculous soldiers, it is desirable for the military authorities to conduct a medico-social inquiry in their homes, to be carried out by a visiting nurse.

IV. Military disablement is to be applied to all positively demonstrated manifestations of tuberculosis, and should involve an invalidity pension of 100 per cent as long as symptoms are present rendering rest imperative. Later on, the rate of pension as determined by specialists will vary, but must never fall below a certain percentage to be determined for every bacillary manifestation, this percentage to be in conformity with the functional incapacity which is considered as irremediable, and to be increased whenever required by an aggravation in the condition of the patient. The family of the tuberculous soldier is entitled to a supplementary allowance during the patient's stay in the hospital or sanitarium.

V. Connection with civil organizations: A permanent connection is required between the civilian antituberculous services and the military authorities, these services to report at the time of recruiting the names of those men who have applied to them; and the army, on the other hand, to indicate the soldiers discharged for tuberculosis to the management of the region where they are going to reside. It is desirable for the army to give its financial assistance to the civil organization, so that the disabled soldiers may enjoy the advantage of the institutions belonging to the same, in the form of agricultural settlements, reeducational centers, occupational advisory boards, and other suitable institutions.

The Prophylaxis of Tuberculosis in the French Army in Peace Time is the suggestive title of the paper presented to the congress by E. Sacquépée, Médecin principal de 1re classe, Professeur à l'Ecole d'Application du Service de Santé Militaire, who adds a number of valuable hygienic recommendations—more essential to a cure than medicinal agents—for patients suffering from disturbances of the respiratory passages. The prophylaxis of tuberculosis in the army aims at avoidance of the introduction, development, and propagation of the disease. Its operation is based on the simple principle of eliminating tuberculous recruits, while collaborating as far as possible toward national prophylaxis; but the prophylactic work must be continued during the entire course of the soldier's service. According to the official rules for determination of physical fitness for military service, the different manifestations of tuberculosis are always a reason for removal from the army, this removal being temporary or permanent, according to the nature of the case. The most important form of the disease as regards prophylaxis is represented by pulmonary tuberculosis. Regulations must always be in force to prevent the admission of tuberculous individuals who endanger the health of the entire military community, and whose removal must be accomplished as promptly as possible so as to insure an efficient prophylaxis. Unfortunately, the manifestations of the disease, more particularly those of pulmonary tuberculosis, do not always permit a positive and early diagnosis. Precautions are taken, however, to eliminate not only the positive but the suspected cases. The law ordains the elimination from the army of men suffering from visceral tuberculosis, no matter how slight the indication of the disease. In the *absence* of distinct signs of visceral tuberculosis, more particularly pulmonary tuberculosis, the men are accordingly enlisted, pro-

Sacquépée (France).

vided they are free from other infirmities. As a matter of fact, tuberculosis may really exist in a latent form, which may flare up at any instant, and it is for the best possible avoidance of imperceptible or latent lesions, as well as for the maintenance of good general health, which is the best protection against the disease, that an entire series of hygienic prophylactic measures are instituted as the soldier's daily routine.

All known tuberculous individuals are removed from the army, at least temporarily. But the interest of the army is not alone concerned in the fate of these men, who must not be allowed to become foci of contagion when they return to civilian life. A special course of education is therefore provided in the hospitals where the necessary isolation and treatment of these patients are carried out. After his discharge, the educated tuberculous patient is not left to his own resources, but has learned where to turn to obtain financial assistance and the necessary care. While eliminating all diseased individuals and protecting itself against contagion, the army endeavors to contribute its share toward the great work of national prophylaxis.

Kensa Oyama (Japan).

Japan was represented at the congress by Surg. Lieut. Col. Kensa Oyama, who gave a short address on precautionary measures in use in the Japanese Army. After pointing out that the disease since 1918 is unfortunately on the increase in the army, no less than in the entire nation, the speaker emphasized the urgent necessity of prophylaxis and local sanitation. The following measures are in use in the Japanese Army at the present time: At the time of recruiting, all men are carefully examined as to their heredity, constitution, and physique, especially the throat and chest. Recruits on entering the barracks are subjected to examination of the body, urine, feces, and sputum, sometimes also a von Pirquet skin reaction. Doubtful or suspected cases are sent to a stationary (garrison) hospital, while emaciated or anemic men are watched and repeatedly examined. At least once a month all the soldiers in the barracks are examined as to their physical condition and body weight, which are noted in a special register. On the appearance of suggestive symptoms, the soldier is classified under the heading of suspected cases. Such men are excused, entirely or in part, from military drill and other service.

Clothing, bedding, and tableware are furnished strictly for personal use, and no mixing or common use should occur, as each man is expected to wash his own tableware. These utensils are frequently disinfected or cleaned, and likewise the masks and gauntlets used in fencing and bayonet exercises are disinfected every time they are used. Pleurisy is considered and treated as a disease of tuberculous character, and all these patients are sent to hospitals. Their clothing, bedding, tableware, and rooms are disinfected by means of steam or other disinfectants. Some patients, after making a rapid and complete recovery, are discharged from the hospital and rejoin the troop, but the great majority are removed from military service, experience having shown that the latter may be entirely cured by the change of climate and living conditions, whereas the former have a tendency to relapse. The relief department of the Japanese Red Cross Society is intrusted with the care and treatment of men who are discharged from military service on account of tuberculosis.

Surg. Commander E. T. Meagher, Royal Navy, in his contribution to the subject, considered the problem of tuberculosis and its prevention in the British Navy from the viewpoint of the nonspecialist naval medical officer. The following regulations or routine, which were in force in the navy during the war, can, in his opinion, be correctly viewed as of operative utility in the campaign against tuberculosis, although statistics relative to the war are not yet available. (1) Health lectures, which are delivered periodically to the crews of the ships by their medical officers, include instruction in the nature, danger, and prevention of tuberculosis. (2) Ventilation of ships. Of recent years considerable attention has been given to this subject, and structural improvements have been introduced. (3) The crew is exercised daily, and the "Physical exercises" which form a part of the routine, are framed in such a manner as to insure a full and free expansion of the chest and are a valuable aid in maintaining a healthy condition of the lungs. (4) The body weight of each member of the crew is taken periodically, and a record is kept. If it be remembered that a loss of weight is usually concomitant with tuberculosis, it is evident how valuable a measure this continued observation is, as being likely to attract notice in case infection

Meagher (Britain).

has insidiously established itself. (5) A thorough physical examination of the chest is directed to be made periodically, and the result is noted on the man's medical history sheet, which accompanies him throughout his service career. (6) Regulations are in force, the object of which is to prevent the raising of dust when decks or wards are being swept. (7) Men suffering from pulmonary tuberculosis are not retained in the service afloat. A tuberculosis subject is considered to be a source of danger to others with whom he has to live in such close continuity, and in addition to this, the life at sea in a man-of-war is decidedly unsuitable for incipient lung disease. At sea in rough weather, it is often difficult on board a man-of-war, especially so in the smaller craft, to keep the atmosphere between decks pure.

Tuberculosis control in the Swedish Army.

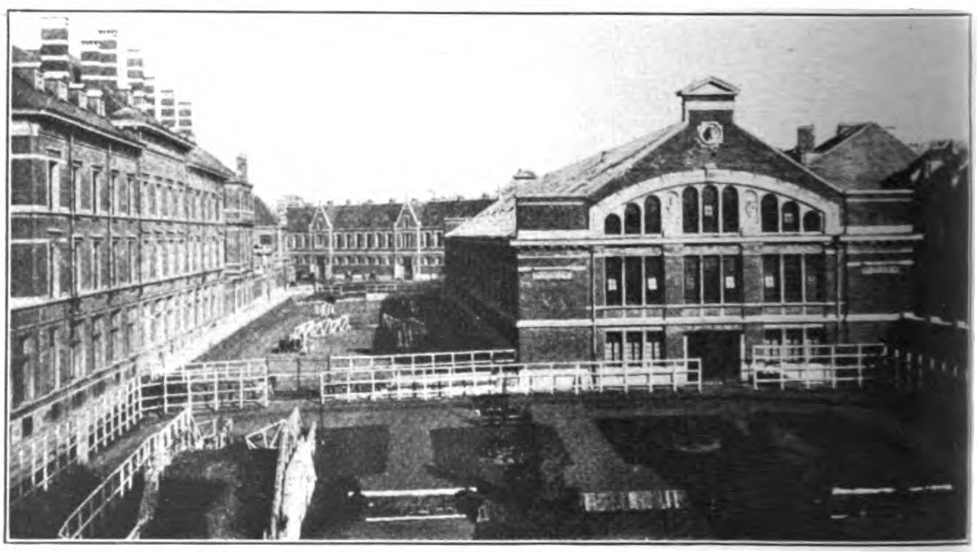
The fight against tuberculosis in the Swedish Army is fundamentally based upon collaboration with the civilian sanitary authorities, and rests on the measures provided for the protection of the community. Antituberculosis measures in Sweden are governed in a general way by international hygienic principles, including general precautions of social character, promulgation of information, and foundation of sanatoria. Since 1912 all members of the army, including noncommissioned officers and troopers, are entitled to sanatorium care at the expense of the nation during the duration of their service and up to one year after their discharge from the army. Steps concerning admission are taken through the medical officers. The daily costs are stated in advance, in the form of approximate estimates, after which an arrangement is made at the end of the year between the directors of the hospital and the administration of the medical service of the army. Pulmonary tuberculosis in particular is strenuously fought in the garrisons by means of strict hygienic measures and spreading of knowledge on the subject of tuberculosis, through lectures, addresses, or health talks, held by military as well as medical officers. The findings on examination of the men at the time of entrance are noted on special medical cards. A set of regulations were published in February of 1920, dealing with the routine fight against contagious diseases in general in the Swedish Army.

The number of tuberculosis hospitals in Sweden amounts to 4,861; the larger towns and a certain number

BRUSSELS. THE PALAIS DES ACADÉMIES USED BY THE GERMANS AS A MILITARY HOSPITAL.

BRUSSELS. THE GREAT HALL OF THE PALAIS DES ACADÉMIES, CONTAINING MURAL DECORATIONS DESCRIPTIVE OF THE HISTORY OF BELGIUM, CONVERTED INTO A HOSPITAL WARD BY THE GERMANS.

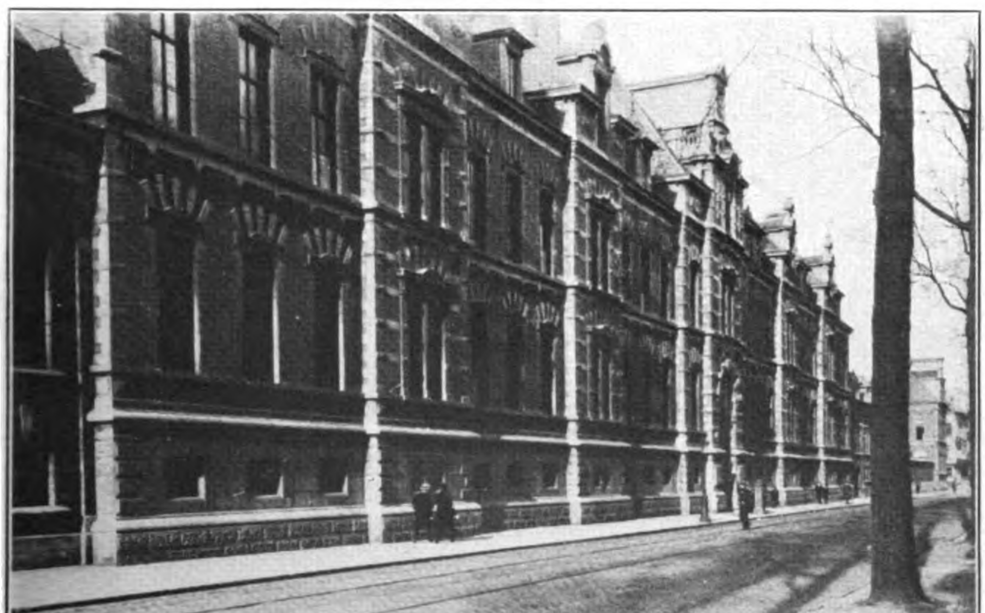
BRUSSELS. THE STUDENTS' QUARTERS AT THE MILITARY SCHOOL.



BRUSSELS. THE RIDING ACADEMY AT THE MILITARY SCHOOL.

1010–2

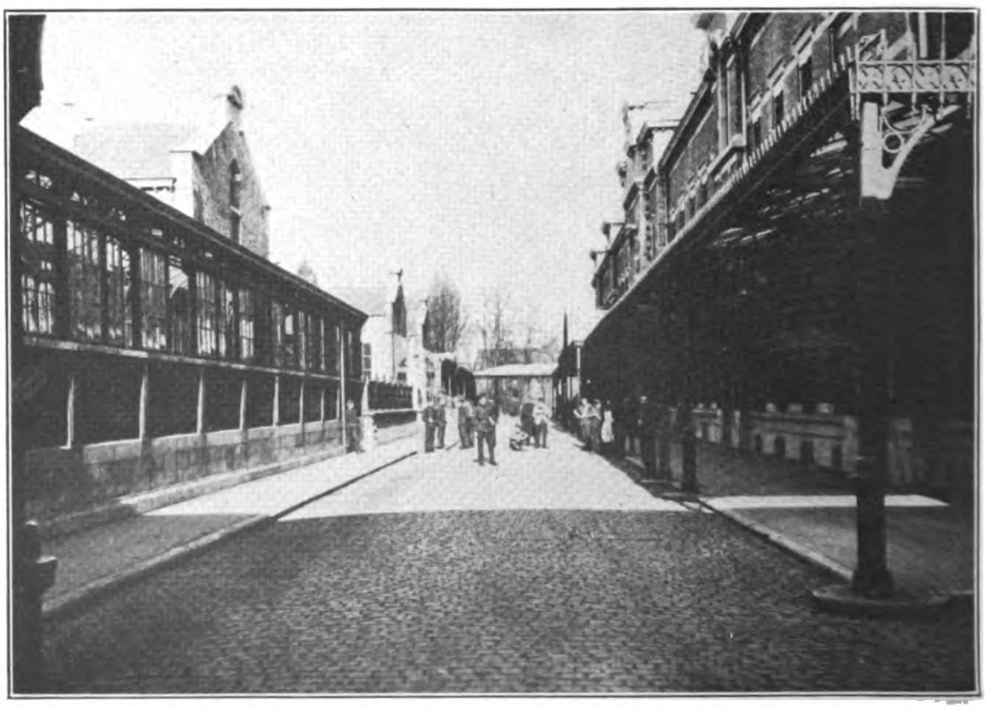
BRUSSELS. THE MILITARY SCHOOL FOR OFFICERS.



BRUSSELS. THE MILITARY HOSPITAL.

1010–3

BRUSSELS. A TYPICAL WARD IN THE MILITARY HOSPITAL.



BRUSSELS. INTERIOR COURT OF THE MILITARY HOSPITAL.

1010–4

of rural communities have dispensaries, about 160 altogether. Both the hospitals and dispensaries receive aid from the State for their maintenance. Associations against tuberculosis exist in all districts, headed by an association covering the entire country, under the name of National Swedish Association against Tuberculosis. The percentage of deaths due to tuberculosis in 1901 amounted to 1.90 per thousand inhabitants. In 1918 the mortality percentage was 1.45, or a reduction of about 24 per cent.

Colonel Nienhaus, of the Swiss Army, Médecin de division de la 6e division, pointed out that the fight against tuberculosis, which has been extended in recent years, has yielded such favorable and encouraging results, as proved by numerous statistics, that it would be "a crime" not to keep up this fight in behalf of the civilian as well as military population. Among soldiers a distinction can be made between three different forms of tuberculosis: (1) Recent infection during service in apparently healthy individuals, without clinical signs of latent infection. Theoretically, these infections may occur, although they will always be exceptional, but no precaution can be taken for their avoidance. (2) Aggravation of disease already in evidence before admission to the service, but not discovered at the time of enlistment. (3) Development of a latent tuberculosis during the service, in soldiers who were in good health, fit for work, and free from all signs of disease at the time of entrance into the service. The last two named forms, in particular, must be eliminated from the army as promptly as possible, in order to guard against the danger of contagion in the environment. Nienhaus (Switzerland).

In the Swiss Army the fight against tuberculosis is waged by means of sanitary examination at the time of enlistment and entrance into military service, these examinations aiming at the elimination of all tuberculous cases before admission to the service; by medical supervision during the service, for the purpose of removing diseased individuals from the troop, watching the general state of health, and teaching prophylaxis against infectious diseases; and by appropriate treatment of the sick. This treatment is carried out in sanatoria, according to the rules of modern phthisio-therapy, and is provided for by the law of June 28, 1901, dealing with the insurance of soldiers against diseases and accidents.

Mendes (Italy). The fight against tuberculosis in the Italian Army. during the war of 1915–1918, was graphically described by Prof. Guido Mendes, Tenente Colonnello Medico, who showed to the congress that a new start in this direction was made after the military administration had secured the valuable cooperation of the two largest State sanitary organizations, i. e., the Public Health and Association and the Red Cross. Purposeful measures could now be instituted for the discovery of incipient and masked cases of tuberculosis which are often misinterpreted, and after a few months of military life result in the onset of grave conditions of open tuberculosis, fatal for the patient and dangerous as regards the propagation of the infection. Regional sanitary centers were established for the reclamation of tuberculous prisoners, exchanged from Austria, such as the Nervi center and the center of the Tiburtino Hospital, near Rome, followed by the institution of another large sanitary center near Bologna, for tuberculous cases coming from the troops in the fighting zone. One of the greatest difficulties encountered by the military administration, seeing the scarcity of such institutes in Italy and the unjustified opposition of the people against their erection, even in special localities of the large urban centers, concerned the establishment of tuberculosis sanatoria. Valuable assistance for the foundation of sanitary camps was given to the military authorities by the general administration of public health and the Red Cross Society. In these sanitary camps and hospitals, which were founded for every corps of the territorial army, the tuberculous soldiers remained for a period of about three months, at the end of which time further beneficial measures were continued in their behalf, according to a special agreement between the war ministry and the ministry of the interior.

Costa (Spain). According to Commandant Médecin A. Costa, Professeur à l'Académie de Santé Militaire, the most reliable measure for the avoidance of tuberculosis in the army consists in preventing the admission of infected individuals to the barracks, for, being germ carriers, they will cause contagion of the other soldiers within a very short time. Exemption from military service in Spain provides for the exclusion of all known tuberculous individuals, those who present advanced lesions as well as those who are in the incipient stage, the latter, of course, being kept under observation in order definitely to prove the existence of the lesions. By order of a health committee of the army to the war ministry, a monthly review is held, in which all patients who are suspected of suffering from pulmonary disease are at once segregated and subjected to a very strict examination. As soon as a man is found to have the least sign of tuberculosis, he is put on the discharge list. All medical officers give a monthly address on the subject of hygiene, and point out the necessity of obeying hygienic rules for the avoidance of infection. A separate ward in good hygienic condition should be provided in the barracks for the reception of men who are suspected of having the disease, where they can be observed without coming in contact with the others. Men with a low physical resistance should be very frequently examined, as these individuals are usually tuberculous. Military tuberculosis sanatoria should be established for the treatment of soldiers who have contracted the disease in the army, and from which these patients should be sent home in good health. if possible.

Reichborn-Kjennerud (Norway).

In Norway, according to Dr. Reichborn-Kjennerud, Médecin Divisionaire, the inmates of all miltary schools and garrisons are subjected twice yearly to a complete examination of the respiratory organs. Cases which are classified as suspects, as well as positive cases, are evacuated to civilian hospitals, for treatment at the expense of the State. Affer the general examination of the men at the time of enlistment, the recruits are once again examined by a specialist during the first month of service, in order to detect any cases of latent tuberculosis. The demonstration of pulmonary tuberculosis, no matter of what degree, requires exemption and definite discharge from military service. The outcome of this examination is registered on a double file, one being sent to the divisional medical officer, and the other to the medical authorities of the recruit's home community. The divisional medical officer collects the individual statements and prepares a list of statistics which are forwarded to the chief of the army medical service. In case a soldier has contracted tuberculosis during his service, he is treated in a civilian sanitarium at the expense of the Government. Statistical figures were not yet available at the time of this report to the congress, as the above rules of the fight against tuberculosis have only been in force for two years past.

Ten Hove (Netherlands). According to Lieut. Col. Dr. Ten Hove, sanitary stations (sanatoria) are utilized in the Netherlands in the fight against tuberculosis in the army. When the disease has been diagnosed, the chief of the medical service may recommend that the patient be cared for in a sanatorium during a period of six months, at the expense of the Government, provided the soldier has completed three months of military service prior to this development. The chief of the medical service arranges for a further examination by a specialist, in order to decide if the suggested course of treatment is likely to lead, if not to a cure, at least to a considerable improvement. The patient's preference concerning the choice of the sanatorium is given consideration as far as possible. The treatment may be prolonged during several terms of three months by the authorization of the chief. According to a circular inquiry covering 12 months, one-half of the inmates of sanatoria left with very good results. When the medical director of the sanatorium and the controlling medical officer are agreed that further stay is useless, the patient is transported into a military hospital where he may remain as long as hospital care is needed, unless he prefers to go home. Those who, after their departure from the sanatorium or hospital, are able to work without being able to resume their former occupation, can be reeducated for new work, the Government bearing a part of the expense for this reeducation.

Granjux (France). Doctor Granjux, Médecin Major de 1re classe en retraite, as the representative of the Society of Public Welfare and Sanitation, summarized the question of tuberculosis in the army in the following approved statements: In peace times, tuberculosis contamination in the army is rare, the existing cases being the result of failure of recognition at the time of enlistment or admission to the service, or an exacerbation of a latent tuberculosis without apparent manifestations at this time. To begin with, as the cases of military tuberculosis are cases of civilian tuberculosis carried into the army, two conclusions result: (1) All measures taken for the protection of the future soldier, namely, the child.

against tuberculosis will render this disease more and more uncommon in the army; (2) measures must be instituted which permit the detection of tuberculosis at the time of enlistment as well as after entrance into the army. Whenever tuberculosis is claimed as a cause of exemption, the man should be asked to support his claim by a certificate, to be furnished him gratis by the antituberculous dispensary of the department, which has at its disposal all the means for the detection of this disease. A service equipped like the antituberculous dispensary should be organized in the military hospital at the headquarters of every army corps; to functionate especially for the radiographic examination of all suspected recruits who should be sent to this hospital for the above-mentioned examination. The conclusion seems to be justified that such precautionary measures would effectively prevent the introduction of tuberculosis into the army, where the disease would consequently become more and more exceptional.

De Block (Belgium).

Special attention was called by Doctor De Block, Commandant, Professeur d'Hygiéne à l'Ecole Militaire, Bruxelles, to the great divergence of opinions as regards the value of the many mathematical formulas which have recently been introduced into science and change the valuation of tuberculosis. Although the formulas of Spehl rest on certain definite principles, this does not seem a reason to reject the formulas of other authors. Prof. Emil Spehl, of the University of Brussels, propounded in 1919, a new adjuvant diagnostic method for the recognition of pulmonary "pretuberculosis," based on the demonstration of insufficiency of the vital capacity and a less than average body weight. The "vital quotient" is obtained by multiplying the weight, estimated in hectograms, by the thoracic perimeter estimated in centimeters, and dividing the product by the height, in centimeters. In a general way, the relation between the vital capacity and the weight is the measure of the "breath"; other conditions being equal, it indicates with nearly mathematical accuracy the physical strain of which a given individual is capable. All nontuberculous persons whose weight and vital capacity, in proportion to the height, are below normal, must be regarded as pretuberculous pulmonary cases, and should accordingly be subjected without delay to appropriate treatment. Spehl claims that the determination of the general nutrition and the exploration of the mechanical phenomena of respiration constitute together a new and most valuable method of examination in the difficult diagnosis of "pretuberculosis."

The question arises, Should these mathematical formulas be abandoned—compared—or adopted? An international inquiry ought to be instituted to settle this important point. The army at this time possesses human material for the study of many relevant questions, but our anthropological knowledge is insufficient and in need of further extension. After pointing out that this duty should not be left to physicians exclusively, the speaker concluded his brief communication with the expression of the wish that in view of the primary interest belonging to the prevention of tuberculosis, the congress should suggest the desirability of ascertaining through the military mediums, by means of a universal inquiry, if it is correct to attach any value to the mathematical formulas which at present are claimed to give the equation of the body resistance; these mathematical methods, providing their value is established, to be adopted and applied by all physicians, on the basis of uniform data.

THE ANTIVENEREAL CAMPAIGN IN THE ARMY.

A considerable number of contributions bearing on the control of venereal disease in the army were submitted to the "Congrès International de Médecine at de Pharmacie Militaires" in appreciation of the fundamental importance and imperative necessity of antivenereal measures. As a corollary of these offerings, the congress advanced official recommendations in behalf of a most rigorous antivenereal campaign, as called for by the extent and gravity of the peril in the army and navy. Society as a whole, the civilian in the street no less than the soldier in the ranks, is concerned far more vitally than is generally realized in the control of these insidious infections. In order to stamp out all infectious foci in the community, thereby indirectly guarding against contamination of the army, on land and sea, the fight against venereal disease must be waged primarily among the civilian population. Judicious educational measures, from didactic instruction to the cultivation of sports and games, are valuable prophylactics in the management of the venereal problem. When the infection has been contracted, the latest and best methods of treatment must be rendered available for the soldier and sailor. It is recommended that in the armies and navies of all nations, the antivenereal campaign in all modalities be organized or modified without delay, namely, in conformity with the following principles:

A. Educational measures, to the widest possible extent.

B. Measures aiming at the preservation of healthy bodies and minds, through (1) provisions for amusement and entertainment, recreation rooms, athletic activities, and social centers of various kinds; (2) supervision of sources of infection, in cooperation with the civilian authorities; and (3) conservative protective measures, by providing prophylactic cabinets for soldiers and sailors, on the plan of the American prophylactic stations, amply supplying individual combs, brushes, soap, and similar utensils to the men.

C. Measures concerning syphilitic patients: (1) Early detection of infected men; (2) isolation of contagious cases; (3) treatment by the most efficient means in specialized services; (4) follow-up supervision of patients; (5) patients who are discharged before they are entirely cured must be given the necessary information as regards stations where they may secure treatment in civilian life.

Dujardin (Belgium).

With special reference to the control of the venereal peril in the Belgian Army, Doctor Dujardin, after giving a brief historical review of this vexed problem during the World War and the lessons taught by the study of venereal questions confronting soldiers, proceeded to a discussion of the most serviceable organization of the antivenereal campaign in the army. from the therapeutic, prophylactic, and moral viewpoint. The conclusions arrived at in this report are briefly formulated as follows:

1. The medical antivenereal campaign in the army must include the two steps of (*a*) divisional services (ambulant treatment and differentiation); (*b*) a central hospital of large capacity possessing a well-equipped laboratory. Its scope and receiving capacity, as well as its various departments, may be calculated in advance, and its staff should consist only of competent surgeons.

2. Therapeutic procedures alone are insufficient, and should necessarily be supplemented by prophylactic and moral antivenereal education of the soldier, with the two-fold object of lessening the number of contamina-

tions, and especially of securing timely treatment, prompt interference being essential to the efficiency of therapeutic measures.

Damazio (Brazil).

Dr. Alarico Damazio, Médecin-Major de l'Armée Brésilienne, Professeur à l'Ecole d'Application Médico-Militaire, discussed the history of venereal prophylaxis, its application in civilian centers, its necessity from the social viewpoint, the fight of the venereal evil in military centers, prophylactic measures, attempts at eradication of this evil, and contributed comparative statistics showing conditions as they exist in Brazil and in other countries.

Statistical table showing the morbidity and mortality from venereal diseases in the Brazilian Army in 1919.

Diseases.	Per 1,000 men in the service.		Per 1,000 men in the service.		
	Discharged.	Died.	Cured.	Died.	Disabled.
Gonorrhea	60. 43	......	958. 76	......	0. 51
Syphilis	43. 68	0. 24	897. 84	5. 55	19. 59
Venereal chancre	65. 06	......	965. 55	......	....

Statistical table showing the morbidity and mortality from venereal diseases in several armies, calculated per 1,000 men of the average number of troops.

Diseases.	Portugal, 1910.		Spain, 1916.		Argentina, 1917.		Brazil, 1919.	
	Morbidity.	Mortality.	Morbidity.	Mortality.	Morbidity.	Mortality.	Morbidity.	Mortality.
Gonorrhea	(1)	......	25. 12	......	62. 38	......	60. 43	......
Syphilis	8. 72	0. 06	19. 67	0. 02	6. 53	......	43. 68	0. 24
Venereal chancre	95. 13	......	21. 93	......	24. 09	......	65. 06	......

[1] The figures for gonorrhea are included in those for venereal chancre.

The desired goal of elimination of venereal disease from the armies of all nations, as pointed out by the speaker, involves the urgent necessity of more energetic prophylactic work in this direction. General measures at present consist in the establishment of stations for individual prophylaxis and other stations where infected soldiers from the entire army may be "purified" as completely as possible, or rendered incapable of transmitting the disease to others. All governments must intensify their antivenereal propaganda by lectures and printed pamphlets, in order to show the dangers of infection, the means of avoiding it, and the methods of combatting the disease. Certain penalties should be imposed upon the transgressors of prophylactic rulings or for negligence in their performance. Systematic regulation of prostitution is an imperative necessity, in civilian centers as well as in military zones, in peace time or in war, in conformity with the laws, penal codes, and military legislation of the various nations. Capable government officials of the nations represented at the congress were called on to organize a uniform legislation aiming at a humanitarian campaign against the venereal evil. The speaker called attention to the desirability of stimulating in military centers a love of sports in general and of providing recreations of all kinds, in order to help those who have chosen the career of the soldier.

Marriage of soldiers should be encouraged, the use of alcohol strictly prohibited, and abstinence from illicit sexual intercouse be forcibly urged. The maintenance of an excellent moral and physical standard in the troops will help to increase resistance and diminish exhaustion, thereby protecting the soldiers against the disease and making of them valuable propagandists of antivenereal prophylaxis in civilian communities. Liberal prizes should be awarded to all those who by their works or discoveries contribute to the suppression of this human plague. The speaker requested the proclamation of absolute scientific conformity with the methods in use in the United States of America, through which excellent results have been accomplished. An appeal to the Red Cross societies all over the world was recommended, for the purpose of organizing a concerted effort of prophylactic work against venereal diseases. In conclusion, the governments represented at the congress were urged to promote biannual meetings of specialists from all over the world for comparison of results and adoption of new procedures, so as to secure the greatest possible efficiency of the antivenereal campaign.

The Leagues of the Red Cross societies was represented at the congress by the report on venereal diseases in armies by Lieut. Col. T. F. Ritchie, D. S. O., M. B., R. A. M. C., retired. Stress was laid on the fact that the preservation of health and maintenance of efficiency of the troops is the primary function of an army medical Ritchie (Britain).

service, both in peace and war. The prevention and cure of venereal diseases becomes, therefore, an important responsibility of the army medical service, these diseases being probably the greatest cause of disability in all armies. Accordingly, a well-considered policy in regard to venereal disease should be adopted by those responsible for the health of the army. These measures may be divided into preventive and curative. Preventive measures may be summarized as follows: Education as to the dangers and results of venereal diseases and their methods of spreading; organization of wholesome recreation and entertainment; diminution of opportunities for exposure to infection; medical prophylaxis. During the World War, prophylaxis or disinfection assumed considerable importance and was used in the form of two methods, namely, voluntary self-disinfection, and compulsory skilled disinfection. The first is commonly known as the "packet system" and consists in supplying the soldier with certain medicaments such as calomel ointment and a solution of potassium permanganate.

This method was adopted in the British Army, but with only moderately successful results. Being entirely voluntary, no definite statistics as to its efficacy are available. The American Army employed compulsory skilled disinfection, treatment being given at "prophylactic centers." Very successful results were obtained, but drastic measures were essential to success. Colonel Ashburn, of the Medical Corps of the United States Army, has published an exhaustive analysis of the American Expeditionary Force in regard to skilled disinfection as a prophylactic measure. After infection has occurred, the spread of these diseases in and through the Army must be prevented by early diagnosis followed by isolation of infected soldiers in hospitals at the base. Organization of treatment is an imperative requirement, and in most armies it has been found desirable to formulate a standardized treatment so that each patient will receive at least the minimum amount which will be sufficient to cure his disease. It is therefore essential to devise a routine treatment which will insure continuity and due economy of drugs. Such routine treatment may have to be modified as to its intensity and duration by the existing military situation and to secure reasonable safety for the patients. In the British Army this treatment consisted of 9 doses of 606 and 8 doses of intramuscular injections of mercury, making a total of 3.3 grams of 606 and 8 grains of mercury.

In discussing the relation of Red Cross societies to army medical services, the speaker pointed out that national Red Cross societies in war play a most important part in cooperating with and supplementing the work of army medical services. In his opinion, in time of peace, Red Cross societies could suitably cooperate with the army medical authorities in an antivenereal campaign. A Red Cross society could organize recreation and entertainment for the troops in military cantonments and hospitals. It could assist in educational work, such as the supply of lecturers, distribution of pamphlets, organization of exhibits, and display of motion-picture films. In cooperation with the military medical authorities, it could also undertake the improvement of existing venereal hospitals. Practical experience has shown that a progressive diminution of venereal diseases may attend an improved standard of the soldiers' barracks and living conditions.

Granjux (France).

For the better protection of the young soldier against bad influences and gross temptations, Doctor Granjux, Médecin-Major de 1re classe en retraite, advocated a simple measure, proposed to the French Senate by the hygienist Strauss, and consisting of the creation of "tutor-correspondents" for the young recruits, and of family-centers for their reception when on furlough. By this system of "tutor-correspondents" is meant the application to the army of a regulation in force in French colleges, where for every schoolboy whose parents do not reside near the college, these are replaced by an official "correspondent," approved by the school authorities. The movement is not unlike the Big Brother plan which has been advantageously adopted in America for the moral uplift of neglected boys, and from the military viewpoint it is expected that these correspondents will cooperate with the army officers in maintaining a high moral standard among the young recruits. This idea has been very favorably received in France, so that the Congrès d'Hygiène Interallié asked the military authorities to extend to the families of recruits the right to propose to the chiefs of regiments a tutor-correspondent for their sons during the period of military service. The speaker asked the congress to indorse this request, as the tutor-correspondents are certainly called upon to do their part in the antivenereal fight in the armies, by virtue of the advantages which this organization can provide from the sanitary, family, military, and social viewpoint. In reply, the congress, appreciating the potential services of tutor-correspondents along the line of antivenereal prophylaxis for the soldiers and the peace of mind of their families, besides assisting the work of the military command, expressed the urgent wish that the military authorities of all armies extend to the families the right of proposing to the regimental chiefs tutor-correspondents for their sons during the period of military service.

Glibert (Belgium). Victory in the battle which is now being waged against the venereal peril is the keynote of a contribution by Doctor Glibert, Médecin principal de 2e classe, Chef des Services d'Urologie et de Syphiligraphie à l'Hôpital Militaire de Bruxelles. He believes that in armies more than anywhere else, many steps in advance may be taken toward the desired goal.

According to Doctor Chastang, of the French Navy, who was quoted by the speaker, the wide distribution of venereal diseases in oriental countries is illustrated by statistical data of the crews, the number of venereal cases amounting to about 137 per thousand men yearly in the two divisions of Indo-China and the Far East, whereas it was only 64 per thousand in the navy of European waters and other colonial stations. In his practical experience, properly applied prophylactic measures were found to be of the greatest value, especially with regard to the prevention of syphilis. In a general way, Glibert emphasized that the three great preventive measures are represented by moral prophylaxis, which, alone, will always remain insufficient; conservative prophylaxis, which, in his opinion, is not as generally adopted as its merits warrant; and finally, curative prophylaxis against infection with the gonococcus as well as the spirochete. Conservative prophylaxis seems to be highly efficient, judging from reported results, and its systematic organization on a large scale was warmly advocated by the speaker, who expressed the hope that the relevations made to the congress from many sides would clear up this point in behalf of the vital interests of human society.

During the war the venereal peril, as emphasized by Dr. L. Wilmaers, Médecin-Général, grew into a menace such as to necessitate the institution of a systematic and most energetic campaign against this dangerous plague in either of its forms. The total percentage of venereal contamination in the Belgian Army, from August 1, 1914, to June 30, 1918, amounted to 15.30 per cent of the average annual strength. The rapidly progressive annual percentage of venereal disease lowered and weakened the standard of health sufficiently to suggest the possibility of a reduced fighting strength in the army. The strictest possible prevention of venereal diseases in the army, in peace as well as in war time, is imperative for the protection of the individual, the community, and military efficiency. Altogether, the necessary preventive measures include: (*a*) Moral prophylaxis, which should be as educational and comprehensive as possible; (*b*) preventive prophylaxis, shown to be actually serviceable by war-taught lessons and consisting in the utilization of a personal outfit or application for skilled prophylactic treatment after every suspicious intercourse; (*c*) sterilizing and healing therapeutic prophylaxis, which means the prompt detection of venereal infections, followed by therapeutic disinfection of germ carriers and treatment of existing lesions, until the best possible cure has been obtained. **Wilmaers (Belgium).**

The organization of the antivenereal fight in the field must be mapped out in peace time, and requires (*a*) the creation of a divisional hospital section, in charge of a specialist in venereal diseases, and equipped with facilities for the establishment of a local service for venereal cases, in the form of consultations and temporary reception of patients; (*b*) the provision of hospital centers for venereal cases at the rear and in the interior, under the supreme direction of a medical chief of unquestioned standing as a specialist; (*c*) the individual prophylactic outfit and the functioning of preventive disinfection services must be conceded on principle; (*d*) under certain conditions incident to warfare, the venereal peril may be modified by the erection of supervised brothels behind the armies.

In the antivenereal campaign in the British Army, as outlined by Maj. A. D. Stirling, R. A. M. C., the chief measures adopted are as follows: (1) Frequent lectures by chaplains and others specially qualified on the moral **Stirling (Britain).**

aspect of the subject. Provision of every form of amusement and recreation—cinemas, concerts, Young Men's Christian Association institutes with reading rooms, writing rooms, billiard rooms, outdoor sports, so that the men have plenty of healthy amusement in their leisure time. (2) Frequent lectures by medical officers to all units, which regimental officers must attend (see copy of a specimen lecture at the end of this report). (3) Frequent instruction as to the taking of adequate prophylactic measures after exposure to infection, this instruction being usually given after a lecture on the moral side. (4) Distribution of prophylactic packets to all units. These are available free at all military stations. Full instructions are given on the envelope containing prophylactic preparations, which consist of a bottle of permanganate of potash 1:1000, a tube of 33 per cent calomel cream with a pin and a pledget of cotton wool. (5) Provision of night ablution rooms, where soldiers who have incurred the risk of infection can carry out measures of self-disinfection. The following warning displayed on a poster was displayed in early treatment centers:

TO PREVENT VENEREAL DISEASE.

THE RIGHT PLAN IS TO KEEP STRAIGHT.

If you have not done so, prompt disinfection with an E. T. outfit is most important. Therefore do as follows:

I. Get an E. T. outfit, consisting of a bottle of antiseptic lotion, some cotton wool, and a small tin tube of antiseptic cream.

II. Urinate in gushes, holding the urine back by pinching the foreskin or the mouth of the pipe, and letting it go with a rush.

III. Wash thoroughly well under the foreskin with the cotton wool soaked in the antiseptic lotion.

IV. Push a pin through the nozzle of the small tin tube and squeeze half of its contents into the pipe (urethra). Squeeze the rest of the antiseptic cream over the knob of the penis, and rub it well in.

Prompt action is most important.

Never delay more than one hour.

If you have delayed for some hours, ask the M. O.'s advice about it.

[NOTE.—This poster is to be displayed only in early treatment centers.]

(6) The formation of special treatment centers, each under a specialist officer, where adequate treatment is given at the earliest possible moment when disease mani-

fests itself and the abortive treatment of gonorrhea is carried out.

SPECIMEN LECTURE TO TROOPS ON THE PREVENTION OF DISEASE USED IN THE BRITISH ARMY.

Almost every disease from which we suffer—especially in the young—is caused by microbes. Pimples and boils, skin diseases, and almost all forms of blood poisoning are due to microbes, and so is toothache. Different kinds of microbes cause colds in the head, measles, malaria, diphtheria, influenza, typhoid, plague, cholera, and the venereal diseases. There is no doubt that the trench fever from which many of you have suffered is caused by microbes.

The way to prevent illness is to prevent microbes from getting into you. To do that one must find how they travel from one person to another and stop them on the way. Some microbes live in the air passages of the sick person—in his nose, mouth, or lungs—and the sick man breathes or coughs them out into the air. That happens in measles, colds, influenza, and such like complaints, and that is why it is dangerous to go into a room where there is measles, for instance. The only way to stop such diseases as these is to isolate the sick man and disinfect his room—you can not help much here—it is the M. O.'s work.

But with some other diseases you can help a lot. The microbes of some diseases live in the stomach and bowels, generally causing diarrhea. They pass out of the sick man in his stools and may thus get into drinking water in a stream or pond, and be carried on the legs of flies to food. When there is such a disease as typhoid or dysentery about, one must be careful, therefore, that no infection reaches the food or drinking water. If one can not be sure of that one must eat only hot, cooked food and drink only boiled or disinfected water. General Maude died recently in Mesopotamia of cholera because he drank a single glass of unboiled water.

Some diseases are carried by insects. Thus typhus fever is carried by lice. The microbes live in the blood and are sucked up by the lice when they feed on the sick person; they are thus conveyed by the lice to the next person on whom they feed. You could sleep quite safely with a man suffering from typhus fever if there were no lice about. Plague is carried in much the same way by fleas, and mosquitoes carry malaria and yellow fever, so whenever there are any of these diseases about you must be careful about vermin.

But the diseases which you can most easily prevent by the use of your own common sense are what are known as the contagious diseases, so called because they are caused by actual contact with sick persons. Scabies, or "the itch," is a contagious disease and ringworm is another; but the chief of the contagious diseases are venereal—gonorrhea and syphilis. Venereal diseases are much the most terrible and prevalent of all, and yet they are the easiest to prevent, as I shall show you.

Of course the right way for you to avoid venereal diseases is not to put yourself in danger. You can not get it if you keep straight. But in every lot of men there are sure to be some who *will* put themselves in danger, and it is to them especially that I now speak. Suppose that I got some of the poison of a venereal disease on my hands, what do you think I should do? Of course I should disinfect my hands at once. The germs of venereal disease are the easiest of all to kill, and by using the disinfectant at once I should be perfectly safe. That is what you should do when you get any of the venereal poison on other parts—disinfect—and, just as I don't wait a moment before dipping my hands in the disinfectant, so should you disinfect at once.

I must tell you how a man gets the venereal poison on his private parts, because some of you may think that you need disinfect only at some times and not at others. A man contracts venereal disease by having connection with a woman who is in the habit of going with all and sundry in the same way. Not only women who do it for payment—what are known as prostitutes, but any woman with loose morals. In fact, it is those we call "amateurs" who have caused such a frightful amount of venereal disease in the British Army, and it is the same in France. I expect there are some amongst you think I am exaggerating because they have already been with such women and not got venereal disease. So they think they can insure their safety by choosing carefully. But they are wrong—and for this reason: A woman who goes with an infected man can not escape getting venereal disease. This means that almost any woman who can be "picked up" has got venereal disease because there are thousands of infected men about and it is almost a certainty that she has already been with one of them. Very often she does not know she has it and none of you could tell from looking at her that she was suffering from venereal disease; only a doctor could tell by a skilled examination that she was infected. So she goes about her work much as usual and carries on with men the same as before.

A man who goes with such a woman may easily enough escape without taking any special precautions because it is different in that way with men. The microbes are planted on the outside in his case and may easily be washed away. But you know the old saying, "The pitcher went once too often to the well," and there is nothing truer than that in the case of venereal disease. Sooner or later the man who goes with loose women without taking the precaution to disinfect himself afterwards gets caught. It may not be until the fiftieth time, but very often it is the first. There are plenty of instances where a man has contracted both gonorrhea and syphilis the very first time he went with a loose woman. Since the war began an enormous number of men in our Army have caught venereal disease. The plague grew so bad that ablution rooms were set up in barracks where men could go and wash the poison out of their pipes by irrigating themselves, and kill it on the surface by rubbing in some antiseptic ointment whenever they had been in the way of getting venereal disease. Those ablution rooms did a great amount of good when they were properly used. They stopped a great deal of venereal but they had some faults. For one thing many men were shy about being seen going into them and did not go at all, or at any rate not until it was much too late. Others could not use them because they were on leave and not living near barracks. You must remember that time is everything in the prevention of venereal disease.

The microbes are easy enough to kill when they are still on the surface, but in both syphilis and gonorrhea they burrow very quickly, especially the syphilis germ, and once they have got below the surface of the water pipe or the skin of the penis it is the most difficult thing, taking many weeks, to turn them out. So the Army authorities have now provided antiseptics which can be used anywhere. All that a soldier has to do after exposure is to go to the medical orderly and ask for some early treatment antiseptic. No questions are asked, and he is given a small bottle of Condy, a piece of cotton wool, and a little tin tube containing some antiseptic ointment. He takes these with him to some quiet spot—a water-closet or a dark doorway, for instance—and first wipes his parts thoroughly well with the cotton wool soaked in the Condy. He should wash the mouth of his foreskin and all the little crannies round about his bridle string—or bobstay, as sailors call it—particularly well, because those parts are apt to have the skin rubbed away from them and let in the syphilis poison very easily. When he has washed in this way, he takes the tube of antiseptic ointment, sticks a pin through the nozzle end of it, and squeezes about half the antiseptic ointment out into his pipe; the rest of the ointment he rubs well into the end of his penis and again he takes great care that the mouth of his foreskin and all around the bridle string are well dosed with the ointment. All this should be done at once. Remember that the germs are trying to burrow all the time so as to get into safety, and if you give them too much start you will never catch them.

You would, no doubt, like to know how much this prevents venereal disease when it is properly carried out. A medical officer in Portsmouth was looking after 2,000 troops for about 18 months. Something like 16,000 men passed through that barracks in that time and only four cases of venereal disease occurred in the whole 16,000. That was because most of them carried out his instructions with regard to disinfecting themselves as soon as possible after exposure to infection. The four men who did get it had not used the disinfectant at all. I could tell you a number of instances like that, but here is just one other to show you the value of disinfecting early. The troopships from New Zealand used to touch at Capetown, and a lot of men were always allowed to go ashore. The result was that by the time they got to England there was always a crowd of venereal patients to send to hospital. But on one trip the medical officer got the men together before they reached Capetown and told them all about the importance of disinfecting after going with women. He told them that if they went with women and did not disinfect afterwards many of them would be sure to get venereal disease, and advised them very strongly to come and be disinfected as soon as they got back to the ship if they had been in any sort of danger while they were ashore. They practically all took his advice, and the ship landed in England without a single case of venereal disease.

This is not told you to show you how to indulge in vice without penalty. You know that on every ship's railings there are always a number of life buoys. Of course, they are there to save the life of anyone who is fool enough to fall overboard. Everybody knows they are for that purpose, but nobody thinks they are to encourage men to jump overboard. Well, the early treatment antiseptics are like the life buoys.

One other thing you must bear in mind, and that is this. The disinfectants which are provided for your own use are no good after the disease has really started. The only hope of stopping it then is by getting skilled treatment. It is the very worst kind of folly to wait a day after the first signs of the disease have appeared, as all the time it is getting more and more into the system, and every day lost means weeks more treatment and ever so much less chance of a cure. So, even though he has used the early treatment antiseptic, a man who has been in the way of getting venereal should examine himself every morning for weeks to see if there is any discharge from his pipe or anything looks wrong about his penis. If there is the least feeling of irritation, even only a little itching or any part looks redder than it should, he should go at once to the medical officer to get advice about it. Remember that nobody can tell at that early stage whether the disease is starting or not unless he uses a microscope, but that is the time which gives the best hope of a rapid cure. The man who waits, hoping for the best, or runs off to some quack or other for a bottle of medicine or lotion is simply playing ducks and drakes with his future health and probably condemning his future wife and family to a miserable existence.

For the sake of our country we must prevent venereal disease at all costs. All the thousands of soldiers who are now suffering from venereal diseases have to be replaced by other men. That means so many more men called up, millions more money spent, and so much longer the war. After every war venereal disease spreads through the country like the plague, and wherever it goes it causes endless misery. Clean, decent, healthy young women who marry infected men get the disease and perhaps never know a day's enjoyment of health afterwards. Children inherit it from their parents and grow up cripples, insane, or blind. Think of the responsibility which lies on a man who causes all that misery, and remember that he could have prevented it if he had only avoided intercourse with women beforehand, or if he had only taken the precaution to disinfect himself at once whenever he had indulged.

You must remember the history of all this. Four hundred years ago there was a condition of war in Europe much the same as at the present day. The armies marched all over Europe, and when the war was over the soldiers went home. Then two great plagues which had been spread by the soldiers ravaged all the countries. One was smallpox, which killed millions. The other was more awful and invaded every home, striking down prince and peasant. It was called "great pox," and it was the same disease we call syphilis or "the pox" to-day. Something like that happens after every war, and the bigger the war the more likely the country is to be infested with these horrible diseases. This is the biggest war that has ever been, as you know, and unless we take precautions the venereal plague will be worse after it than it has even been before. We don't want the homes of England ravaged by these diseases after the war, and now that we know how to prevent them it is up to everyone to do his best to keep venereal disease out.

Now, that is all I want to say. I have talked to you as decent, reasonable men. I have appealed to your common sense. You know as well as I do how venereal disease is caught, and know what a terrible thing it is, and you know how it is prevented. I don't want you to be immoral, but if you *will* incur danger of disease you must not come back here in a filthy state, bringing disease into the barrack room. For the sake of your comrades, to say the least—for the sake of your country, your future wives and families, for the sake of almost everything which makes life worth living, you must disinfect yourselves.

The excellent results of the prophylactic stations in the American Army were extolled in the report by Dr. R. Lakaye, Médecin de Bataillon de 1re Classe, de Réserve. He pointed out that the medical officer is the keystone of the entire antivenereal prophylaxis in the Army. It is he who is charged with the duty of instructing, preventing, curing, and investigating. This task, in order to accomplish its object, requires not only a high competence and considerable work, but an unceasing zeal and devotion to this truly humanitarian service. It is certainly necessary to give detailed instructions to physicians concerning their part in the great antivenereal fight, but they must also be left the greatest possible freedom of action, for success will depend not so much on the more or less strict adherence to the various rulings, but rather on the efforts and especially the willing cooperation of all concerned. **Lakaye (Belgium).**

The Prophylaxis of Venereal Disease in the French Army in Peace Time was the subject of an address to the congress by Dr. E. Sacquépée, Médecin Principal de 1re Classe, Professeur á l'Ecole d'Application du Service de Santé Militaire, who emphasized that although the war was a victorious one, more formidable enemies still remain to be overthrown, in the form of alcoholism, tuberculosis, and venereal diseases. Statistics for France have shown that syphillis in 10 years has cost more victims **Sacquépée (France).**

than the war. Prophylactic antivenereal measures in use in the French Army were successively discussed by the speaker, under the headings of educational measures, sanitary measures aiming at the protection of healthy individuals, and therapeutic measures in behalf of infected men. Stress was laid on the curability of syphilis, when properly treated, and on the gravity of gonorrhea, which is often erroneously considered as a harmless disease, but which from its onset requires careful treatment under medical supervision.

Antivenereal prophylaxis in the Swedish Army.

In the form of an extract from Circular No. 432 (1920) of the medical director of the army administration, Sweden submitted to the congress sanitary rulings in regard to the prophylactic treatment against contagious venereal diseases. A circular containing these rules was first issued on December 31, 1919. Personal prophylactic treatment is referred to as one of the most efficient measures against the propagation of contagious venereal diseases. In all army corps where medical officers are on duty, measures must be taken for the application of preventive treatment against contagious venereal diseases, in conformity with the special orders of medical chiefs and with certain army regulations. Medical officers are expected to make suggestions as to what is needed for the facilitation of treatment, to give all the hospital attendants in their service the necessary instruction for the application of the treatment, and to superintend the proper performance of the treatment.

Kensa Oyama (Japan).

Some effective precautionary measures, adopted by the Japanese Army, for the prophylaxis of venereal diseases, were mentioned by Surg. Lieut. Col. Kensa Oyama, as follows: Hygienic and moral lectures, given by medical officers or others, to teach the soldier the evils of venereal disease and the necessity of self-control; improved conditions of military life, with provision of some home comforts; attempt at extermination of unlicensed prostitutes, in cooperation with the local authorities; accurate instruction, in popular intelligible terms, concerning the evil of venereal diseases, the modes of infection, and prophylactic measures, by means of wall maps, cinematographic views, photographs, models, and other adjuvants; recommendation of precautionary measures in the form of local application of disinfectant ointment after every illicit intercourse. The incidence of venereal diseases in the Japanese Army during the past 40 years shows a most gratifying gradual decrease, the rate of venereal disease among the soldiers having dropped to one-eighth of the figure noted in 1877. This slow but steady decrease was attributed by the speaker to the gradual improvement of social sanitation, the progress of medicine as well as personal hygiene, and systematic educational training in the army.

A summary of the method and measures adopted for the prophylaxis and treatment of venereal diseases in the Italian Army during the World War formed the contribution to the congress by Lieut. Col. Prof. M. Carruccio. The three goals pointed out by him as forming the basis of the sanitary organization against venereal diseases in the army are social and individual prophylaxis, prompt and efficient treatment of infected men, their best and earliest restoration to health. The institution of "personal cards" for syphilitics was found to be a very useful measure, these cards stating the name and paternity of the patient, the date of infection, its principal symptoms, and the treatment to which the soldier was subjected during his military service. A supplementary card contained the most important hygienic rules as well as earnest advice to the patient to avoid possible contagion of members of his family and to continue his specific treatment. In his capacity as director of the First Municipal Dispensary in Rome, which is frequented every day by large numbers of civilian and military patients, he often had occasion to observe that syphilitic patients, still in uniform, or soon after their discharge, presented themselves for treatment with this card, which accordingly served its purpose in a number of the cases. Carruccio (Italy).

Other prophylactic measures in use in the Italian Army consisted in the erection in the fighting zone of houses of prostitution reserved for soldiers, carefully supervised by medical officers and equipped with all known measures for individual disinfection; periodical addresses to the regiments; sanitary visits; extensive distribution of hygienic propaganda pamphlets among the soldiers; finally, the provision of a special station in all military infirmaries where the soldier on his return from a suspicious intercourse could, with the assistance of a trained attendant, carry out the necessary disinfection measures for the removal or diminution of the risk of contagion. In the speaker's opinion, the most important and efficient of all these prophylactic measures was the establishment of houses of prostitution reserved for soldiers and supervised by a specialist medical officer; and if it were possible to create and reliably operate such houses also in peace time and in the organization of civilian prophylaxis this would mean a great step in advance in the social defense against venereal diseases.

The prophylaxis against venereal diseases in Albania and Macedonia demanded still greater efforts, on account of the prevailing very bad hygienic conditions in regard to contagious diseases in general and venereal diseases in particular. According to the synthetic report on the work of the sanitary commission of the allied countries, all the other nations except Italy agreed to adopt during the war the most severe methods of suppression against prostitution and to enforce the strictest measures in cases of venereal contagion among soldiers. Carruccio laid stress on the fact that nothing of the kind was considered necessary in Italy, where soldiers were carefully instructed in regard to personal prophylaxis and patients suffering from venereal diseases were managed as any other patient, the military officers thereby accomplishing a wise and humanitarian task. Directed by the spirit of modern progress, conducted by reliable and efficient means, fought with commendable zeal by the medical officers intrusted with this work—the fight against venereal diseases is claimed to have so far produced all the good results obtainable in view of the gravity and manifold difficulties of the complicated physical and moral problem of social defense against this evil.

Pochon (Switzerland).

Doctor Pochon, Médecin-major de l'Armée Suisse, reports on the treatment of venereal diseases in the Swiss Army, under the conditions as they existed during the World War. Based upon his experiences in the Sanitary Institute in Soleure, he considers it as dangerous to group together all the venereal patients of the army (especially men with recurrent infections, and those who count on their disease to remain inactive) in a sanitary institute instead of sharing in the work of the troop. These less desirable elements must be removed and cared for in small groups, so as not to contaminate too many men from the moral viewpoint. Centers of antivenereal treatment should be established which the soldiers can visit without being too long away from their troop. Strict measures must also be taken against men who allow their disease to go on indefinitely or who reacquire it directly on their return to military service. Finally, and especially, the antivenereal fight must be organized in the civilian population, imparting knowledge, placing within reach of everybody without obligation and as far as possible without expense, antivenereal treatment by competent specialists. This will prove the best weapon against this evil, and the number of venereal patients in the army is thus certain to be diminished.

Ten Hove (Holland).

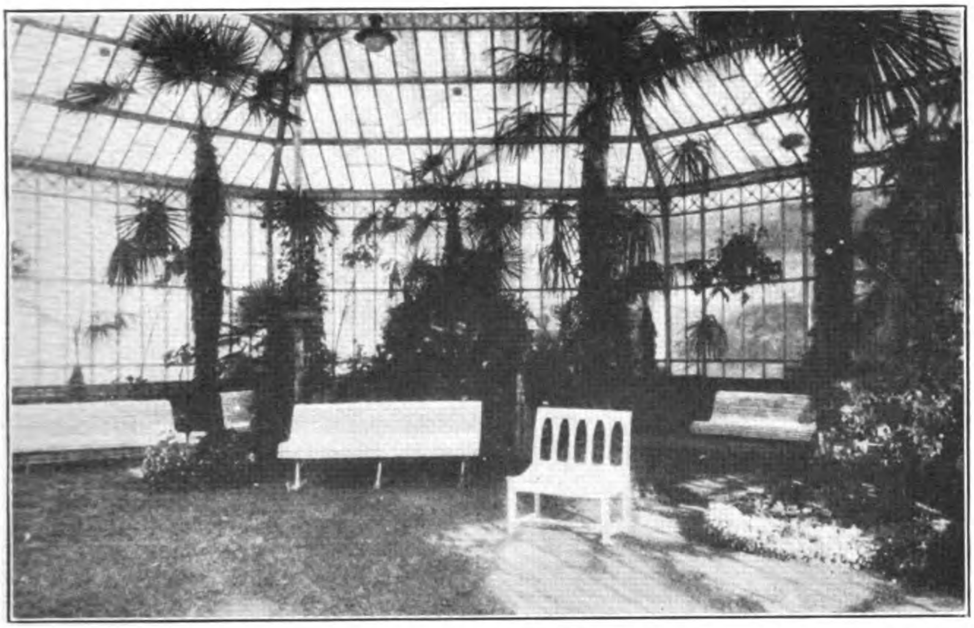
Lieutenant Colonel Ten Hove pointed out that the problem of the fight against venereal diseases in the army lost much of its urgent character after the return home of the demobilized soldiers. Holland was mobilized almost throughout the entire war in order to prevent breach of neutrality, to guard against any unexpected eventualities, and to take care of interned troops. At the time of this report the antivenereal fight in the Dutch Army had practically ceased to exist. In May, 1920, the number of venereal patients treated in the military hospitals did not exceed the figure of 2.5 per thousand of the sum total of the army, and in May of 1921 this number had diminished to 1.6 per thousand. The professional chiefs of the medical service in the garrisons are charged with the duty of taking all necessary steps in the case of an increased number of these patients (unannounced medical visits, lectures held in the barracks by a sanitary officer, and similar procedures). The diminution in the number of venereal patients in the Dutch Army may be attributed to two principal causes—progressive diminution in the number of enlisted soldiers, and the measure of permitting soldiers, as a favor, to sleep at home, in the houses of their parents or guardians.

Van der Smissen (Belgium).

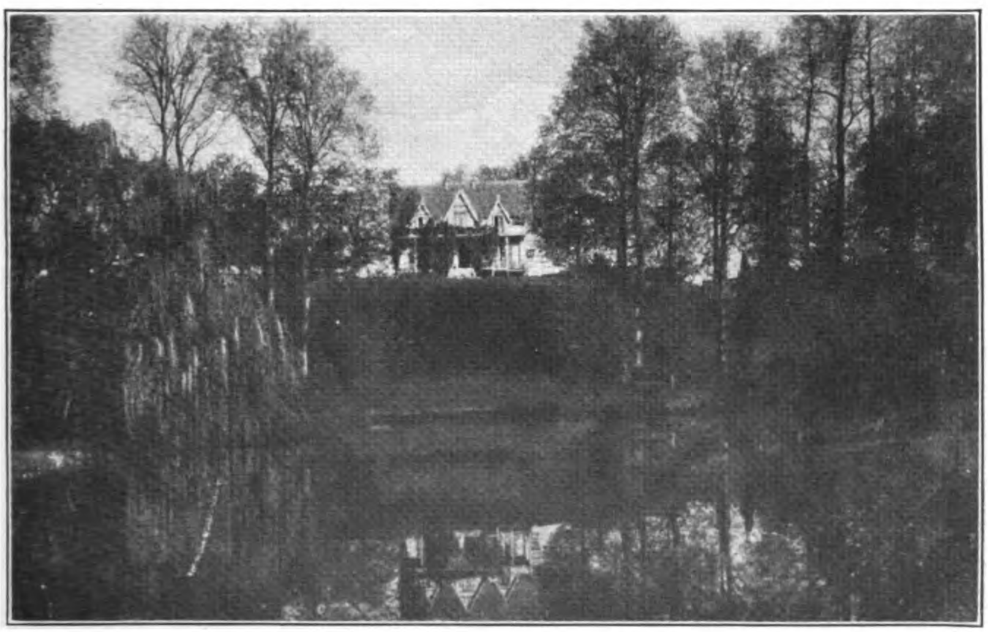
A practical preventive measure against venereal diseases, more particularly gonorrhea, was proposed by Doctor Van der Smissen, médecin principal de 1re classe, in the form of a polyvalent product of calomel and sodium taurocholate, for local application as an ointment. The bacteriologic action of sodium taurocholate is not antiseptic, but bacteriolytic, for the drug may be said to dissolve the gonococcus. This preventive treatment is easily applied, entirely painless, and so promising of good results that its originator hopes for its introduction not only in the Belgian Army, but in all armies.

Nyssens (Belgium). Doctor Nyssens invited the attention of the congress especially to the subject of *individual prophylaxis.* He laid stress on the negative results accomplished by the delivery of periodical lectures and addresses to the newly enlisted men. In view of the inefficiency of these lectures, and the recrudescence of venereal affections, chiefly at the time of and following the armistice, the speaker, while at the head of the venereological service in the Antwerp Military Hospital, adopted the system of illustrated lectures, intentionally making use of somewhat sensational, startling, and impressive pictures. He is forced to admit, however, that the percentage of new cases remained the same before as well as after the illustrated lectures, which were each time attended by several hundreds of soldiers. Briefly stated, lectures to the soldiers with or without projections had identical and absolutely negative results. This is not the case as regards individual prophylaxis, such as is practiced in the American Army or enforced in the German Army. The results of the American system have been highly encouraging, as the speaker was enabled to convince himself, the chiefs of the venereological services having succeeded in almost entirely eradicting venereal diseases among the soldiers. Penalties are inflicted on men found to have a venereal disease, not because the soldier has had the misfortune to become infected, but because he has neglected to follow the prophylactic prescriptions at his disposal. While satisfactory results may be anticipated from the regulation of public prostitution and from the strict control of secret prostitution, simple rules of *individual* prophylaxis are likely to yield more efficient results, the benefit to the men increasing at the rate of the simplicity of application of these measures.

Declairfayt (Belgium). In his venereological service at the front Doctor Declairfayt was strongly impressed on noting the disastrous influences of furloughs and leaves of absence on the recrudescence of venereal diseases. The urgent need for making clear to the soldier the appalling consequences of debauch and fornication led to the preparation of a booklet (pocket edition, 130 pp.), entitled Les Durs Réveils (The Sad Awakening), which was published in Brussels in November, 1920, the work of a qualified friend of the speaker, who submitted it to the members of the congress with the proposal of its gratuitous distribution through the army, among the young recruits,



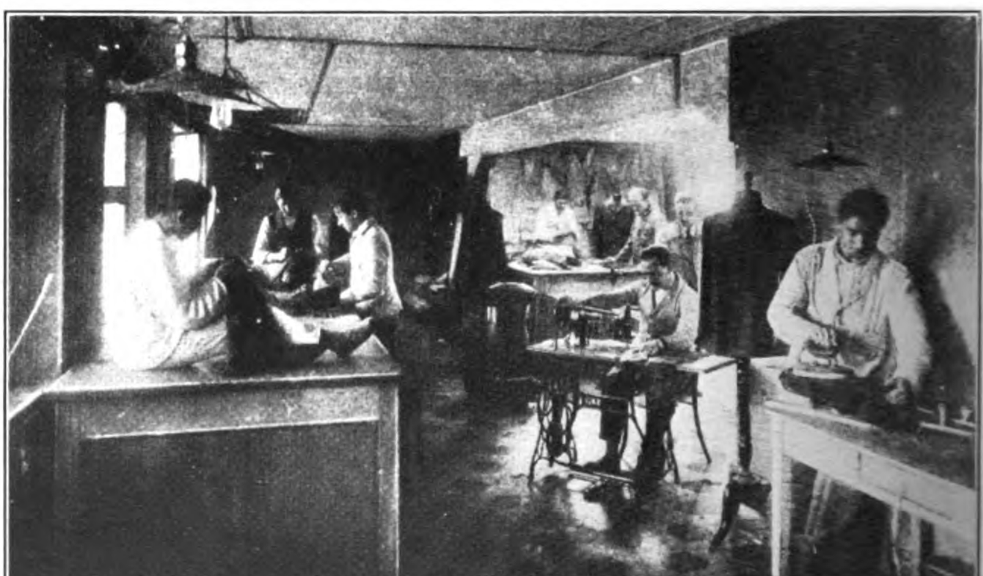
WOLUWÉ. THE WINTER GARDEN AT THE HOSPITAL FOR CRIPPLED SOLDIERS.



IN THE GROUNDS OF THE REEDUCATION HOSPITAL FOR CRIPPLED SOLDIERS AT WOLUWÉ.

1034–1

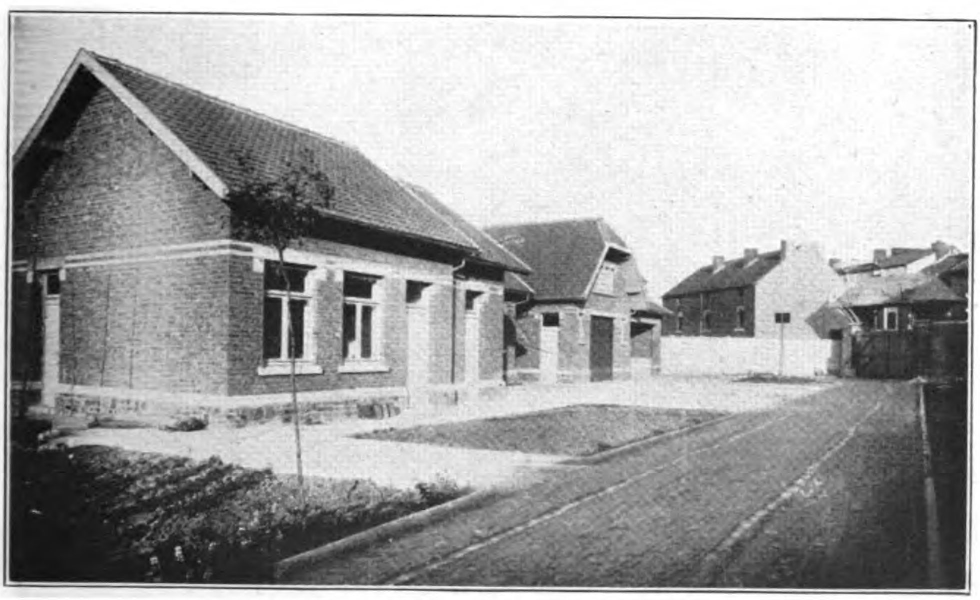
WOLUWÉ. A WORKSHOP IN THE HOSPITAL FOR WAR CRIPPLES.



PRACTICAL WORK IN THE REEDUCATIONAL SCHOOL FOR CRIPPLED SOLDIERS AT WOLUWÉ.

1034–2

INDUSTRIAL HOSPITAL AT SERAING, BELGIUM.



SERAING. A PORTION OF THE INDUSTRIAL HOSPITAL.

1034—3

SERAING. THE INDUSTRIAL HOSPITAL WHICH IS PERFORMING A REMARKABLE WORK IN CARING FOR THE INDUSTRIAL ACCIDENT CASES OF SERAING AND THE NEAR-BY CITIES.

THE SANITARIUM DE BORGOUMONT FOR THE TREATMENT OF TUBERCULOSIS: NEAR SPA.

where it would undoubtedly render the best prophylactic services.

De Block (Belgium).

Objections against this booklet—written by Hoornaert, not a physician, and dedicated to the young recruits of the Belgian Army—were raised by Commandant De Block, who pointed out that the army should never be designated as the hotbed of the syphilitic evil. It is urgently desirable that the public services of the civilian community take up this problem with the same zeal as shown by the military authorities, for nothing is gained by delivering lectures and taking other similar measures if the disinfected soldier recontaminates himself with public and private prostitutes, who have been insufficiently recognized and treated in civilian life. The speaker suggested the formulation of a request in the following terms: The Congrès International de Médecine et de Pharmacie Militaires, considering that the extinction of venereal diseases is scientifically and strictly practicable in the military medium by means of disciplinary, preventive, and curative measures, expresses the desire that the civilian authorities in their turn engage with energy in the antivenereal crusade in the civilian community in order that the soldier may be less and less exposed to the contamination which threatens him outside of the barracks. Furthermore, in view of the perils of dangerous sexual intercourse of enlisted youths, the congress expresses the desire that initiation in these matters should be provided in the upper classes of high schools and other institutions so as not to send totally inexperienced young men to the army, who may unwittingly expose themselves to the danger of venereal contamination, even before their entrance into military service.

Wilmaers (Belgium).

General Wilmaers, in discussion, spoke eloquently of the venereal peril, and the necessity of utilizing all possible means in the fight against this evil. The antivenereal fight in the field in time of war should be organized in advance, during peace time. The attention of the congress was drawn to the statistical data in the speaker's report, which show the extent of the venereal evil in the course of the war—18,755 venereal cases were seen in the divisional infirmaries from August 1, 1914, to June 30, 1918, in an average annual force of 122,449, not including the officers, about 4,000 in number (15.3 per cent). It is estimated that at the rear, where the danger of contamination was permanent, the number of venereal cases was likewise considerable, probably not far removed from 10,000 to 15,000. After the armistice the hospitals remained packed with venereal patients, and on March 5, 1919, at a time when demobilization was already far advanced, among 3,210 hospitals inmates in different sanitary formations, there still remained 702 venereal cases, or 21.83 per cent. As an example, showing that after the war venereal evil is still prevalent, the speaker pointed out that in the garrison of Antwerp alone, with an average force of 11,000 men, the hospital of this garrison received a monthly average of 21 per thousand of syphilitics and 27 per thousand of gonorrheal cases. To this number it is, of course, necessary to add a more or less considerable number of venereal patients cared for outside of the hospital.

The antivenereal fight must be strenuously waged, and all that *can* be done *must* be done. No tangible results have so far been accomplished by means of moral or educational measures, lectures, tracts, healthy recreations, and related methods. In Belgium the Government has everywhere opened its dispensaries and physicians have been authorized to prescribe all the necessary medicinal agents at the expense of the State, thereby encouraging therapeutic sterilizing prophylaxis. As a result, large numbers of venereal cases have come under treatment, and many syphilitics have been "purified." But this is not enough, especially as gonorrhea with its far-reaching consequences is very difficult to eradicate. Preservative individual prophylaxis must be still more urgently recommended and popularized. The prophylactic dispensaries, created during the war in certain allied armies, have been tried and tested, their brilliant statistical results suggesting a well-nigh absolute efficiency of preservative sterilization. This is undoubtedly exaggerated, but even if the percentage of sterilization amounted to no more than 80, 70, or even 50 per cent, the method would still remain imperative. With special reference to the Belgian medical service, the speaker stated that in October, 1920, the technical committee of this service transmitted to the department of national defense a complete program of antivenereal prophylaxis, comprising individual prophylaxis and the establishment of prophylactic treatment rooms in the barracks. The realization of this project, as emphasized by the speaker, still called for a formal declaration of the congress, conferring the necessary authority for the institution of needed measures along these lines.

Sieúr (France). The general agreement from all viewpoints on the matter of individual prophylaxis was conceded by Inspector-General Sieur, but he pointed out that the moral difficulties must not be lost sight of. Referring to the individual procedure described by Van der Smissen, the speaker mentioned an individual procedure of his own, but he is waiting for the solution of moral difficulties before adopting this procedure as well as a series of individual remedies. He is convinced, however, that a satisfactory solution will be reached.

Tant (Belgium). Doctor Tant gave information concerning the number of venereal cases in the army in the field and supplemented the statistics given by General Wilmaers. Since September, 1918 to August, 1919, the time of demobilizations, in an average force of 151,000 men, reports were received of 5,576 new cases of venereal diseases (1,079 syphilitic, 4,086 gonorrhea, 411 soft chancres). Taking into consideration the date of demobilization, this figure must be regarded as very incompletely indicating the sum total of venereal infections, for the data of two months are lacking, equalling 24,331 cases for an average force of 136,000 men. The antivenereal fight at the front has often been led under difficult conditions during the war, and it is desirable to provide now for an improved organization. The speaker described the organization in wartime of a divisional antivenereal service, permitting patients to receive without difficulty the care of a specialist, and to follow a rational treatment. He urged that all men suffering from gonorrhea in its acute stage, and all syphilitics with contagious lesions, especially of the mouth, be removed from their unit, and energetically treated in an antivenereal center.

POISON GAS IN WARFARE.

An important subject considered by the congress was the recent and far-reaching problem of poisonous gases as modern weapons of warfare, including their remote and permanent effects on the organism, as well as the bearing of war-gas poisoning on disablement and earning capacity. A number of valuable papers were presented for consideration by distinguished authors from England, Belgium, Czechoslovakia, Italy, and France. Anticipating the more detailed summaries of these contributions, which will be found farther on, a prominent place must be given to the statement that for the treatment of so-called "gassed soldiers," special sanitary formations in the army medical services, in the form of mobile units, located near the front, were approved of by the congress. Acute war-gas poisoning is to be treated in these sanitary formations by competent physicians who have made a special study of this condition and are entirely familiar with the handling of these patients. The diagnosis tags of all gassed soldiers are to be marked with a plainly visible sign, to be fixed in its place after the diagnosis of gas-intoxication has been confirmed in a specially equipped hospital.

War-gas poisoning was declared to be very rarely followed by pulmonary tuberculosis, as a direct sequel of the injurious effects of these gases. The condition, on the other hand, in severe cases, is likely to induce permanent, more or less complete, disablement, as a result of irregular and hurried heart action, so-called "irritable heart;" chronic respiratory disturbances, in the form of asthma or emphysema, through pulmonary adhesions; total or partial loss of teeth, with many harmful sequelæ; neurasthenia and other nervous affections of various kinds; impaired vision and other ocular disturbances, rare but grave remote results of war-gas poisoning. The disability percentage of gassed soldiers is further modified by the fatigue effect of chronic respiratory disturbances—such as inflammatory or fibrous changes of the bronchioles, or pulmonary emphysema—upon the heart. There is also reason to assume a diminished resistance of the lung against subsequent acute pulmonary infections in individuals who have been exposed to severe intoxication through poisonous war gases. In gas-poisoning of the usual degree, however, and in soldiers who have not been obliged to pass a long time after the attack in the hospital, there is practically no danger of permanent lesions as the aftermath of war-gas intoxication.

Stirling (Britain).

In his clinical and therapeutic study of war gases, used during the war by the Central Empires the contribution of Maj. A. D. Stirling, R. A. M. C., who also investigated the sequelæ of the action of these gases on the organism and their influence on invalidism, the speaker, on the basis of a report by Meakins and Priestley on 700 cases of gas poisoning, finds that the remote complications of chlorine poisoning are practically limited to the manifestation of the syndrome "irritable heart." Bronchitis was noted in only 5 per cent of the cases. Symptoms on the part of the stomach or the kidneys were extremely rare. It is especially noteworthy that the incidence of tuberculosis in these cases is negligible, although conditions such as have been described as pseudo-tuberculosis after gas poisoning by French observers, with symptoms of profuse expectoration, low fever, and loss of weight, were occasionally noted in protracted cases. The after effects of chlorine gas were fortunately not so serious as had been originally feared. Stirling's statistics prove that the most severe cases may recover and be fit for duty again in four to six months. According to figures of the ministry of pensions, gas poisoning accounts for 2 per cent of all disabilities among pensioners, and the number of pensioners in which gas poisoning is the principal disability is approximately 20,000. The avereage degree of disablement amounts to 18.5 per cent.

The exhaustive report of Henri Frédéricq, Professeur à la Faculté de Médecine de Gand, Médecin de Bon de 1re Classe de réserve, Ancien chef du service des intoxications par gaz à l'Ambulance de l'Océan (section de Vinckem), comprises a study of the physiological action of the gases used in warfare, the acute clinical manifestations of gas poisoning, and the therapeutic measures adopted for their control; the sequelæ of war-gas intoxication and their treatment; finally, a brief discussion of incurable lesions from gas poisoning and the invalidity percentage. The severe acute symptoms are produced in conformity with the dominant properties of the different groups of gases used by the Central Powers, in the form of hypertoxic substances, represented by hydrocyanic acid and carbon monoxide; suffocating gases, such as chlorine, phosgene and others; vesicants or blistering gases, notably dichlorethyl sulphate, better known as mustard gas, or as yperite, because it was employed for the first time by the Germans against the British front at Ypres, in July, 1917; lacrymogenic or tear-producing substances, usually fluids with a high boiling point, which are used exclusively with artillery projectiles; sternutatory gases with the same action as

Frédéricq (Belgium).

vesicant gases, and in addition causing frequent sneezing attacks. The disturbances caused by suffocating gases consist of reflex heart failure, asphyxiation, pulmonary edema, pneumonia, pulmonary gangrene, and digestive disturbances. Vesicant gases act primarily on the eyes, causing acute conjunctivitis (followed by secondary purulent changes), with swelling of the eyelids, chemosis, acute congestion of the anterior ocular structures. Serious lesions of the cornea are rare. These gases also give rise to cutaneous burns of the first, second, or even third degree, as well as severe inflammation of the larynx and trachea, followed by secondary and often fatal broncho-pneumonia.

The treatment of acute pulmonary edema from war-gas poisoning includes venesection, systematic inhalation of oxygen, absolute rest, application of heat to the gassed body, administration of ipecac, heart stimulants, antiseptic agents for the respiratory passages, prophylactic measures against pneumonia. Disinfection of the eyes aims at the prevention of conjunctivitis. Burns of the skin require adequate local applications. In the treatment of broncho-pneumonia heart tonics and antiseptic agents are called for. Chronic bronchitis, pulmonary emphysema with attacks closely resembling asthma, cicatricial adhesions of healed pulmonary abscesses, symptoms of so-called pseudotuberculosis on the part of the lungs and the body as a whole, irritable heart and tachycardia, chronic conjunctivitis, and injurious adhesions constitute the principal sequelæ of war-gas poisoning. For the treatment of these conditions breathing exercises and suitable gymnastics are recommended, with antisepsis of the respiratory apparatus, and judicious addition of oxygen to the air breathed by the patient. In estimating the percentage degree of disablement the primary consideration is the degree of functional impairment experienced by the patient, as well as the condition of his heart. At the same time, it is advisable to take into account the liability of gassed soldiers to contract intercurrent diseases, their onset being favored by the diminished resistance of the heart and lungs after recovery from war-gas poisoning.

Denhaene (Belgium). An unexpectedly cheerful note is struck by the observation that as compared to the damage done by war gases to the respiratory apparatus, the *eyes* have escaped with relatively very mild injuries through these agents.

Doctor Denhaene, Médecin principal de 1re classe, presented a most instructive paper on the ocular lesions caused by these gases and the bearing of their sequelæ on pensioning for disablement. Corneal opacites of a mild type are the only result of war-gas poisoning, and the occurrence of these opacities is by no means common, according to the majority of authors. The severity of the general phenomena which accompanied the ocular lesion must be taken into account in the verification of damage claims; for a very extensive or very thick corneal opacity can only be the result of a very deep corneal ulceration, a complication which is always associated with severe gas poisoning, followed by prolonged stay in the hospital so that it can be controlled by means of hospital records. Although the possibility of incurable lesions of the choroid and retina can not be altogether denied, it must be kept in mind that according to all observers, the action of the vesicating gases upon the anterior segment of the eye is limited to a venous congestion of the deep membranes, a condition met with only in the presence of severe gas poisoning of the entire organism. Simple blepharitis and conjunctivitis, following upon exposure to poisonous gases, is amenable to more or less prolonged appropriate treatment, and therefore can not figure in a percentage disablement claim.

The sequelæ of the action of war gases from the oto-rhino-laryngological viewpoint formed the subject of a brief but instructive paper, presented by Dr. C. Sterckmans, Médecin de Bon de 1re classe, who in the course of three years observed 34 cases, most of which were due to yperite. Such sequelæ are rare and usually accompany other more distressing lesions; they have received practically no attention in the literature. Persistent aural disturbances may occur in the form of acute middle-ear suppuration or chronic catarrh of the Eustachian tube. Contraction, adhesions, and chronic inflammatory conditions have been noted in the nose and the accessory nasal sinuses. By far the most common manifestation on the part of the oto-rhino-laryngological apparatus is chronic laryngitis. All gassed soldiers, irrespective of the composition of the responsible gas, reach the ambulance or the hospital with a hoarse or husky voice, difficult respiration, a constant dry, distressing cough; the larynx being the seat of more or less marked acute inflam-

Sterckmans (Belgium).

mation. The constant irritation of the laryngeal mucosa through the atmospheric dust drawn in by the widely open mouth, due to involvement of the nose; its low vitality; its scanty blood supply; its local delicacy; and especially the innumerable folds of the laryngeal mucosa, favor the persistence of inflammatory changes, and account for the great frequency of chronic laryngitis following the inhalation of war gases.

Zrunek (Czechoslovakia).

In a general way, the same asphyxiating gases were employed by the Allies as by the Central Powers. Dr. C. Zrunek, Commandant-Médecin of the Czechoslovakian Army, in an elaborate address delivered before the congress on gas intoxication during the war, pointed out that the term "gas" is customarily employed, although these products are for the most part liquid at ordinary temperature, their boiling point lying above 100° Cel. Even substances which are solid at ordinary temperature, such as diphenylchlorarsin, are usually grouped under the heading of war gases. As a matter of fact, such products are highly volatile and through the explosion are scattered in the form of very small drops, with the result that their evaporating surface is enormously increased, evaporation is greatly facilitated, and their behavior toward living bodies becomes that of a gas. From the practical viewpoint, moreover, it is sometimes immaterial if their influence is exerted in the form of a gas or as a fine fog. Hence, as the conception of a gas from the technical, fighting viewpoint does not coincide with the physical character of gaseous substances, the name of asphyxiating gases should be improved upon in medical terminology, for example by the term "War intoxicants" (toxiques de combat). Aside from poisoning through actual war intoxicants, there are other intoxications due to the liberation of gases, especially carbon monoxide, in the combustion of explosives.

Although the concentration of carbon monoxide does not become dangerous in the open air, on account of its rapid diffusion, circumstances differ in inclosed spaces, such as trenches or dugouts. With special reference to war intoxicants proper, the action of these gases, with the exception of cyanogen and yperite, is based upon acid corrosion, promptly leading to death through arrest of the function of the epithelium of the respiratory passages, or proving ultimately fatal through pulmonary edema complicated by severe circulatory disturbances. Death may follow later on, after secondary infection has occurred, as the result of pneumonia or pulmonary gangrene. Therapeutic measures in these cases consist of oxygen inhalation and venesection, as the most important procedures for the control of the existing disturbances. The derivatives of cyanogen act through absorption and kill as the result of paralysis of the central nervous system, especially paralysis of the respiratory center. Treatment in these circumstances consists of artificial respiration and inhalation of oxygen. Yperite causes, in addition, a bullar inflammation and necrosis of the epidermis, inflammation and ulceration of the conjunctiva and cornea, diphtheroid inflammation of the respiratory passages, and pulmonary edema. The fact of having been "gassed" undoubtedly diminishes the resistance of the organism against subsequent intoxications. However, permanent disablement due to the action of asphyxiating gases is very uncommon.

Businco (Italy).

So-called asphyxiating gases were discussed by Dr. Armando Businco, Tenente Medico di Complemento, and are summarized in their most important features, as follows: The anatomoclinical effects of gaseous substances used in warfare correspond relatively rather than absolutely to the causative agent, so that substances belonging to one group may exhibit the properties of another. It is possible in animal experimentation to reproduce conditions similar to those observed in human beings as the result of these emanations. A careful histological examination is required in order to ascertain (*a*) that the anatomical picture is due to the action of deleterious powders or vapors; (*b*) that this picture differs from the ordinary circulatory disturbances of the respiratory organs (hyperemia, edema from other causes), from acute inflammatory phenomena (pneumonia, bronchopneumonia), from primary asphyxias (suffocation, etc.), all of which present similar microscopical findings. One of the most important histopathological signs, showing that a poisonous gas has been inhaled, is represented by respiratory histoeosinophilia. It is difficult, if not impossible, to specifiy the causative toxic agent by means of histological examination, but through careful research a reliable opinion can be reached as to one group of poisons being responsible rather than another. From this viewpoint—restricting this statement to personally or recently studied substances—the Italian author distinguishes between the following groups: (*a*) Group of poisons with a hemolytic-edema-producing action (hydrocyanic acid) and a congestive-edema-producing action (chlorin-bromin); (*b*) group of poisons with a congestive-desquamative-exudative action (phosgene, chloropicrin, acrolin); (*c*) group of poisons having a slower, emphysema-producing action (fuming sulfuric acid, etc.). These groups are not to be considered as rigid or permanent divisions. In order to arrive at a positive conclusion as to the specific agent, chemical tests (extraction of the poison) or histochemical examinations are required in all cases.

The respiratory organs experience these injurious influences to the highest degree. The principal effects may be distinguished as (*a*) acute manifestations (syndrome of asphyxia, hemoptysis, emphysema, edema): (*b*) subacute symptoms (sequelæ of the preceding phenomena): (*c*) chronic conditions (establishment of sclerotic lesions, leading to progressive reduction of the respiratory exchanges, with all its harmful results); (*d*) complications (pneumonia, broncho-pneumonia, etc.) for which the "gassing" constitutes the predisposing factor. The predominating phenomena of asphyxia are eminently due to the serious damage and sudden desquamation of the respiratory mucosa in all its tracts, but especially at the level of the bronchial ducts and smallest bronchioles. The edema participates in the production of the asphyctic phenomena, but does not constitute its only or predominant cause. The anatomical findings permit a more realistic interpretation of the gravest syndromes of the acute stage, as well as the phenomena of the resulting chronic obliteration of the respiratory passages. *Anatomically*, these cases may be divided according to the level of the obliteration, into (*a*) obliterative fibrous bronchiolitis, when the chronic process affects the respiratory bronchioles, or the smallest bronchi; (*b*) obliterative fibrous pneumo-alveolitis, when the process takes place essentially at the expense of the respiratory parenchyma; (*c*) obstructive fibrous bronchitis, when chronic productive processes become established in the bronchial passages with a large lumen. *Clinically*, these various localizations give rise to an identical symptom complex.

Other systems of the body, besides the respiratory apparatus, also participate in the clinical picture of war gas poisoning: First in order of frequency and gravity rank the digestive organs, the cardiovascular system, the nervous system, the internally secreting glands. Sometimes the affections of these systems predominate in the symptomatology, manifesting themselves as a disease which overshadows the respiratory disturbances. The behavior of the thyroid gland is especially noteworthy in this connection. At the present state of our knowledge, it may be asserted that although the changes caused by inhalation of poisonous gases can not be regarded as a pathognomonic sign of asphyxia, these changes nevertheless possess an undeniable medico-legal importance in doubtful cases, and should always be looked for. Taken in conjunction with the respiratory histoeosinophilia, they may constitute positive evidence as to the cause of death.

The Italian contribution, in conclusion, emphasizes the fact that the study of "gassing" has thrown a valuable light on occupational pathology, because aside from explaining the origin of the acute and chronic disturbances of the respiratory organs, which previously were not entirely understood, a more accurate and sympathetic estimate can now be made, from the medico-legal viewpoint, of the actual anatomical condition in which the gas poisoning has left the individual. From the practical, industrial viewpoint, it is desirable to save from neglect and oblivion some prophylactic measures and defensive appliances, which have been found useful in the exigencies of war and are worthy of being utilized in time of peace, for the protection of the workers in certain industries more or less dangerous to health.

The effects of asphyxiating and lacrymogenic gases as studied during the war, protective measures against their action, and therapeutic procedures were the subject of a contribution by Prof. Allessandro Lustig, Senatore del Regno. The speaker stated that asphyxiating gases appeared on the Italian front, in action, for the first time in 1916. After discussing the nature of poisonous gases and giving a classification of gases used in warfare, he briefly considered the differential diagnosis of gas intoxication, with special reference to the signs of direct irritation, suffocation, general intoxication and cutaneous Lustig (Italy).

irritation. In view of the fact that several war gases are somtimes used, in one engagement, and that different gases are capable of causing identical symptoms, the diagnosis must often remain one of probability.

After defining the characteristic features of asphyxiating gases in general, the speaker contributed a classification of war gases in particular, enumerating the chemical substances, as follows: Chlorine gas; carbon monoxide; "collongite," or phosgene; "palite," a preparation of carbonyl chloride or phosgene; "superpalite," or diphosgene; hydrocyanic acid; "manguinite," or cyanogen chlorine, and cyanogen bromide; methyl chlorosulphanate; dimethyl sulphate; phenyl carbilamin bichloride; "martonite," or bromated ketones; "acquinite," or chloropicrin; arsine, and irritating nitrous vapors. Phosgene was one of the first gases used by the enemy, with disastrous effects, in the form of a mixture of phosgene, superpalite, and diphenylchlorarsine. War gases with a predominantly lacrymogenic or vesicant action were represented by the halogen products of toluene and xylene; dichlormethylic ether; so-called "rationite," or sulphuric chlorhydrine; and especially by mustard gas, or yperite, chemically, dichlorethyl sulphide. The general mortality through the effects of yperite amounted to about 10 per cent, death being usually due to aggravated lesions of the respiratory apparatus or to secondary complications. About 30 per cent of the gassed soldiers were able to return to duty after 8 to 20 days. The Italian contribution includes a brief review of the defensive measures against this dangerous gas, as compiled by the speaker and published by the technical office of the supreme command.

WATER PURIFICATION IN THE FIELD.

The full importance of an adequate and pure water supply, or, rather, the provision of means for supplying the same to the army in the field, had not been foreseen, so that this problem is still a matter of controversy. Although the method of chlorination which was employed by the allied armies in the World War proved efficient and satisfactory, the Congrès de Médecine et de Pharmacie Militaires encouraged further investigations along the line of other than chemical products, and especially of physical methods of sterilization, more particularly those based on the use of ultra-violet rays or of ozone, for the purification of army water supplies. The employment of chlorine (a solution of chlorinated potash and chlorinated lime) as a purifying agent was found on very extended use to possess important advantages. It still remains to determine more accurately the amount of chlorine required for water purification, and a number of promising devices have been suggested, some of which have been given a trial with good results, so that at the present state of knowledge the employment of chlorine still ranks first for the purification of drinking water on a large scale. Special methods are needed for the clarification of a turbid water supply before the water is subjected to purification by chlorine.

Dendalle (Belgium).

A useful contribution by M. Dendalle, Pharmacien de reserve, Directeur du Laboratoire du Service des Eaux (campagne 1914–1918), describes the purification of the water supply of the Belgian Army in the field, the different methods used and their results, with special reference to the action of chlorine on the water. At the outbreak of the war no great difficulties were encountered in the provision of drinking water, as the troops passed only through well-organized centers. During the concentration of the troops in the Antwerp zone this question was first taken up by the sanitary service, and antityphoid vaccinations were instituted to a limited extent. Cases of typhoid fever having made their appearance early in 1915, prophylactic measures were at once taken, primarily by forbidding the ingestion of unboiled water. The water for distribution was brought from Dunkerque, by portable cisterns, and several sterilizing systems were employed, in the form of boilers, as well as different methods of filtration. But these local measures were not generally adopted. At the beginning of 1917, when the authorities came to realize the difficulties and the danger of the utilized systems, a committe was appointed which decided the creation of a special service, based on the results obtained in the allied armies.

This was the origin of the technical direction of the water service, which consisted of a commander specially experienced in water distribution, a technical officer and a pharmaco-chemist, with consulting members such as a physician-hygienist, a geologist, and a doctor of law. The speaker proceeded to give an account of the manner by which the extremely important hygienic problem of the water supply was successfully solved under very difficult practical conditions. Upon the basis of actual experience in the field, he pointed out that unless new facts should be advanced, the procedures based on water sterilization by means of chlorine in different forms are entitled to rank first in order of importance, on account of the simplicity of application, efficiency, and inexpensiveness. Sterilization by means of chlorine must be not only a war-time expedient, but its employment should be considered for water distribution on a minor scale in communities which can not afford a water supply brought from a great distance and where the water supply near by does not meet the conditions of safety required for such plants.

Erculisse (Belgium). In discussing the same subject, Dr. Paul Erculisse arrived at the conclusion that chemical water purification is to be considered as at best only a makeshift, to be applied only after a careful study of the methods aiming at its accomplishment. In spite of the results obtained in the allied armies, this subject should be taken up systematically in peace time, bringing into consideration the needs of the army in the field. In the first place, the army in the field must be accompanied by chemists supplied with the necessary material for the performance of the work they are expected to do, and familiar with the methods to be employed as well as the object aimed at. Detailed instructions must be provided, in order to guard against research along a line more or less inadequate to the desired purpose. The method which seems the best, and toward which future investigations and efforts might perhaps be most profitably extended, seems to be the sterilization of water by ultra-violet rays, preceded by a rapid partial purification, and followed by oxydation and forcible aeration of the water through the atmospheric air. Without at this time entering into details of particular projects, the speaker pointed out that the creation of special easily transportable automobile cars would permit the establishment, close to a spring of more or less potable water, of actual purification works, functioning with a large output. These cars should be accompanied by a series of cistern wagons, permitting the transportation of the water thus obtained into the cantonments of the army division for which they operate. Besides these cars, movable laboratories on wheels should be maintained, where the different investigations concerning the purification of the water may be carried out. These laboratories would not necessarily have to be restricted to this service, but would be under the direction of a military pharmacist charged at the same time with the execution of all chemical investigations of urgent importance for the requirements of the army.

Zrunek (Czechoslovakia).

Dr. C. Zrunek, Commandant Médecin de l'Armée Tchécho-Slovaque, pointed out that according to experience acquired in the Austro-Hungarian Army the mechanical and chemical methods of purification of drinking water are of no value for this water supply in the field. The physical methods, on the contrary, have been tried and tested with good results, especially the method by boiling, carried out either in special apparatus or by simply boiling the water in ordinary receptacles. Prior to the World War, the mechanical filtration of suspected water was considered as one of the most important methods for improving the water. The Austro-Hungarian sanitary service recommended numerous types of filters, either improvised (by means of sand) or prepared in advance. In the course of the war, however, these methods were rejected by the military hygienists for a variety of reasons. The methods of mechanical sterilization do not lend themselves to the preparation in the field of water free from pathogenic microorganisms. Chemical measures were highly recommended by the German medical press, but have never been employed on a large scale by the Austro-Hungarian Army, the principal cause for this being the scarcity in chemical products. For example, the rapid method of water sterilization by means of iodine could not be adopted for this reason. In the speaker's opinion, chemical measures are not to be recommended, on account of their not being sufficiently reliable, especially in the hands of careless or indifferent soldiers. The simplest chemical means of water sterilization consists of calcium chloride, 33 centigrams of which are dissolved in a hectoliter; the water does not become sterile until six hours later. This delayed action may be reduced to 10 minutes by increasing the quantity of chlorine, but in this case it is necessary to neutralize the excess of chlorine contained in the water, for example, by means of oxygenated water. Two *physical* methods were employed in the field, namely, purification by boiling and purification by ultra-violet rays. Before being exposed to the action of these rays, the water must be filtered in order to free it from suspended particles. It is difficult to estimate the effective influence of these hygienic measures on morbidity; during 1914 and 1915, the morbidity due to typhoid fever and cholera was very great; later on it diminished, but it can not be stated to what degree this reduction was caused by the control of the water supply or other hygienic measures.

Water purification in the British Army. The purification of water as conducted in the British Army on Field Service showed the intrinsic value of the adopted measures in the excellent health of the British troops in the World War and their relative freedom from water-borne disease. When the British Army took the field in 1914, the organization of the water scheme was based on the established principle that the Royal Engineers provide the necessary water, calculated on a definite allowance, while the medical department is responsible for its quality, advising as to the processes required for its treatment and ascertaining that the results are satisfactory. The only actual apparatus for the treatment of water with which troops took the field in 1914 was the water cart in one or another of its forms, and by this means chiefly was the water supply of the original small army purified. A battalion now has two carts, each of 110 gallons, which enable the personnel of the battalion to refill the water bottles on the march. The individual British soldier owns his water bottle, holding two pints, for personal supply. In the earlier years of this century the carts were constructed to clarify water by pumping it through cylinders packed with compressed sponges, and then to purify it further by passage through earthenware filter candles arranged in batteries.

In time it was realized that the sponges were not effective for very turbid waters and in addition clogged easily. A new type of clarifying cylinder was then adopted, in the form of a metal cage wrapped around with several layers of flannelette, the water first passing through a perforated terminal box in which sulphate of alumina was taken up, and then depositing suspended matter on the cloth through which it passed, and on which an aluminum hydroxide layer assisted effective filtration. This type of clarifying reel was fairly satisfactory, but was later improved by increasing the surface area and substituting a close canvas cloth for the flannelette. Road trials showed that the old dome-shaped tanks were less suitable, from the point of view of balance, than cylindrical tanks set transversely, and the latter were therefore adopted as standard. Meanwhile field tests threw doubt on the suitability of filter candles for active service, in view of their friability and the need for regular sterilization and inspection.

As a result, sterilization of water by chemicals was decided on, and chlorine, in the form of bleaching powder, was adopted as being the most suitable, by reason of the fact that it is cheap, easily handled, and capable of exact operation. Experimental work showed one part per million free chlorine, acting for half an hour, to be adequate for most clarified waters. New pattern water carts adapted to this purpose were therefore constructed, comprising simply two large clarifying reels for preliminary clarification with alum, and the large 110-gallon tank (divided into four compartments to give stability on the road) for chlorination. Bleaching powder, with at least 30 per cent available chlorine, was taken as the means of supplying chlorine, and was added in such quantity that a trace of free chlorine, indicated by testing with an emulsion of starch and potassium iodide, remained half an hour after mixing. The value of these new pattern carts, employing chlorination by bleach, was to be tested in the maneuvers of 1914, but the war intervened and the majority of units of the old army took the field with earlier pattern carts.

The aim of all water purification for drinking purposes being to produce a clear, tasteless water, free from harmful bacteria, the problem mainly resolves into the removal of suspended matter and the destruction of microorganisms likely to cause disease. As regards the former, the number and variety of existing water sources in northern France and Flanders made it unnecessary in many instances to carry out filtration through the clarifying reels, and water could often be pumped directly into the tank for treatment. In eastern countries, however, clarification by filtration through the reels was usually essential, and if effectively carried out produced up to 98 per cent reduction of total organisms. As regards microorganisms a geological study of the water supplies and sources of the western theater of war indicated the almost universal possibility of contamination of the wells which form the chief sources of rural supplies, and vindicated the decision of the British authorities to regard *all* waters as possibly (if not probably) contaminated. In eastern theaters this axiom held good even more justifiably. To deal with such waters effectively sterilization by bleach was the method decided on at the outbreak of the war. Such treatment in any case is a safeguard in the event of breakdown of the clarifying apparatus.

When the British troops took the field, medical officers were instructed that turbid waters should be clarified by the use of alum, 3 grams to the gallon, and then sterilized by the addition of 23 grams of bleach to every 100 gallons (i. e., approximately 1 part per million). Defective clarification in some instances indicated the need for admixing alkali with the alum to insure proper flocculation of fine matter in acid waters, and as a result the substitution of ordinary alum by a clarifying powder of alum, 3 parts, and sodium carbonate, 1 part. Eight grams of this mixture were employed in the clarifying cylinders for each filling of the cart. The empirical use of 1 part per million chlorine, which involved occasional overdosing, led to the elaboration of tests to determine how much chlorine actually is required for any particular water, and finally a standard test case was devised to meet requirements, as a result of considerable experimental work at the Royal Army Medical College, under the direction of Sir William Horrocks. With the general issue and taking this test case into use, the sterilization of regimental water supplies became an exact operation and gave little or no further trouble during the war.

However, the necessity for the arrangement of larger schemes of water supply became evident with the growth of the British armies in France, after the first year of the war, and the enormously increased concentration of men in already occupied areas. As a result, general headquarters took up the matter, appointed a special committee to report on immediate requirements, and to deal with water questions throughout the force. Almost simultaneously, certain of the eastern theaters of war found the same questions confronting them and calling for similar solution by the provision of large schemes. The scheme adopted for the western theater envisaged the provision of numerous "water points" (groups of large storage tanks elevated at the side of road loops), from which regimental water carts could be rapidly filled with purified water, the water points themselves being brought as far forward as possible, and in many cases eventually being connected up by pipe lines to the front-line trenches, or to canvas store tanks close behind. These forward water points would serve also to supply troops advancing to occupy new country, pipe lines being run forward after the advancing troops as rapidly as possible. The water points were to be replenished by pumping from deep wells of good quality—in some cases a considerable distance away—or by the use of sterilization plants. The majority of troops on service can be catered to with a regimental system of sterilization in water carts by bleaching powder and larger schemes in the rear areas employing chlorine gas as a substitute for chloride of lime. All the larger sterilization apparatus employed chlorine gas, administered by the Wallace-Tiernan gauge. Noteworthy and interesting features are represented by the formation of water tank companies, sterilization plants on motor lorries or on barges, and stationary land plants, the institution of a standardized motor lorry sterilization plant for water tank companies.

With special reference to the organization of water supplies in a force on service, the regimental water arrangements in the British Army are based on the two water carts per battalion, the selection and treatment of water controlled by the regimental medical officer and his staff of trained "on water duty" men, using bleaching powder and the official test case, and on the individual soldier's water bottle, sterilization in which can be effected by tablets of acid sodium sulphate. Divisional schemes of water supply, the boxing of tube wells, etc., are carried out by the commander of Royal Engineers controlling his three field companies, and assisted by the divisional pioneer battalion. Sanitary control of such schemes is in the hands of the assistant director of medical services of the division and his staff, at whose command are the trained personnel of the divisional sanitary section. Behind the divisions, the larger schemes were controlled from General Headquarters by a special staff, with representatives in each army corps, and the standing water committee including representatives of the Department of Engineers, medical services, general staff, and transport. In these schemes were employed corps troops companies of the Royal Engineers for the necessary works, and the skilled chemist who formed the personnel of the water companies, together with sanitary officers of the Royal army medical corps, for the necessary hygienic control. Valuable work was carried out by the mobile field laboratories, both hygienic and bacteriological, in connection with the examination of new and established water schemes.

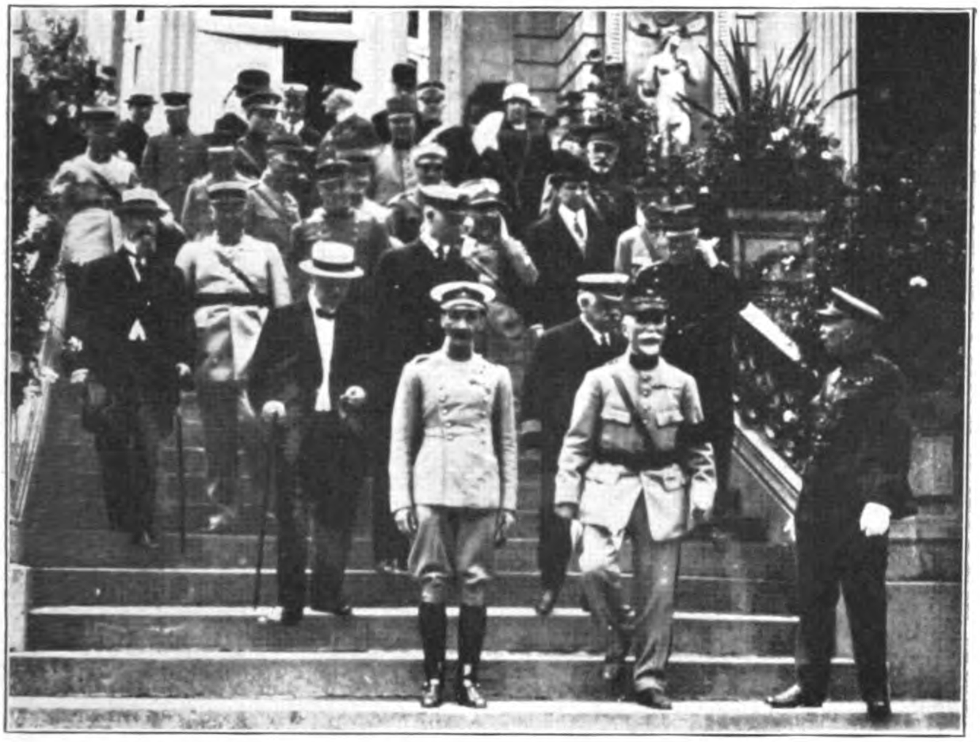
Sacquépée (France). The importance of a supply of potable water for the troops was emphasized by Doctor Sacquépée, Médecin Principal de 1re classe, Professeur au Val-de-Grâce, as one of the greatest problems in military hygiene. Experience in the course of the war with various water-purification methods led to the extensive utilization of hypochlorite, the employment of which was based on its own merits no less than on the failure of other procedures, so that so-called "javellization" became the customary method of water purification in the French Army. Stationary purification centers were established, some utilizing "continuous javellization" while others were based on "automatic javellization." In the former a proportionately calculated quantity of Javel's extract is allowed to flow into a given volume of water, by means of very elementary apparatus. This procedure possesses the advantage of great simplicity, after the installation has once been put in running order, but, on the other hand, requires a steady oversight. In automatic javellization, distribution of the hypochlorite is made by circulating water itself in such a way that the quantity of hypochlorite used is exactly proportionate to the volume of water to be purified. Numerous apparatus have been constructed on this principle, some of which have been extensively and successfully utilized, being applicable under all conditions with slight modifications. Such automatic systems have the evident advantage of being relatively simple and not cumbersome, while reducing the necessary control to a minimum. Turbid waters must always first be clarified (by means of sponge clarifiers, Buron filters, or small sand filters), no matter what method of water purification be employed. For future use sterilizing apparatus through ozone and ultra-violet rays enter especially into consideration, these procedures having the additional great advantage of providing a practically unlimited output. The utilization of a given procedure is naturally governed in part by local conditions, as well as by the intrinsic value of the apparatus. The speaker in concluding suggested the advantages of centralizing and industrializing the sterilization of water, a plan which would not only prove of decided economic advantage but also provide a greater security with a greatly facilitated supervision.

According to M. A. Rolland, Pharmacien de l'Armée, Géologue à l'Institut Scientifique du Maroc, in the chemical control and purification of water in the field, the utilization of chlorine best meets the requirements of a sufficiently mobile system which guarantees the healthfulness of the water supply while preserving its palatable properties. However, the employment of hypochlorites, as in so-called "javellization," is open to criticism on account of the instability of these substances, and the speaker expressed himself in favor of the general employment of liquid chlorine, as in use in America under the name of "chlorination." Rolland (France).

A procedure of individual water purification by means of colloid ferric hydrate was offered for consideration by Saturnino Cambronero, Pharmacien en Chef de l'Hôpital Militaire de Madrid. No claim of originality was made, as this forgotten method was already utilized in 1872. It consists in the precipitation of microscopical particles suspended in drinking water by adding an irreversible synthetic colloid, thereby causing coagulation. This colloid is the hydrosol of ferric hydrate. The procedure may be utilized for purifying the water for a group of four to six soldiers, or for a single individual. It is not offered as a method of sterilization, because no absolute hygienic value can be attached to sterilizing methods based on the mechanical elimination of bacteria, but it possesses sufficient relative hygienic value to enter into consideration as one of the measures for water purification in the field. Cambronero (Spain).

The value of ferric alum for purposes of water purification was discussed by Dr. Alberto de Vasconcellos Cruz, and the conclusion was arrived at by the speaker that coagulation by means of alum should be the method Vasconcellos Cruz (Brazil).

of election whenever a volume of turbid water is to be purified. The procedure is well understood, and its adoption, when properly employed, involves no disadvantages of any kind. For field service, water wagons should be furnished containing reservoirs for decantation, filters, and receptacles for the filtered water. In addition, these water wagons should contain the necessary accessories for raising the water from the place where it is obtained, so that it may be thoroughly mixed with the alum. The necessary apparatus must also be provided to insure the passage of the water through the decanters and filters. A laboratory where all chemical and bacteriological investigations can be carried out should be established in a neighboring town, as selected by the technical officers; one laboratory assistant will thus suffice for the local control of the water purification. When the water supply is turbid and presumably contaminated by injurious germs, clarification and sterilization are indicated. When the water supply is turbid but free from contamination by possibly harmful germs, clarification by itself alone is sufficient. When the water supply is clear and does not contain an excessive amount of organic matter but is suspected of contamination with dangerous germs, the employment of alum is dispensable, and sterilization of this water will suffice. After the water has been mixed with the alum solution, it should be decanted and filtered. Absolute security demands the demonstration of nonalkalinity of the filtered water and its freedom from objectionable germs. The establishment of the minimum quantity of alum required is a purely economic question, while the establishment of the maximum quantity which the water will bear involves a hygienic problem.



SPA. AFTER THE DELEGATES WERE RECEIVED BY THE MAYOR OF THE CITY AND THE SENATOR OF THE DISTRICT, BOTH OF WHOM APPEAR IN THE FOREGROUND IN CIVILIAN CLOTHES.

SPA. AFTER AN INSPECTION OF THE HYDRO.

1056–1

SPA. THE HEADQUARTERS OF THE KAISER AND THE EMPEROR OF AUSTRIA DURING A LARGE PART OF THE WAR.

SPA. REPRESENTATIVES OF VARIOUS NATIONS.

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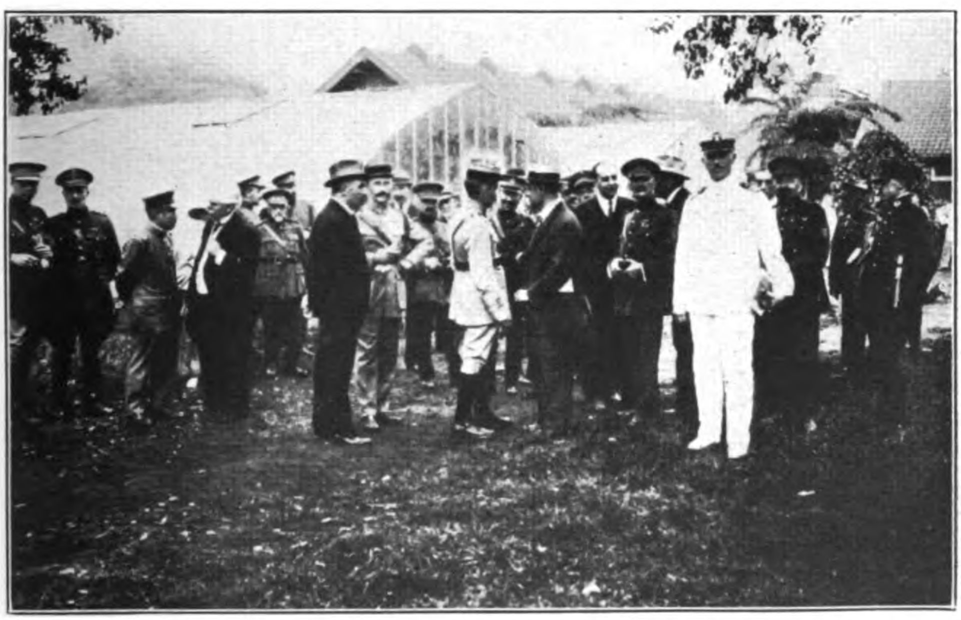
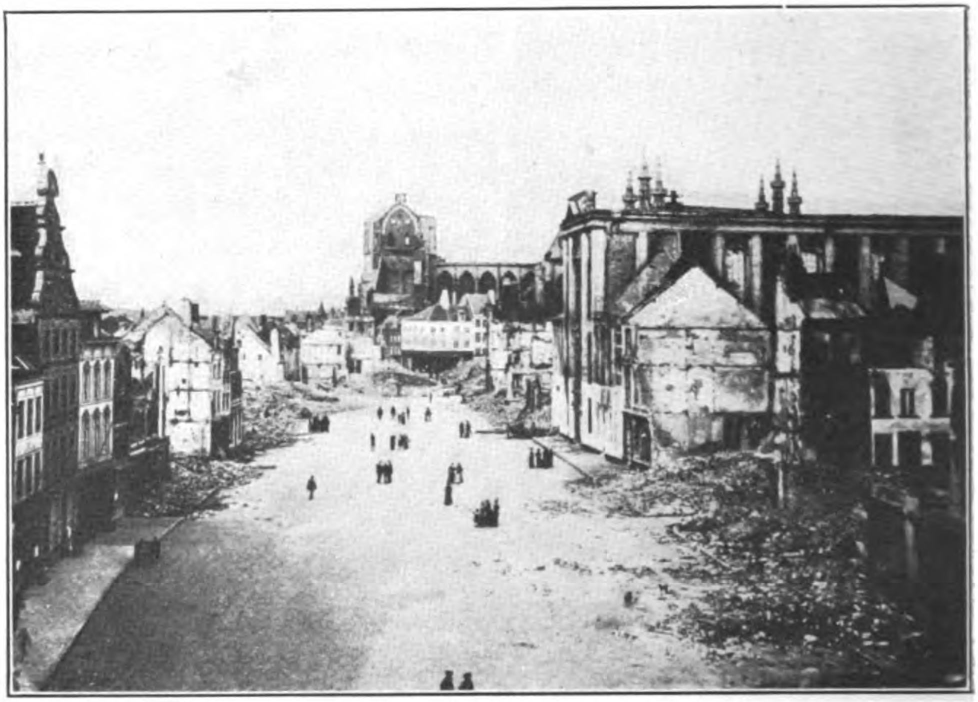
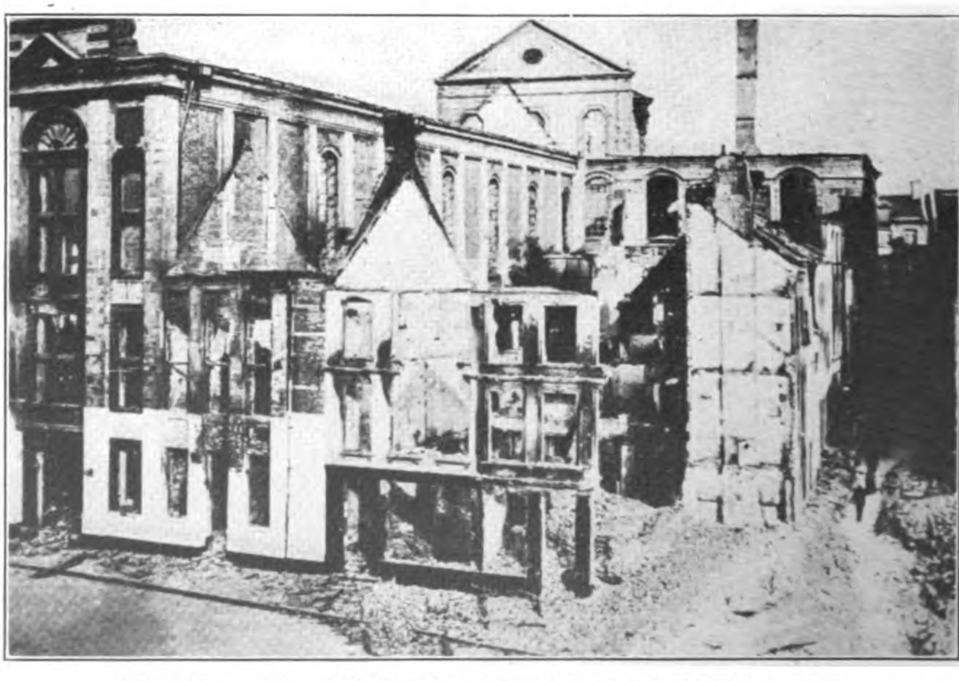


WOLUWÉ. MEMBERS OF THE CONGRESS INSPECTING THE HOSPITAL FOR WAR CRIPPLES.



LOUVAIN. SOME OF THE EFFECTS OF WAR.



LOUVAIN. THE DESTRUCTION OF THE UNIVERSITY LIBRARY.

1056–4

SUPPLEMENTARY NOTES.

The valuable papers and addresses delivered by the delegates have been concisely reviewed in this report. In regard to the general organization of the army medical service and the relation of the military services to the Red Cross, the suggestion was approved by the congress that in times of peace the medical profession of each nation should aim at a state of preparedness, in case of a declaration of war on the part of another nation. During warfare, medical consultants of tried and tested standing in their particular sphere of usefulness are in future to be equally responsible to the supreme command with representatives of the medical service.

It was decided by the congress that in peace or war, measures concerning the adaptation of medical knowledge to military organizations should always be subjected, before acceptance, to consultation and close cooperation between the military authorities and the army medical service. Sanitary organization can never be successful without due deferences to military considerations, and on the basis of this argument, the representatives of the army medical corps must be members of the staffs with the same rank as officers of the fighting forces, so as to give them a vote in the settling of medical matters. An unconditional requirement consists in the investing of representatives of the army medical corps in every large military unit, working under the military authorities and in collaboration with other services, with the power to prepare and enact measures pertaining to the functioning of the army medical corps in all its capacities. These responsible representatives of the army medical command are to be assisted in times of war by properly qualified technical medical consultants, picked from the ranks of physicians, surgeons, hygienists, and chemists. In order to insure a sufficient force of competent workers in the various lines of professional service, the medical graduates and practitioners of the nation, irrespective of specialties and restricted activities, should be challenged to compete for some particular service, their eligibility for appointments to be graded according to their fitness. All advances along industrial and hygienic lines are to be utilized for the benefit of the army medical corps in a number of ways, notably in the transportation, evacuation, and treatment of the wounded.

The first great step toward the internationalization of surgery, medicine, pharmacy, and sanitation was taken in the work of this congress in its endeavor to secure the urgently needed uniformity of treatment of the wounded and disabled. No matter through how many hands the patient passes, his treatment should remain fundamentally the same on the basis of the new principles urged by the congress.

Industrial and hygienic improvements will also be utilized for the establishment of the sanitary formations and the technical units attached to them. The declaration of war should find an adequate material equipment as regards quantity no less than quality. The special competence of army pharmacists is to be taken into consideration in the organizations required for the investigations of chemical problems of military importance. This congress may be described as one of the epoch-making events in the advance of military medicine and internationalization of medical interests.

Aside from the well-filled programs of the several sessions of the congress, as well as many sectional and individual conferences, a series of instructive, official visits had been carefully arranged for the delegates. These tours of inspection included the military hospitals of Brussels and Woluwe and the reeducational center for war cripples in the latter city. Other visits were paid to the model military hospital of Antwerp and to the central pharmacy of the army, which has an equipment for making all drugs and medical-pharmaceutical supplies used by the army. It is noteworthy that in Belgium and some of the other European countries there is a special department of pharmacy in the army.

The delegates were received at the City Hall of Antwerp by Burgomaster Max and given a reception. An instructive trip was made to the famous thermal station at Spa, and other visits concerned the Borgoumont Sanatorium and the so-called "abri de l'Empereur" (Imperial Shelter). The entire congress participated in the trip to Spa, where the delegates were received by the city and county authorities. Special trains had been placed at the disposal of the delegates by the Belgian Government.

July 21 was the national fete day in celebration of Belgian independence. In the afternoon the delegates were escorted to attend the Te Deum service at the cathedral, where front seats had been reserved for them. On the next day, a visit was paid to Seraing, where the American delegate, assisted by the secretary of the congress, performed several operations in the Industrial Hospital. He also operated in the army hospital in Liege. Seraing is a Belgian industrial town, situated on the right bank of the River Meuse, 3 miles southwest of Liege. The old palace of the prince-bishops of Liege, who formerly resided in Seraing, now forms the façade of the Cockerill engineering and machinery works. These works produce a large output in the form of steam machinery, locomotives, and engines of various kinds. They occupy some 270 acres and employ about 14,000 persons, a considerable proportion of the entire population of Seraing, which in 1919, when the last census was taken, was 37,274. Valuable coal mines and the most important glass factory in Europe are situated in the vicinity. The Cockerill Co. maintains its own hospital, school, and orphan asylum, for the benefit of its employees.

The Incorporated Federation of the Mutualistic Societies of the Seraing Basin has instituted a modern surgical service and clinic in the Seraing Industrial Hospital. This enterprise is the first of its kind to be realized in Belgium, and illustrates the purpose of the people to take a step in advance in the domain of mutual service and altruism. This experimental departure in social medicine, which is being tried out fully for the first time in Belgium, is being watched with great interest by many other European countries. Owing to the large number of contributors, the members find themselves entitled, for a minimum outlay, to the very best of care and treatment in case of illness or disablement. Before the war the monthly contribution of heads of households, married men or fathers, was fixed at 2 francs per month, single persons, young unmarried men under 20 years of age, paying only 1 franc per month. The creation of the Medical Dispensary and Clinical Institute was accomplished on the basis of mutualistic cooperation and coordinated centralization. The growth of this interesting enterprise is illustrated by the progressive increase in membership from 14,000 members in 1914–1918 to 42,000 active members in 1922. The aim and object of these federated services of the Seraing Mutualistic Societies is to pay all general expenses, extraordinary disbursements, and cost of propaganda. There are special services which allot indemnities for disablement, pay for treatment in a sanatorium, or give a fixed indemnity to all members past the age of 60 years. A medico-surgical service provides medical and surgical care, the consultation of specialists, and a supply of remedies.

The importance of *internationalization* of medical and surgical military knowledge was emphasized at the congress by the delegate from the United States of America, who referred in this connection to a proposal offered by the Spanish delegate, concerning the establishment of an international museum and the compilation of statistical data for international use. The greatest benefits would undoubtedly accrue from the consummation of this plan of internationalization of medical and surgical military science. The advantages to be anticipated from the application of war-taught knowledge to the problems of industrial medicine, surgery, and sanitation can not be overemphasized.

A number had suggested the advisability of repeated conferences of this type from time to time, and the American delegate moved that a committee be appointed by the chair from the attending delegates, for the consideration of this question, and be instructed to report the results of their deliberation to the congress. In presenting this resolution, he gave the following as—

"A VISION."

(1) An active society as proposed by the commandant, Doctor Voncken:

(2) The collection and standardization of many practical lessons learned during the war in medicine, surgery, and sanitation;

(3) Active military surgeons, retired medical officers, reserve officers, and those serving with or for troops link together in a broader brotherhood as humantarian scientists;

(4) A meeting every two years, or as material is forthcoming, and conference is possible;

(5) A volume of transactions, a ready reference book;

(6) A general monthly or a supplement to a monthly, such as the "Archives Medicales Belges."

This is a possibility; can it be made a reality?

He stated that medical military officers are not separated in the same way as are members of other branches of the service, and suggested that an international association of military surgeons would bring closer cooperation, better mutual understanding and possibly be another influence tending to prevent war. Of course anything of this nature decided by the congress would be subject to the approval of the respective Governments.

The resolution was passed. Considerable discussion arose over the name "International," as the French and Belgians objected to including the Germans for some time to come, whereas the Swiss delegate recommended that they be invited to the next meeting. The American delegate suggested that the conditions laid down by the King of the Belgians for the present meeting should stand also for the immediate future.

A committee was appointed by the chair to consider the feasibility of this "vision," and its report was one of hearty approval. The congress then appointed a permanent committee, consisting of eight nations, as follows:

President: Doctor Wibin (Belgium).

Members: Doctors Uzac (France), Van Baumberghen (Spain), Bainbridge (United States of America), Sterling (British), Caccia (Italy), da Fonseca (Brazil), and Thomann (Switzerland).

Secretary: Doctor Voncken (Belgium).

The permanent committee held a meeting and made plans in regard to future congresses and methods of procedure. These plans were passed unanimously by the congressional delegates, and were then sent through official channels to all the allied, associated, and neutral powers with a request for criticism, comment, and advice.

The nomination of this permanent international committee was an accomplishment of the congress which offered the most hopeful prospects for the future. In all countries the young men who represent the pick of the nation are entrusted to the military medical service which is called upon to play a far-reaching part in the health and happiness of the men and their progeny. From the eugenic viewpoint the future of the world is concerned in the successful handling of this world problem. Justice, however, can not be done to it as long as the best planned efforts are scattered and decentralized. The vital strength of military medicine must be centralized with this object in view for military medicine alone when once officially organized in all countries will be in a position to propose measures which can be reliably applied and efficiently controlled. A periodical reunion of a congress of military medicine and pharmacy would permit the realization of this object and would confer upon all humanity the benefit of the progress achieved by one of the attending nations. Such a reunion may be expected efficiently to maintain the bonds established by the first congress between military surgeons and pharmacists.

GENERAL CONCLUSIONS.

The following are the official conclusions of the congress, unanimously formulated and accepted by the delegates. It can therefore be stated that they represent the opinions to date on the subjects discussed of all the allied, associated, and neutral powers which took part in the first "Congrès International de Médecine et de Pharmacie Militaires."

GENERAL ORGANIZATION OF THE ARMY MEDICAL SERVICE—RELATION OF THE MILITARY MEDICAL SERVICES TO THE RED CROSS.

1. The congress held that all measures concerning the adaptation of medical science to the military unit, in peace as well as in war, are to be formulated in close collaboration with the army military authorities and the army medical service.
2. In order that in all military measures, when circumstances permit, certain medical considerations, without which all sanitary organizations are deficient, be taken into account it is imperative that the representatives of the medical service be made a part of the "Etats-Major," with the same rank as the army officers, there to deal with the problems of their particular service.
3. It is indispensable that in each large unit under the authority of the army military authorities the representatives of the medical service, in agreement with the same and in connection with the other services, be authorized to carry out orders related to the functioning of the medical service in all its forms, so as to insure the transmission and superintend the execution of these orders.
4. In war time it is necessary that medical technical consultants, chosen among physicians, surgeons, hygienists, and chemists especially qualified by their scientific standing, be added to the repre-

sentatives of the medical service responsible to the supreme command.

5. The entire medical personnel of the nation, whether belonging to the active army or counting as complementary personnel, must participate in the organization of the medical service, contribute to its general progress, and prepare for the special part to be allotted to each according to his ability.

6. The material utilized by the medical service for the transportation, examination, and treatment of the wounded and for the organization of the sanitary formations and technical organs belonging thereto must be planned in accordance with all corresponding industrial and scientific advances and be available in sufficient number at the onset of hostilities.

7. In organizations for the study of the chemical problems which arise in all armies advantage must be taken of the special competence which has been gained by military pharmacists.

TREATMENT OF FRACTURES OF THE LIMBS.

Among the principles for fracture treatment learned by experience in the war, the congress emphasized—

1. The imperative necessity for constant and frequent radiographic control in the course of treatment, and in certain cases, at the bedside.

2. The necessity for modifying the removal of bone splinters (esquillectomy), in compound fractures, to meet the needs of drainage and surgical disinfection.

3. The primary importance of directing treatment from the first day with regard to the functional future of the limb, and of resorting in this behalf to physiotherapeutic measures, and especially to the earliest possible mobilization of the limb.

4. The increasing rarity of indications for the classical treatment of fractures by immobilization of the limbs in plaster apparatus. The obsolete pre-war appliances should now be abandoned in favor of those which have proven efficient in the armies, notably walking apparatus and simple devices for continuous extension, combined with or without suspension of the fractured extremity.

5. The necessity of reducing transportation apparatus in war time to a few simple, strong, elementary models constructed on the principle of permitting continuous extension, with interchangeable parts, and easy of application.

6. The advantageous organization in peace time, in the great industrial and urban centers, of specialized services in analogy with those of warfare, equipped with a competent staff and all the requisite equipment.

ANTITUBERCULOSIS CAMPAIGN IN THE ARMY.

1. The fight against tuberculosis in the army, in order to be efficient, must first of all be based upon the strict enforcement of general and personal hygienic measures, universally admitted as useful, and more particularly concerning the quarters, food supply, physical education, prevention of predisposing affections, antialcoholic crusade, and related items.

2. The antituberculosis education of the people and of the soldiers must be improved by means of pamphlets, health talks, conferences, and similar measures.

3. In view of the peculiar mode of evolution of tuberculosis, it is advisable to provide each man with an individual health card and medical booklet containing his antecedents and his state of health during the period of active service. It is desirable for these documentary data to include the period of military service in the reserve.

4. Routine repeated examinations of all the men are indispensable. especially during the first time of their incorporation in the army.

5. There is reason to refuse admission to the army to all men infected with tuberculosis.

6. The corresponding selection should be carried out in two stages: First, in the course of enlistment of recruits, and, second, directly after the men's incorporation in the army.

7. From the prophylactic viewpoint, temporary or permanent removal is required in the presence of tuberculosis of any kind.

8. It is desirable to carry out further investigations in order to determine the practical value of various numerical indexes and biometric measurements which have been purposed for the estimation of the degree of body vigor, especially in its relation to tuberculosis.

9. The establishment of specialized services for following up suspected cases is recommended.

10. Practical instructions concerning the diagnosis of tuberculosis must be made available for army surgeons.

11. In behalf of national prophylaxis, the congress recommends that the antituberculosis civil administration and the military authorties should be permanently associated. The army is to notify these administrations, without delay, of the discharge of soldiers because of tuberculosis.

ANTIVENEREAL CAMPAIGN IN THE ARMY.

The "Congres International de Medecin et de Pharmacie Militaires," having taken cognizance of the extent and gravity of the venereal peril in armies, believes that military as well as individual and social interests imperatively require the most energetic antivenereal measures, and advises as follows:

1. Venereal diseases, being infectious, should be fought primarily among the civilian population, in order to reach all foci of infection and guard against contamination of the army.

2. In all armies and navies the antivenereal campaign, in all its forms, should be organized or improved, as required, on the basis of the following principles: (*a*) Educational measures, as extensive and instructive as possible; (*b*) measures aiming at the preservation of health among the men; recreations, soldiers' and sailors' clubs, sports, etc. Control of sources of contagion. Conservative prophylaxis, by placing at the soldier's or sailor's disposal the use of prophylactic stations, individual toilet requisites, and other hygienic contrivances; (*c*) measures concerning infected soldiers and sailors. Early discovery of venereal infections; isolation of contagious cases; treatment by the most efficient methods in specialized services; ultimate control of the patients.

3. At the time of their discharge, syphilitics who are still in need of care are to be instructed concerning civil services where they may apply for treatment.

POISON GAS IN WARFARE.

1. It is of the utmost importance to provide for the treatment of gassed soldiers in the course of warfare, in special, mobile organizations, established in the immediate vicinity of the front (in analogy with the so-called Z hospitals of the French Army).

2. The treatment of acute cases must be entrusted to specialists in gas intoxication.

3. A very obvious, distinctive sign must figure on the health card of every soldier suffering from war-gas poisoning. This sign to be attached only after the diagnosis has been confirmed in a special hospital for such cases.

4. The *positive* onset of pulmonary tuberculosis, as a distinct sequel of gas intoxication, is altogether exceptional.

5. The permanent disabilities to be taken into consideration by experts in determining the invalidity percentage of old gas intoxications practically consist of (*a*) tachycardia, irritable heart; (*b*) chronic respiratory disturbances (emphysema, asthma, pulmonary adhesions); (*c*) more or less extensive loss of teeth; (*d*) neurasthenia and neurosis; (*e*) ocular disturbances (rare and easily recognized).

6. In the establishment of the percentage of invalidity, it is necessary to take into account the cardiac fatigue which may eventually follow upon chronic respiratory disturbances (obliterative fibrous bronchiolitis, emphysema), as well as the diminished resistance of the lung against ultimate acute pulmonary infections.

7. The lesions enumerated under headings 5 and 6 enter into serious consideration only after grave, acute gas poisoning, which has necessitated prolonged treatment in the hospital.

WATER PURIFICATION IN THE FIELD.

1. In the World War the purification of water in the Allied Armies was generally obtained by the method of chlorination.
2. The most frequently utilized substances were Javel's extract, calcium chloride, and liquid chloride.
3. This very extensive employment of chlorine as a purifying agent has shown it to possess certain important advantages.
4. The determination of the chlorine dosage, although approximately settled for practical purposes, nevertheless still remains indefinite.
5. Multiple apparatus were utilized, the majority of which may be made serviceable in the future, according to the indications furnished by special circumstances.
6. In the presence of turbidity, special apparatus must be provided in order to clarify the water before it is treated.
7. At the actual state of our knowledge there is reason to continue the utilization of chlorine for the purification of water in the field.
8. The utilization of other than chemical products should be kept in mind, however, occasion presenting.
9. It is desirable that investigations be followed along this line, with special reference to physical methods of sterilization, notably those based on the employment of ultra-violet rays, or of ozone.

RESOLUTIONS APPROVED.

At the final session of the congress certain resolutions were unanimously approved.

(1) The International Congress of Military Medicine and Pharmacy has obtained results which justify great hope for the future.

At a certain period of life, toward the age of 20, in every country, young men, including the best of the race, come under the care of the military medical service. It is easy to imagine how important a part the latter can play in the health of the race; it is not too much to say that from the point of view of eugenics it has a world-wide rôle.

(2) This world-wide rôle can not be played to the full on account of dispersion of effort. There exists in military medicine a live force which must be centralized, and it is only by official organization of military medicine in every country that measures can be instituted which would be certain of application and thoroughly supervised.

(3) The periodic reunion of a congress of military medicine and pharmacy would permit of the realization of this object, and the

whole human race would profit from the advances made by one or other of the nations.

It would maintain effectively the association established by this congress between military doctors and pharmacists.

It is to be understood that the same rules which were in force at the Brussels Congress will apply to future congresses.

(4) It is also desirable that an international association of military medicine and pharmacy should be formed under the same conditions.

(5) With this object in view a permanent committee has been elected by the Brussels Congress. It is designed to centralize all the results obtained, and is charged with the arrangements for the next congress.

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Tant	Docteur (Belgium).
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Tonneau, R	Docteur (Belgium).
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MEETING OF THE COMITÉ PERMANENT AT BRUSSELS, BELGIUM, FEBRUARY, 1922.

The first meeting of the permanent committee, following that held at the time of the International Congress of July, 1921, was held in Brussels, Belgium, in February, 1922, under the presidency of Inspector General Wibin and secretaryship of Commandant

Voncken. The following nations were represented: Italy, Britain, France, Belgium, Switzerland, Spain, and the United States of America. The replies which had been received by the Secretary of the committee, in acknowledgment of the requests for advice and approval, were most cordial, and not only favored similar congresses but urged that there be a prompt meeting of the permanent committee to arrange for the next one, which was thought advisable at an early date. In accordance therewith cabled notices were forwarded to the countries on the committee, and they were all represented except Brazil, who because of the short notice could not reach Brussels in time.

The conference was opened at the Brussels Military Hospital, and the meeting on the next day was continued at the office of the Service du Santé. Although several delegates presented official invitations for the next congress to be held in their countries, earnest deliberation resulted in the acceptance of the urgent invitation extended by the Italian delegate on behalf of the Italian Minister of War. It was therefore decided to hold the next congress in Rome in May, 1923. It is planned to hold meetings of the congress every two or three years and of the permanent committee when necessary. Thus there will be opportunity for every phase and aspect of all military, medical, surgical, sanitary, and pharmaceutical subjects to be covered, and in a reasonable number of years a complete and practical medical history of the World War will be produced, giving a correlation of the experiences gathered from all.

The permanent committee proceeded to a discussion of subjects desired for consideration at the next congress. Lists of such subjects had been submitted by each nation represented, and these documents were tabulated. It was decided by the committee to restrict the number of subjects discussed at any one congress, so as to insure the exhaustive handling of the various topics, with inclusion of all related data in addition to an analysis of the main contribution in all its phases. Adopting this restriction, each future congress will take up four general and two pharmaceutical topics. In this connection it is necessary to keep in mind that in some European countries, notably Belgium, the department of pharmacy, which includes sanitation, is a distinct division of the army. Two main papers on every subject are to be furnished, one a contribution from the country in which the congress is held, the other to come from the nation or nations in collaboration, to whom this subject is officially assigned. The selection of contributory nations by the permanent committee was based on the accomplishment of some special work or extensive experience along that particular line of inquiry. The questions were all written out and discussed, extended and revised, until a definite shape had been agreed upon.

According to the final decision, the *first* question for the next congress concerns (1) the general principles of evacuation of the wounded in the fighting armies; (2) the organization of such evacuations, taking into account the exigencies of therapeutic needs; (3) the adaptation of medical and surgical therapy to the various conditions resulting from the necessity for evacuation of the wounded. This question is to be considered in a paper from Italy, the seat of the Second International Congress, and one from France.

The *second* question takes up the collaboration of military and civilian authorities in their functioning in matters of social hygiene, physical education, and prophylaxis, including demographic statistics of social diseases, such as tuberculosis, venereal infections, alcoholism, mental stigmata, early discovery of incipient disease, notably tuberculosis; organized and centralized prophylactic measures, such as vaccination and immunization. Italy is to contribute the first paper, while Britain and America will collaborate in the preparation of the second article on this important subject.

The *third* question before the next congress is a critical study of methods of disinfection and disinfestation in times of peace and war. Italy will provide the first paper, Switzerland and Spain joining their activities for the second contribution.

Data concerning the *fourth* question, the treatment of wounds of the chest involving the lung and the sequelae of thoraco-pulmonary wounds, are to come from Italy and Serbia.

The question assigned to the pharmacy department calls for the discussion of chemical army laboratories, and will be taken up by Italy and by Czechoslovakia.

The suggestion was offered, leaving the decision to the discretion of each country, to arrange a meeting of military surgeons in the years in which no International Congress is held, for the collection of material for eventual use at the congress of the succeeding year. The permanent committee, furthermore, deliberated the question of the various specialties, and decided that dental and oral surgery are specialties under the heading of surgery.

The official organ for the publication of the transactions of future congresses was selected, in the form of the Archives Médicales Belges, a well-known periodical published monthly under the auspices of the Belgian Army, with a staff whose names are all more or less familiar in connection with activities during the war. The Archives Médicales Belges is printed by war cripples in the Belgian Military Institute for Vocational Reeducation. After temporary interruption of 30 months, due to the war, publication of the periodical was resumed in November, 1916, at a time when military medicine was at the zenith of its activity.

The date for the next meeting of the permanent committee was set for the early part of May, 1923, just before the gathering of the Second International Congress of Military Medicine and Pharmacy in Rome. (The term "medicine" covers surgery and all its specialties.)

The American delegate had the honor of being received by the Queen of the Belgians on February 28, 1922. He and others were escorted through Belgium's great medical universities in Liege, Brussels (the birthplace of Vesalius), Louvain, and Ghent. After a tour of inspection through all military schools and main military hospitals, some of the delegates were conducted through the famous Louvain Prison, which provided some interesting experiences. Here a number of improved methods have recently been introduced in the line of mental tests and examinations of the prisoners on admission, with the result that about 40 per cent of the convicts were found to be of inferior mentality or actually insane. These tests are carefully prepared by neuropsychiatrists and anthropologists of criminal subjects and aim at discovering some mental weakness, which, although not reaching the degree of insanity, renders it doubtful whether the persons can be held responsible for certain acts. The Belgian prison administration sends men found to be of unsound mind to a special prison for such cases. Another 10 per cent are known to become insane in the course of their incarceration in the Louvain Prison, where disciplinary measures are extremely severe and include the enforcement of solitary confinement. The inmates of this prison, to which the most desperate criminals are sent, are kept under the so-called cell system, meaning that they are locked up in their cells during 23 of the 24 hours; also during the single hour permitted for exercise each man remains by himself. The Louvain prisoners do not see each others' faces, which were formerly kept veiled. This shrouding has recently been abolished, but the men must turn their backs, facing toward the wall, when anyone approaches. The seats in the prison chapel are so arranged that each prisoner can see only the altar and the priest on looking up above the high walls of the separate boxlike compartments.

On being asked for the expression of an opinion concerning the Louvain Prison and its management, the delegates were ready to appreciate and commend the excellent sanitary conditions, the general cleanliness and security of the prison, from which escapes are unknown, but they questioned the solitary confinement system, making mention of the fact that the object of imprisonment is the protection of society far more than the infliction of a penalty on the lawbreaker. In a comparative discussion of the relative merits of prison systems employed in the United States and Great Britain, attention was called to the fact that the protection of society must cover both the present and the future; at the time of his release, the chastened prisoner should be returned to society a better man and a more useful member of the community. Otherwise, society will be contaminated and endangered by the unconverted and embittered reprobate. Men who are kept caged in solitary confinement for years often lose their minds, as admittedly happens in 10 per cent of the cases, while others become so profoundly depressed and disheartened that at the expiraiton of their terms they become helpless burdens on the community.

The majority, however, are thrust back into society to act as more dangerous elements than before their incarceration, moved by a spirit of revenge and despair, predestined ringleaders, as it were, in the surreptitious work against the Government and the established social system. From the viewpoint of a broader humanity, it was argued that some consideration should be shown these unfortunates, and suggested that the prisoners be permitted to work together, as far as their behavior warrants the privilege, that they should eat together, enjoy games in the open air, and be given the benefit of lectures and entertainments, in groups. Two large prisons in Brussels, which were included in the tour of inspection, are conducted in a general way on the same plan as the Louvain Prison—including careful mental tests on admission—but the prisoners are here allowed in some cases to work together. The Louvain officials were evidently grateful for all suggestions, and expressed their intention of permitting the convicts to work in a common room. The plan of serving meals to the prisoners together was to be taken into consideration. It is probable that a commission will be sent before long to this country, in order to inspect the American prisons and to study its methods of penalization. The treatment of the offender and the administration of penal institutions present many complex problems, more or less difficult of solution, and of fundamental importance to the welfare of the community.

The First "Congrés International de Médecine et de Pharmacie Militaires" may be described as one of the epoch-making moments in the advance of military medicine and internationalization of medical interests. May it not be considered in the days to come one of the factors in bringing about a permanent peace?

INDEX TO UNITED STATES NAVAL MEDICAL BULLETIN.[1]

VOLUME XVII.

INDEX TO SUBJECTS.

[1] The index to Volume XVII appears in this number of the BULLETIN, as the December issue will be devoted exclusively to a Report on the Congrès Internationale de Médecine et de Pharmacie Militares held in Brussels, Belguim, July, 1921.

8554—22——14

INDEX TO AUTHORS.