VOL. XI NO. 4

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 PUBLICATIONS
MEDICAL INSPECTOR J. S. TAYLOR, U. S. NAVY
IN CHARGE

OCTOBER, 1917

(QUARTERLY)

WASHINGTON
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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.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties and with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General, United States Navy.

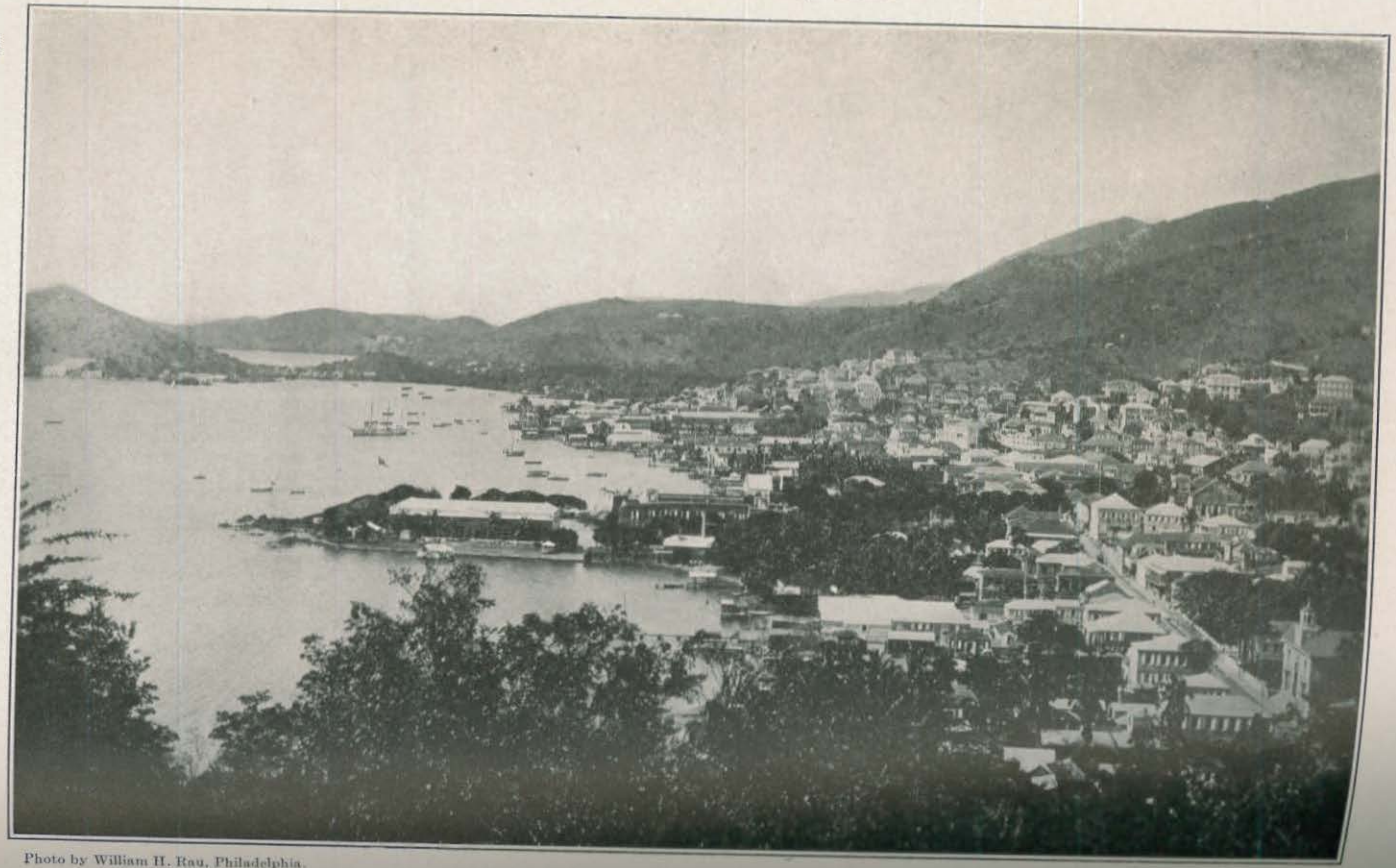


Photo by William H. Rau, Philadelphia.

VIEW OF CHARLOTTE AMALIE, ST. THOMAS, VIRGIN ISLANDS OF THE UNITED STATES.

U. S. NAVAL MEDICAL BULLETIN.

VOL. XI. OCTOBER, 1917. No. 4.

SPECIAL ARTICLES.

TUBERCULOSIS AND MILITARY ORGANIZATION.

By Dr. ARNOLD C. KLEBS, Washington, D. C.

Whether the organization of the new Army and Navy is an emergency measure destined to meet a temporary urgency or whether it is the beginning of a permanent policy toward an efficient organization of the physical resources in the entire population for future emergencies are questions foremost in the minds of a great many people. The decision will have to come soon. Whatever it may be there can be no question that the feeling for determined action has been aroused and that the conviction gains adherents daily that measures in order to be effective require careful and unimpassioned consideration, expert and systematic application by agencies which practically have to be created. It is the time for tremendous opportunities to take the right or the wrong path. That the problems of physical fitness and health are bound to attract painstaking attention will hardly need emphasis if it were not for the well-known tendency to give the questions involved a secondary consideration. The time, however, is bound to come when the medical services will have to shoulder the heaviest responsibilities.

Thanks to a persistent propaganda the problem which tuberculosis presents to civilized populations has been kept in the foreground of the public interest in health matters. The antituberculosis movement in this country, very active and ably managed, has come to cover practically every phase of modern life which directly or indirectly is thought capable of making new victims of the disease. Its vigorous advocacy of measures of personal and public hygiene has had already visible success, especially the bad habit of indiscriminate spitting has been restrained and fresh air has lost some of its terrors to those formerly apprehensive. That its success is also measurable specifically by an effect on the death rate, is an opinion which some maintain by a persuasive display of figures held to be unconvincing by others. The latter argue with equal plausibility that death rate

from a given cause is no reliable index of public health, because it does not appraise, or only inadequately, the causes of physical deficiencies during life, and also because it is computed from figures whose variations are influenced by many uncontrollable factors (especially lacking uniformity and standards of the pathological nomenclature). But even if the success of the movement is not accurately determinable by vital statistics it undoubtedly constitutes one of the most potent influences in the promotion of healthy living conditions in a wide sphere which is constantly widened further by cooperation with other agencies.

Like every campaign, this one against tuberculosis has to have its formula, its platform. This is naturally based on the scientific concepts of the day, but not always applied in the spirit of true science, which furnishes only approximations, continuously subject to revision. It brings out the salient features, emphasizes them, and even overstates them. In our age such a propaganda seems to be needed for the success of public measures, be they suffrage, prohibition, or antituberculosis. Its counterpart is advertisement in business. Waste of energy and money, false ideas sometimes, are the by-effects of such methods, but it is a curious fact that on the whole they are well balanced and of indubitable utility. Its danger, if of such we can speak, is that its undue emphasis or overstatement of factors and conditions influencing the disease may find blind acceptance among those whose grave responsibilities demand an unbiased and critical attitude toward all questions. It is the old danger that threatens sound judgment by deductions from dogma. And it can hardly be denied that the tenets of the antituberculosis movement have assumed the nature of a dogma; i. e., an overmastering sentiment which has found expression in a formula.[1]

But let us examine the formula itself. Tuberculosis is a very prevalent disease caused by a well-known microorganism. It is communicable from man to man, rarely from animal to man. The cause being known and determinable, it can be destroyed and the disease prevented. When infection has taken place it can be ascertained by expert examination of the patient and the disease arrested or cured if in its incipiency. If not discovered and properly cared for, the disease is extremely dangerous, almost fatal. Its prevalence in general, its marked predilection for the young and vigorous, its insidiousness, chronicity, disabling, and therefore pauperizing power, and especially its infectiousness mark the disease as a social problem of prime importance. But it can be prevented and stamped out by special well-tried measures. This is a fact shown by the

[1] This definition of dogma is from the recent work by the French academician, Emile Faguet: The cult of incompetence (N. Y., Dutton & Co., 1916). Its perusal can be warmly recommended to everyone interested in questions of government.

declining death rate from the disease wherever the measures have been applied.

This formula contains a clear-cut proposition and a warning at the same time to the responsible heads of any social community and at this moment particularly to those of the new Army and Navy. In plain words it says: "Disqualify from service everyone found tuberculous or suspect by an expert; apply the well-tried measures of prevention. If then tuberculosis occurs, the responsibility will clearly fall on yourself." Herman M. Biggs[1] places the responsibility for the present appalling tuberculosis situation in France unequivocally on the negligence of the responsible military and civil authorities. If the responsibility can be placed as accurately as Biggs thinks it can, those responsible for the health in our Navy, for instance, had better take notice, for their statistics show a very much higher incidence of tuberculosis than that in the principal European navies,[2] and one can hardly expect the ratio to decrease in actual war conditions. Since the warning in the antituberculosis formula is largely based on the infectiousness of the disease, we can not but recall the dismal experience the Army has had with another infectious disease during the Spanish-American War. There 20,000 soldiers, or about 1 in 6 of the Army in the South, although they never saw hostilities, became infected with typhoid fever, a higher ratio of incidence than that in the British Army in active service during the South African War (1 in 9). It was the opinion then of many authorities that proper camp sanitation and hygiene ought to have prevented the calamity.

The chief representative of the antituberculosis movement, the National Association for the Study and Prevention of Tuberculosis, has lately been requested to appoint a committee which in cooperation with the War and Navy Departments and with the antituberculosis agencies of the country was to devise and execute a war program for the prevention and control of tuberculosis. This program[1] is before us; it elaborates for the special purpose in view the formula outlined above. It concerns itself: (1) With recruiting examinations, (2) with reexaminations during service, (3) with the treatment of incidental cases in the service, and (4) with their disposal after treatment. The greatest stress is placed on (1) and (2), the committee being of the opinion "that any man with even a very limited

[1] A war tuberculosis program for the Nation. The American Review for Tuberculosis. Baltimore, 1917, i, 258–266.

[2] For the five years ending with 1906, inclusive, the morbidity per thousand men was the following: German Navy, 2.4; English Navy, 3.2; United States Navy, 5.6. See G. H. Barber: The incidence of tuberculosis in the Navy, etc., NAVAL MEDICAL BULLETIN, 1917, xi, 290.

amount of pulmonary tuberculosis that is latent or arrested is almost certain to break down under the physical strain of military training and army life and a focus of disease previously latent or arrested will almost certainly become active." The committee does not state what is to be understood by "a very limited amount of pulmonary tuberculosis that is latent or arrested" and "a focus of disease previously latent or arrested," that "almost certainly" will lead to trouble. The uninitiated is not supposed to grasp the intricacies of a classification to which an excessive craving for mathematical accuracy in things biological or pathological has driven the specialist. Therefore in the program no disqualifying conditions are mentioned as such, only it recommends that examinations should be made by "voluntary qualified experts" in the case of every candidate for service who (1) has a history of illness possibly tuberculous, or (2) of pneumonia or pleurisy, or who (3) had pulmonary tuberculosis in his immediate family, or (4) has a flat chest and is 15 per cent underweight, or (5) has a history of chronic catarrh, or a cough or any symptoms of chest disease, or (6) has abnormal physical signs of any kind in the chest. How these voluntary examiners have to qualify as experts and how far they are expected to have knowledge of service conditions is not mentioned in the program; it simply offers to furnish the War Department with a list of a large number of such experts who would volunteer; because the committee is of the opinion that "the work of the Medical Corps of the Army and Navy could be much facilitated and expedited and this corps, already greatly overworked, could be given much needed assistance. * * *"

From this it is seen that the program presupposes two conditions: One, that the Medical Corps is quantitatively inadequate to the task of recruiting, and the other, that qualitatively it does not possess the expert knowledge necessary to detect whether or not certain anamnestic features in the history of recruits or physical signs in their condition are to be regarded as disqualifying them for military service. As regards the first point, of quantitative inadequacy of the Medical Corps for recruiting service, we have no accurate data. As an expression of patriotism the proffer of expert assistance will no doubt be highly appreciated. We have been under the impression that the creation of a Medical Officers' Reserve Corps and its organization was intended to supply competent men, especially for recruiting service, which has to go on more or less independently of the medical service of the enlisted body of troops, although under the same general direction. As regards the qualitative inadequacy of the Medical Corps, which the program does not express specifically, although it is clearly implied so far as tuberculosis is concerned, we have no means of judging the force of the implication. It is evident that the creation of a new Army and new Navy on principles essen-

tially different from previous ones will necessitate various adjustments in this regard as in so many others. Nevertheless, whatever experience we have gained, whatever guiding principles we have evolved therefrom, must be of prime importance in the shaping of a future policy, if for no other reason but that it corresponds to our own and peculiar needs, which no other experiences can supply. That the Medical Corps, individually as well as collectively, has not been unmindful of the problems which tuberculosis presents in both Army and Navy is clear from the publications by members of the corps, which show both insight and expert knowledge, some of them to a very high degree. As a collective expression of past experience we have various official publications[1] and reports. As a test of how far the experience has been utilized in practice, and especially in the recruiting service, we may find an index in the various rules and regulations governing the sanitary service. The rules for the examination of recruits are brief and to the point. Their careful study shows that the subject of tuberculosis was throughout in the mind of the writer or writers and that the difficulty of the task of discovering conditions behind which tuberculosis may be hidden was fully appreciated.[2] There is a wholesome absence of intricate definitions and subtle distinctions which are apt to burden and confuse modern textbooks as well as the minds of conscientious students. On the other hand, there is abundant evidence of common sense, a full recognition of the need of "special standards and requirements, being more or less subject to change," and providing for what is most important, the cooperation of the line officer and the medical recruiting officer in providing not only healthy soldiers but those fit to perform satisfactorily the tasks with which these officers must be acquainted. The rules provide also for the study and observation of doubtful cases for a reasonable period, a most important point in the detection of tuberculosis, which, however, has not even been mentioned in the otherwise specific directions of the program. It is evident, of course, that excellent rules have value only when intelligently applied and strictly enforced. Guiding thoughts and suggestions as to how this might be brought about may suitably engage us to the end of this paper.

Before we consider how tuberculosis might affect in particular the subject of enlistment and that of the care of the tuberculous developed

[1] In passing we may remind the reader only of one of these publications, the Medical and Surgical History of the Civil War, which probably more than any other similar publication has exerted a world-wide influence on military sanitation. The Index Catalogue of the Surgeon General's library is another work of inestimable worth to the whole medical world.

[2] War Department: General Orders, No. 66. Rules for the Examination of Recru'ts. Washington, Apr. 18, 1910. Navy Department: Circular Relating to the Physical Examination of Recruits for Enlistment in the Navy and Marine Corps. Washington, July 10, 1916.

after enlistment, let us for a moment, based on the concepts outlined above, meditate over the actual rôle of importance which this disease plays among the multiple phenomena that determine the efficiency and well-being of Army and Navy. Quite generally it must be conceded that the line dividing health from sickness is one that does not always appear clearly and sharply marked because the two conditions which we are in the habit of distinguishing are determined not only by inherent differences but by individual consciousness and attitude as well. Modern medical science concerns itself almost exclusively with those factors, symptoms, or signs discernible and measurable by physical methods. The accent put on these not only limits our understanding of conditions where the physical factors are not clearly discernible, but it weakens our effective interference. The good physician instinctively evaluates both the ponderables and imponderables, his interest and solicitude is focused in the whole man not in isolated phenomena. We are aware that these are elementary, self-evident concepts, and still we feel they bear repeating again and again, especially in the subject under consideration.

For the fact that tuberculous infection is exceedingly prevalent, we have abundant and reliable evidence. This, however, is constantly disregarded or faultily interpreted by those who are interested in the specificity of the disease and the effectiveness of specific measures. We need not examine here the details of the statistics, but only wish to recall the significant findings by tuberculin tests applied to the recruits of the Hungarian Army by Franz, which demonstrated the presence of the infection in a vast majority of all the recruits, i. e., nearing the 100 per cent. This was one corroboration in the living of identical findings in autopsies of the dead from all causes made by Naegeli, Burkhardt, and others. These are facts which have found general acceptance, but not general application. Whatever their explanation they must inevitably lead to the conclusion that practically everyone living under conditions with which we are familiar not only makes the personal acquaintance of the tubercle bacillus by coming in contact with it, but receives lesions so distinct that years after they are still discoverable. What does that mean? It means that practically everyone some time in his life must present symptoms and signs, discernible and measurable by physical methods, at least by the expert, of what we are taught to call "incipient tuberculosis." And it is certainly not unreasonable to presume that a greater degree of expert skill would eliminate the qualitative "practically" and allow us to speak of tuberculosis as a universal disease. But does not this lead inevitably to the conclusion that the specificity of the disease is of relative unimportance unless there is, discernible and measureable, a specificity of resistance against the infection?

Even a superficial consideration of the subject of specific resistance to tuberculosis would lead us far away from our main argument. Of late it has received much attention from the laboratory worker, the scientific physician, and the general biologist, especially since the specificity of cause could not be made to yield satisfactory conclusions. At the present moment we can only say that this research, extended even to those elements borrowed from Darwinian speculations, heredity and environment, has furnished us no data which would allow uniformly applicable deductions. We can not, therefore, agree with the definition of tuberculosis, as accepted by Barber in his notable paper "Tuberculosis in the Navy,"[1] describing it as a universal disease "producing death in about one-tenth of the population in whom resistance is lost from ascertainable causes, but unable to kill in the nine-tenths in whom resistance continues." The "ascertainable causes" which he mentions and describes, as also the so-called "stigmata of tuberculosis" of Holeman,[2] to which he refers, are all possible factors in the production of the disease, but by no means specific. We must make a mental note of them and further examine their relation to tuberculosis and other diseases, but it must not lead to a one-sided generalization unless we are prepared to revert to the ancient belief that the worshipping of one pet divinity will free us from all the demons tormenting our existence.

Tuberculosis, therefore, does not present any special problem that can be met by special measures. As we understand it now, it is to a certain extent, which is by no means exactly definable, an index of collective health and physical vigor. In this aspect it deserves painstaking but also well-balanced attention. It certainly has not received either by those who now alarm and warn our people—and especially the medical authorities of Army and Navy—by producing so-called evidence from France intended to show that tuberculosis has increased enormously, and that this was due entirely to the nonenforcement of well-tried measures by the responsible authorities. When once the time has passed that the authorities do not longer "deem it unwise to publish certain figures," and we may add, "or deem it wise to publish others," then, but only then, shall we be able to appraise correctly the amount of damage inflicted on the French forces and population by tuberculosis. Nowhere in the world as in France has an antituberculosis campaign been waged for a longer time, influencing research, legislature, and every agency of public organization and welfare. As it would be preposterous to make this fact responsible for the present calamity, just as much, and more so, is

[1] Naval Medical Bulletin, 1917, xi, 290.
[2] Med. Rec., New York, 1915, lxxxviii, 1037–1040.

it absurd to put the blame on negligent authorities.[1] If the time ever came—may God forbid—that we had to face three cruel years of intensest warfare, had to bear the brunt of the battle unaided for the first months, our best men killed in it, our most prosperous States occupied either by foe or friend, upsetting completely our internal relations, our entire economy, what significance would it have when under such circumstances we picked here and there among the victims a few—say, even four or five in a hundred—that were tuberculous, merely to show that they might have been saved by "well-tried measures"? What are "well-tried measures" in the midst of a cyclone or a cataclysm? It is the entire vitality and power of resistance of a nation that is on trial at such times. To learn how to strengthen and husband these is the task of true preparation in advance.. In this the so-called tuberculosis problem is submerged.

The main fault we have to find, therefore, with the "war tuberculosis program" is that it proposes against this disease the same measures that have been found effective against the acute infectious diseases and attempts to justify them by the order of reasoning pertaining to them, and especially that it is apt to becloud the main issue by insisting on a minor one or, as we may put it, by trying to substitute tactics for strategy. The all-important task of assuring and maintaining the health of Army and Navy has to be directed by proper authorities, and much depends on their wisdom of coordinating issues. Our Medical Corps has an excellent tradition which will be of great help in the impending new organization. It alone, if nothing else, must insure to it our fullest confidence and readiness to assist when required. It needs not only the most extensive authority and powers of execution, but also its prestige has to be raised as much as possible. It is almost a tradition in military service to look down upon the sanitary branches. Nothing should be left undone to counteract such tendencies, and, of course, the best way to do it is to raise the standards and create facilities for special training, education, and research which will attract the best available men. Never can such a service reach the desired degree of efficiency if it has to rely on the assistance of outsiders, no matter how expert they may be. Just as the other services have to create their own experts in navigation, in gunnery, in aviation, etc., the Medical Corps should be secured the highest degree of independence in this respect. The direction

[1] Ten years ago the antituberculosis movement in this country had hardly begun to gather momentum, when in France it was a well-organized and widespread crusade (whose emblem, the double red cross, our national association adopted and still carries on its banners). To the French movement, which began in the seventies of last century, we not only owe all the inspiration for our own but also the initiative for international cooperation in questions of public health in many tuberculosis congresses in Paris and for the last time in Washington, where a large delegation from France certified to the continued active contribution from that country.

and execution of its work is so entirely different from that in civil life that independence and concentration upon its particular task are of paramount importance. While the daily task of health authorities and the medical profession in general centers in the prevention, alleviation, cure, and study of ills which befall all individuals of a population, the military medical service has in its care the flower of the population, specially and carefully selected for its physical efficiency. It has more the position of a national trainer, not, however, as a trainer for a particular feat or competition or emergency, but for an all-around fitness of body and soul, in peace and in war, which alone enables a great people to withstand successfully the actual blows of an arrogant enemy and to parry the more insidious attacks of all civilization's worst enemies—increasing love of ease, luxury, material ideals, excessive wealth, and sordid poverty. An army and navy maintained for such defense against enemies within and without can hardly find objectors even in pacifist quarters, for it surely has its place in a "wider life of coordinated activity." (Miss Jane Addams.)

I. TUBERCULOSIS AND ENLISTMENT.

We believe that there are pertaining to this subject mainly three existing regulations which may deserve analysis and possible elaboration.[1] They are: (*a*) "Evident predisposition to pulmonary tuberculosis" is a special disqualification from service; (*b*) after the use of "every possible diagnostic procedure (microscope and X-ray included)" have been used, doubtful cases may be admitted "to hospital for study and observation," or in case of "temporary illness" unfitting applicants, they may be admitted to hospital for treatment "with a view to their enlistment upon recovery"; (*c*) "candidates for special ratings" are not expected to possess "the physique and endurance of those actively engaged in strictly military duties." Nevertheless it must be remembered that they are "enlisted for the performance of all duties to the naval service ashore and afloat."

(a) "EVIDENT PREDISPOSITION TO PULMONARY TUBERCULOSIS."

This phrase, we believe, shows clearly how much definiteness is still lacking in our concepts about the disease and how much confusion is created by the use of anatomic and bacteriologic terms to designate clinical conditions. The old terms of "status phthisicus," "scrofulous complexion," or "tuberculous diathesis" conveyed to the pre-Kochian examiner a picture which had fully as definite a sig-

[1] We quote from the regulations cited in note 2, p. 443, not verbatim, however, because we are more after the principles governing them than after the various expressions they may have received in the several services.

nificance as the above phrase. The Navy Regulations in which this phrase occurs do not mention tuberculosis among the "general disqualifications," although here under the heading of constitutional diseases we find noted "feebleness of constitution (poor physique), syphilis" (1916). In his annual report for 1907 the Surgeon General of the Navy stated that a material reduction of tuberculosis in the service could not be expected "until it is more fully realized that tuberculosis is a disease of nutrition, and until a minimum standard of physical requirement is more consistently exacted." The Army Regulations are more explicit; they name "tuberculosis of whatever degree and whether general or localized" among the general diseases which are causes for rejection. They also attempt to define (under "chest") the conditions which "usually coincide with a somewhat enfeebled constitution and a predisposition to disease of the lungs." Under "lungs," definite signs, data from the history, and temperature variations are enumerated as leading to "suspicion" of pulmonary tuberculosis. In the Navy Regulations "incipient tuberculosis" is noted in the examination of the organs of the chest by percussion and auscultation. We have already had occasion to speak of the conditions which Barber considers as marking the "physical defective" and to which he refers as "the source of the first increment of our ratio of tuberculosis for the service." The author thinks that such cases should under no circumstances be accepted for any branch of the service. We may take this to be an individual expression of how the phrase "evident predisposition" might be defined. Barber further on in his paper,[1] when discussing the positive evidences of the disease, insists that a diagnosis is possible in the early stages, and that the great importance of this fact should be realized by medical officers, "a considerable number of whom," he says, "do not concede" this possibility of diagnosis from the clinical history and physical signs.

The recruiting officer, if he has taken in the regulations and literature from which we have quoted, will find that he has to use a great great deal of judgment in carrying out the regulations, or practically none if he tries to emulate the scientific precepts. Everything from a hypertrophied tonsil to a protracted use of "Brown's mixture" he will have to look upon as suspicious, should he belong to the latter category. Since he is told that he "can not be too careful and stringent," he is very apt not to use his judgment, but to hold himself to definite conditions as he may find them described. The result may be an Army and Navy of suspicious cases, or none at all. It is just here where it is proposed that voluntary experts shall help us out of the dilemma by examining every man who presents cause

[1] Op. cit., p. 297.

for suspicion. It is particularly on account of their special skill in the examination of the chest that expert assistance is deemed necessary. This is curious, because when we look into specialistic literature we find that there is a distinct tendency not to rely too much on physical examination. Lawrason Brown, Trudeau's excellent pupil, a man of great practical experience, expressed this clearly in a recent paper:[1] "Symptoms are a better and more accurate guide to activity than are physical signs" and "symptoms without physical signs demand treatment, while physical signs without symptoms require often only careful watching." A more pointed expression in this direction we find in a notable paper, also quite recent, by Louis Hamman of the medical clinic of Johns Hopkins Hospital. The painstaking analysis of the subject, coming from a man who has had a most extensive clinical experience in the tuberculosis out-patient department, which he has utilized both practically and scientifically, and who has now worked for some time in the wider field of the general medical clinic, merits the most careful consideration.[2] We can give here only briefly some of his pertinent remarks: "The undue emphasis that has been put upon the physical examination by distracting attention from other no less important factors, has rather obstructed than facilitated early diagnosis" and "there must be some inherent traits in the progress of tuberculosis that render the detection of early stages difficult and, indeed, in many instances impossible"; and "I am convinced that early diagnosis would profit if physicians could be rid of the bugbear of physical examination, which exacts that every diagnosis be supported by gross changes in percussion and auscultation."

We have cited these various expressions to show that there is no unanimity on this subject and that if a really useful formula, useful to the recruiting service especially, is to be evolved, we must change entirely our attitude toward the problems involved. Our object is not to complicate the matter by an analysis of the various factors alleged to predispose to tuberculosis or of the methods devised to diagnose them, nor do we wish to discuss all the more or less artificial phases between predisposition, evident or supposed, and actual infection. But we believe it can not be emphasized too strongly that if society and especially our Army and Navy is to profit from what we have learned in our laboratories and autopsy rooms about these things we must first of all rid ourselves of our slavish devotion to terms and names, and adjust them to newer and broader concepts. In this sense tuberculosis means one thing to the laboratory worker

[1] Tuberculosis theses, diagnostic, prognostic, therapeutic. American Review of Tuberculosis, Baltimore, 1917, 1, 194, theses 12 and 13.

[2] The diagnosis of pulmonary tuberculosis. American Review of Tuberculosis, Baltimore, 1917, 1, 206–217.

but something essentially and fundamentally different to the practitioner and to society in general. "Infection" and "incipiency" are experimental laboratory terms of value no doubt in their respective places, but of no significance in the broader issue of determining the border lines between health and disease, between physical deficiency and efficiency. Like the beginnings of all things and events, they transcend our ken or at least mark only plausible theoretical factors or phases in that continuous struggle of the organism to adapt itself to ever-changing conditions of the environment. With the use of terms and names current at present our recruiting officers will undoubtedly discover that we are a nation of defectives. Anyone who has his eyes open on his walks in the streets of our cities, on our popular bathing beaches, in our offices, will see if he wishes to, stigmata of degeneration, predisposition to tuberculosis. We over here who for decades have attracted to our shores the output of what is most enterprising, tough, and persevering in the white race of the whole world, continue insisting that the highest standard of human efficiency is to be found in the type of the Apollo of Belvedere. We see our athletes, prize fighters, and others who come up to these physical ideals ending pitifully as consumptives, while the undersize, underweight, narrow-chested clerks and laborers outwork and outlive them. But we refuse to learn from such everyday observations; tenaciously we stick to our test-tube and guinea-pig standards. Like Frederic the Great we clamor for our 6-foot-and-more grenadiers and forget that warfare and life have changed entirely, that wholly new standards of physique and mind will determine victory and success and survival.

Therefore we believe that the somewhat vague terminology in the Army and Navy regulations, the expressions used by the Surgeon General of the Navy in 1907, as cited above, although they do not fulfill scientific requirements, betoken a much higher wisdom than the attempts to force a narrow, one-sided fixation of standards. There are many hopeful signs that the medical military authorities are well aware of the needs of a thorough revision of standards and able and enthusiastic workers are devoting themselves to this important task.[1]

(b) OBSERVATION BEFORE ENLISTMENT.

The provision for study and observation in a hospital of recruits suffering from a "temporary illness" in existing recruiting regulations probably had not in view the cases which we have been considering. With the increasing anxiety to keep everybody out of the

[1] See the excellent article by W. G. Farwell on the important subject, "Border-line cases at the recruiting office," illustrated by photographs of the Russell Sage Institute, which are most suggestive as to how we may arrive at a more exact determination of physical standards. NAVAL MEDICAL BULLETIN, 1917, xi, No. 3.

service who by any chance appears likely to develop tuberculosis it would never occur to a recruiting officer to regard, for instance, a case with bloody sputum, or with a rise of temperature in the afternoon, or with dullness over the left apex, as one of "temporary illness." He may possibly order the candidate to present himself again for reexamination, but observation in a hospital with a view to "enlistment upon recovery" will hardly ever be resorted to under present conditions. In spite of the conclusions which Barber[1] draws from a study of the admissions to the naval hospital at Las Animas, Colo., during the year 1916, and in spite of the alarm sounded by Biggs on account of the present French experiences and other less specific but equally insistent warnings, we believe that the provision for observation should not only be extended to the tuberculosis suspect but be made the basis of a distinct system of dealing with the so-called "defectives" or "suspicious cases" presenting themselves for service and otherwise fulfilling certain minima standards. As far as tuberculosis is concerned, we have already shown that the ascertained prevalence of tuberculous lesions among modern populations inevitably forces the conclusion that practically everybody is sometimes temporarily ill from tuberculosis and that only a very small percentage of them succumb to it. Every practitioner of experience can give direct proof of this and can testify to the fact that the later immunity of such cases was by no means always insured by proper treatment or the hygienic ideals of the propagandists, that indeed it persisted often despite every infraction of rules and under actual hardships and arduous occupation. The science which does not take these things into account is not science but sterile dogma. To the unbiased it will be evident that among those rejected for such suspicions there must be a large number of just such cases, some no doubt precious human material for every kind of service. Toward these the Nation has not only a right but also a duty. Observation in a hospital, however, would not serve either. We believe that these cases—and we would not limit ourselves to the tuberculosis suspects—ought to be enlisted and entered in a service to be created especially for the purpose of observation under working conditions. Such a corps should be officered the same as any other military unit, under strict military order and discipline, encamped separately or near other troops, the only difference being that especially delegated and especially selected medical officers would supervise the training and the work, the strictly military part of which might be made theoretical only at rest intervals, while the actual work might consist in those occupations in the rear of an army which modern military practice tends more and more to assign to specially organized and trained

[1] Op. cit. in note 7, p. 297.

bodies of unarmed men. The organization of such a "working corps"[1] might also provide that men who in the regular armed service "in line of duty" develop suspicious symptoms or signs may be assigned for service in this corps. Such cases naturally occur, and sending them to a hospital or dismissing them will be neither to their interest nor to that of the service. This would place such a working corps in an intermediate position between the organization of the fighting lines proper and that vast organization in the rear with its provisions for casualties from wounds and sickness which will merit separate consideration. We believe that this working corps wisely organized and ably led would not only demonstrate but develop the great potentialities which are in many of those presently considered physically deficient.

(c) ENLISTMENT FOR SPECIAL RATINGS.

Very similar viewpoints to those just outlined must govern the opportunities offered under this heading. Primarily the choice of candidates will depend on fitness for particular tasks which they have acquired in civil life. A waiver of defects in such cases is probably recommended not infrequently but the injunctions to the examining surgeon contained in the regulation cited above (p. 443) suggests that this is not done with deliberation and on the whole discouraged. It would seem that the subject merits study by line and medical officers who are thoroughly conversant with the physical demands made on the men in different ratings. The division of labor in a modern military organization and the utilization of special qualifications formerly not even thought of has created new services and ratings which make different, some lesser, demands on the physique and endurance of their incumbents. If this is so, it is evident that a systematic and careful distribution of recruits of known physique among different ratings of known demands will allow the proper utilization of many border-line cases. Maximum standards of physical efficiency will be made to prevail where most needed—that is, in the fighting line and the reserves—but the many types representing stages between maximum and minimum standards can find appropriate utilization. Also here we must remember that the fighting line represents only the sharp and hard edge of the weapon whose shaft must be held solidly and intelligently by the whole social structure, organized and coordinated. In the planning there is a great chance for the useful cooperation of medical prac-

[1] Some such name would be preferable to a designation suggesting physical observation, especially for any particular disease. Every man enrolled in this corps ought to be made to feel that in the organization of national forces the duties assigned to him are of equal importance to those in any other corps.

titioners, physiologists, ethnologists, with the military authorities. The drafted thousands and millions must furnish the principal data which are probably dissimilar from those in any other country. It is of fundamental importance that we fix our own standards and devise our own methods to deal with and properly distribute the physical resources of our population. It undoubtedly can prevent the waste which disgraces so many of our largest enterprises in which we otherwise take pride. In another but allied field we have a characteristic example. In the last half year the health department of New York City has had to destroy 10,000 tons of foodstuffs only because means for storage and proper distribution were inadequate. By this the sanitary authority undoubtedly renders a service but it certainly does not counterbalance the irreparable damage done by a lack of foresight and organization, particularly inexcusable at a time when food is short and dear.

The great rôle which "national service" can play in the conservation and utilization of the resources in our young population will be obvious to everyone not biased against all military organization because of moral convictions. The measures which we have suggested in the last two chapters, although they are concerned with only one side of the problem, ought to go a long way toward removing this bias. They also ought to help transform the frequent conflict between civil and military authorities into purposeful cooperation. The aversion of the "conscientious objector" against any armed service can not be dismissed simply as a form of cowardice. In the general policy of armed preparedness we believe he ought to be considered rather to occupy a similar rôle to that of the one who does not fulfill certain standards of physical requirement, to be dealt with similarly and not by coercion or punishment. The British experiences in this matter will deserve our most careful attention. On their basis we have lately been warned not to repeat their mistake in placing the "alternative services" under the direct or indirect control of the military authorities.[1] These are questions which undoubtedly engage at present our Council of National Defense. Generally speaking it seems of minor importance whether the "alternative service organization"—and that of the proposed "working corps" would naturally be an integral part of it—is placed under military or civil control. The essential requirement, as we see it, is that it insures discipline, an esprit de corps, uniform standards of living conditions and of duties such as we are in the habit of associating with military organization. To the Nation at large the efficient cooperation of civil and military authorities in the training of those enlisted for alternative services must be of the highest value

[1] Sidney Webb: British experiences for Americans, II. Atlantic Monthly, 1917, August, p. 163.

in war and in peace and we will do well to remember in this regard the suggestions about "alternative industrial service" made by one of our best thinkers, William James.

II. PREVENTION AND CARE FOR THE TUBERCULOUS.

The precautions during enlistment and the enforcement of sanitary regulations in the service ought to, theoretically at least, prevent the development of tuberculosis in Army and Navy. Certain authorities, some of whom we have quoted, assert that this is even possible in practice. This is obviously a fallacy, not only on the general ground of human imperfection, but because tuberculosis not infrequently develops suddenly and without any warning, a fact to which Hamman has also called attention. At the present rate of incidence we would have to reckon with a minimum of about 2,000 cases in a force of 1,000,000 men. We believe that this ratio will be increased or decreased more in proportion to those factors which depend on the discipline, morale, and spirit which permeate the whole organization than on the application of specific measures. An attempt to base the prevention of tuberculosis and allied conditions on methods of prophylaxis against acute diseases would be a short-sighted blunder. On the other hand it is certain that the nature of the service itself and that of the service environment so far as it affects the health of the men must require careful scrutiny.

It is often assumed that the outdoor life, the rigidly enforced hygiene, the sanitary arrangement of living quarters naturally offer to those enlisted in either Army or Navy the advantages of a health resort. The assumption is, of course, rather exaggerated, but it contains elements of truth. When, however, the service is prolonged and especially in actual warfare the strain becomes great, sanitation and hygiene are neglected, particularly in trench warfare and when billeting in private houses has to be resorted to. The training at home has to anticipate these conditions and therefore "health resort standards" or the elaborate hygienic and sanitary arrangements of many of our public institutions ought to be barred from military establishments. We have become very dependent on those arrangements and it is difficult for us to realize how healthy living conditions can be obtained without them. To teach the men how this is possible under almost every condition, to harden themselves, to avail themselves almost instinctively of healthful opportunities wherever they are present (washing, bathing, etc.), is infinitely more important than the provision of the best sanitary appliances unless they can be used under all conditions. That this principle of aiming at the best with the simplest means ought to inspire also those who have to plan the sanitary measures would hardly need emphasis if it were not for the inclination to overdo in this direction.

In our aim at simplification it ought to help when we realize that practically all our prophylactic measures come under the heading "cleanliness." Thus cleanly habits and clean, open air are now our mainstays against tuberculosis. Asepsis and antisepsis, even protective inoculation are nothing but measures of microscopic cleanliness, external or internal. Greek and Latin etymology changes words and adds luster, but does not change the sense. Mainly by increasing cleanliness have we been able to control a great number of diseases, some very fatal especially in war. But the realization of this fact has brought us very little nearer to a satisfactory understanding of what makes and unmakes healthy living conditions. Open-air life, perfect ventilation indoors, outdoor sleeping lay so much emphasis on the one factor of air in the prevention of tuberculosis that we have become accustomed to accept its prime importance as a matter of fact. It will be regarded as hyper-criticism, as heresy to question its primacy. And still it must be done if ever we want to see clearer.

The Indian who hunted in wood and prairie lived up to the tenets of open-air life in perfect form. He was free from tuberculosis and only when he adopted our mode of life did he succumb to it. Propaganda, of course, has utilized this example, but it proves just the opposite from what it intended to prove, for we know very well that the Indian and probably all hunting and nomadic races have hardly any resistance against tuberculosis when they do come in contact with it. And with them it takes the form of an acute infectious disease. Long generations are needed to develop a resistance as the case of the American negro demonstrates. Hence the Indian's mode of life in the open is not necessarily healthy for us whose main existence is bound to be under shelter. It will benefit us for a time, but if we pursue it indefinitely we not only would have to give up all that means a useful existence but very likely we would diminish our resistance. The Indian's mode of life, therefore, can not determine our standards of healthy conditions of living, no matter how much the modern imitators of J. J. Rousseau may proclaim it from the housetops. We must look around for other factors.

The possibility of artificial immunization perhaps? Does not the Indian example directly suggest its possibility? It is an important subject the research of which will continue to occupy us, but, so far as tuberculosis is concerned, it must seem hopeless when we consider the nature of the disease. Let us do this for a moment, for while it shuts up one line of attack, at the same time it opens others. Consumption, as we see it, presents nothing but an alternating series of accidents and recoveries in the one naturally immune to tuberculosis. It is the factor of inherited and acquired resistance that determines the chronic and debilitating course of the disease. And

during the prolonged and tedious struggle other factors than those of specific immunity become effective. It is not speculation but the careful consideration of pertinent research which forcibly leads us to this apparent paradox—that tuberculous consumption is a disease of the immune. Now, to immunize the immune at times of failing resistance is a task beyond our power and therefore the hope for protective immunization against the disease a priori unlikely to be fulfilled. A greater theoretical possibility may be seen in the sterilizing therapy as conceived by Ehrlich, but we consider this slight also because we must assume that the struggle between the specific factors of immunity and the nonspecific ones, which we will still have to consider, must have set profound changes in the whole constitution which an influence on the specific factors alone would hardly alter. It is important that this realization remove tuberculosis out of the class of diseases which can be influenced by specific measures. Our efforts must therefore be concerted against the other nonspecific factors by whatever means, medical or non-medical, we may find effective.

The greater part of the nonspecific factors which we believe to be of decisive influence in the genesis of tuberculosis belong to that large category of factors which were determined in the laboratory of human observation and experience. Some of these factors at times undermine the natural resistance; others strengthen it. They must have a physical basis, though at present we ignore it, assigning many of them to that ethereal realm of the psyche, so much dreaded by the accurate laboratory worker. All the various emotions belong hereto; fear and anxiety and worry especially, and against them the sensations of relief that mark their passing. We believe that in this regard the experiments of Crile and the conclusions to which they led him have the greatest heuristic value. His postulating "that the mechanism which produces muscular action and emotion is the same as the mechanism which generates heat, maintains consciousness, and causes the splitting up of foreign proteids by which the chemical purity of the body is maintained" has a significant bearing on our problem of tuberculosis and suggests a more tangible explanation and perhaps may lead to more direct measures of prevention.[1]

The relative importance which the specific and nonspecific factors have in the production of the disease tuberculosis must determine our preventive measures, as it should guide also our therapeutic methods. To place undue stress on the importance of the specific factors would not seem justified from what we have said above. While we will not relax our vigilance as regards the specific causes

[1] George W. Crile: Man, an adaptive mechanism. N. Y., Macmillan, 1916 (387 pp. illustrated, 8°), p. 164.

of infection (cleanliness, sputum destruction, etc.) and the natural variations of specific immunity (hereditary, ethnic, etc.), we will have to admit, and direct our actions accordingly, that the non-specific factors which tend to undermine natural resistance are, for the present at least, outside of the reach of strictly medical interference. A new profession, that of the medically trained educator, the "social physician," will have to cope with these problems for which the general physician with his specialistic preoccupations is little fitted. The new Army and Navy might well offer an immense and most fertile field for the raising of such a profession which at present is recruited almost entirely from amateurs, well-to-do, philanthropically inclined physicians who will give some of their precious time to committee meetings, but very little independent thought or work. That there is need for such trained and paid experts, and that the need is felt especially in the problems centered in tuberculosis, a glance at the literature shows immediately. It is well expressed in the words of one social worker when he says: "The effort to combat tuberculosis without changing the fundamental errors in our economic life is a futile task.[1]

III. INSTITUTIONAL PROVISION.

We can be brief in the discussion of this subject. Here as in no other part of the tuberculosis problem American contribution has been original, eminently practical, and successful, achieving with the simplest means the ends in view. From the earliest creation of a Trudeau and Bowditch to those of a Herbert Maxon King, whose death we deplore at this moment,[2] and in many other private and public sanatoria we find types of planning and construction that preclude all necessity of looking for models elsewhere. It is evident that the military authorities, which must be prepared to take care of every kind of "casualty," of the crippled as well as of the wounded, of the chronically ill as well as of the acute case, will have to include in its provisions such as are suited to the needs of the tuberculous. Whether an enlargement of existing provisions will suffice and whether, in general, these patients be cared for in military institutions or be distributed in private or public sanatoria and hospitals, those are questions which will have to be settled in accord with the general policy and financial and administrative considerations.

[1] Boris D. Bogen: An adequate relief program for tuberculosis cases. Journal of Outdoor Life, New York, 1917, xiv, 232.

[2] King died June 24, 1917. To him belongs the honor for having first evolved and executed a type of simple lean-to for the accommodation of a group of patients, providing for outdoor sleeping in all climates. This little model has been copied in almost every later institution. As a type, in its original simplicity and usefulness, it is still unsurpassed.

In regard to the management of the cases confined in special institutions, we believe that an entire change of attitude toward the subject will have to come about if a real benefit to the men and to the service is to result. We can not enter into details, but it must be clear from what was said in the foregoing chapter that also in the institutional treatment of tuberculosis strictly medical measures will have to play only the minor rôle. Also we do not think that the strict separation of the tuberculous cases from those suffering from similarly debilitating disorders is either necessary or desirable. A distinction of type of institutions will be necessary, but the assignment to them of cases should be based less on the anatomical and bacteriologic findings but rather on the degree of physical incapacity for definite kinds of work. Marked invalidity will require infirmary or hospital provision, while all the other conditions short of it ought to be accommodated or better employed in institutions, which might be called "sanatoria," "health work camps," "vocational colonies," in accord with their fundamental purpose and method which makes useful vocational training and work its primary aim, rest and recreation, prevailing in existing sanatoria, being assigned to a secondary, complementary position. Between the two types of institutions there ought to be closest cooperation and exchange of patients.

The mention in the "war tuberculosis program" that "the establishment of Government farm colonies * * * is worthy of careful consideration" is a timid and insufficient recommendation of a measure the effectiveness of which does not need any further experimentation and theoretical consideration. It needs purposeful and energetic introduction, following examples which have proved eminently successful abroad and which to a limited extent have found successful imitators in this country. Farm colonies provide satisfactory opportunities only during the summer months. But the scheme of organizations such as we have in view must provide for such opportunities continuously throughout the year and also be fairly independent of particular climatic advantages. We recommend the establishment of central institutions for vocational training of the tuberculous, under medical supervision, but managed by one or more experienced vocational teachers; any kind of vocation, farming included, to be on the program of such institutions. For what may be termed the "convalescent period" of the patients, beginning with their "graduation" as regards physical and vocational fitness, the formation of squads for "vocational health work" might be made a feature. Such squads, led by some responsible graduate, may serve to form nuclei of new institutions throughout the country, where suitable work might offer itself. The whole scheme in order to be truly successful, we believe ought to be organized on business principles, subsidized

by the Government, but aiming at self-support on a profit-sharing basis.

In the attack on the tuberculosis problem, which is of vital interest to Army and Navy because it is submerged in the general problems of physical fitness and efficiency, the main thing is that we make valid the commands of a broader, deeper vision, which transcends specialistic conceptions. Expert advice and assistance without such a vision will give us isolated schemes and institutions which in their well-groomed appearance will delude us into a sense of perfect achievement while, in fact, they will lack coordination, vitality, and all the elements of true efficiency.[1]

SOME OF THE PROBLEMS OF DIAGNOSIS AND PROGNOSIS IN CARDIO-VASCULAR RENAL PATIENTS.

By Hobart A. Hare, Surgeon, United States Naval Reserve Force.

There are certain conditions of the cardiovascular renal system which are constantly presented to the practitioner of medicine and surgery whether he be in civil or military life. It is not necessary, nor is there space at this time, to enter into a full discussion as to whether renal disease is the primary cause of cardiovascular change, whether cardiovascular change is the primary cause of renal disease, or whether some common factor induces changes simultaneously in the heart, vessels and renal tissues. In certain instances, as, for example, where syphilitic infection has taken place, there can be no doubt of the common etiological factor being present, and, fortunately for our diagnostic, prognostic and therapeutic purposes, the various tests which have been introduced to determine the presence of a recent or old infection may give us such a definite amount of information that the cause is exposed and the indications for treatment are discovered. It is not my intention, however, to deal with cases of cardiovascular renal disease from the ordinary standpoint, but rather to discuss certain points in connection with the manifestations of these conditions, which points are of importance particularly to medical officers, who are not only called upon to express expert opinions, as are civil practitioners, but upon whom an additional grave responsibility rests in that the opinion given to an individual, or to those in authority over him, if correct, may possibly save a ship and many lives, or, possibly, be even more far-reaching

[1] Homer Folks, one of our most experienced workers in the field of social control of tuberculosis, in advocating the coordination of general and tuberculosis relief, lately placed his finger on this sore spot in our relief work at home and at present also abroad. He noted particularly how the parallel separate agencies "bring into the field constant confusion and divisions of responsibilities." Journal of Outdoor Life, New York, 1917, xiv, 229.

in its influence should the function of a particular ship be of vital importance at a critical moment. On the other hand, an error in diagnosis and prognosis may deprive public institutions in civil life, or the Navy in professional life, of an exceedingly able officer and may block the career of a man in whom every one has confidence and whose prospects have hitherto been considered excellent.

The first proposition which may be taken up is the discovery of albumin in large or small quantity in the urine. In much the same way that years ago sugar in the urine meant a diagnosis of diabetes, but does not have that result to-day, so some years ago albuminuria was supposed to be a pathognomonic sign of nephritis, or, to use a more accurate term, of a chronic degenerative change in the kidneys. The mere finding of albumin, unless it is found repeatedly, is not sufficiently diagnostic to do anything more than cause a physician to investigate the case still further. It might almost be said that he who makes a diagnosis of Bright's disease on finding albumin in the urine is in much the same category as the man who makes the diagnosis of tuberculosis because the patient is somewhat under weight and has a cough. The microscopic examination of the urine and a careful examination of the cardiovascular apparatus are essential before an opinion is expressed. If side by side albumin and granular casts are found, and particularly if along with these granular casts red cells can also be seen, then, a diagnosis of chronic parenchymatous nephritis with some acute exacerbation can be made, particularly if the number of red cells is considerable. A multitude of people in all walks of life are going about attending to their affairs with ordinary efficiency who, nevertheless, have parenchymatous nephritis with very considerable amounts of albumin and granular casts in their urine and who do not come to grief until by exposure to some infection or other cause an acute or subacute process is superimposed upon the chronic degenerative change in the kidney which so impairs its activity that acute nephritic symptoms promptly develop and often cause death within a few hours or days, although the patient hitherto may have been looked upon as one in perfect health because of his efficiency and general appearance. The finding of albumin constantly in any quantity associated with the presence of granular casts should, therefore, put a man, holding a responsible position, "on shore," and if, in addition to albumin and casts, red blood cells are found, not only should the recommendation be made that he be relieved of his responsibilities, but that this relief should be given at once, since ordinary exposure may be highly detrimental to the individual and possibly detrimental to the service. Where renal changes are manifestly present and where laboratory facilities, even of moderate degree, are at hand it is of very considerable importance

that an estimation of the nonprotein nitrogen of the blood should be made, and if the nonprotein nitrogen content of the blood is increased the danger to the man is marked. Thus, a prominent lawyer of 58, with a blood pressure systolic 180, diastolic 110, whose urine contained only a trace of albumin and a few hyaline casts, but whose blood showed 53 milligrams per cent nonprotein-nitrogen, felt so well that he insisted on starting on a pleasure trip, but he was seized by an attack of pulmonary edema within 24 hours of the examination of his blood and died before he could be gotten to his bed in the hotel where he was staying, yet I think that anyone who had simply inspected this individual would have passed him as being more than a fair specimen of manhood at his age. It would seem to be pretty clearly established that in patients suffering from failing circulation resulting in renal congestion there is no increase in the nonprotein nitrogen of the blood even if some hyaline casts and albuminuria are present with edema of the lower extremities, but in chronic nephritis of either type at the stage when the patient is in danger the nonprotein nitrogen is greatly increased, sometimes being as high as 180 milligrams per cent, and if it be only 40 milligrams per cent he is out of bounds. When these cases that have blood as well as granular casts recover from an attack they are always prone to other attacks of pulmonary edema or other evidences of uremic poisoning, so called, which attacks may come on with the suddenness of apoplexy on slight exposure after some nervous stress, indiscretion as to diet, and sometimes apparently without cause. On the other hand, it is not to be forgotten that in some instances it would appear that the chronic degenerative process in the kidneys is really very moderate; that the symptoms are precipitated by acute congestion or inflammation of these organs; and that absolute rest in bed with proper additional treatment, and later the avoidance of exposure, may be promptly followed by apparent complete recovery for a very considerable period of time, save that an examination of the urine may constantly reveal the presence of some renal trouble. It may fairly be said that, if such a case presents a considerable number of granular casts, he is unfit for active duty even if his general symptoms for the time being clear up, but he may be sufficiently well to work for a brief space if these casts are few. It is not to be forgotten that a considerable number of hyaline casts has not the grave significance at one time attached to their presence, since many normal urines if carefully centrifuged will reveal a few hyaline casts and some temporary renal irritation or congestion may induce a shower of these casts and thereby mislead the physician if several examinations are not made.

It is, however, in connection with so-called chronic interstitial nephritis with associated cardiovascular change that the physician

will most frequently have to deal with a complex problem. The duration of life of the parenchymatous nephritic is nearly always brief; in interstitial nephritis it may go on for 20 years and during the majority of these years the patient may be efficient and present no manifestations to himself or to his fellows of impairment of health. If he appears for a physical examination it will be found that he has, as a rule, a blood pressure considerably higher than normal, sometimes very high, and it is a noteworthy fact that not infrequently a man with interstitial nephritis and high blood pressure feels that he has quite his usual vigor and, possibly, seems to be more energetic and to have a greater feeling of well-being than some one whose blood pressure is in normal bounds. Such a man is precisely the one in which the most accurate diagnostic and prognostic skill is required. Under ordinary conditions his efficiency may be at the maximum, but no sooner is he placed under unusual strain and stress than his faults become manifest. Either his pressure is sharply increased so that an undue strain is thrown upon his heart and vessels with the result that he suffers from cardiac symptoms, or from retinal hemorrhages or renal symptoms, or he suddenly becomes enfeebled and dyspneic on exertion and presents evidences of toxemia. In such a case there may be few or no granular casts, albuminuria may not be constant, and the condition of his retinal vessels and his vascular system, as shown by the fingers and the sphygmomanometer, may reveal to the physician that at any moment some absolutely incapacitating complication may arise or death ensue.

Retinal hemorrhages are not the only things to be looked for with the ophthalmoscope. Marked compression of the retinal veins by pressure exercised at the point where they are crossed by the arteries is significant of threatened trouble.

The probable duration of life can to some extent be determined by the state of the retinal vessels. De Schweinitz has studied this matter most carefully from the standpoint of the ophthalmologist and we have followed a number of cases together.

These facts are well emphasized by the following figures, which illustrate the duration of life in chronic interstitial nephritis after the occurrence of retinal changes. Belt collected 419 cases, of which 72 per cent died within 1 year and 90 per cent within 2 years. The cases reported from Haab's clinic by Possauer showed that none of the men applying for treatment lived more than 2 years; of the women, 68 per cent died within the same period of time. Of private patients who could live comfortably, only 59 per cent of the men and 53 per cent of the women had died at the end of 2 years. Gruening collected 100 cases, none of which survived more than 2 years after retinal changes began, and Bull found that 69 out of 103 cases died within 2 years. Of the remaining 34, 17 died after a longer

period, and 17 were alive at the time his paper was published. Harlan analyzed 40 cases with the following results: Thirty-three ended fatally at various periods, averaging 4 months; 3 lived a year after the discovery of retinal changes; 3 recovered, and 1 regained his eyesight, although the urine was albuminous at the end of 2 years. Milot traced 34 cases and found the average duration of life to be less than 4 months from the time eye changes were first observed. One of his patients lived 18 months, but all the others died within a year. On the other hand, Webster mentions the case of a clergyman suffering from chronic interstitial nephritis, in whom retinal changes had been recognized 10 or 15 years before, and "who is still living," and Wert had a woman under observation in whom retinal changes had been noticed more than 4 years before he reported the case. Her general condition was much the same as when she came under his charge. I have had under my care a number of patients who have lived from 6 to 8 years, during which retinal hemorrhages have repeatedly occurred, and whose arterial tension has been astonishingly high. Most of these cases, however, with very high tension and retinal changes die from apoplexy or an acute myocardial failure soon after retinal changes develop, the patient often dropping dead without warning symptoms.

Different observers give varying percentages of occurrence of retinal lesions. Out of 935 cases of renal disease, Groenouw found retinal lesions in 209, or 22.4 per cent. The age at which they most frequently are met with is from 50 to 60 years, but they have been seen in adolescents.

Five types of these lesions are recognized by ophthalmologists: (a) typical albuminuric retinitis; (b) degenerative albuminuric retinitis; (c) hemorrhagic albuminuric retinitis; (d) albuminuric neuroretinitis, and (e) albuminuric papillitis. In the first form irregularly shaped white dots or spots appear in and around the macula and may take a stellate form. When the condition is well developed a zone of whitish yellow may surround the head of the optic nerve. Flamelike hemorrhage may also appear. The condition is at first one of hyperemia, then of degeneration, and finally one of atrophy. In the second form the white spots are small, hemorrhages are more limited, and the white zone about the nerve head is not well developed. The third form, as its name indicates, is chiefly hemorrhagic in type and the hemorrhages are large or profuse, while the other changes are insignificant. Only when the hemorrhages are absorbed do these areas become whitish. The fifth form shows that the process has been confined to the optic nerve, so that a papillitis or choked disk is present, the retina being but little involved.

It is important to remember that mere excess of blood pressure, while it may bespeak abnormality, is by no means sufficient justification for shelving an efficient individual. It must be recalled that the use of the sphygmomanometer may, through nervousness and apprehension from the novelty of the procedure, give a record 15 or 20 points higher than that usually present and, if the reading is 185 systolic, undue importance may be attached to this, whereas a second examination within a few minutes, or on another occasion, particularly after a period of rest, may show that the average pressure is probably as low as 160 or 165, which, in turn, is quite within bounds for some persons. The point to be remembered about blood pressures ranging from 160 to 180 is that their prognostic and diagnostic importance depends more upon what is found as to the heart and as to the kidneys than upon any other factor. If the kidneys are right, or repeated examination shows that they are only slightly wrong, a pressure of 180 has not the evil significance that a pressure of 160 would have if the heart is feeble or tired and the kidneys much impaired. If the urinary examination is fair, the point to be determined as to the individual's efficiency should be reached not only by ordinary methods of examining the heart but by studying the difference between the diastolic and systolic pressure after rest and after exercise. If the diastolic pressure is constantly high, above 110 or 115, the high systolic pressure indicates a still greater strain upon the heart, and if the difference between the diastolic pressure and the sytolic pressure be only 10 or 15 points in a case of high tension, in all probability the reserve power of the heart is so impaired by exhaustion or disease that a cardiac crisis or the development of rapid cardiac failure may be expected. Under these circumstances there can be no doubt as to the value of stair climbing or other forms of effort in determining cardiac efficiency. Going up 20 or 30 steps at a fair speed if followed by no rise in systolic pressure, or if followed by a fall, is very significant as indicating that the individual is incapable of being subjected to severe mental or physical stress. In other words, the mere height of the systolic pressure, unless it is so extraordinary as to endanger the integrity of the blood vessels, has nothing like the significance that is possessed by a very high diastolic pressure, a poor pulse pressure, or by a definite fall in pressure on moderate exercise. Many persons with a high blood pressure have developed a compensatory hypertrophy which enables the heart to overcome this *vis a fronte* with impunity, whereas many others with a comparatively low systolic pressure are constantly on the borderland of more or less acute cardiac breakdown.

In other words, as was indicated at the beginning of this article, there are few conditions met with by the medical man in military or civil life in which his diagnostic and prognostic acumen is so

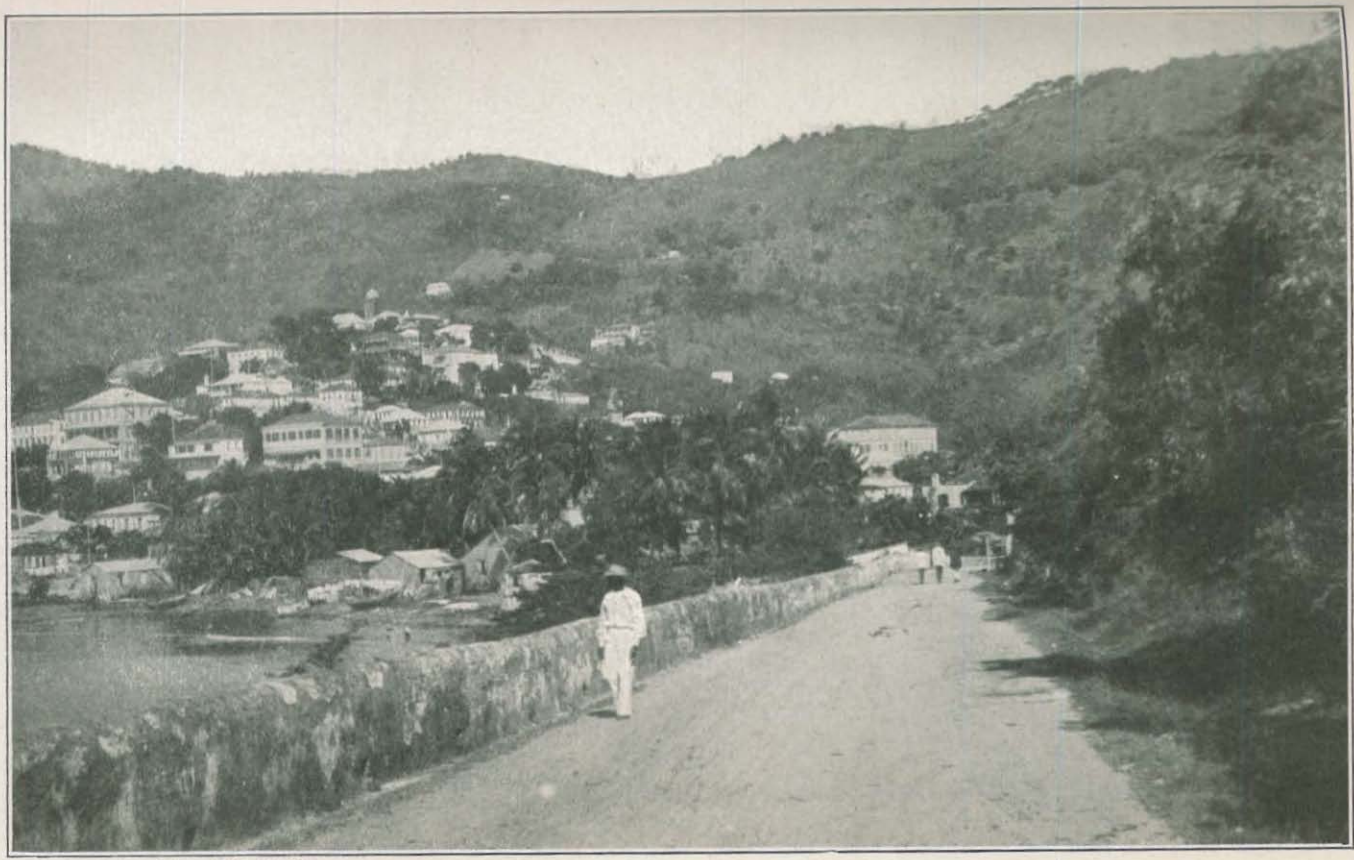


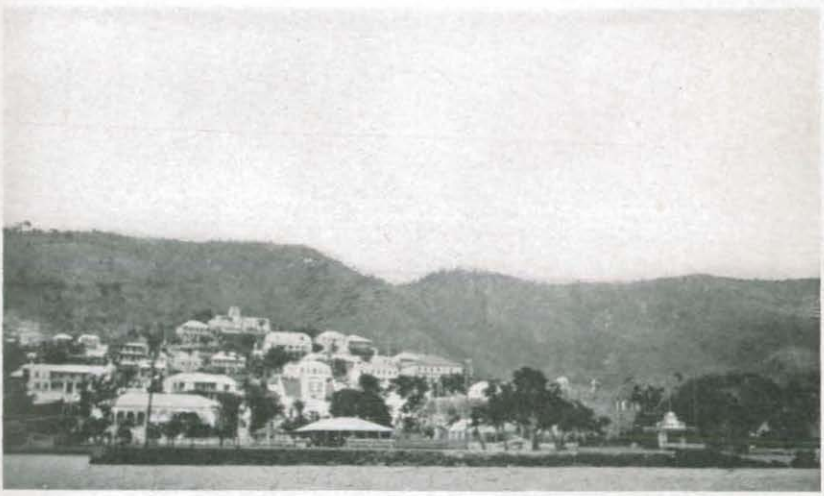
Photo by William H. Rau, Philadelphia.

ROAD IN CHARLOTTE AMALIE, ST. THOMAS.

BIRD'S-EYE VIEW OF CHRISTIANSTED, SANTA CRUZ.

A PICTURESQUE OLD WINDMILL.

HARBOR OF ST. THOMAS, LOOKING TOWARD WEST INDIA COMPANY'S DOCKS.



GOVERNMENT HILL, ST. THOMAS.

Government House is where the flag is flying on the extreme right. Blackbeard's castle is the building on the apex of the hill.

STILL FOR EXTRACTING THE OIL FROM BAY LEAVES, ST. JOHN.

EXPERIMENTAL SUGAR CANE PATCH, SANTA CRUZ.

thoroughly tested as in the study of cardiovascular renal states; there are few in which his professional judgment may be followed by so much credit or discredit, and there are few in which the immediate and possibly the remote future and happiness of the patient more largely depends.

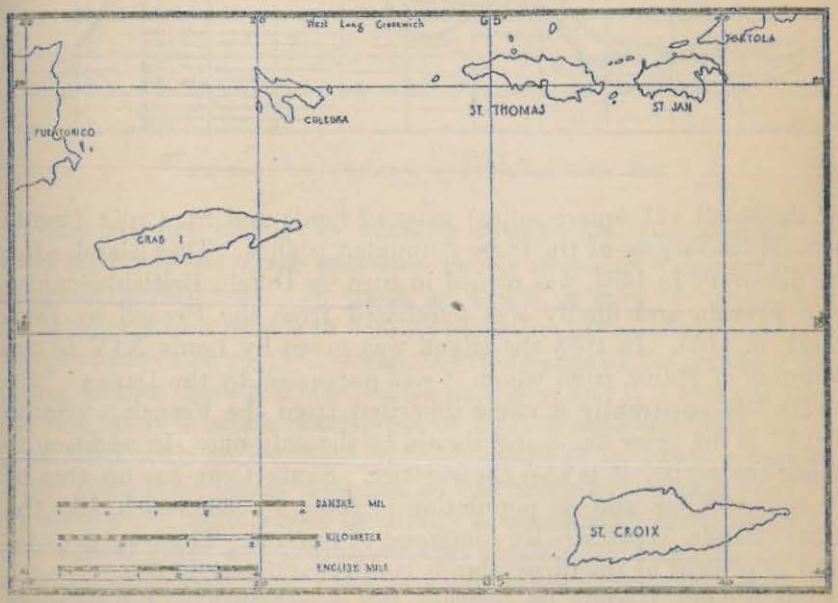
This subject illustrates once more that he who attempts prognosis and diagnosis on one major symptom is faulty, and that correct and accurate conclusions can only be reached by thorough investigation and a careful balancing of all the pros and cons in the case.

Finally, I would like to emphasize the value of the estimation of nonprotein nitrogen in the blood for its prognostic importance in renal cases. I am well aware that it, like all other factors in diagnosis, is not to be given too great importance, but a high nonprotein nitrogen percentage, in association with the other symptoms described, will, like a sudden change in barometric pressure, put the physician in a position to be ready for the storm that may arise.

SOME FIRST IMPRESSIONS OF THE VIRGIN ISLANDS, MEDICAL, SURGICAL, AND EPIDEMIOLOGICAL.

By C. S. Butler, Surgeon, and E. G. Hakansson, Assistant Surgeon, United States Navy.

The Virgin Islands were discovered by Columbus while on his second voyage. It seems that he gave them the name "Las Virgenes" in



honor of St. Ursula and the thousand virgins who were murdered while on a pilgrimage, so the legend goes, by the Huns and buried

near Cologne. (See Encyclopædia Britannica, 11th ed., Vol. XXVII, pp. 803–804.) There are about 100 islands in the group, mostly uninhabited, and their total area is not over 500 square miles. The group belongs to the Leeward Islands, which extend from Porto Rico in a chain to east and south as far as Martinique. Leeward refers to their less exposed position as regards the northeast trades than the Windward group. Great Britain and the United States now own the whole of the Virgin Islands. Vieques and Culebra belong geographically to this group and were in possession of the United States before the purchase of the Danish Islands. This purchase increased by about 135 square miles the area held by the United States in the group, and the islands transferred in this purchase comprise St. Thomas, with the pretty little city of Charlotte Amalie as capital; St. John, the 900 inhabitants of which are mostly collected around Coral Bay and Cruz Bay, on the east and west ends, respectively,

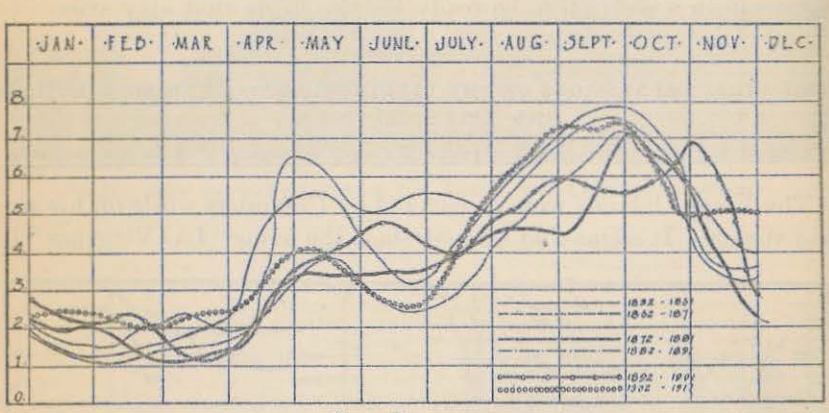


CHART 1
RAINFALL CURVES TAKEN IN PERIODS OF 10 YEARS (1852-1911) SANTA CRUZ

of the small (21 square miles) mass of land; and St. Croix (Santa Cruz), the largest of the three populated islands. This island, after its discovery in 1493, was owned in turn by Dutch, British, Spanish and French, and finally was purchased from the French by Denmark in 1733. In 1653 the island was given by Louis XIV to the Knights of Malta, from whom it was purchased by the Danes. "St. Croix" is apparently a name inherited from the French. "Santa Cruz" is the prior name and should be the only one. In addition to being the earlier it is also the prettier. Santa Cruz has an area of 84 square miles, and its population is about 14,000, which, like the other islands, is principally composed of negroes. The total population at present of the three islands is approximately 25,000.

The Virgin Islands lie between the seventeenth and nineteenth parallels of north latitude and in longitude between 64° 10′ and 65° 30′ west. The mean temperature is 74° F. and varies about

10 degrees on either side of this figure for summer and winter. The trade winds blow over the islands for a considerable part of the year and add materially to their healthfulness and comfort. Rainfall on the several islands is about the same and amounts on an average to 46 inches in the year. January, February and March are the dry months, after which there is a gradual rise in the rain curve till October, which is the month of greatest rainfall. The rain curve shows a slight rise in May, but there do not appear to be two rainy seasons, and the cause of this secondary rise is unknown. July, August, September and October are the months during which hurricanes are liable to occur. The configuration of the three islands is mountainous, so that water quickly tumbles home to the sea or soaks into the ground, usually not to appear again.

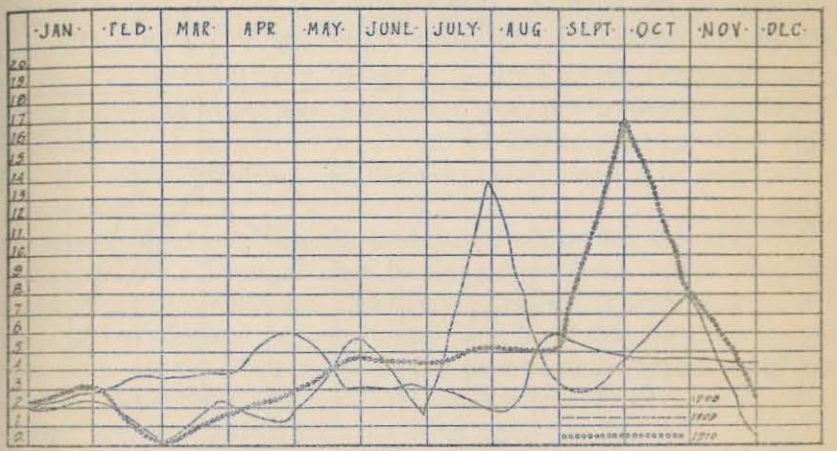


CHART 2.
RAINFALL CURVES (SINGLE YEARS) SHOWING THE EFFECT OF HURRICANE YEARS 1909 1916 SANTA CRUZ.

There are few springs or running streams and the question of water supply is one of the numerous knotty problems which confront the naval government. To create an axiom, it may be stated that the happiness of a race is in direct proportion to the abundance and purity of its water supply. Judged by this standard, the people of the Virgin Islands should be abundantly unhappy, and it is thought that this is a fairly accurate description of their present condition. Cisterns filled with an emulsion of roof washings in which mosquito larvæ spend their tender moments of life absolutely unhampered by any enemy and wells whose proximity to somebody's privy seems to be a studied effect and guarantees that bacillus coli shall not perish from the earth constitute the sole water supply of 25,000 people.

The nondisposal of night soil is effected generally by privies or pits, and these are cleaned when the householder is faced with the necessity of emptying the pit or moving out of the premises. It is

said that he often chooses the latter alternative. When one of these pits is emptied it disturbs the atmosphere of the stilly night for many square miles and reminds one of dear old Baltimore a few years back. On one occasion one of the writers was awakened from a sound sleep by the odor from one of these emptyings. He immediately reached for his gun, thinking it was a gas attack by the Germans. This is a slight exaggeration, but may give point to the assertion that pits are not good for the health and comfort of a community.

St. John is the best watered of the three islands, and it is there that most of the malaria is seen. The Anopheline responsible for its transmission has not been identified; and though repeated searches have been made, these have hitherto been without success both there and here on St. Thomas. It is notable that the few foci of malaria are in the vicinity of small swamps or brackish ponds, and it is

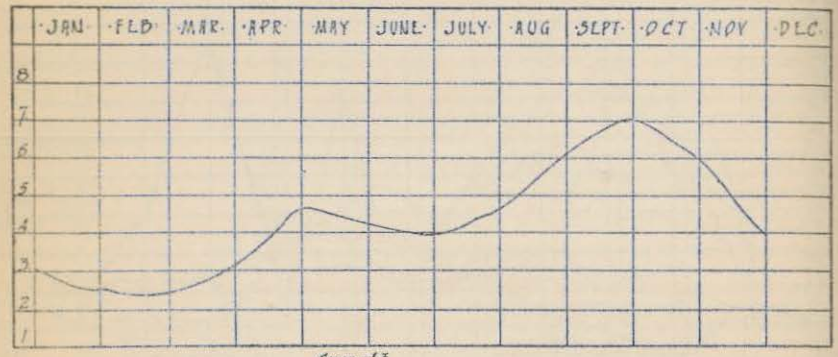


CHART 13
RAINFALL IN INCHES · AVERAGE FOR 60 YEARS · SANTA CRUZ

probable that the malarial transmitter breeds in crab holes or in water-containing crypts of trees or plants. Malignant tertian and quartan are the types of malaria hitherto seen. Benign tertian is rare, if, indeed, it occurs at all.

St. John is interesting rather from the beauty of its scenery and the large number of ruins of old estates than from the character or variety of its diseases. It must, in former years, have supported a considerable population. This is shown by the number and size of ruins which mark old estates. These doubtless required large numbers of slaves to properly run them. The island is dissected by miles of ancient stone walls and narrow roads, often cut out of the solid rock, over which carts carried the sugar to one of the ports for shipment abroad. In riding over the island one gets some exquisite views of land and sea. Turquoise-colored bays fringed with marble-white coral beaches vie with azure skies in the profligacy of their beauty.

Outlying keys protect snug little harbors, which made the section a paradise for the buccaneer in the seventeenth century.

Since slavery was abolished in 1848, the population of St. John has steadily decreased until now no more than 900 natives remain. The sloth of the negro, combined with bad land laws, has reduced the remnant to a state of abject destitution. The soil in many places is fertile, cattle raising is easy owing to the guinea grass and fish abound in the surrounding waters. Yet in the midst of these possibilities the people are on the verge of starvation and the once beautiful estates have reverted to tropical jungle. The bay tree (Pimenta acris) grows well on the island of St. John. The leaves are collected, their oil extracted by distillation, and bay rum made either by mixing the oil with a low-grade alcohol or, better, by distilling this mixture of oil and alcohol.

St. John's highest land is Camel Mountain, 1,250 feet. Another point almost as high is Bordeaux, which has the distinction of having a village on its small apex. Most of the time of the villagers is consumed in trying to get food and water from the lowlands up the difficult trails. A short distance south of Bordeaux, near Reef Bay, is a cliff upon which one of the few remaining Carib inscriptions may be seen.

The natives of the Virgin Islands are a subject for the study of the anthropologist. Brought over in slave days from Africa, they, of course, fetched the diseases and habits prevalent in their native land. Such of the diseases as found conditions favorable for their spread have been passed along down to the present time. Hookworm disease, schistosomiasis, filariasis, and other infections have, in all probability, been introduced into the West Indies in this way. Sleeping sickness was undoubtedly also brought over, but never spread because of the absence of tsetse flies. Hookworm infection has been found on Santa Cruz in the neighborhood of one of the sugar factories, where, with soil pollution in evidence and a barefooted population, one could easily predict its presence. This disease is not widespread, however, and the reason is that the rural population is sparse, the people tending to live in the towns, the night soil from which, while poorly disposed of, is at least prevented from widespread pollution of the earth. The fact, too, of the dryness of the soil during a considerable part of the year very likely interferes with the proper evolution of the life cycle of the worm.

In temperament the negroes here are quite different from the negroes of our South or from those brought up under Spanish, French or English rule. Two casts are recognized—negroes and colored, the latter not being pure blacks. Their method of speech is peculiar and not devoid of interest and amusement to the foreigner. It is English modified by contact with many other races. The in-

tonation and modulation of the voice are Danish, perhaps, which with English words give the effect of a negro speaking with an Irish accent. They are polite, cleanly in person and inclined to be melancholy (this, too, is doubtless a Danish inheritance). Irresponsible in the discharge of their work and comparatively inefficient, they are, nevertheless, dignified and capable of being "insulted." An employee reported two separate insults from his associates in the course of one day's work. A peculiar habit which many natives have, and which may be psychopathic or normal to the species, is talking aloud to some imaginary person as they walk along the streets. This conversation is, at times, quite spirited though one-sided and is accompanied by all necessary facial and gesticulatory punctuation. The outlying natives pay no attention to these conversations, though they appear to understand what its all about, and the replies being given by the absent party. They are quite superstitious and many of them believe in obiism. This is a kind of sorcery or conjuring. It is an inheritance from Africa and is practiced by negroes of other West Indian islands. Certain individuals are supposed to be able to work a conjure to the disadvantage or even the death of those under the shadow of their displeasure.

Filarial conditions are widespread, the percentage of people showing one or more of them varying in the different islands. A conservative estimate of the extent of this infection is 25 per cent.

Illegitimacy is the rule, about one child in five being legitimate. Girls of 13 or 14 often become mothers. Pellagra is quite common and results in many deaths. Venereal diseases are widespread and amongst the natives little attention is paid to them. With admirable naïveté, a chancre will be explained as the result of catching cold, or gonorrhea as due to a strain. Drinking is common with both sexes. This is of the steady rather than the acute hilarious type. Two fairly satisfactory drunks can be purchased for from 10 to 20 cents. This is due to the high voltage of Santa Cruz rum. The teamwork, or tobacco smoking and alcohol drinking, is thus admirably expressed by St. Thomas's chief physician, Dr. Mortensen. "There is no doubt in the mind of the narrator that the smoking of tobacco greatly furthers drinking; it is soon found out that alcohol is a splendid antidote for languidness, brought on by the use of tobacco; after the drinking they feel so revived that they can start smoking again."

Under the Danes the practice of medicine was regulated largely from Denmark. Crown physicians were appointed, and these (one in St. Thomas and one in Santa Cruz) had charge of practically all medical and public-health affairs. They also had charge of the marine quarantine. Public physicians looked after the needs of the population, and those people who could not pay were not charged.

SMALL NATIVE DOORWAY MARKET, ST. THOMAS.

HEAD WAITER OF A HOTEL, ST. THOMAS, IN "FULL CRY."

AN OVERRIPE SURGICAL CASE.

HOSPITAL AT CHRISTIANSTED AFTER THE HURRICANE OF OCTOBER, 1916.

FRONT VIEW, UNITED STATES NAVAL HOSPITAL, ST. THOMAS.

A PAVILION OF THE NATIVE HOSPITAL, ST. THOMAS.

This nonpay portion represents a majority of the population. There are three hospitals in the islands, one at each of the principal towns. Lack of money to properly build, equip, and maintain these establishments has greatly handicapped their usefulness. All of them are crowded with poor patients, and the doctors who have hitherto had charge of them have been so overworked and had such a multitude of outside duties that it was impossible to look after the work as it should be done. This is no criticism of the Danish physicians who have had to struggle with the proposition. They should have been backed with money, a working and nursing force sufficient to care for the needs of the people and buildings and equipment proper to the amount of work. Owing to the lack of sanitation throughout the islands, disease incidence and death rate are high. Poor water supplies, lack of sewage disposal, lack of effort to limit mosquito breeding and other shortcomings have made of the Virgin Islands veritable lazarettos. Yet there is not a laboratory in the entire group. There is a mass of potential surgical work in sight, but practically very little surgical work is ever attempted. Imagine a hospital of 100 patients of all types, including insane, with only one nurse who knows anything about practical nursing, with no laboratory, no facilities for modern diagnosis and only one doctor to run the place. This is the state of affairs in each of the three hospitals. Of course, one can not invariably diagnose malaria, typhoid, dysentery, syphilis and a hundred other complaints to which man is heir, if all he has to do it with are his bare hands and a thermometer. Of course, surgical work must stand as it did in the days of Ambroise Paré, if such essentials as sterilized dressings must needs be prepared in Denmark and shipped out, supposedly ready for use. There has been too much long-distance control of the medical proposition here, too much of the "you-do-it" attitude, with no provision made for proper facilities and a sufficient and trained personnel.

Medical practice is further complicated by the small number of people who can pay a doctor's bill. Of the 25,000 people, it is very unlikely that four or five thousand of them are able to pay for medical service. This throws a considerable burden upon the Government, for as stated above, the disease incidence is high. There must be an outlay for hospitals, medicines, midwives and doctors, and those cared for must include lunatics, lepers, pellagrins and those disabled from filariasis and syphilis. In other words, there is a large number of chronics who are a perennial expense to the State and an economic burden long before death terminates their woes.

As regards the social and sanitary aspects of the Virgin Islands, it would seem that the causes which operate to give high morbidity and mortality are: (a) Lax observance of the laws relating to mar-

riage. To this is attributable the high rate of illegitimacy and of venereal disease and indirectly the high infant mortality. (b) Poor food conditions leading to undernourishment and pellagra. (c) Poor sewage disposal and defective water supplies, leading to numerous intestinal disorders: diarrhea, dysentery, and typhoid. (d) Long-continued encouragement to house breeding of mosquitoes, which has caused the high rate of filarial infection and high morbidity from this cause. In this connection it may be pointed out that Stegomyia, which is the common house mosquito here, breeds preferably in rain water. It is common in cisterns and yet rare in wells, even though these be shallow and open at all times. It has occurred to the writers that a possible explanation of this is that the insect may lay her eggs after a rain in the water-holding depressions common in house gutterings. The eggs stand drying well and later rains may wash these into the cisterns where they hatch and thus increase the numbers of insects in the cisterns. If correct, this would complicate the question of rendering cisterns mosquito proof.

Regarding the botanical features of the islands, it should be stated that the hurricane in October, 1916, wrought destruction to the palms and other trees of the islands and the dry season that followed this calamity allowed the plant vegetation to live only by its roots. So that on their arrival, the Americans found barren islands with ashy gray hills.

A month later the daily showers of the rainy season began, and within a week the hills were green, covered with thriving tufts of the naturalized guinea grass (Panicum maximum), and a multitude of tropical plants which soon had their richly colored flowers giving fragrance to the air.

Of the 1,000 floral species found on these islands, only a few are important in pharmacology. Ricinus communis, from the seeds of which the castor oil is pressed, is very common. The natives are familiar with the physiological action of the seeds and harvest their dose of castor oil as needed.

Acacia arabica is naturalized in some places around dwellings. There are many other varieties of acacia. Acacia farnesiana grows abundantly. Its wood is used for making charcoal, an important industry on these islands, where practically all cooking is done on the coal pot. Guaiacum officinale (Linné) or lignum-vitæ, from the resin of which the guaiac is obtained, was formerly common. A few of these beautiful trees are still seen in parks and along the seashore.

Thymus vulgaris is cultivated in many places. From the flowers can be obtained the oil of thyme, which contains the important thymol. Zingiber officinale (ginger) and Pimpinella anisum (anis) are cultivated extensively for use as spices in "mabee," the native

drink of the island. This is made from the bark of Colubrina reclinata (the mabee tree).

Other pharmacological plants found here are: Capsicum frutescens, or cayenne pepper, called bird pepper by the natives; Cinnamonum zeylanicum; Foeniculum vulgare, from which the fennel seed are gotten; Chenopodium ambrosioides grows in a few places on walls. A few species of Gossypium are common; they were formerly cultivated on the island. G. barbadense (sea-island cotton) can be grown. Coffea arabica grows in shady localities. It has been cultivated on a small scale, principally on the island of St. John. Lime (Triphasia trifoliata) is abundant. Datura stramonium, Quassia amara, one of the plants from which quassia is obtained, Rosa gallica and Rosmarimus officinalis about complete the list.

The unwritten pharmacopœia of the negro inhabitants comprises, however, a larger number of plants. Their therapeutic wisdom is not limited to a few medicine men, but is a matter of more general knowledge. Even the children willingly inform one how to treat the ailments of man. Every disease or symptom has its remedy. A certain kind of leaf is put on a wound, another kind on a sore joint. The colic has its tea, and the cough its balsam. For worms, take wormseed (Spigelia anthelmia); for indigestion and fever, drink the tea made from sour sop (Anona muricata). In their treatment of "jaundice," the native name for malaria, "similia similibus curantur" has been the guiding principle, a tea made of the yellow love weed (Cussuta americana) being invariably used until the doctor's little white tablets stop the chills.

The Manchineel tree (Hippomane mancinella) deserves to be mentioned. Its innocent appearance and tempting fruit have led newcomers to do more than look upon it—a disastrous mistake. The tree is highly poisonous in all its parts, and its milky juice exuding from the slightest cut produces an intense inflammation at the site of contact. It is said by the natives that even the rain water dripping from its foliage will produce an eruption on the skin and a severe conjunctivitis. There are many other poisonous and supposedly poisonous plants feared by the natives and occasionally used for homicidal purposes. The flora of these islands offers many interesting fields for investigation. The small area on which the numerous species grow makes the islands as convenient to the botanist as a botanical garden.

The practice of pharmacy is carried on according to the Danish laws and regulations. A few remarks about this system, which differs so widely from ours, may be of interest.

In the Kingdom of Denmark the Government has complete control of the number and location of drug stores. The principle according

to which drug stores are established is that the population should get their medicine without too much travel and inconvenience, and yet that the apothecary should get a trade that insures him a good income without the strain of competition. If local authorities find their community in need of a drug store, an application for such is made to His Majesty the King, via the supreme board of health. Should these authorities find that the demand is justified and that the place can support a business of that kind, it is granted that a drug store be established in such and such corner or house. An announcement of the vacancy is made and applications from pharmacists are in order.

There are three grades of diploma issued from the Danish College of Pharmacy. Only pharmacists rated one or two are qualified for the privilage of running a drug store. The grade of diploma, number of years of experience, professional merits and scientific work done are the main factors to determine a choice. The privilege of having a drug store is granted for a lifetime to the successful candidate. He pays no tax for this monopoly and is independent of the Government in his business. He may resign at any time, with the permission of the authorities, and his successor, appointed in a similar manner, is obliged to buy his stock and place of business. This form of drug store is called "real," and is the only kind established since 1830. Before this year the privilege of having drug stores did not return to the Government with the death or resignation of the appointee, but the privilege was his personal right, which he could sell at any time to any qualified pharmacist for any price he could get. These drug stores are called "personal" and were not changed to "real" when the new law went into effect.

There are three drug stores in the Virgin Islands, one in each of the three towns. The ones in Charlotte Amalie and Christiansted are "real"; the one in Fredericksted is "personal." The history of Apothecary Hall, in St. Thomas, illustrates the system. It was established about 1830 and kept by the successful pharmacist until 1883, when he transferred it to his two sons and retired, spending the remainder of his days in a suburb of Copenhagen in his magnificent villa, "St. Thomas," entertaining royalty and nobility. His sons managed the business up to 1913, when the present owner bought it for $76,000.

This sketchy and unsatisfactory article will perhaps suggest to the reader some idea of the problems pertaining to medicine and the public health which must be solved here. Under the Danes medical matters have evolved to the condition of paternalism. This was, in some ways, a matter of necessity. In others it would seem that there has been a failure to make the island population assume all the responsibility it should bear and to educate it to a complete sense of self-responsibility. To bring this about will take many years

and many kinds of teachers. It is our opinion that the medical teachers and nursing teachers should not come to the Virgin Islands with the idea of money-getting, but rather with that of service—service which will eventuate in better things.

In the preparation of this article the writers have to thank Lieut. Commander William R. White, United States Navy; Dr. Oliver L. Fassig, of the United States Weather Bureau; and Mr. James A. Donohoe, United States Navy, each of whom has rendered much assistance in its preparation.

THE TRAINING CAMP, NAVAL RESERVE FORCE, SECOND NAVAL DISTRICT.

By D. N. Carpenter, Medical Inspector, United States Navy.

The present interest in training-camp organization and buildings warrants the publication of this description of the Naval Reserve training camp at Newport, R. I.

When it became necessary to enroll a large number of men for the defense of this Second Naval District, it was found difficult to secure suitable buildings as barracks in Newport. The mission of the military commander of the district was to call into active service and quickly train as many men as possible. Although the military situation was paramount, it became necessary for sanitary reasons to limit the number of men until proper accommodations could be provided. It was a source of considerable anxiety to the medical officers that the personnel was scattered through the town in various boarding houses, hotels, Army and Navy Y. M. C. A., Newport Y. M. C. A., and church parish houses.

During the first three weeks of organization the men were attached to the naval training station, but, owing to the great influx of recruits for the regular service, it soon became necessary for the Reserve Force to move to Newport, where headquarters were established in a State armory on Thames Street. At first this armory was used to quarter men but, as it is dark and gloomy, it is now used for members of the reserve crew while on duty. In this armory, which is at the head of the wharf where the patrol boats come in, is located the dispensary for this section base. Proximity to the boats is essential for dispensary service throughout the district.

There were several schemes for housing the men pending the construction of barracks that for one reason or another fell through, such as utilizing a Fall River liner, renting hotels at Jamestown, leasing the bathing establishment of the Newport Beach Association, etc. The camp sites available in the vicinity were limited. The Cloyne School athletic field between the Training Station Road and the hos-

pital was finally offered, free of charge, through the patriotic generosity of the owner, Dr. O. W. Huntington. This field slopes in two directions—toward the water and toward the main road. Water and sewer connections were both near by. The field is easy of access for supplies of all kinds and is relatively sheltered from the bleak winds of winter. Proximity to the naval hospital was an objectionable feature, but with the present method of handling contagious diseases in the same grounds and even in the same building of a general hospital this objection was not sufficient to outweigh the several advantages of this site.

It was first intended to have the men quartered in tents on the field, but as it was impossible to obtain tents it was decided to build wooden barracks. Plans for these barracks were modified to suit the special needs of this camp. The general plan was that of the type for mobilization camps issued by the Quartermaster Department of the United States Army. The appended sketches have been taken from the blue prints of the plans used in the construction of these buildings. A general description, furnished by the public works officer, Samuel Gordon, Civil Engineer, United States Navy, is as follows:

Sills: Two pieces 2 by 6-inch spruce, supported every 7 feet by 6-inch cedar posts.

Floor joist: Two by 6-inch spruce, 17 inches on centers, 10-foot span.

Studs: Two by 4-inch spruce, 7-foot centers, with 2 by 6-inch plate.

Rafters: Two by 4-inch spruce, 21 inches on centers; pitch of roof, 1/4.

Sides of buildings are covered with 1 by 12-inch hemlock, placed vertically, and one layer of single-ply ready roofing. Battens of 1 by 3-inch spruce are nailed over the joints of the 1 by 12-inch boards, holding the ready roofing in place.

Roof consists of 1 by 12-inch hemlock boards, covered with two-ply ready roofing.

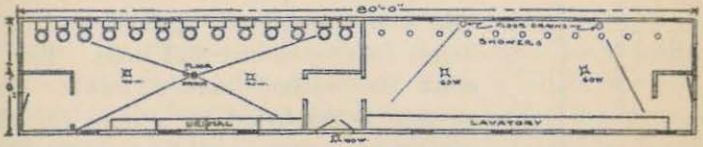
Floor is 1-inch tongued-and-grooved spruce of random lengths and widths.

Interior walls are sheathed with 1-inch tongued-and-grooved spruce of random widths. Ceilings are of three-ply wall board.

The interior fittings of these barracks are quite complete and practical. The kitchens are equipped with electric ovens, and the mess halls are provided with tables and benches, utilizing the cafeteria method to quickly furnish hot meals. Outside the kitchen doors are screened racks for garbage cans. Each barracks can accommodate, without overcrowding, 80 men, which provides a minimum distance of 2 feet between cot frames.

Although the barracks are classed as "temporary," they can be made suitable for winter by closing in the outside space between the floors and the ground and sheathing and ceiling the interiors. The numerous windows will provide adequate ventilation for summer, while for winter use when the windows are closed, ventilating louvers will be installed in the roof of the buildings. A steam heating system with a central heating plant has been been approved for winter use and its installation begun. The barracks will not only be heated by this method, but the hot water for the kitchen and for bathing and washing purposes in the lavatory will be thus supplied.

The barracks, mess hall, lavatories, sick bay, supply and administration buildings are screened throughout and have screen doors. All the buildings are lighted with electricity obtained from the city of Newport. Between each cot are hooks for men's duffle bags, and it is expected to provide racks for their ditty boxes. Each mess hall will have a twin bubbling drinking fountain with an ice cooler attachment, supplying Newport water. A group unit of these barracks consists of a mess hall with a barracks on each side and a latrine in the rear. The latrines are equipped with sanitary toilet



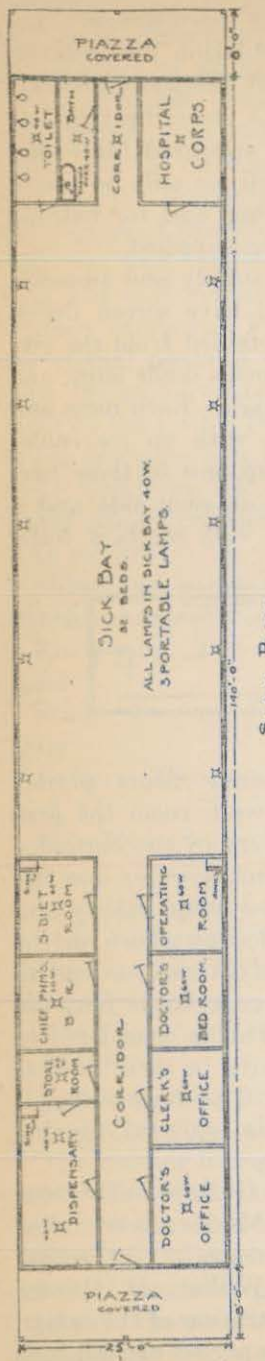
LATRINE

bowls, shower baths and wash sinks. Concrete floors permit these buildings to be easily cleansed. In the wash room the men scrub their clothes and dry them on lines in front of the barracks. The building for general stores has a large refrigerator for the storage of fresh meats, butter, etc., and a butcher shop, bakery and dry storeroom. The sick-bay building is divided as shown in the plan and is used for the cases of trivial illness not sick enough to send to the hospital. Such a building permits cases to be removed from barracks and placed under observation. This is considered to be of special value to check contagious cases early in their incubation and secures a certain amount of isolation. The daily sick call is held in this building and dispensary service rendered for the camp.

For the destruction of garbage and refuse the Guthrie incinerator of the type recently used by the Army on the Mexican border has been built. The following recommendations made by the senior medical officer of the Newport section, Surg. William D. Owens, United States Navy, govern the sanitary administration of the camp:

The medical officer of the day is on duty for a period of 24 hours, during which period he does not leave the camp except to answer an

emergency call. Sick calls are held at 8.15 a. m. and at 3 p. m. The medical officer of the day is responsible for the care of patients in the sick bay. The senior medical officer makes the necessary inspection of the camp, including the sanitary conditions, and inspects all fresh provisions that are received. He also inspects the meals to ascertain if they are properly cooked. A sanitary police force to eliminate mosquito-breeding places, flies, etc., is under the direction of the senior medical officer. The camp sanitary orders include the prevention of urinating and defecating on the camp grounds, the maintenance of proper ventilation in all buildings, the use of handkerchiefs and instruction concerning the spread of disease by coughing and sneezing, daily airing of bedding, orders against the use of other men's towels, borrowing pipes and cigarettes, lying around the camp grounds and on other men's cots, and instructions against putting dirty hands in the mouth and nose. The hands must be washed before meals. The fly menace is combated by orders for the use of flytraps in every building, preventing men from contaminating the grounds with foods and other material favorable to the breeding of flies, keeping the garbage cans in special fly-proof racks outside each mess hall and moving these covered cans to the incinerator for the destruction of contents. Efforts are made to eliminate the rats along the adjacent beach. A liberal number of spit kits are provided and waste-paper cans to prevent throwing waste papers about the grounds. Educational prophylaxis against venereal disease is very actively conducted by the senior medical officer, W. D. Owens. Posters, lectures, and the reservist newspaper are the means employed, and it is expected to use stereopticon views and moving pictures when possible. To quote Dr. Owens in his talk to the reservists: "During the war a man is dishonest to himself and to his country who contracts through self-indulgence a venereal disease. The individual who deliberately incapacitates himself for



rendering that service to his country for which he enlisted is in the same category as the man who intentionally raises his hand above the trenches that he may be shot and thus avoid further service. I desire to impress upon every man the need to keep himself clean of venereal diseases, and also by his good example to help encourage his shipmates to avoid temptation. If we are to be victorious in the present struggle, it will be necessary for everyone to inculcate strength of character so as to resist temptation, for only by giving the best can we win the war." Surgeon Owens also keeps a watchful eye on the communicable diseases by means of a diagram in his office. A measles census was made of the camp and is kept available for consultation in cases of transfer of men.

The contract for building the camp was awarded to Darling & Slade, and on May 14 the work of construction began. The first two units were ready for occupancy on June 21, and 320 men were moved into the camp. The remaining units are being occupied as fast as they are completed. Close by the camp is the Cloyne House School, a large commodious building with beautiful grounds, filled with rare plants and trees. When the reserve force began to enroll Dr. and Mrs. Oliver W. Huntington established a clubroom in the gymnasium of the school, with books, magazines, games, etc., and provided a lunch counter for the use of the men. At present the Huntingtons are using Cloyne School for a cooking class, a school for cobbling and repairs for clothes, which they conduct under the auspices of the Government. A road at one side of Cloyne School leads to Coddington Point, over a bridge that was constructed to cross a small estuary. The Playground and Recreation Association of America built this bridge and laid out recreation grounds, and in cooperation with the Newport Chapter of the Red Cross secured and equipped a house which has been opened as a service club for the men. The barracks on Cloyne Field will provide quarters for 1,600 men until the buildings are sheathed and ceiled for winter use, when the cubic air space per man will make it necessary to reduce the number of men in each barracks from 80 to 60. The camp will then provide quarters for 1,200 men.

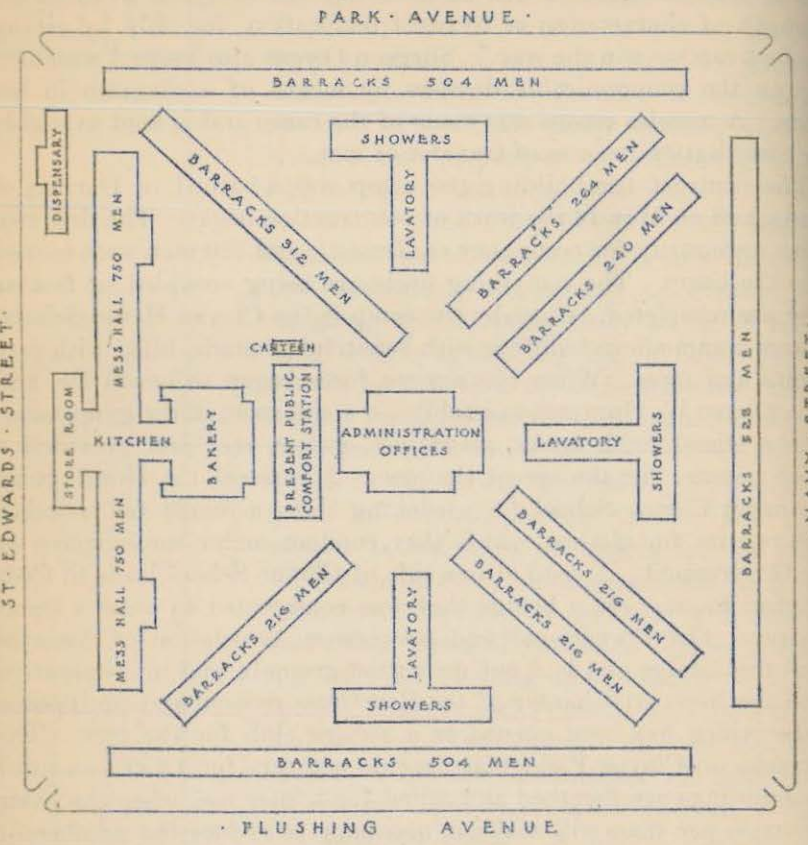
TEMPORARY BARRACKS AT CITY PARK, BROOKLYN, N. Y., A PRELIMINARY SANITARY SURVEY.

By W. S. Pugh, Surgeon, and R. Jansen, Assistant Surgeon, United States Navy.

General considerations.—The temporary barracks at City Park are located in the heart of a congested district. On the Navy Street and St. Edward Street sides are three-story brick tenements occupied by Italians of the poorer class. The navy yard is located on the Flushing Avenue side, and on the Park Avenue side are a number of dilapi-

dated, two-story buildings, also occupied by Italians. The neighborhood, from a sanitary standpoint, is undesirable. The park comprises about 6 acres.

The following buildings constitute the establishment at City Park: Nine barracks (quarters); three latrines; a kitchen; two mess halls; an officers' mess hall; a hospital; a guardhouse; an administration



· PLAN · OF · TEMPORARY · BARRACKS ·
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building; a canteen, and a public-comfort station. Collectively they occupy 114,240 square feet, or about 35 per cent of the park area.

The buildings are disposed about a central administration building. Six of the barracks are located on lines radiating from the administration building. Three of them and the mess halls are situated parallel to the sides of the park. The latrines, of which there are three, are T-shaped, and are placed with the vertical extensions radiating from the administration building and the crosspieces

parallel to the sides of the park. The granite public-comfort station, the boiler house, and the kitchen are located on the St. Edward Street side. The hospital is located in the southeast corner, parallel to St. Edward Street. The guardhouse is situated at the northwest gate.

This arrangement of buildings is quite artistic on paper, for it gives the appearance of a rosette. In practice it has one objectionable feature. Except for the barracks facing Navy Street, the mess halls and the hospital, only one side of the barracks can ever receive direct sunlight. The shaded side is liable to be damp. The buildings excepted lie in a north and south line and, therefore, receive an equal amount of sunlight on each side.

The structure of all the buildings is practically the same, regardless of their use. They are wooden, frame buildings, with double slanting roofs, built over two layers of beams resting on concrete posts. The finished floor surface is raised about 18 inches above the ground. The floor is of two thicknesses of wood, with a layer of paper between. The sides are constructed from without, inward of $\frac{7}{8}$-inch siding, heavy paper, $\frac{7}{8}$-inch sheathing, 2 by 4-inch studs spaced 16 inches apart, heavy paper, and $\frac{7}{8}$-inch sheathing. The roof is of $\frac{7}{8}$-inch sheathing covered with heavy tar paper. The ceiling is of $\frac{7}{8}$-inch sheathing. Doors and transoms are cut in the inner side and windows in the outer side. The kitchen and mess halls have a clear story with windows cut in both sides. On the inner side of the barracks the roof projects about 8 feet and the ground is covered with concrete. The floors of the latrines are to be of concrete instead of wood. The kitchen floor is marbeloid. The buildings are painted gray without, and with linseed oil within.

The construction of these bulidings is as good as one can expect in a temporary cantonment, and will meet the various sanitary requirements. The thickness of the tar paper on the roof will prevent leakage for a long time. The three thicknesses of wood, two thicknesses of paper, and the air space between the inner and outer sheathings of the walls will afford good insulation to prevent the escape of heat. The floor will probably be dry, although it would have been much more desirable to have concreted the ground beneath the barracks.

The barracks.—The various buildings for barracks are divided into compartments 40 feet long. A detailed study of any of them is applicable to all. They are 26 feet wide and 12 feet high, except at the sides, where the roof, which slopes to both sides, cuts off the corners. The floor space is 1,040 square feet. The gross air space is 12,000 cubic feet. Each barrack is being equipped with 24 double-deck beds, the frames of which are of iron piping. Being planned

for 48 men each will afford a floor space of 21.6 square feet per man, or 43.2 square feet per double-deck bed, and an air space of 250 cubic feet per man.

As will be seen below, the ventilation is rather better than what usually obtains in barracks. But, apart from ventilation, there are sanitary requirements relative to air space and floor space. Double-deck beds are very objectionable, for, in spite of liberal ventilation in a compartment or in the absence of a separate louver for each lower bunk, the circulation of air in these is very slight. The spread of the ordinary contagious diseases, as measles, mumps and meningitis, and of tonsillitis, influenza and pneumonia, is favored by crowding both as regards floor space and air space. At least the nose and mouth, as in sneezing, coughing, and even in talking. Their firing distance, so to speak, is not very great, and is usually below 5 feet. Still, their prevention is more certain where men are not crowded. Danger from these diseases is relatively greater ashore and in a large city than afloat. Hence, it is desirable to avoid overcrowding both as regards floor space and air space. At least the United States Army requirements of 50 square feet of floor space and 500 cubic feet of air space per man should be met. It would be even better to meet the recommendation of Army medical officers for a minimum of 600 cubic feet. However, as planned we shall have only 21.6 square feet of floor space and 250 cubic feet of air space per man. To meet the higher requirement the medical officer recommends that each compartment be used by only 24 men instead of by 48.

The natural ventilation of each compartment is quite ample as regards the volume of air that may enter and escape. The distribution of pure air, however, will not be so satisfactory owing to the use of double-deck beds. Each compartment has two doors, two transoms, and four windows. Collectively, these measure 14,544 square inches. By figuring on the basis that 8 square inches of inlet and 8 square inches of outlet permit the extrance and exit of 1,000 cubic feet of air per hour in natural ventilation under average conditions, enough air will circulate through the room for 75 complete renewals of air per hour when all the above apertures are fully open. This is more than sufficient. However, it is not to be expected that all doors and windows will be fully open at all times. Nor will a uniform distribution of pure air be found. Instead, there are liable to be pockets of foul air, especially between the upper and lower bunks.

In cold weather ventilation will be accomplished by direct-indirect heating and suction vents. Each compartment has two radiators with radiator vents measuring 10 by 14 inches at their most constricted portion, and two 24-inch suction vents of the Larsen type placed on the roof and opening into the attic over the compartment. Between the attic and the compartment there are nine ceiling vents.

each measuring 6 by 18 inches. Cold air entering through the radiator vents will be heated by the radiator and will ascend to the attic to make its exit through the exhaust vents. The system will furnish a desirable combination of heating and ventilation.

The mess halls.—There are two mess halls, each accommodating 750 men at one time. They are situated on a line from north to south with the kitchen between. They are entered from the east aspect, where the tables and shelves are located, so that the men on entering will take their mess gear and receive their food. The greater part of each hall is taken up by tables. The ceiling is very high through the center, where the roof has a double slope, and lower to either side, where the roof has a single slope.

The floor space of each hall is 7,668 square feet. The air space is 98,637 cubic feet. The area of windows, doors, and transoms is 139,764 square inches. This will permit about 85 renewals of air per hour under ordinary conditions which is quite ample. The provision for artificial ventilation of each hall consists of three 24-inch suction vents of the Larsen type, 10 ceiling vents, measuring 16 inches square, which constitute the outlets, and 12 radiator vents, measuring at their most constricted portion 10 by 14 inches. These radiator vents would admit enough air to permit two renewals per hour under ordinary conditions, but with the added impetus of convection currents when the steam is on they can be relied on to deliver several times that many volumes of air. Hence they will probably furnish the necessary 12 renewals of air per hour. The ceiling vents afford an area sufficient, irrespective of their location, to permit the discharge of about three times the air volume per hour. But owing to their location in the path of natural convection currents they can be relied upon to discharge 12 volumes of air per hour. The provision for ventilation is therefore considered adequate, even when the weather will necessitate closing all doors and windows. Twelve radiators are provided for heating.

Lighting the mess hall is accomplished by 72 40-watt lamps, arranged in 4 rows of 18 each. The lamps will be placed 7 feet above the floor and provided with illuminated steel shades. Each lamp will illuminate about 100 square feet of space. This will provide sufficient light.

The equipment of each mess hall consists of 34 tables, measuring 16 feet and 7 inches by 2 feet and 6 inches; 20 tables measuring 20 feet and 8 inches by 2 feet and 6 inches. Besides the above there are tables and shelves for mess gear and food.

Doors, windows, transoms, and radiator vents are provided with fly screens.

The kitchen, bakery, etc.—There is a kitchen, bakery, butcher shop, meat refrigerator, general refrigerator, vegetable storeroom,

vegetable preparation room, flour room, bread room, receiving room, issuing room, and office. These are to be situated between the mess halls and behind the boiler house. The ceiling of the kitchen is to be very high, as the building has a clear story. The roof has a double slope toward the mess halls. Doors, windows, etc., will be provided with screens.

Floor space, air space, and ventilation.

	Floor space.	Air space.	Natural ventilation.	
			Inlets and outlets.	Estimated renewals of air per hour.
	Square feet.	*Cubic feet.*	*Sq. in.*	
Kitchen	2,120	35,000	63,212	112
Bakery	2,120	23,320	11,016	32
Bread room	272	2,992	6,696	140
Flour room	272	2,992	6,696	140
Vegetable room, storage	272	2,992	6,046	126
Vegetable-preparation room	352	3,872	13,392	216
Butcher shop	372	4,092	4,860	74
Meat refrigerating room	325	3,575	4,860	85
General refrigerating room	325	3,575	4,860	85
Storeroom	420	7,260	9,720	83
Receiving room	279	3,069	3,024	61
Issuing room	168	1,848	10,030	340
Cooks' rooms (4), each	140	1,540	6,696	272

As the number of renewals of air desired for such rooms is about 12 per hour, it can readily be seen that the natural ventilation is quite ample. Besides the natural inlets and outlets there are three 24-inch suction vents of the Larsen type and a 12-inch flue for the kitchen. The radiators in the cooks' rooms are provided with radiator vents.

Equipment.—The kitchen has 12 ranges, 10 80-gallon boilers, 8 sinks, 2 coffee urns, 1 water urn, and 2 dish-washing machines. The dishwashers will be supplied with steam at 40 pounds pressure, which will make it possible to sterilize all mess gear. The vegetable-preparation room will have 1 vegetable parer and 2 sinks. The butcher shop will be equipped with 2 sinks, 2 meat blocks, and a meat chopper. The bakery will have 2 dough troughs, 2 dough mixers, 2 sinks, and 3 bakers' ovens.

The lighting of the kitchen, bakery, and adjoining rooms will be accomplished by forty 40-watt lamps, which will be adequate.

Two small outbuildings are provided for the cooks. Each is divided into three compartments. Two of these measure 13 by 14 feet and have four double-deck beds each. Each has two windows, a door, a radiator and a radiator vent. The third compartment contains two showers, a urinal, and a washstand. It is a pleasure to remark that nowhere in the kitchen, or adjoining it, is there a single urinal or water-closet. This feature is quite unusual, for architects

and naval constructors have always in the past placed a water-closet close to the kitchen.

The latrines.—There are three latrines, each of which is a T-shaped building. In the vertical segment of the T are two compartments, one for the water-closets, the other for the lavatories. The cross-piece of the T has at either end a compartment for showers and in the center a urinal compartment.

All told there are 144 water-closets, 228 showers, 252 lavatories, and 24 urinal racks. Each urinal rack is 14 feet 6 inches long and will accommodate about 6 men. Urinals are therefore sufficient for 144 men at one time. For a complement of 3,000 men the average will be 1 water-closet to 21 men, 1 shower to 13 men, 1 lavatory to 12 men, and 1 head to 21 men, which is sufficient.

The compartment for water-closets is 39 feet long, 26 feet wide, and 11 feet high, except at the sides where the slanting roof cuts off the corners. The gross air space is 9,750 cubic feet. Provision for ventilation is similar to that for the barracks, with the unfortunate omission of the underground radiator vents. The doors, windows, and transoms afford 33,352 square inches of inlet and outlet, or about 700 square inches for each water-closet, which is ample. This permits about 210 renewals of air per hour. The ceiling vents afford an outlet of 576 square inches, or about 12 square inches for each water-closet, which is not enough. Each water-closet in natural ventilation should have an area of inlet of at least 48 square inches and an equal area of outlet, or 2,304 square inches for 48 water-closets. It is desirable to increase the outlets. Instead of 4 ceiling vents there should be 16 and instead of 2 suction vents there should be 6. In cold weather there will be a strong draft of cold air blowing in at the doors, which is undesirable. It would be better to have vestibuled doors which would stop drafts and have radiator vents, as in the barracks, to act as inlets. This compartment is provided with steam-heat radiators.

The lavatory is 43 feet long, 26 feet wide and 11 feet high, except at the sides where the ceiling slopes. The gross air space is 10,750 cubic feet. There are the same ample provisions for natural ventilation as in the water-closet compartment. The recommendations for increasing the artificial ventilation of the latter compartment apply here. There should be at least 16 ceiling vents and at least 4 suction vents. It would be desirable to have air admitted by radiator vents instead of from the door, which should be doubled, with vestibules between, to prevent drafts. There are 4 steam-heat radiators.

The compartment for urinals is 26 feet square and 11 feet high, except at the sides, where the ceiling slopes. The gross air space is

about 6,500 cubic feet. The provisions for natural ventilation are as ample as in the water-closet compartment.

Each compartment for showers is 40 feet long, 26 feet wide, and 11 feet high. The gross air space is 11,440 cubic feet. Provisions for natural ventilation are as ample as in the other compartments.

Equipment.—The water-closets are to be placed in batteries of 12 seats, each battery to have an automatic flushing appliance. Flushing supply will come from an overhead tank. The discharge is by an automatic siphon eduction appliance. Regurgitation is prevented by an S water valve. Foul gases will escape from the piping by a vent to the roof. The seats are to be fixed and of enameled iron. All these features are very commendable, except perhaps the fixed seats. This will make it difficult to clean their undersurfaces. The lavatory units consists of hot and cold water faucets, a trough and a discharge pipe with P water trap. Discharge of sewer gas is accomplished by a vent to the roof. The showers are 4-inch rain heads provided with a single self-closing valve. With the exception of four showers in each set all will deliver hot water only. The other four will deliver cold water only. The best that can be said for such an arrangement is that it is practical. The urinals are troughs 16 feet long and 14 inches wide above. They are of enameled iron and constructed without angles or corners, which will facilitate cleaning. They are flushed through perforated pipes controlled by an automatic flush tank. The waste pipe is interrupted by a P water trap. Foul gas escapes through a vent to the roof. On the whole, the equipment is as satisfactory as can be desired in a temporary latrine.

The hospital.—The plans for the hospital provide for a building 107 feet long and 17 feet wide, with extensions for the isolation ward and venereal treatment room. The buildings will be situated in the southeast corner of the park and will lie in a north-south direction. This is very favorable, because it permits both sides of the building to receive sunlight for some part of the day. The roof slopes to either side. The ceiling will be about 11 feet high. It will be divided into rooms for the sick bay, isolation ward, dispensary, examining room, venereal room, dental office, waiting room, surgeon's office, offices for executive medical officer and officer of the day, the officer of the day's quarters, Hospital Corps' quarters, galley and bathroom. Berthing accommodations are for 12 men in the sick bay, 5 in the isolation ward, 6 Hospital Corpsmen and 2 medical officers.

The provision for natural ventilation is very ample, as may be seen from the following table:

	Floor space.	Air space.	Natural ventilation.	
			Inlets and outlets.	Estimated renewals of air per hour.
	Square feet.	*Cubic feet.*	*Sq. in.*	
Sick bay	357	3,927	11,016	175
Isolation ward	171	1,891	6,264	204
Dispensary	153	1,683	6,696	248
Examining room	255	2,805	6,696	150
Venereal room	99	1,089	4,428	254
Dentist's room	120	1,320	3,696	175
Waiting room	63	693	4,860	438
Surgeon's office	96	1,056	3,672	217
Medical officer of the day	136	1,496	3,672	153
Executive medical officer	108	1,188	1,836	96
Hospital Corps	80	880	1,836	130
Galley	72	792	3,124	250
Bathroom	105	1,155	3,888	124

The air space in the compartments for the sick bay, isolation ward and Hospital Corps is inadequate. The space per man in each is, respectively, 325, 380 and 220 cubic feet. As the sick bay and isolation ward will probably never be filled to their capacity, this lack of air space is relatively unimportant. But in the quarters for the Hospital Corps overcrowding should not be permitted. It is suggested that the room assigned as a dental office be also used for the Hospital Corps and other provisions be made for the dentist. Or only two Hospital Corpsmen should be quartered in the hospital and the others should sleep in the barracks, which are only about 15 feet from the hospital. There is ample provision for heating. It is to be regretted that only a few of the radiators are provided with radiator vents. There are four suction vents on the roof and ceiling vents in the sick bay and some of the rooms.

Sufficient toilet facilities will be provided. There will be a large bathroom between the sick bay and the isolation ward, which will be divided by partitions into two small lavatories and a water-closet. Each lavatory will have a bathtub, a washbasin and a water-closet. There will be a large enameled iron sink and a washbasin in the dispensary; a washbasin and an enameled-iron slop sink in the venereal room; a sink in the galley; a washstand in the room for the officer of the day. These facilities are adequate. It is strongly recommended, for obvious reasons, that the sink in the venereal room be provided with either knee or pedal valves instead of the usual faucets with handles. It is also desired that a steam pipe be run into the galley sink to permit sterilizing of mess gear.

Lighting will be accomplished by forty 40-watt lamps located in the various compartments. There will be six lamps in the examin-

ing room, four in the dispensary, five in the sick bay, four in the venereal room and one or two each in the other compartments. This should be sufficient.

The equipment, apart from the plumbing fixtures and medical stores, consists of six double-deck beds for the sick bay, five single beds for the isolation ward, two double-deck beds for the Hospital Corps, a storeroom, desks, chairs and shelves.

Miscellaneous buildings.—The canteen is a small building measuring 14 by 24 feet. It is provided with two radiators.

The guardhouse is a building measuring 11 by 15 feet. It is adequately provided with light, heat, and ventilation.

The former recreation pavilion is being remodeled as an administration building. It measures 54 by 112 feet. It will have offices for the commanding officer, the executive officer, officer of the day, paymaster, and five rooms. It will be heated by the direct-indirect method. Each room will have one radiator, except the paymaster's office, in which two will be installed. Lighting will be by 40-watt lamps, provided with reflectors. There will be two lamps each in the executive office and the paymaster's office, and one each in the other rooms. This will not be sufficient for the performance of clerical work. It is recommended that a lamp and reflector be installed for each desk and typewriter.

The granite public-comfort station, which has eight water-closets, five urinals, and two lavatories, will be divided for the use of officers, and rooms are being added at each end for officers and the armed guard. It is adequately provided with radiators and lighting fixtures.

An officers' mess hall is being erected in the rear of the boiler house. It measures 32 by 22 feet, and will consist of a pantry and mess room. The building is of the usual construction and has one suction vent. Heating, lighting, and ventilation are adequately provided for.

Heating.—The heating of the various buildings will be accomplished by steam under pressure generated in the boiler house located in the park, and distributed to the various buildings by the underground two-pipe system. The radiators are double rows of vertical columns. The number of columns differs according to the requirements. Each radiator is controlled by a hand valve and has a compression air valve. The radiators in the latrines and some of those in the hospital are of the direct type. Others in the mess halls, the barracks, and several in the hospital are of the direct-indirect type. In this type air is admitted from without by vents, and is heated as it rises through the radiator. It is a very desirable form of heating, because it supplies fresh air without causing cold drafts. The amount of air entering the vent may be diminished by closing

the vent trap. Air will escape through the ceiling vents and suction vents. Regulation of heat will be accomplished by using the hand valve on the radiators.

Heating of an interior compartment of the barracks will apparently be adequate except at extreme low temperatures. The difficulty in heating the barracks arises from the large volume of air that must be admitted to furnish sufficient ventilation for 48 men. At 2,400 cubic feet per man per hour this will be 115,200 cubic feet per hour, or about 10 renewals. Assuming that the radiators will have an efficiency equal to that of indirect heating, or of about 600 B. t. u. per foot per hour, the two radiators having 72 square feet each will be able to make up the loss of heat through the walls and heat 5 renewals of air per hour when an inside temperature of 60 degrees is to be maintained with an outside temperature of zero. This would cut the air supply per man to 1,200 cubic feet per hour, which is too little. If, however, the compartment should be limited to 24 men, the heating and ventilation would be adequate. Fortunately the temperature rarely falls to zero in this vicinity. The usual mean temperatures for the winter months are between 20 and 30 degrees. Hence the heat required most of the time will be within the capacity of the radiators provided. Assuming an outside temperature of 30 degrees and an inside temperature of 60 degrees, the radiators will be able to supply the heat lost through the walls and to heat about 10 renewals of air per hour.

From the end compartments of the barracks the heat lost through the walls will be greater. To offset this, a larger radiator has been installed there. The radiating surface is 168 square feet. This will not only meet the additional loss through the end wall, but will also heat an additional renewal of air per hour.

A similar consideration of the heating of the mess halls, which is also by the direct-indirect method, shows that under extreme conditions there will be only heat enough for the loss through the walls and for 6 renewals per hour, which is not sufficient. Under average conditions there will be heat enough for 12 renewals of air per hour, which is adequate.

The various compartments of the latrines are to be heated by the direct method, in which the efficiency will be about 300. They will supply enough heat for the loss from the sides and for 5 renewals of air under extreme conditions and for 10 renewals under average winter conditions. This is adequate.

Some of the compartments of the hospital will be heated by the direct method, others by the direct-indirect method. The sick bay will have two large direct-indirect radiators with 144 square feet of radiating surface. This is ample for, in addition to the heat lost from the walls, it will be sufficient to heat about 20 renewals of air

per hour under extreme conditions. The other compartments have heating surface sufficient for from 10 to 20 renewals of air per hour.

The small miscellaneous buildings, such as the canteen, cooks' houses, guardhouse and administration building, have a proportionately greater heating surface.

The kitchen will be supplied with both steam and gas. The ranges and bakers' ovens are for gas and the boilers for steam. No special provision is made for heating these rooms.

On the whole the heating system appears to have been well planned and will meet sanitary requirements under the usual winter conditions, although in extremely cold weather it will be inadequate. This inadequacy will not be in producing the desired temperature, for this will be maintained at the expense of ventilation.

The equipment is good and if properly and intelligently cared for a satisfactory degree of ventilation and heating will be obtained. This should be a part of the work of a sanitary corps. To facilitate its work each compartment should be provided with at least one thermometer and outside each barrack there should be several more. The important thing is proper supervision. With it the equipment will be able to meet the requirements for comfort and physical efficiency.

Lighting.—Proper lighting of the various buildings in this cantonment is a subject of no small importance, for though it has been called a temporary cantonment it has been planned with a view to being used five years. It is well worth while to consider if the lighting provided is sufficient to meet physiological requirements and if the distribution is the best that can be obtained at the expenditure of energy planned.

Before proceeding it is well to point out the principal physiological and sanitary applications of light. Daylight can hardly be excessive except where reading or writing is to be done, when the direct glare of the sun would be objectionable. To overcome this, shades should be placed on the windows of the sick bay and offices. Except for these the greatest daylight obtainable is desired for general comfort and for its destructive action on germs. The coloring of the compartments is not bad. They are of pine, finished with linseed oil, which gives a light buff color. This is very desirable for walls. For the ceilings white paint would give a better reflecting surface both for natural and artificial lighting. In artificial lighting there should be enough light in each compartment for its various uses. In the berthing compartments there should be enough light, at some points at least, for reading and for mending clothes. For this about 2 foot-candles are required. In the mess halls about $1\frac{1}{2}$ foot-candles are required on the tables, and if they can be adapted as reading and writing rooms, there should be an illumination of from 2 to 3 foot-candles.

In the latrines the lighting should be about 1½ foot-candles on the various fixtures. Further, a well-lighted latrine will be kept cleaner than a gloomy one. While every effort should be made to get the desired illumination on the working plane, as in reading, messing, etc., the general illumination of a room should not be ignored, for the eye frequently wanders from the page to the ceiling. If the change is from bright light to comparative darkness and back again, rapid and hurtful pupillary accommodation is necessary. As far as possible the direct exposure of incandescent filaments should be avoided, because they produce retinal strain. These are the chief sanitary considerations.

In natural lighting the transparent surface of the windows, etc., should be about one-fifth of the floor surface to admit the desired amount of light. In the various buildings this ratio is not maintained. In the barracks it is one-fourteenth; in the mess halls, one-eighth; in the kitchen and bakery, one-ninth; in the water-closet compartment, one-sixth; in the lavatories, one-seventh; in the urinals, one-ninth; in the shower baths, one-eighth; and in the hospital, one-fourth.

The artificial lighting of each standard compartment of the barracks now being installed consists of six bare 40-watt Mazda lamps fixed in ceiling receptacles. The illumination in the following estimates has been calculated from curves of distribution submitted by the manufacturers of the lamps and from the diagrams of location of lamps. The illumination on the floor will vary from a maximum of 0.4 foot-candle in the center of the room to a minimum of 0.2 foot-candle in the corners and will average about 0.3 foot-candle. At a plane 3 feet above the floor, which is the usual reading height, the illumination will vary from 0.5 foot-candle to 0.2, with an average of 0.4. Remembering that 2 foot-candles are necessary for reading, one can see that the lighting is not sufficient, and if more light will not be provided the medical officer recommends that men be prohibited from attempting to read, write or sew in the barracks. If, however, instead of 40-watt bare lamps 60-watt lamps, with distributing shades should be used, the illumination at a plane 3 feet above the floor would vary from a maximum of 2.3 foot-candles at the four points midway between the lamps at either end of a compartment to a minimum of 0.6 in the corners, with an average of about 1.2. This would permit reading and mending at the four points of maximum illumination. Or, if instead of increasing the wattage and using reflectors, the latter be merely added to the present equipment, a maximum illumination of 1.7 foot-candles could be obtained. This would be a better illumination than that afforded by the bare lamps without any increase in operating expense. The medi-

cal officer recommends the use of 60-watt lamps with distributing shades.

The mess halls will be lighted by 40-watt lamps placed 7 feet above the floor and provided with 6-inch bowl-shaped illuminated steel shades. These will be arranged in rows over the tables. The distribution of light on the tables will range from 3.5 foot-candles directly under a lamp to 1.3 at the ends of the tables. This is ample. Unfortunately all the light will be reflected downward. The space above the lights will remain in darkness, except for what little light may be reflected back from the floor and table. It would be much more desirable to use bowl-shaped holophane reflectors. With these the light would be more evenly diffused. It should be noted here that the lighting in the mess halls will be ample for reading, writing, and mending clothes. It is therefore recommended that one of these halls be available for these purposes.

In the kitchen and bakery the lighting will be by 40-watt lamps, provided with bowl-shaped illuminated steel reflectors. This will give an average illumination at a plane 3 feet from the floor of 2.5 foot-candles. The maximum will be 3.9 directly under the lamps, and the minimum 1.1. By using bowl holophane reflectors the distribution would be more uniform.

The latrines will be lighted by 40-watt bare lamps. The illumination on the various fixtures will average 0.5 foot-candle on the water-closet seats, 0.6 foot-candle at the lavatories and 0.4 foot-candle on the urinals. By the use of distributing shades this could be increased to 0.7 for the seats, 1.2 for the lavatories and 1.2 for the urinals, or by the use of 60-watt lamps with shades to 1.2 for the seats, 1.8 for the lavatories and 1.8 for the urinals. Though very little light is necessary, it is well to remember that the cleanliness of a latrine is dependent on the lighting.

The outside lighting will be by 60-watt lamps, provided with 14-inch enameled-iron distributing reflectors. These will be placed over the doors of the latrines at a height of about 12 feet. They will provide sufficient illumination to light the paths to these buildings.

The hospital will be lighted by thirty-six 40-watt lamps placed 7 feet above the floor and provided with 6-inch illuminated, steel, bowl-shaped shades. Estimation of the lighting power shows that at a plane 3 feet above the floor the maximum in the various rooms will be 4 candles, the minimum zero, and the average about 1.8. In the offices lights have been arranged so that the desks will be well lighted. Because of the opacity and the narrow angle of the shades some part of each room and the ceiling will receive only reflected light. It would be much better to replace the opaque shades by holophane glass reflectors. With these the distribution of light would be more

uniform. It is also recommended that in the sick bay at least bulbs with frosted tips be used to avoid having men lying on their backs suffer the discomfort of looking directly at bare filaments. There should also be a plug or two in the sick bay, isolation ward and examining room for attaching a portable lamp.

From the foregoing considerations the medical officer makes the following recommendations:

(*a*) That in the barracks and the latrines 60-watt lamps with distributing shades be used instead of 40-watt lamps without reflectors.

(*b*) That holophane reflectors be used in the mess halls, kitchen, and hospital instead of opaque shades.

(*c*) That a mess hall be available for use for reading, writing and mending.

(*d*) That frosted tip bulbs be used in the hospital.

Water supply.—The disadvantages of locating a cantonment in a large city are compensated for by the advantage of an abundant and excellent water supply. The source of the water supply is in the Catskill Mountains. It is a pure surface water which requires neither physical nor chemical purification. Its purity is maintained by protection from pollution. It is conveyed by an aqueduct and distributed to iron water mains. From the mains water is led in through galvanized-iron pipe and distributed to the latrines, kitchen, hospital, boiler house, etc.

Below is the average of analysis of tap samples from the vicinity of the barracks for the week ending July 7, 1917, taken from the weekly report of distribution system, department of water supply, gas, and electricity, city of New York:

Physical examination:	
Temperature (° F.)	64
Turbidity (silica scale)	2
Color (platinum cobalt standard)	6
Odor	1v
Chemical analysis (parts per million):	
Nitrogen as albuminoid ammonia	-----
Nitrogen as free ammonia	-----
Nitrogen as nitrite	-----
Nitrogen as nitrate	.05
Total residue on evaporation	-----
Hardness	22
Alkalinity	13
Chlorine	1.6
Iron	.10
Microscopical examination:	
Microscopic organisms (standard units per cubic centimeter)	135
Amorphous matter	115
Important genera.	

Bacteriological examination:		
Number of bacteria per c. c. (agar 37°)		2
Test for B. coli—		
0.1 c. c	per cent	0
1.0 c. c	do	0
10.0 c. c	do	14

The water supplied to Brooklyn during the past week has been of satisfactory quality. Daily tests for B. typhi were negative.

Preservation and preparation of food.—Two ice refrigerators are being constructed. Their walls and roof are made up of insulating material comprising paper, cork board and asphalt cement. The floor is of concrete. They each have an air space of about 3,500 cubic feet. The ice platforms are 6 feet 6 inches above the floor. The drip pans are of galvanized iron and discharge is by a floor drain connected with the house sewer and intercepting S traps. One is to be used as a meat refrigerator; the other as a general refrigerator. They should be adequate to meet the requirements of a day's refrigerating in a sanitary manner.

The rooms for the preparation of meats and vegetables for cooking are large enough and meet sanitary requirements.

Meats will be cooked in gas ranges. Vegetables will be boiled in steam caldrons. Bread will be baked in gas ovens.

Sewage and refuse disposal.—Disposal of excreta is accomplished very simply by discharging it into the city sewers whence it is discharged into the river. The house plumbing appears to be sanitary in all its features. The flushing supply of the water-closets should be sufficient to cause eduction of the excreta by siphonage. Regurgitation is prevented by S traps. The troughs empty into 6-inch waste pipe which joins the 8-inch house sewer. The other units in the latrines empty into either 3 or 4 inch pipes which join the house sewer. The various waste pipes are provided with either S or P traps and the house sewers with an 8-inch house trap. Ventilation of the waste pipes is accomplished by vent pipes of galvanized iron either 2 or 3 inches in diameter. These extend to the roof where they discharge foul gases.

Disposal of slops and excreta from the kitchen and the hospital is similarly accomplished.

Food refuse and waste will be disposed of by cartage to the offal dock. Previous to cartage it will be stored in covered galvanized-iron cans placed in the garbage refrigerator. The garbage refrigerator measures 16 by 6 feet and has a height of 11 feet. This would seem hardly large enough to hold a day's garbage. It will have a cement floor and an ice compartment.

Rubbish will be disposed of by cartage to the rubbish dock. It is recommended that numerous receptacles be placed around the bar-

racks to receive waste paper and other rubbish and that a large receptacle be placed behind the kitchen, where fruit crates, barrels and rubbish may be kept prior to cartage without becoming unsightly.

General comfort and safety.—It is to be hoped that spit kits will be installed in the barracks. There should be about eight in each compartment.

There is one fountain with three sanitary scuttle butts in the park. It would be desirable to have more. However, drinking water can be obtained from the lavatories, so that the need of these is not urgent.

Flies are probably the greatest nuisance in any camp. Every effort has been made to prevent this nuisance arising in this cantonment. All the doors, windows and radiator vents have been provided with fly screens. The sewage connections are so excellent that the latrines are not likely to be favorable to fly life. The kitchen and mess halls have been provided with screens, which will probably be effective in keeping out flies. Garbage will be kept in an inclosed refrigerator until carted away and will not draw flies. Still, while adequate provision has been made to check the fly nuisance, the flies will not be kept out unless proper supervision is maintained to see that these provisions are being used to the best advantage.

It is to be regretted that a laundry has not been provided. It is suggested that wash lines be put in a systematic manner between the latrines and barracks and not in the haphazard way that the yeoman guard is now doing. Above all, it is urgently requested that men be forbidden to hang wet clothes in the barracks.

To prevent the park from presenting an untidy appearance, it is suggested that numerous receptacles be placed about the grounds for paper and rubbish and that proper attention be given to their utilization.

It is suggested that benches be placed along the concrete walks on the inner side of the barracks.

It is to be regretted that no provision has been made for draining away rain dripping from the roofs. It appears probable that when there is heavy rainfall great pools of water will collect in the spaces between buildings and may even overflow the concrete paths and so get under the floors, which will be very objectionable.

Because of the inflammable structure of the buildings every precaution should be taken to prevent fire. It is recommended that smoking indoors be prohibited and that men detected at it or in throwing away lighted cigarettes be placed on report. It is desirable to equip each compartment with a hand extinguisher in addition to the chemical engines which have been supplied. Immediately

outside of the park are 10 public pumps, some of which are connected with the local high-pressure fire mains. It is recommended that a number of hose carts with fittings to attach to these pumps be placed at the entrances to the park. It may be noted in this connection that the wiring system is antiquated. The circuits are of insulated wire laid on porcelain bases. This system has been condemned by various boards of underwriters. But be that as it may, the medical officer recommends the installation of as much fire-fighting material as is practicable to prevent a big conflagration.

Sanitary policing.—In almost all details the planning of the cantonment and its equipment meets the best of sanitary requirements. To some extent automatic appliances have been installed instead of those controlled by hand. The flushing of the water-closets and urinals is under automatic control. Water flows in the showers only while the chain is being pulled. There are no basins in the lavatory to stand filled with dirty water. But, nevertheless, many things require constant supervision. Some one must be responsible for the cleanliness of the latrines, barracks, etc. Some one must see that toilet paper is always provided. Some one must see that a set of plumbing fixtures which is temporarily out of order is not being used. Some one must see that the men do not hang wet clothes in the barracks, or if they do, must confiscate them for the lucky bag and place their owners on report. And of still greater importance, some one must be responsible for the proper utilization of heating and ventilating appliances. Without supervision of these it is easy to predict that in very cold weather every door, window, transom, radiator vent and ceiling vent will be closed. But if they are intelligently managed it will be possible to get a satisfactory degree of ventilation and heating. Further, it may become necessary to increase the humidity at times. This can be accomplished by placing shallow cans of water in the radiator boxes. But unless some one is assigned to the task, all the details necessary for sanitary conditions and comfort will be neglected. The equipment is good; it now remains for us to get the best from it by good methods.

To get such supervision of sanitary features the medical officer recommends the organization of a sanitary corps responsible to the officer in charge of the cantonment. As a tentative plan of organization he suggests that the cantonment be divided by diagonal lines into four divisions. Three of these divisions will then comprise three barracks and a latrine, and the fourth will include the mess halls, kitchen, hospital, canteen, etc. It would be desirable to have a chief petty officer for sanitary work only in charge of each division. Under him there should be one man in each compartment of the barracks responsible for the conditions in his compartment, and one man in each compartment of a latrine responsible for conditions there.

BIRD'S-EYE VIEW OF RECRUIT CAMP.

NEW EMERGENCY HOSPITAL. TYPE OF WARD BUILDING.

Calver—Sixth Naval District.

MESS TENT.

496-3

Résumé.—In this preliminary survey the medical officer has undertaken to point out and commend the sanitary features included in the cantonment. Unfortunately there are a few conditions which do not meet sanitary requirements. Chief among these are the crowding of men in the barracks, crowding of buildings in the square and poor lighting of the barracks. The installations for heating, lighting, ventilation, messing and toilets will very satisfactorily meet the average requirements. The advance made from quartering men on ships which are out of commission and undergoing repairs is enormous. With this fine equipment and with an equally excellent sanitary supervision the medical officer is confident that the department will be well repaid by having a healthier and more spirited personnel. As the men are expected to do their best in their country's service, it is for the department to do its best in providing a sanitary cantonment for them while on shore duty.

ORGANIZATION OF THE NAVAL MEDICAL CORPS, SIXTH NAVAL DISTRICT.

By G. W. Calver, Assistant Surgeon, United States Navy.

In a discussion of this subject it is thought better to divide it into three heads, giving the three important phases of the work performed by the naval medical officers of the regular corps and Reserve Force, in preparing for and handling the various situations which arise in their territory:

1. Preparedness organization of the Sixth Naval District.
2. Organization for reception and care of recruits.
3. Emergency hospital facilities.

Preparedness organization of the Sixth Naval District.—In the organization of the Sixth Naval District, preparing for first-aid work and handling of wounded in cases of emergency, or disembarkation of troops or sailors, it was thought advisable to divide the territory into nine sections, establishing a section base with a dispensary in each seaport.

The medical organization of a section base is founded upon the dispensary. In the organization of the section base dispensaries, plans were formulated to provide medical care and attention for two groups of personnel; first, those directly concerned with the administration of the section base, including the office force, etc., and, second, the crews of the coast patrol boats. To fulfill these requirements an office was established in each section base for a medical officer, which was to consist of two rooms, wherever possible, one to be used as an office and dispensing room and the other for an examining room.

A medical officer of the Reserve Force, with one Hospital Corpsman and yeoman, when necessary, comprise the personnel of each section dispensary; an outfit of drugs was provided for each medical officer, from the naval-supply depot requisitioned on Form B, approved by the medical aid. Regular weekly reports of all work performed by the medical officer of each section base is forwarded direct to the medical aid of the district, who thus keeps in touch with the details of each office. These reports are complete and full in every respect.

The work performed by the medical officer at each section base consists of examining recruits for enrollment and the care and treatment of the sick on all patrol boats which make the section a port of call. To assist the medical officer of the section base in keeping up his records and treatments a Hospital Corpsman of the Reserve Force has been detailed to each coast patrol boat, when the size of the crew warrants it, and who, being provided with a reasonable amount of drugs, is able to continue the treatments and keep up the maximum effectiveness of the personnel of each ship. These Hospital Corpsmen are especially selected men who have received an intensive course of instruction at the navy-yard dispensary, Charleston, S. C.

Contracts were entered into by the section base medical officers for the care and treatment of sick in hospitals in case of emergency and are utilized whenever a case arrives which requires hospital treatment. Where practical, the services of the United States Public Health hospitals are utilized.

With this dispensary personnel as a nucleus, information was obtained and organizations were started which will be able, in time of emergency, to handle the injured.

The first information gathered was concerning the docks located in the various cities with a sufficient depth of water for landing purposes and which the owners would loan for use. Next, the distance of these various docks from hospitals or other available locations where the injured might be taken.

A canvass was made of all hospitals and an estimate obtained from each, determining the number of patients that could be accommodated, as well as the cost per diem for each patient accepted.

Through the Boy Scout authorities, viz, the chief scout master, the sectional medical officer arranged that as many boys as were necessary would be detailed to act as messengers, etc.

Comfort squads, consisting of from 8 to 12 ladies, were organized, with the assistance of one captain for each squad, whose name is on file in the section base office. The purpose of these squads is to be at the docks, temporary hospitals, or barracks, to assist in the transfer of wounded, act as untrained workers, and render such assistance as is feasible.

A canvass was made of the city for automobile trucks to be placed at the disposal of the sectional base medical officer for emergency cases, and resulted in obtaining a number of trucks in each city. The owner's name, truck capacity, and telephone number in each case was obtained and filed for referenec. A canvass of automobiles was made in the same manner and listed. The latter were intended for use for such sitting cases as might arrive.

A circular letter was sent to each of the trained nurses in each town, and those who volunteered their services were listed. A number of nurses agreed to serve if they were off of duty when the call came, while others have volunteered their entire services in case of emergency.

One of the biggest questions was the preparation of such places as might be available for use as temporary hospitals or barracks. Such hospitals and sanitoria already in existence were usually unprepared for the handling of any great emergency and such an overload as might be thrown upon them had to be provided for in the location of vacant buildings, such as might be used for temporary hospitals or barracks. Clubhouses, armories, schools and dormitories of various kinds were the type sought for and desired.

To make these buildings fit for temporary use, sanitary squads were organized which were headed by business men who agreed to be responsible for the appearance and remuneration of five negroes who would do this work, each man paying and supervising the men of his squad.

To feed the patients in these temporary quarters, a victualing committee was organized in each section base. These men agreed to see that, in case of emergency, all of the men quartered at any point in the city would be properly fed. To assist in the more rapid organization and efficacy of this committee, a canvass was made of the hotels, restaurants and bakeries for the loan of cooks or the promise of their assistance in preparing food wherever possible.

The provision of equipment for these hospitals in cases of emergency was met by securing promises of loans of beds and bedding from various hotels and the securing of estimates of quantities of articles the various dealers would be able to deliver on notice, with the current prices on each article.

Last but not least, practicing physicians in each town who were members of the medical society were asked for instruments, sterilizers, tables and such other equipment as they would volunteer to loan. They were also asked to volunteer their personal services in case of necessity. We found in some places that many of the physicians were members of the Red Cross and decided that they could not serve in both places.

From this it will be seen that an attempt has been made at each section base to provide:

1. Docking facilities for the wounded.
2. Accommodations for the injured to the extent of the cities' capabilities, in the matter of housing at either hospitals at present in commission or in such buildings as might be converted.
3. The proper cleansing and preparation of these buildings.
4. Their equipment with arrangements for feeding all patients.
5. Transportation and care of all wounded from the time of their landing until they are finally delivered to the hospital by the use of automobile trucks or private automobiles, for those slightly injured, and with the assistance of registered nurses and comfort squads.
6. Medical attendance and nursing until patients are fit for duty.

The greatest difficulty in each of these section bases was to secure available building space in case a large numebr of men were suddenly thrown upon the community. This, however, was partially met in certain towns by the offer of some hospitals to build temporary pavilions or additions to their present building, provided they would receive sufficient patients to repay them for the outlay.

Organization for reception and care of recruits.—The navy yard at Charleston, S. C., is exceptionally well located as far as its railroad connections are concerned for the handling of bodies of men arriving from recruiting stations. There are several long sidings from the Southern Railway and the Atlantic Coast Line and Seaboard Air Line Railways which come direct to the navy yard. A draft of men arrive, cars are pushed in on a siding, and the men are marched to the detention camp.

The camp consists of two units of 500 men, each with separate toilet facilities, and a large mess hall accommodating the personnel of two units. This comprises what is called a regimental unit.

Small houses have been built accommodating 25 men each. Each of these houses, as will be seen, allows 25 men, including a petty officer in charge, to swing their hammocks and provides a maximum circulation of air and protection from the weather. An additional personnel of 15 men may be added to each house by the use of folding camp cots placed on the floor, thus accommodating 40 men per house in case of necessity. Owing to the exceptionally mild climate in this locality, it is unnecessary to provide heating facilities for a greater period than two months. These houses will be heated by small wood-burning iron stoves with ventilation around them. Of all the various types of heating apparatus which have been under consideration this appears to be the most economical for this climate and type of house.

Twenty houses are necessary for the accommodation of 500 men normally and four of these houses with one toilet room forms the smallest division or unit which can be completely segregated from the rest of the entire camp, except in those houses where an infectious case occurs. Under these circumstances the entire personnel in the house which has been exposed to an infectious disease are quarantined to the house, a separate toilet room being designated for their use. They form and march to the mess hall, to their own particular table and are kept together for work and recreation, under the charge of their own petty officer, during the necessary quarantine period.

The object in dividing the camp into units of this small size is to prevent a greater damage being done by quarantining a large number of men. Instead of its being necessary to quarantine a hundred or more men, if a larger type of barracks had been used, it is here only necessary to lose the services of about 25 men, decreasing the damage by 75 per cent.

The mess halls have been so constructed as to allow each squad house to have its own table, the men marching in to this table and not being allowed to visit or use other tables. The mess gear of each squad of 25 is kept separate and, having been washed in scalding hot water, a minimum chance of infection by this means of infection exists. Dish-washing machines are to be installed to enable this work to be more expeditiously handled. The mess hall is screened to prevent the entrance of flies, and the galley has been screened, portions double screened, to prevent the entrance of flies and their access to articles of food. Men are kept a minimum period of 21 days in the quarantine camp. They are then moved to the large camp which consists of four regimental units, accommodating 4,000 men.

Thus there is a practical amount of precaution taken to prevent infection occurring in the main body of the camp by carriers from the recruiting stations. The majority of men coming to this camp will be men who have been in a recruiting camp, and who have been supplied with their outfits, typhoid prophylaxis and vaccination having been completed, or at least commenced in each case.

Administration buildings have been provided, and the Y. M. C. A. or recreation building is in process of construction. Ample toilet facilities and bathing space for the proper scrubbing of clothes has been provided. These toilets have been divided with a long lengthwise partition into two halves, and each of these halves is divided into five sections; each section is equipped and comprises a toilet unit for 100 men. They have cement floors, shower baths, wash hand spigots, and individual automatic closets. No basins were in-

stalled, it being thought desirable to eliminate them, as a possible source of transmission of infection.

Separate quarters have been provided for the chief petty officers and cooks to keep them away from both the quarantine and the larger camps, the object being to prevent if possible the occurrence of any contagious disease among them.

The question of dispensary location and accommodation has not been definitely decided. It has been suggested to build one large dispensary for the main camp to care for 4,000 men, with a separate dispensary for the detention camp. Another suggestion is the construction of dispensaries for each regimental unit of one thousand men. The factor deciding this question will be the availability of the necessary personnel. It is believed that the latter plan will permit of greater expedition in holding sick call and facilitate the handling of men reporting at that time.

Emergency hospital facilities.—The navy yard dispensary at Charleston, S. C., prior to the present war generally carried an average sick list of about 30 patients, the total bed capacity being about 19 in the main building.

When mobilization orders were issued to all Naval Militia organizations of the Southwest States as far west as Texas, to proceed to Charleston Navy Yard, no special preparedness plans at this place had been contemplated. Later a training station of 1,000 men was decided upon and buildings were hurriedly erected to accommodate this number.

The problem at the naval dispensary was how to take charge of this marked increase, the high mark on the sick list being 108 patients. To do this, small tents were first procured, all the standard hospital type available being used; then tents were borrowed from the Marine Corps, until a total of 22, capable of accommodating 4 men each, were put in commission.

Later orders were received for the marine quartermaster to turn in all his tentage to the marine supply depot, which necessitated putting out of commission 10 of these tents. Plans were made for the construction of hospital-ward tents at the sail loft of this navy yard, and 4 were procured. These tents have proven a great success, accommodations for 35 men being made in each full-sized tent; 2 of the tents being of shorter length could only accommodate 25 men.

Construction of hospital-ward tent is as follows: The tent itself is 66 feet 6 inches long and 20 feet wide, supported by a ridgepole divided into four sections, with five upright poles, each section being 16 feet 6 inches long. The ridgepole fits into a half socket as an awning strong back on board ship, the socket being 18 inches from the top of the pole. A second ridgepole is fitted on pins on top of

REAR ENDS OF TENTS. "MODESTY" CLOTH IN PLACE ON TWO TENTS.

WARD TENT, "MODESTY" CLOTH REMOVED, SHOWING ARRANGEMENT OF BEDS.

INTERIOR OF WARD TENT.

CONNECTING SYSTEM OF BOARD WALKS AND GENERAL OUTLAY OF TENTS.
SHOWER BATHS FOR PATIENTS IN THE DISTANCE.

the upright tent poles, which is 4 inches thick, giving a clearance of 22 inches between the tent and the fly.

The tent is 20 feet wide, side walls 7 feet high, supported by poles 2 inches in diameter, 7 feet long, with a galvanized-iron spindle running through the tent. The tent is bound by a 21-thread manila rope, running from ridge to side walls and spliced in at both ends. Side walls are made in sections to correspond to the sections of the ridgepole. They are secured in place by leather thongs with snap hooks on the ends, snapping into galvanized-iron rings attached to the binding rope at the top of the wall. The front of the tent is divided into two sections, each of which may be rolled up independently. A ventilator 9 by 18 inches is placed in the peak at both front and rear. The height of the peak of the tent proper is 15 feet 9 inches. The fly projects 3 feet at either end of the ridgepole, which extends for this distance, and projects 5 feet beyond the walls of the tent, to give additional protection against inclement weather.

The tent is set up on a tent floor 72 by 24 feet. The center of this floor is raised 2 inches higher than the sides to allow for easy flushing and drainage of these floors. The upright poles and poles of the side walls are set in fitted blocks nailed to the deck. This makes the tent absolutely steady and prevents the poles from being knocked around. The guy lines from the tent proper are taken to pipes secured lengthwise to the tent by driving stubs in the ground 3 feet 6 inches apart. Two lines of pipe are necessary, one for the tent itself, the other for the fly guys. These two lines of pipe should be 5 to 6 feet apart. The long guys to the pins in the top of the tent pole are crossed, one guy to each side, on each pin; for the end poles, preferably two guys to each pin to the central poles, which permits of the crossing of the guys when the tent is pitched.

A "modesty" cloth is made of 8-ounce ravens, edges hemmed, turned in 1 inch, and brass grommets are put in for each post. Ties of white line, the size similar to clothes stops, are used to secure this cloth in place at the top and bottom. The purpose of this cloth is to prevent people on the outside seeing too much of men inside the tent when incompletely attired.

Mosquito-bar frames were constructed 5 feet high, 3 feet wide, of 1½ inch square stuff, set in wooden blocks 4 by 6 by 6, braced diagonally at all corners at front and side. This frame has given considerable satisfaction, as it holds the standard Navy mosquito net just down to the deck. It has an advantage in being made wider than a folding cot and thus keeps the mosquito bar away from the side of the cot and prevents the mosquitoes from biting the man if he inadvertently sticks a leg or arm off of the narrow cot, as one is prone to do. The galley and mess hall facilities then proved inadequate, and it was necessary to convert one of these tents into a mess tent.

Each tent has been connected by a system of board walks, and a venereal prophylaxis and treatment booth, emergency heads, and shower baths have been constructed; water piped into camp and sanitary drinking attachments installed; all of this work having been done by Hospital Corps men and convalescent patients. The medical camp and dispensary building is now in condition to care for and feed 200 men without difficulty.

There is in process of construction an emergency hospital of 250 beds, which will be the base hospital for this district. Being constructed on the pavilion plan it can easily be enlarged to meet our requirements by the addition of five 50-bed wards. This hospital will be in commission on July 20, 1917.

A hospital or, rather, ambulance ship would be desirable in order to centralize the care of the men of the naval coast patrol on this hospital. The early arrival of such a vessel to facilitate the care of the men of this service is earnestly desired.

A school of instruction has been organized at the navy-yard dispensary, Charleston, S. C., for the purpose of instructing both the new medical officers and Hospital Corpsmen; besides this a special intensive school of instruction in recruiting has been organized for the purpose of preparing certain selected men for duty at section bases.

The medical officers receive instructions in naval forms and procedures, drills and general routine of naval life. They also have been given a special course of instruction in Swedish movements, hurdling, wrestling, wall scaling, etc., to equip them as thoroughly as possible for any field service.

The Hospital Corpsmen are given a three months' intensive course of training, covering the course prescribed in the Manual for the Medical Department. Besides this they are given drills, Swedish movements, and other exercises to bring them into as good physical shape as possible.

THE PRESENT STATUS OF CEREBRO-SPINAL FEVER WITH SPECIAL REFERENCE TO DIAGNOSIS AND CONTROL.[1]

By H. S. Cumming, Surgeon, United States Public Health Service.

Cerebro-spinal fever is one of the communicable diseases whose appearance has been considered an almost inevitable consequence of the mobilization of large bodies of men under conditions of sudden change of environment, overcrowding and lack of adjustment, which usually initiate such action. The hitherto mysterious mode of trans-

[1] Since this article was prepared a valuable contributon to the knowledge of diagnosis and treatment of the disease has been written by Dr. Simon Flexner: "Mode of Infection, Means of Prevention and Specific Treatment of Epidemic Meningitis." (The Rockefeller Institute for Medical Research, 1917.)

mission, sudden onset, suffering, high mortality and serious sequelæ attributed to this malady have made it one of the most dreaded of camp diseases and the methods to be adopted for its control worthy of most careful study by medical officers.

Prevalence.—Cerebro-spinal fever appeared among the newly mobilized army and navy of Great Britain and continued in 1915 and 1916. It has been *reported present this year in nearly every State in this country* and, as was inevitable, in consequence of extensive recruiting of young men and boys for the Navy, it has appeared at some of our training stations. Cases will almost certainly appear next winter and spring in the cantonments and camps and the following review of present knowledge may be of use in preventing its spread.

Etiology.—The causative agent of epidemic cerebro-spinal fever is the diplococcus intracellularis meningitidis of Weichselbaum, a Gram-negative organism found in the cerebro-spinal fluid (characteristically in polymorphonuclear cells as a rule), in the nasopharyngeal secretion, and during certain stages in the blood of patients suffering with the disease, as well as in the nasopharyngeal secretions of certain persons who have shown no clinical symptoms of the disease.

Predisposing causes.—It is evident from the large number of persons without clinical symptoms who are carriers of the meningococcus, that something in addition to the presence of the organism is necessary to produce the disease. The disease is more prevalent during the winter and spring when there is more indoor life with increased exposure to infection, overcrowding, bad ventilation and sudden changes in climatic conditions, all of which are conducive to various other depressing diseases with catarrhal conditions. The disease is apt to follow these conditions and also to follow lowered vitality due to excessive fatigue, or incident to such diseases as measles, German measles, and influenza. The mere presence of chronic catarrhal conditions, however, does not seem to increase susceptibility.

Modes of transmission and infection.—The meningococcus is spread by being carried in the nasopharynx of normal individuals, convalescent patients, and those actually suffering from the disease, and is imparted to other individuals by direct contagion. Such contagion takes place either by absolute contact, such as kissing, or by the spraying droplets or discharges of the nose and throat, as in coughing, speaking, singing, or snoring. While there is a possibility that the organism might be spread by the contamination of clothing, or of floors and walls, the extreme susceptibility of the meningococcus to drying renders such methods of spread quite unlikely.

The fact that by far the greater number of carriers have normal throats and therefore no excessive discharges from the nose or naso-pharynx and that there is no inclination to spit is an additional factor in making such a method of spread unlikely.

The portal of infection is from the nasal mucous membrane above the turbinate and the posterior wall of the nasopharynx through the connecting channels to the subarachnoid spaces.

Diagnosis.—Both for the cure of the individual victim and for the safety of those exposed to infection early diagnosis is most important. There is available a store of clinical observation of great value whereby an accurate diagnosis may be made based on the appearance, sequence and relative severity of certain symptoms, but a diagnosis based on clinical evidence in the early stages can not be conclusive.

The discovery of the meningococcus, the introduction and perfection of the technique of lumbar puncture, and the discovery of bacteriological and serological methods for identification of the organism and the preparation of curative sera have recently afforded opportunity as well for early diagnosis as for the institution of specific treatment. The question is, therefore; What cardinal symptoms are sufficiently suggestive of the disease to justify the immediate performance of lumbar puncture?

A patient who has been seized with sudden illness ushered in by a rigor, accompanied by severe headache, rapidly growing worse and soon accompanied by vomiting, is a suspicious case. When Kernig's sign is present, when there is pain and stiffness of the neck, and if retention of urine occurs, the probabilities are sufficiently great to justify lumbar puncture. Other symptoms, such as delirium going on to coma, a petechial rash, or head retraction would merely confirm these probabilities.

The differential diagnosis is mainly concerned in distinguishing the disease from acute febrile infections on the one hand and from other diseases of the brain and meninges on the other. The chief confusing febrile diseases are influenza and pneumonia, while the chief cerebral affections are meningitis, due to other organisms and cerebral abscess.

The differential diagnosis of early cases of cerebro-spinal fever from influenza is often difficult; both have sudden onset with headache and fever; in both pain and stiffness in the neck, back, and legs are prominent symptoms; in both search for Kernig's sign may reveal stiffness, and for the first two days cases of cerebro-spinal fever which ultimately become severe may show no obvious difference from influenza. Constantly increasing headache, vomiting after onset, retention of urine, and increasing Kernig's sign justify lumbar puncture.

Pneumonia in children and young adults, in whom headache and vomiting are striking symptoms, may be easily mistaken before physical signs of consolidation occur. The absence of Kernig's sign, rise in pulse respiration ratio, and beginning consolidation indicate pneumonia.

Typhus fever is difficult to differentiate in its early stages, owing to sudden onset with rigor, intense headache, delirium, and retention of urine. The points of difference are absence of head retraction, later onset of delirium, and contracted pupils in typhus. If doubt exists, lumbar puncture is justified.

Malignant forms of scarlet fever, measles, mumps, and smallpox are liable to be confused with fulminating cases of cerebro-spinal fever and the urgency of symptoms justifies lumbar puncture. It should be remembered that there may be cross infection and that an attack of any specific fever may be followed by cerebro-spinal fever, or, indeed, by cerebro-spinal meningitis due to the causative organism of the original disease.

The main difficulties in differential diagnosis are in distinguishing cerebro-spinal fever from other diseases of the cord and brain, particularly those affecting the meninges.

The commonest variety is tubercular meningitis. The gradual onset with failure in health, slowly increasing headache, only slightly increased temperature, marked photophobia and paralysis of ocular nerves indicate tubercular origin.

Examination of the spinal fluid gives the only definite diagnosis. In tubercular meningitis there are comparatively few cells present, of which 70 to 100 per cent are lymphocytes, while in cerebro-spinal fever there are few lymphocytes (about 30 per cent or less), and polymorphonuclear cells comprise the bulk of deposit. The identification of the organism clinches the matter, but fluid from a hydrocephalic case of cerebro-spinal fever may cause difficulty as the cytological picture there is identical with that of tubercular meningitis.

Purulent meningitis caused by any of the pyogenic group of organisms may occur and the pneumococcus is one of the commonest causes of primary meningitis of this kind. The course of the disease from these organisms is very rapid, lasting only from three to five days or even less and leading invariably to a fatal result. The differential diagnosis is to be made by lumbar puncture.

The onset of the acute epidemic form of poliomyelitis may simulate cerebro-spinal fever. The early palsies or hemiplegia of ordinary forms and the convulsion which invariably ushers in the cerebral form, as well as the seasonal prevalence of poliomyelitis in the summer and autumn, should serve for differentiation.

Lumbar puncture requires little skill provided the position of the patient is correct and the landmarks are accurately ascertained.

Any trocar and cannula at least 4 inches long will serve, if no special instrument is at hand. The patient should be on his side, his buttocks on the edge of the bed, the knees flexed on the abdomen, and the head and body bent forward so that the intervertebral foramina are opened and the ligamenta subflava rendered tense. The puncture should be made in the intervertebral foramen between the fourth and fifth lumbar vertebræ.

The spine of the fourth vertebra can be felt on a line joining the summits of the crista ilii and in adults the interspinous space will be felt about 1½ inches below the spine. Perhaps the lateral route is preferable in adults as the interspinous ligament traversed in the median line interferes with delicate manipulation. It is important that the trocar should be sharp.

General anæsthesia has many advantages, particularly with a nervous, recalcitrant or delirious patient. The only disadvantage is the possible danger therefrom, which is practically negligible. The English favor the use of a general anæsthetic and Foster and Gaskell advance three reasons for making such practice general; ease in making the puncture, increased amount of fluid secured and temporary relief from intolerable pain. General anæsthesia is obviously advisable in active delirium and in cases where lumber puncture has to be repeated from day to day. The operation without anæsthesia taxes the fortitude of patients, whereas with it in cases of severe suffering they even look forward to the relief afforded. "When headache is severe it is no uncommon thing to see a patient, who had previously been restless and moaning, pass straight from the anæsthetic to a peaceful sleep of four or five hours."

Study of the cerebro-spinal fluid is of the greatest importance, for not only is recovery of the meningococcus necessary for diagnosis and of value in prognosis, but its removal is an important factor in treatment. The normal cerebro-spinal fluid is a perfectly clear, colorless liquid of low specific gravity, being usually 1.007, with alkaline reaction. The normal pressure is such that when lumbar puncture is performed, the fluid flows at the rate of only one drop every two or three seconds, and never more than 10 c. c. can be obtained, often less. Reduction obtained with Fehling's solution is appreciable; albumin is usually absent. The cellular constituents of a normal fluid are extremely scanty, averaging about one to seven lymphocytes and an occasional endothelial cell per cubic millimeter. Polymorphonuclear cells are absent in the normal fluid.

Change in the cerebro-spinal fluid in epidemic meningitis consist in increased pressure, alteration in chemical and cellular constituents. Increase of pressure is present in almost all stages of the disease, even on the first day, and is often so great that the fluid spurts out and as much as 40 to 70 cubic centimeters are often obtained in acute

stages. In some chronic cases no fluid can be withdrawn, and this is of serious import as it indicates occlusion. Removal of cerebro-spinal fluid can be continued safely until the flow is equal to or even less than normal. In the acute stage the appearance of the fluid is profoundly altered. When first withdrawn it is clouded or opalescent, or it may contain fragments of flocculent material. When allowed to stand the cells to which cloudiness is due sink and the supernatant fluid is clear. In acute stages a small amount of pus is of favorable, a large amount of unfavorable, import. In cases which do not respond to treatment pus increases, while in later stages of favorable cases the fluid gradually becomes clearer. In chronic cases the fluid becomes clearer, particularly in the chronic hydrocephalic type. The chief alteration of constituents in solution consists in an increase of protein, mainly albumin, and a diminution of sugar. With improvement in the clinical condition the latter returns. The cellular changes in epidemic meningitis are characterized by the presence of polymorphonuclear leucocytes, often in enormous number, and a relatively small increase in lymphocytes. These conditions of the cerebro-spinal fluid are not pathognomonic of cerebro-spinal fever, and identification of the meningocoocus is essential for a complete diagnosis.

Technique.—When practicable a few cubic centimeters of the fluid should be centrifuged and smears made of the sediment stained with methylene blue or carbol-gentian violet, and examined under oil-immersion lens. It may be necessary to examine many fields or even many slides. If the organisms are easily found in every field, the outlook is grave and especially if many extracellular organisms are present. Staining by Gram's method should be done.

The organisms are Gram-negative diplococci and they are typically found in polymorphonuclear cells, though in fulminating, very grave, and in suppurating cases they are also extracellular.

The cerebro-spinal fluid should be placed in the 37° incubator overnight, as a film from the sediment the next morning will often show meningococci, mainly extracellular, even when none were found at first.

Cultures should also be made at once and for this purpose many media have been recommended, all of which have some body fluid as an essential element.

The freest growth, perhaps, may be obtained by seeding on agar plates on which about three drops of fresh blood have been added. A medium which has been found satisfactory is made as follows: To 5 parts of a nutrient, 2 per cent neutral agar made of beef infusion, with 1 per cent glucose, is added at 50°–52° 1 part of sheep serum water (sheep serum 1 to water 2). Neutrality is tested against phenolphthalein.

The glucose agar is sterilized for 1½ hours in streaming steam and the serum water is autoclaved for 15 minutes at 15 pounds pressure. The serum water and agar are mixed shortly before using with aseptic technique and tubed.

The tubes should be incubated previous to use and kept moist at all times. This medium is comparatively clear and permits easy recognition of colonies on the plate. It is well adapted to the growth of the meningococcus so that visible colonies appear in six to eight hours and develop from 2 to 3 millimeters in diameter overnight.

In the absence of sheep serum an excellent medium can be made by the addition of laked human or rabbit blood to the above-described agar. The blood is laked in distilled water and added to the melted agar at 45°–50° in the proportion of 1 part of laked blood in 6 to 10 parts of agar. Rabbit blood agar (1 part blood in 20 parts agar) affords good growth, but is opaque and masks the color and structure of the colonies. The various serum agars are made by the addition of animal fluid to the agar in the proportions of from 1 to 5 to 1 to 20. Ascitic and hydrocele fluid may be used and the organism will grow, though not so freely, on Loeffler's medium.

Experience in England has demonstrated the value of taking a swab of nasopharyngeal secretion at the same time, as this secretion at the onset always contains meningococci of the same agglutinating type as contained in the cerebro-spinal fluid, and at times they may be found in the nasopharyngeal fluid before they can be found by lumbar puncture.

The fluid and secretion should be plated at once on plates which have been warmed and placed at once in an incubator kept at 35°–37°. After 6 to 12 hours plates should be examined under low power or with the naked eye for characteristic colonies, which can be recognized by lack of color, regularity of outline, homogeneous granular structure and ease of homogeneous suspension in salt solution. Occasionally colonies may not appear for 24 hours or longer, but this is infrequent if care has been taken to seed immediately on warm plates. A colony should be picked and specimens should be stained for Gram-negative cocci in which diplococci predominate, young cultures exhibiting many ghost or involution forms.

While very accurate differential descriptions have been made of the cultural characteristics of the meningococcus, further identification is necessary to distinguish the organism. Pending further identification, however, the finding of Gram-negative intracellular diplococci in the cerebro-spinal fluid or in the nasopharyngeal swab from a patient with the cardinal clinical symptoms of meningitis justifies isolation and treatment of the patient with polyvalent serum, and isolation of contacts.

Further identification of the organism should be made by (a) agglutination tests and (b) fermentation tests. The colony in which Gram-negative cocci have been found should be fished and heavily seeded on a serum agar slant tube which should be incubated for 8 to 18 hours at 37°. A suspension of the growth should be made in 2 to 5 cubic centimeters of 0.8 per cent saline solution, heated to 65° for 30 minutes to inactivate autolysin, and saline should be added to bring the solution to a suspension sufficiently heavy to facilitate the reading of the test (as a minimum, the final suspension should be about equal to the turbidity of typhoid vaccine as made by the Army Medical School or Hygienic Laboratory).

The agglutination test should be made by the macroscopic method in small tubes, using equal parts of the saline suspension and the serum dilution to be tested. Agglutination tests should be carried out at 55° for a period of 12 to 20 hours against normal serum, giving no agglutination in an ultimate dilution of 1/50, and agglutination should be obtained against polyvalent serum in ultimate dilutions of 1/200 and 1/400, and also, preferably against univalent sera of accepted standard types, in order to determine the type to which the recovered organism belongs. Such sera should have a titer of at least 1/300 for control meningoccocci of the various types.

Agglutination with antimeningococcus serum in titer of 1/200 and failure of agglutination in normal serum at one-fourth that titer is sufficient evidence on which to detain an individual as a carrier or to confirm a diagnosis.

As a result of their observations in England, Gordon and Hine have found that practically all meningococci fall definitely into one of four serological types which breed true and preserve their distinctive characters even when propagated on media for months. They conclude that in spite of general similarity they behave as specifically distinct micro-organisms and not as transient variants. Of the four groups, the first two were found in over 80 per cent of the English cases. Only one type of organisms is present in a case, both in the nasopharynx and in the cerebro-spinal fluid. Meningococci of the epidemic type are completely agglutinated by one or other of the standard sera. As a rule the differentiation is sharp, but in some cases an epidemic strain in addition to complete agglutination with its type serum is also partially agglutinated by certain other standard sera. The English found close agglutinative relations between types one and three and between types two and four. There is no agglutination with normal serum. Other variations are possible, but in most cases the type of coccus is indicated by the serum with which it shows most complete agglutination.

Nasopharyngeal cocci resembling meningococci, but failing to qualify serologically may give one of three results: (a) Complete

agglutination by normal and all standard sera in low dilution; (b) no agglutination by normal serum, but partial agglutination in dilutions not exceeding 1/100 by one or all standard sera (group "agglutination"); (c) no agglutination by sera, normal or standard.

For further identification, advantage may be taken of the differences between meningococci and other Gram-negative diplococci in the fermentation of the various sugars. All of these other Gram-negative diplococci, except the gonococcus and M. catarrhalis, ferment glucose, maltose, mannose, lævulose, and saccharose. None ferment lactose, galactose, mannite, dulcite, dextrin, and inulin. M. flavus III does not ferment saccharose. The gonococcus ferments glucose only. The M. catarrhalis ferments none. The meningococcus ferments glucose and maltose and is negative for other sugars. The use of glucose (dextrose) maltose, lævulose, mannose and saccharose is sufficient for differential purposes. One c. c. of a 10 per cent solution of each sugar, previously sterilized by fractional method, should be added to sugar-free agar medium with a reaction of +0.2 to +0.5 (phenolphathalein), to which is added enough pure sterile litmus solution to give a decided blue tint. The plates or tubes should be observed for several days for the production of acid. The glucose reaction is usually the most rapid. Gaskell and Foster prefer fluid media for these tests, and veal broth is excellent for the purpose.

Control of the disease may be discussed under measures for the cure of the patient and measures to prevent spread of the disease.

Curative.—The most important and possibly essential measure for the cure of the patient is the early or immediate diagnosis with lumbar puncture and release of cerebro-spinal fluid, with early administration of suitable antimeningococcus therapeutic serum. Undoubtedly the high mortality and chronic nervous sequelæ associated with previous epidemics have been the result largely of prolonged pressure, and their comparative absence during recent outbreaks has been due to the introduction of spinal puncture, as well as to the introduction by Flexner of intrathecal administration of a curative serum. Relief of pressure is in itself a curative measure, and it should be employed whenever clinical symptoms of pressure, persistent fever, or a sudden lapse into an adynamic stage appear, as well as when indicated by bacteriological observations.

Serum, either polyvalent or the agglutinative for the infecting type of organisms, should be used daily until the fever disappears. Administration of serum should follow the escape of cerebro-spinal fluid, should be of less quantity than the amount of fluid withdrawn, and the serum should be given slowly, preferably by gravity. Any symptoms of vagus inhibition, Cheynes-Stokes breathing, changes in the pupils or fall in blood presure, thready pulse, or shallow respira-

tion should be a signal to stop the injection of serum immediately. About 10 minutes should be taken to inject 15 c. c. and from 30 c. c. to 60 c. c. should be given. After injection the puncture should be covered with collodion and gauze and the foot of the bed raised on blocks 12 inches or more to allow diffusion by gravity. Morphin and hot baths are useful. Constipation, which is usually obstinate, should be treated with enemata, and the bladder should be catheterized when retention exists.

Prevention of spread from the patient.—The precautions to be observed in nursing the cerebro-spinal fever patient are simple and are concerned mainly with discharges from the nose and throat. Cough is seldom present, but during active delirium the patient may "spray" the discharges. Attendants should therefore avoid the patient's breath when he is in such a stage and their throats and noses should be sprayed daily with a mild antiseptic. The patient's bed should be a reasonable distance from others to avoid "droplet" infection. He should be isolated if practicable. Abundance of fresh air and ventilation are most important. All articles used in treating the patient, such as feeding utensils, all linen and other articles which may have been infected, should be disinfected immediately by chemicals and later by boiling or by prolonged exposure to direct sunlight. The urine sometimes contains the organism and incontinence is common. The foul discharges from the mouth and nose especially should be carefully disinfected. The risk of infection to nurses and physicians is not great in a well-ventilated hospital, and there appears little evidence that such persons have carried the disease to others.

The prevention of the spread of the disease should be based upon knowledge that the meningococcus is short lived outside of the body; that infection occurs only by direct conveyance of the nasopharyngeal secretion from a patient or from a carrier without clinical manifestations of the disease; that a patient is simply a carrier who has, through lack of resistance, developed clinical symptoms; and that sudden changes in meteorological conditions, particularly in cold weather with lack of proper clothing, overcrowding, and bad ventilation, as well as other acute diseases, are conducive to bringing about the necessary lack of resistance.

As soon as a case of cerebro-spinal fever has been discovered, all contacts should be isolated and swabs made from the nasopharynx, particularly the region in which adenoids are found. Saliva is antagonistic to the meningococcus and also it contains confusing organisms, therefore care is necessary to prevent touching the tongue or fauces with the swab, which should be of stiff wire with one-half to three-fourths of an inch of the end bent to an angle of about 45°.

The part of the swab which has been rubbed thoroughly on the proper region should be sown immediately on the serum agar plate, previously described. Use of the West tube, a glass or metal tube containing the wire and swab, may facilitate the operation and lessen the risk of contamination. Contacts which show no meningococci on the first examination may be released if they have had no other exposure.

In addition to the known contacts, as many *possible* contacts as practicable should be examined. The circumstances surrounding each case must necessarily suggest the extent of such procedure. If a patient has been received within two or three days and no previous cases have appeared in the vessel or on the station, manifestly the probable extent of contact would be more restricted than if he has been on the ship or station for several weeks.

During convalescence the meningococcus is generally present in the nasopharynx in progressively decreasing numbers for from one to three weeks, but in a considerable number of convalescents the organisms may persist for months. Such individuals are "chronic carriers." In addition to these persons, contacts and other carriers whose nasopharynges contain the meningococci may be divided into temporary and chronic carriers. Fortunately most carriers—perhaps 80 to 90 per cent—fall into the temporary class, the organism disappearing in from a few days to three weeks. Unfortunately there are others in whom the meningococcus persists for months. Despite the evidence that varying numbers of the population of communities free from cerebro-spinal fever are carriers, there is conclusive evidence that carriers are responsible for the dissemination of the disease and they should be isolated until the organism disappears. They should be isolated, quartered, messed, and allowed indoor communication in small groups only, the smaller the better, of 9 if possible, and of not more than 25. There is but slight danger of transmission during drills or other contact under discipline in the open air. They should be kept in the open air, given exercise, and be well clothed and nourished. It would seem that an organism of such low vitality as the meningococcus, which is easily killed by desiccation, by weak disinfectants, and even by saliva, could be readily caused to disappear from the nasopharynx of a chronic carrier, but the great number of remedies advocated in itself suggests failure.

Of all the remedies tried by the British authorities and tried at Chicago as well as at other training stations, including the Gordon-Flack zinc sulphate spray, bicarbonate of soda, iodine, glycerin-and-iron mixture, Dobell solution, and menthol, none have given consistently good results. Vaccines and sera also have apparently failed. The use of chloramine in 1 to 1½ per cent solution has been encouraging to the British workers, and it is possible that dichloramine-T in

chlorinated eucalyptol (1.5 to 2 per cent solution) may be of service. The difficulty appears to be the impossibility hitherto of reaching the crypts and recesses. The organism frequently temporarily disappears after treatment only to reappear after a day or two; hence no culture should be made until at least 48 hours after treatment. The proper procedure would appear to be to cleanse thoroughly the nasopharynx daily with some disinfectant which will not inflame the mucuous membrane and to build up the general resistance by plenty of nourishment, moderate exercise, and exposure to sunshine and fresh air.

In military organizations it is important not only to detect and isolate carriers to prevent spread of the disease, but to avoid damage to the service by unnecessary detention. It is proper to release all those who on first examination show no meningococci in their nasopharynges. Convalescents and others who have yielded positive cultures should be detained until four consecutive negatives have been secured at intervals of five days each. The healthy carrier is the source of greatest danger to the community, and medical officers must be alert to detect cases promptly. Search for carriers among contacts should be thorough. In the presence of the disease the entire personnel should be segregated in small groups. All personal contact should be reduced to the minimum, and possibility of mess gear and drinking utensils serving as conveyances of moist secretions from the nose and throat should be borne in mind.

SYSTEM IN HANDLING DENTAL PATIENTS ABOARD SHIP.

By R. Barber, Dental Surgeon, United States Navy.

The many and varied activities necessary to sustain the lives of the thousand or more men and officers on board a battleship, the work of upkeep of the ship, and the numerous all-important drills and exercises combine to make the organization of the ship highly complex. Lack of proper system in any one of the activities means that the efficiency of the ship as a whole is impaired to a certain extent. It is therefore necessary that all lines of work be systematized in such a manner that the highest efficiency be attained.

The dental officer aboard ship finds that as yet no provision has been made for the routine handling of dental patients. In planning such a system with a view to efficiency the following points are considered: First, that the system should enable the dental officer to render the greatest amount of dental treatment possible. Because there are always more cases than he can treat properly the dental officer should not lose time except for the most urgent reasons. Second, that patients should be taken away from work and drills

no more than absolutely necessary in order to receive dental treatment. Third, that existing systems and customs should be used or paralleled. It is better to use a modification of existing routine than to try to teach something entirely new.

It would not be in keeping with the above if patients were permitted idly to wait their turn for treatment as seen in the "waiting room" of an old-fashioned dental surgeon or physician. It would be equally bad if the dental officer were to wait until it entirely suited the convenience and pleasure of each patient to come for treatment. The dental officer can treat but one patient at a time, so no more than one man need be taken away from work or drill at one time except under certain conditions, as noted below. In order that dental treatment may be carried through to completion in the proper manner and to insure the greatest return from the dental officer's time, each patient must be available for treatment when wanted.

To make this possible the following rule has been established by certain commanding officers: "A man having an appointment for dental treatment is considered as though he were on the sick list and is therefore excused from all work and drill for the time of his appointment." This ruling may be objected to by division officers until it is explained that appointments are seldom made for a longer period of time than an hour, and that but one man out of the thousand or more is taken away from work or drill at one time.

With this ruling as a basis the following system has been evolved, thoroughly tried out, and found satisfactory:

Men desiring dental treatment report to the medical officer at morning sick call. The health record for each man is examined and in case it contains a dental record the latter is detached and sent to the dental officer. A printed form, as given below, is filled in with the patient's name and rate as shown on the health record, and should there be no dental record the fact is indicated by crossing out the proper line.

U. S. S. CONNECTICUT.
MEDICAL DEPARTMENT.

_____, 191__

_____, rate_____,
(Last name, first name, middle initial.)

is recommended for dental treatment.

Dental record sent.

Health record contains no dental record.

_____
Surgeon, U. S. N.

(Patient will take this slip to the dental operating room at once.)

It is necessary that the dental officer be given the patient's name as it appears on the health record in order that the name on the dental record and health record be exactly the same. Frequently when a man is asked his name he does not give it as it appears on the health record.

The patients come to the dental surgeon immediately and each case is examined, dental records are made out as necessary, urgent treatment is rendered and appointments are assigned. A half hour (8.30 to 9, if sick call is at 8.30) is usually sufficient time to reserve for this part of the work. This is the only time that more than one man may be away from ship's work for the purpose of receiving dental treatment and it is at a time of day when work or drills are least apt to be interfered with. By the time sick call is over, or very soon after, all new patients have been disposed of and sent back to their stations or duty. Should the number of men applying at sick call for permits to go to the dental officer be unusually large on any one day, the less urgent cases are held over by the medical officer until the following day. This evens up the number received daily and makes it possible for the dental officer to dispose of all new cases before the time of the first regular appointment for that day. More patients can be examined during this half hour than can be completely treated in several days.

Appointments are assigned in the order that men apply for dental treatment and further appointments are assigned in rotation, so that all men have an equal opportunity to receive treatment. This is necessary on account of the large number requesting treatment. Before noon of each day appointment slips are made out on the form given below for men having appointments during the following day as shown on the appointment book and delivered direct to the patients by messenger:

U. S. S. "CONNECTICUT."
MEDICAL DEPARTMENT.

----------, 191__

To: Division Officer, ---------- Division.

It is recommended that ----------, rate ----------, be sent to the dental operating room at -------- M, on ---------, ----------, 191__, for dental treatment.

----------,
Dental Surgeon, U. S. N.

(Patient will bring this slip to the dental operating room at time specified.)

The man receiving such a slip takes it to his division officer, who approves it. The division officer is thus informed that the man has

an appointment for dental treatment and, when necessary, arrangements may be made for his relief from duty for the time of his appointment. By not giving these slips until a day before the appointment there is very little chance for slips to be lost and appointments forgotten.

This appointment slip, signed by the dental officer and approved by the division officer, is considered an order to the man to appear, in clean clothes, at the dental operating room at the time specified, and a man failing in this is liable to disciplinary action. Dental treatment is not compulsory, but when a man voluntarily applies for dental treatment he is required to have done such treatment as the dental officer prescribes and to continue to keep his appointments until discharged by the dental officer. Were it not for this rule many men would fail to return for completion of treatment after having been relieved of pain. One hour is the time usually allotted for an appointment. A longer period is tiring to the patient, and with shorter ones not enough permanent result can be accomplished in most cases.

To make this plan the established system the commanding officer has issued the following order, which is printed on the reverse side of the appointment slips and which is thus brought to the attention of all patients:

DENTAL TREATMENT.

Men desiring dental treatment must apply to the *Medical Officer* at *morning sick call*, in the Dispensary, for a permit to go to the Dental Officer, who will make examinations, treat urgent cases, and make appointments for further treatment.

Before noon of each day the Dental Officer will send a written notice to each patient having an appointment during the following day. The patient shall take this notice to his *Division Officer*, who will sign it. This notice is an order to appear, in clean clothes, at the dental operating room at the time specified.

A man having an appointment for dental treatment is considered as though he were on the sick list and is excused from all work and drill for the time of his appointment.

It is to be distinctly understood that the Dental Officer shall be the sole judge as to what treatment is necessary (Art. R. 2991), and men applying for dental treatment will be required to have done such treatment as he prescribes.

Approved:

Captain, U. S. Navy, Commanding.

A certain specified part of the day is set aside for treating officers (afternoon hours are most convenient). Officers are treated only

during those hours, and enlisted men's appointments are thus not interfered with. It has been found unsatisfactory to make appointments long in advance for officers. The list of officers under treatment is never very large. The officer whose name is at the top of the list is notified by messenger about an hour in advance that he is wanted by the dental officer at a certain time. If impossible for him to keep the appointment the officer so states, and the next officer on the list is notified for the same hour. Officers usually are able to say positively whether or not they can keep an appointment within an hour or less. By continuing to make appointments by messenger the dental officer is able to get as many officer patients as he can treat during the officers' hours. After a dental officer has been on a ship for some time the number of officers requiring dental treatment will be so reduced that the time set aside for officers may be shortened and more hours assigned to enlisted men.

The system of handling dental patients aboard ship as has been outlined has the following features: There is a certain definite time of day when men may receive urgent treatment and have appointments assigned and be returned to duty promptly. Records receive their proper attention and a check can be made by the medical officer on the number of patients received each day. No time is lost by the dental officer and thus more patients can be treated. The activities of the ship are interfered with to a minimum degree. During the greater part of the day not more than one man is taken from his work and then only for an hour.

It is hoped that those dental officers who are at this time having their first experience of ship life may find some helpful suggestions in the above which will facilitate the organization of their work.

BARIUM-FORMALIN METHOD OF DISINFECTION.

By R. P. CRANDALL, Medical Director, United States Navy.

When the prohibitive cost of potassium permanganate made the permanganate-formalin method of disinfection no longer available, the Medical Supply Depot, New York, communicated with various likely sources of information to ascertain the possibility of adopting other satisfactory means for liberating formaldehyde gas from its aqueous solution. From the replies received it was evident that no other all-chemical process was known to be as suitable as the permanganate method. The lime-formalin and the Dixon methods both have supporters. However, it requires no exhaustive study to determine that the efficiency and adaptability of each are not to be compared with those of the permanganate-formalin method, especially under service conditions.

Available information on this subject being rather limited, the depot undertook an investigation with a view to finding a cheap, safe, and efficient process for the rapid evolution of formaldehyde, together with a required degree of moisture. As a result, the depot developed the "barium-formalin" method, which is as follows:

1 pint solution of formaldehyde (U. S. P.).
1½ pounds barium dioxide (technical) containing not less than 78 per cent BaO_2.
(Required for each 1,000 cubic feet of space to be disinfected.)

The barium dioxide is evenly distributed over the bottom of a wooden or metal bucket[1] of not less than 1½-gallon capacity for the amounts stated above. The formaldehyde solution is first transferred from its bottle to a pitcher or other suitable container, from which it is quickly poured over the barium dioxide. At once close the room and keep closed for 6 to 12 hours.

The method outlined above on repeated trials gave gratifying results and showed conclusively that barium dioxide is in all respects as efficient as potassium permanganate for liberating formaldehyde and water vapor from formalin.

An inexhaustible supply of barium dioxide is obtainable in the American market at a price ranging from 30 to 50 cents per pound in pound bottles. In large quantities the price would be about 30 cents per pound, while potassium permanganate is at present quoted at $5.50 per pound. The price of formaldehyde solution (U. S. P.) is about 25 to 30 cents per pound bottle.

[1] The standard Medical Department bucket is of 3-gallon capacity and may be employed with amounts of material necessary to disinfect 2,000 cubic feet of space. No difficulty will be experienced in washing residue out of bucket.

HISTORICAL.

OSWALDO CRUZ, 1872–1917.

By WILLIAM C. WELLS, Chief Statistician, Pan American Union.

To one who has seen Rio the old controversy, centuries old, as to whether it is Naples or Constantinople which occupies the most beautiful site of any city in the world loses most of its interest and all of its point. Neither Naples, beautiful as it is, with its broad, sweeping bay, the islands of Capri and Ischia, the amphitheater of hills rising over the brightly colored crescent city; nor Constantinople, whether seen from the south and through the early morning mist across the waters of the Sea of Marmora, an enchanted city of blended hills, minarets and towns rising above that domed glory of Byzantine art, Hagia Sophia, the Church of the Holy Wisdom, or from the north, as from the hills above the Golden Horn, one sees a wonder stretch of city, harbor, and distance-fading waters that has charmed every beholder since Constantine chose this site for the capital of the world, are either of them the most beautiful city site. It is Rio, blending of hill, mountain, and valleys clothed in tropical verdure on the shore of that almost landlocked, island-studded bay that the earlier navigators imagined was a river's mouth, the River of January—Rio de Janeiro. The volcanic hills of Naples are bare alongside this rich outpouring of nature's wealth. Even Hagia Sophia fades from memory as one looks on Corcovado, and the minarets of the Mosque of the Conqueror, Mohammed II, are nothing in comparison with Rio's more beautiful minarets, the stately royal palms that watch over the many-colored city.

But for half a hundred years or more Rio was shunned. The voyager who would fain gaze on its beauties threw a cast with Death. Plague slew its thousands, but fever, above all yellow fever, slew its tens of thousands. Yellow fever was first recognized in Rio in 1849 in a case said to have been brought from Bahia. For 60 years thereafter it ravaged the city and the environs. "To go to Rio is to commit suicide" was a saying among all shipping folk. Dr. Theophilos Torres, vice president of the Brazilian National Academy of Medicine, in his work published in 1912 (in French), La Campagne Sanitaire au Brésil, gives tables showing the number of deaths from yellow fever from the time of its first introduction into Rio, Decem-

ber 27, 1849, up to its extinction in 1908. These numbered 59,069 for the city proper, not counting the suburbs. In the epidemic which marked its first appearance, i. e., for the year 1850, the deaths were 4,160. This figure was not again reached until the epidemic of 1891, with 4,456 deaths. In 1892 the number was 4,312 and in 1894, 4,852, the highest number attained in any one year. In 1853 there were 853 deaths, which was considerably more than half the number for the preceding year. In the year following, 1854, there were only 22 fatal cases and in 1855 only 3. This was a period of hope for Rio, but in 1856 there were over 100 deaths and in 1857 nearly 2,000. Again, in 1862, the fatalities fell to 12, in 1863 to 7, in 1864 to 5. In 1865 there were no fatalities and the disease apparently disappeared, for there were no reported cases until 1868, with 3 deaths. In 1870 there were over 1,100. An epidemic occurred in 1873 with 3,659 deaths. The interruption of three years, 1865 to 1868, was called by Brazilian physicians spontaneous extinction. It was certainly not due to any recognizable sanitary measures.

In the four years from 1891 to 1894, inclusive, there were 14,445 deaths from yellow fever, and this is the period of its greatest intensity. From 1894 until the advent of Dr. Cruz the number of deaths rose above a thousand a year only twice, in 1896, 2,929. and in 1898, 1,078. During the 60-year period of the scourge the authorities were not inactive. The best medical advice, or what was believed to be such, was taken and the then approved methods of sanitation were adopted and put into effect. Twice it was believed that the yellow fever had been done away with—in 1855 and again some seven years later. But the outbreak in the seventies, continuing with unabated violence until and after 1900, proved the mistake. At the last it appeared that Rio had become almost callous and was reconciled to pay the Minotaur's tribute. What this tribute was in deaths alone we have seen, but only of deaths directly due to the disease. The indirect deaths, weakened constitutions, vital losses in every field are unmeasured. The property and industrial losses no one has attempted to enumerate. And what was going on in Rio was only the same as in dozens of other places in central and northern Brazil. The scourge of the yellow terror was over all the land. So little was it believed in Brazil that this scourge could be lifted that when the scheme for the improvement of the port and the beautification of the city of Rio began to take form, about 1890, proposals for the sanitation cut but a minor figure. Not that sanitation was overlooked entirely; results prove the contrary; but a hope that yellow fever could be driven from Rio did not exist in the minds of President Rodriguez Ales and his associates. In the decree of September 18, 1903, the outlined plan for the rebuilding of the port and city was contained in nine proposals, in fur-

therance of which two loans of $40,000,000 and of $20,000,000 were secured. Not one of the nine proposals was directly in the line of sanitation or closely touched the question of eradication of yellow fever. The fifth proposal, for the enlargement of the city water supply, and the sixth, for a revision of the sewage system, bore indirectly upon sanitation. Government reports and newspapers of this period are filled with the plans for reconstructing the port, building of quays, rectification of the canal known as Mangue, opening of new avenues, particularly the magnificent Avenida Central (now Avenida Rio Branco) and the Avenida Beira Mar, but never a word of yellow fever or the mosquito.

In 1900 there was an outbreak of the plague in Rio. It had appeared in October of the preceding year at Santos and in December at São Paulo. In 1900 there were 295; in 1901, 199; in 1902, 215; and in 1903, 360 deaths from bubonic plague in the city of Rio proper. In this last year the deaths from plague were nearly two-thirds as many as the deaths from yellow fever. On the outbreak of the plague the municipality of Rio determined to create an establishment for the preparation of antiplague serum and Prof. Baron Pedro Affonso, one of the best-known medical authorities in Brazil, undertook the inauguration of the enterprise. Prof. Pedro Affonso went to Paris and consulted Prof. Roux, of the Pasteur Institute, as to the choice of a French specialist to whom should be given the direction of the proposed establishment. The reply of Prof. Roux was that no French specialist was better equipped for undertaking this work than one of Prof. Pedro Affonso's own compatriots, a young Brazilian, Dr. Oswaldo Cruz, at that time engaged in special bacteriological work in the Pasteur Institute. Truly a prophet is not without honor save in his own country.

Oswaldo Gonçales Cruz was born on August 5, 1872, at São Luiz de Parahitinga, in the State of São Paulo, but removed to Rio in 1872. He was the son of Dr. Benito Gonçales Cruz, at one time director general of hygiene. Oswaldo Cruz obtained his diploma in medicine in 1892 from the faculty of medicine of Rio. Immediately thereafter he entered the National Institute of Hygiene, founded by Prof. Rocha Faria, and began his studies in bacteriology. In 1896 he went to Paris and entered the Pasteur Institute. His work was mainly in the laboratory of toxicology and he became widely known to specialists through his experiments and studies in this field. He published studies on the toxic properties of the castor-oil bean, a method of discovering the toxic properties of lighting gas, the Florence reaction and a pathologic history of poisoning by the castor-oil bean.

The work of the American commission in Cuba in the sanitation of Habana, Santiago, and other cities early attracted attention in

Paris. The new theory that the mosquito was the yellow-fever conveying agent, demonstrated by the work of the commission, had in Oswaldo Cruz one of its earliest believers. In Paris he had followed carefully the experiments of the American commission, and, as Dr. Torres says, he became absolutely convinced that the stegomyia mosquito was the agent in the propagation of yellow fever. He believed that what had been accomplished in Habana might be duplicated in Rio. On his return to Brazil he communicated these views to President Rodrigues Ales and found in him a sympathetic auditor. The matter of the manufacture of antiplague serum was not lost sight of; on the contrary, the fight on the plague was the first work undertaken. Meanwhile Dr. Cruz was almost daily conferring with President Ales and urging a plan for the general sanitation of Rio, and in particular a campaign against yellow fever, all of which was to be undertaken in connection with the city and port improvement plans. President Ales heartily approved Dr. Cruz's plans and appointed him director general of the office of public health. This was in 1903. Dr. Cruz's connection with this office lasted five years—until 1908.

"Give me the proper authority and a sufficient force and means to work with, and I will rid Rio of yellow fever in three years," he told President Ales. To many this seemed a rash promise on the part of a young man just past 30 years of age, with no special reputation as a yellow-fever specialist and no special knowledge of the disease or its methods of propagation. But Cruz fervently believed in the results obtained by the American commission in Cuba and in the theory that underlaid the work of this commission, and Ales believed in Cruz. Authority was given, new laws were enacted, money was provided and Dr. Cruz began the organization of his staff of workers. All of the old measures in force for controlling yellow fever were abandoned. Everything was centered in one purpose, to exterminate the mosquito and to prevent mosquitoes from having access to infected patients. On April 20, 1903, less than 30 days after Dr. Cruz's appointment as director general of the office of public health, the first case of yellow fever was rigorously isolated in Rio, based on the lines adopted by the American commission in Cuba. Dr. Cruz's staff at first consisted of 75 physicians, a number of students, and a large force of laborers. The brigade was scattered over the whole city, but located especially at points where breeding places of mosquitoes were known or suspected to be. All of these places were cleaned out and the larvæ of the insects destroyed. Obligatory notification of all cases of yellow fever formed part of the existing sanitary regulations of Rio, but, as has been pointed out by Dr. Torres, by Dr. Sampaio Vianna, chief of the demographic section of the office of public health, and others, this law had not proven effective. Dr. Cruz asked

the Government to pass a law which would render such a declaration compulsory and enforceable, under pains and penalties for concealment or prevention of notification. This law was passed on March 8, 1904. The prophylactic procedure to be followed included notification, isolation, disinfection, and medical vigilance or supervision. In addition to yellow fever, the following diseases were added to the category of compulsory notification: Plague, cholera morbus, all choleriform seizures, smallpox, diphtheria, puerperal fever, ophthalmia in newly born infants, typhus, typhoid, leprosy, consumption, malarial fever, beriberi, scarlatina and measles.

In 1903 there were 584 deaths from yellow fever in Rio. The disease was stamped out entirely by 1908. In 1903 there were 360 deaths from the plague in 1908, 54, and in 1912 none. When Dr. Cruz in 1908 resigned the position of director general of public health to assume the headship of the Institute of Tropical Diseases, now known as the Oswaldo Cruz Institution for Experimental Pathology and Serumtherapeutics, at Manguinhos, Rio was freed from the scourge of yellow fever and near to being free of the plague. He had become a world figure, although perhaps better known in Europe than in the United States. It should have been the other way. It is not necessary to make comparisons between the work done in Cuba and Panama and that in Rio but it should not be lost sight of that Rio has a population much greater than the combined populations of Habana, Santiago, Panama and Colon, and the work of Dr. Cruz was not confined to Rio, except in the beginning. It soon extended over nearly the whole of Brazil. His campaign against yellow fever was the most extended work of this kind that has yet been undertaken and it was completely successful. When he did not himself personally supervise the work his assistants did or his methods were followed. These methods, as Dr. Vianna, one of his chief coworkers has said, were those of the American commission in Cuba, modified by conditions special to Brazilian localities.

The Oswald Cruz Institute, so named by the Brazilian Government in his honor, which was founded and organized by him and was until his death under his management, has acquired a reputation and a standing through its experiments and discoveries which has extended to the whole scientific medical world. It is to be regretted, however, that the work of this institute should be so much better known in London, Paris, Vienna and Berlin than it is in New York or Washington.

Dr. Cruz died in Rio, February 11, 1917, at the age of 44 years and 6 months. Truly a brilliant and useful life too early ended.

EDITORIAL.

THE MINOR AILMENTS.

It is doubtful if during the course of a long professional career either the lawyer or the clergyman has such opportunities for observing the vagaries of human nature as present themselves to the physician, and especially to the military doctor whose clientèle is composed almost exclusively of officers and men with whom he is in close contact and daily association. Civilian practitioners usually have social relations with but few of their patients. They see them in bed, on crutches, on the operating table but do not sit down to breakfast, lunch and dinner with them, meet them at tennis and golf, nor contend with them for a high score at bridge. They do not live within a restricted area where for weeks and months they see only the same faces and are able to watch and study their patients at play and at work as well as when stretched on the bed of languishing. In the case of the Navy doctor every one he meets in official and unofficial capacity among messmates and shipmates is a possible or prospective patient or has been his patient. This is a feature of life on shipboard not without serious drawbacks from the point of view of both physician and patient. That familiarity breeds contempt and that a prophet is not without honor save in his own country are old sayings that can find no illustrations more apt than those constantly afforded by the conditions of life at sea.

A former Surgeon General of the Navy, speaking at the final exercises of the medical school, urged on the graduates about to embark on their first cruise the importance of cultivating tact and circumspection, a friendly spirit and a dignified bearing so as to invite rather than repel the confidence and good will of those with whom they were soon to consort in the restricted quarters of a seagoing vessel.

In civil life even the most eminent practitioner can exercise but little selection as to whom he will treat and whom he will not treat. A specialist may restrict his labors to a certain field but can ill afford to discriminate in that field. The patient, on the other hand, is free to choose his attendant and often, if too poor to go to a great man's office, he can be treated in free dispensary or hospital ward by that

same great man. On a ship the patient's situation is entirely different, and however obnoxious the surgeon's personality and whatever be his reputation for professional skill the sick man must commit himself to his ministrations or go without attention.

In spite of efforts to be accommodating and the most sedulous attention to duty on his part the ship's surgeon will constantly be impressed by the frequency with which both officers and men, from the captain to the colored cook, seem to enjoy consulting a pharmacist's mate or one of the subordinates of the sick bay about details of health and minor ailments. There may be an element of perverseness in such conduct but criticism should be reserved until all the features of the situation have been considered.

As a class we are prone to find anomalies of behavior in the sick and to ignore the fact that what an overwhelming majority of human beings do under given conditions may be considered normal. At any rate, whatever the ethical aspect of an act may be, if it is in line with universal behavior, it must not be charged up as a peculiarity against any given individual.

Doctors are notoriously indifferent to the trivial complaints of patients. Business necessity and financial considerations lead them to hide their contempt and many a man is described as taking "so much interst in his cases" because he has the acumen and the self-control that go to building up a good practice. Of a less circumspect individual it is often disparagingly and unjustly remarked: "You have to be half dead before he will do anything for you."

To the practice of medicine in a military service there is no business side in the ordinary sense of the term. When 30 days have elapsed 30 days' pay become due. This is an advantage to the physician, but it may sometimes be, and is invariably considered to be, a disadvantage to the patient, who inwardly contrasts the earnest solicitude of the civilian, who must in some way secure his fee out of the groundless alarm over a pin scratch or the baby's sneeze, with the casual assertion of the contract doctor that there is nothing the matter. From the surgeon's point of view there may be nothing the matter, but alarm is always worth allaying, and the more groundless it is the stronger the call for effort to that end, and if ignorance and prejudice appeal to his knowledge and dispassionate judgment he renders a real service by dissipating them.

How often we deceive ourselves! How prone we are to lay the flattering unction to our souls that because we do not coddle and pet our patients as they magnify their trifling ills we are honest and straightforward, maintaining a high ethical standard and scorning to make capital out of the meretricious devices of quackery. As a matter of fact, the salaried surgeon, just because he is far removed from the suspicion of improper ends in view, is the one of all others

from whom a kindly manner and a gratifying show of interest may be expected and he is in honor bound to display the kindly manner and the interest, however little scientific value the case may hold for him. Officers and men may sometimes hesitate to bother the doctor over a minor complaint through consideration for him, but oftener it is through consideration for themselves. The doctor may be surly or facetious, whereas the Hospital Corpsman, gratified at such a tribute to his abilities, lays himself out to satisfy his visitor and, of course, the milder the case the greater his opportunity.

There is a happy mean between the fulsome, fawning attentions of the unscrupulous society doctor and the blunt dismissal of a surgeon who sees no importance in anything that does not invite the knife. Fame as an operator is dearly bought if it is offset by a reputation for utter indifference to the ever-recurring petty ills of daily life. While not a few men may go through their allotted threescore years and ten with little experience of severe illness or accident, until the hour and article of death never seriously requiring the good offices of surgeon or physician, the great bulk of mankind is more or less constantly acquainted with one form or another of physical discomfort—catarrh, sore throat, terrifying stomach aches, depressing diarrheas, scratches, bruises, sprains, headaches, myalgias, etc. These things take up a goodly portion of the general practitioner's time, and, however commendable it may be for a young medical officer to desire to excel in some special branch, he should remember that in the Navy he must be first of all a good general practitioner. As the late Medical Director G. E. H. Harmon once remarked to an ambitious young associate: "When everybody in the Medical Corps has a specialty, who will treat the bluejacket's tummy ache?"

There is perhaps nothing more hopeless than the attempt to cure a cold in a young officer who alternates between an ill-ventilated, overheated stateroom when off duty and his watches in fog, rain and wind on the bridge; who insists on smoking, turns up his nose at the suggestion of a purge and would not forego attending a long-anticipated party ashore though it hailed paving stones. In time the doctor inclines, very naturally, to take these cases as lightly as the patient's actions if not his demands warrant, but we should be big enough to play our worthiest rôle, regardless of the follies of youth and inexperience. If a frontal sinus infection follows a cold in the head, if an arthritic process results from a sore throat, the patient will be quick to recall his joking dismissal or the assurance that he would be all right in a day or two, and the doctor will have just cause to reproach himself if he was too indifferent or too hurried to mention dangerous possibilities, to offer a proper line of conduct, and at least to suggest prudence and overshoes.

One needs to have had but little experience of professional life to discover that a patient's appreciation of the doctor's services are usually inversely proportioned to the intrinsic value of those services as the doctor views them. You divide with the nurses the night watches over a case of pneumonia, you skillfully remove a gangrenous appendix buried in old adhesions and when convalescence is established must listen to daily grumbling at the enforced confinement to bed or the restrictions imposed as to diet instead of the voluble thanks you expected. Per contra, a man who was long annoyed by a few sebaceous cysts of the scalp—inconsequent, negligible details in your opinion—overwhelms you with gratitude and years afterwards when you meet him on another ship he comes to you smiling, hand outstretched and recalls with delight that he "has been shipmates with you before." It would be wrong to see perversity of human nature in these incidents. The pneumonia case was stupid from absorbed toxins and did not recognize your presence at his side. The appendicitis was scented by your diagnostic acumen rather than through the patient's subjective sensations. The value of your ministrations was seen as through a glass darkly and there were no anxious relatives at hand to advertise you after the fact, but the man whom a couple of incisions, a suture or two and a little cocaine relieved has occasion to bless you every time he combs his hair for the rest of his life. Such confidence and affection is not to be despised, for it has an important bearing on ultimate professional success, however indifferent one may be to any given individual's feelings and opinions. If we repel a man with a trifling affection, we must not be surprised or ready to blame him if on some future occasion he is loath to report something *he* deems unimportant but which is in reality the manifestation of a serious condition. It is the part of wisdom to encourage officers and men to come to us with their mild complaints. The appendix where trouble is beginning will be no better for the apothecary's saline. The sore on lip or eyelid which the patient minimizes and scratches daily may be a chancre or epithelioma, and there is no time to lose when these conditions appear.

To those who are not too old or too deeply sunk in the ruts of long-established habit and to the young who have not yet fully realized the significance of the first aphorism of Hippocrates we appeal for earnest study and sympathetic treatment of the minor ailments. In the reaction from the complicated and highly empyrical therapy of other days our medical schools pay less and less attention to materia medica and many a recent graduate affects to despise scores of useful drugs because in reality he does not understand their physiological action or possess any conception of their

proper employment. And yet many of the "shotgun" prescriptions of the old-school doctor had real therapeutic value and afforded a degree of comfort and relief which the single alkaloid of to-day does not impart. With our striking advances in preventive medicine, with our progress toward scientific diagnosis and rational treatment, let us not forget that the physician's mission is not confined to saving life in emergencies by brilliant operations or to presenting an unusual and rare case with a high-flown diagnosis wherein blood pressure, blood count, reflexes, etc., are scientifically tabulated, but that his main obligation is to administer relief from pain whether physical or mental, whether serious or trifling; to put his patient into that state of comfort and ease which usually contributes so largely to recovery, if recovery is possible.

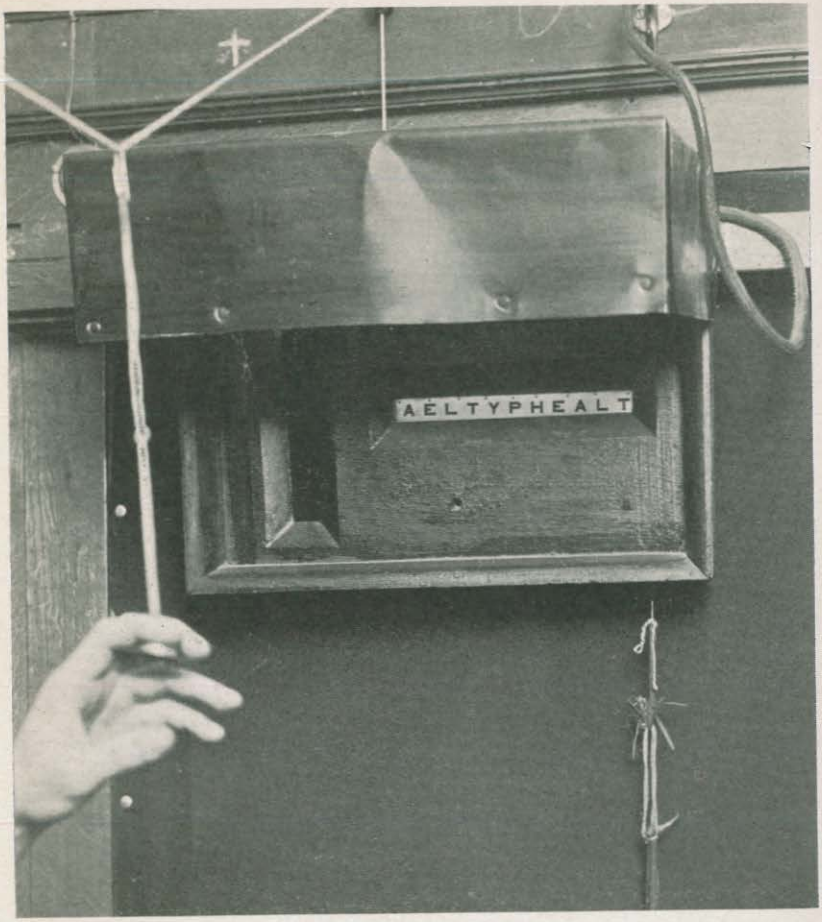
There are situations in life when negligible trifles assume vast importance. Conceive of the exquisite mental suffering, the infinite embarrassment that an acute coryza, a boil, gaseous distention of the bowel, a black eye caused by stumbling against an open door in the dark might occasion—to a bride, for example, to a man due to make his maiden effort at forensic oratory—and consider whether with all your modern science you have ready to hand a prompt remedy for these awful catastrophies. That man would be an unsatisfactory attendant, indeed, who limited himself to answering frantic appeals for help in such critical situations by a laughing assurance that life was not in jeopardy.

The old-fashioned poultice was always a huge comfort and often did good. It was anything but aseptic and we have discarded it in favor of the hot-water bag wrapped in a towel or gauze wrung out in boric acid or bichloride solution. It behooves us to find up-to-date substitutes for a host of other measures rejected by the unfeeling scientist of to-day. This cold creature of accurate calculations is unexcelled in the laboratory, but at the bedside we want some one well tinctured with the milk of human kindness. When we are sick ourselves we do not abjure our modern divinities, but we welcome the advent of the kindly old gentleman made intensely human, intensely kind, by personal acquaintance with life's long chronicle of pain. We shrink instinctively from the youth unacquainted with grief, whose ultrascientific views, whose physical vigor, whose vast appreciation of his high qualifications proclaim him, as he crosses the threshold, incapable of sympathy, incapable of applying his *magna cum laude* attainments to an uninteresting case.

For the young physician in all walks of life we ask of the gods a sensitive soul, a lively imagination and a keen physical susceptibility to pain. With these gifts he will not be a creature too exalted or too witless to condescend to study the relief of minor ailments. Pub-

lished papers painstakingly prepared on the parasites of crustaceans may bring him fame to-day and lay the foundation for benefit to a future age, but such pursuits are not for the general practitioner and the world will always love best the man who knows some simple way to relieve itching, who disdains not to roll up his sleeves and massage your back when it is caught in the vise of lumbago, who comes uncomplainingly at 4 a. m. to put a hot sponge on the larynx or force down a dose of ipecac when the first baby is having his first attack of spasmodic croup.

SHOWING CONTROL OF VISION-TESTING DEVICE.



VISION-TESTING DEVICE IN USE AT NAVY RECRUITING STATION, NEW YORK CITY.

SUGGESTED DEVICES.

A CONVENIENT DEVICE FOR TESTING VISION.

By W. S. THOMAS, Assistant Surgeon, M. R. C., United States Navy.

The apparatus illustrated and described herewith, in use at the Navy recruiting station, New York City, has proved to be of convenience in facilitating the use of the Snellen test-type cards.

Its especial object is to permit the examiner, standing at a distance beside the candidate, to bring the different rows of letters on the Snellen card into view one at a time behind a slot and to conduct the test without an assistant.

Standing out a few inches from the wall is a blackened wooden panel slotted horizontally so as to reveal one line of the test letters. Above and in front of this panel is an electric-light bulb illuminating the type, but whose direct rays are shielded by a hood from the candidate's eyes.

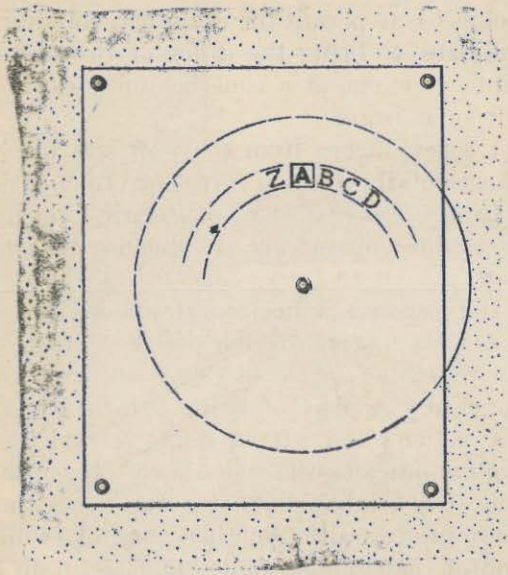
Behind the slot revolves a horizontal wooden cylinder about $2\frac{1}{2}$ inches in diameter, its surface covered with a portion of an ordinary Snellen card, with an inch or so of the wood projecting from each end beyond the card. A piece of twine is tacked to the surface of this cylinder at one end and, after passing several times around it, is led up through a pulley on the wall above. From thence it passes across the room at a height of about 6 feet from the floor and is fastened to the opposite wall. Another piece of twine is tacked to the opposite end of the cylinder and terminates in an elastic rubber band fastened below to the wall. When the overhead twine is pulled upon it unwinds from the cylinder causing the latter to revolve and revealing successively the several lines of type through the slot. At the same time the twine terminating in the rubber band winds up on the other end of the cylinder, and, with the stretching of the elastic, acts as a spring, causing the cylinder to revolve back to its original position as soon as the examiner relaxes the tension upon the overhead twine.

A SIMPLIFIED EYE-TESTING CASE.

By R. B. HENRY, Passed Assistant Surgeon, United States Navy.

In order to simplify the test for acuteness of vision when examining recruits, as well as to furnish a convenient and simple apparatus for this purpose, and one which can be turned out at a low cost, it is sug-

gested that cardboard testing sets made according to the accompanying plan be adopted as a standard and furnished to all ships and recruiting stations. The affair consists of a cardboard disk, 1 foot in diameter, pivoted between two square or rectangular sheets of cardboard in such a manner that the edge of the disk protrudes sufficiently beyond the squares at one side to permit of readily turning by hand. Snellen test letters of the size to be read at 20 feet are printed on the front of the disk in a circle so as to appear successively behind a window cut in the anterior one of the two cardboard squares, and the latter are held in position by being glued to two strips of cardboard binding, each to its fellow along the upper and

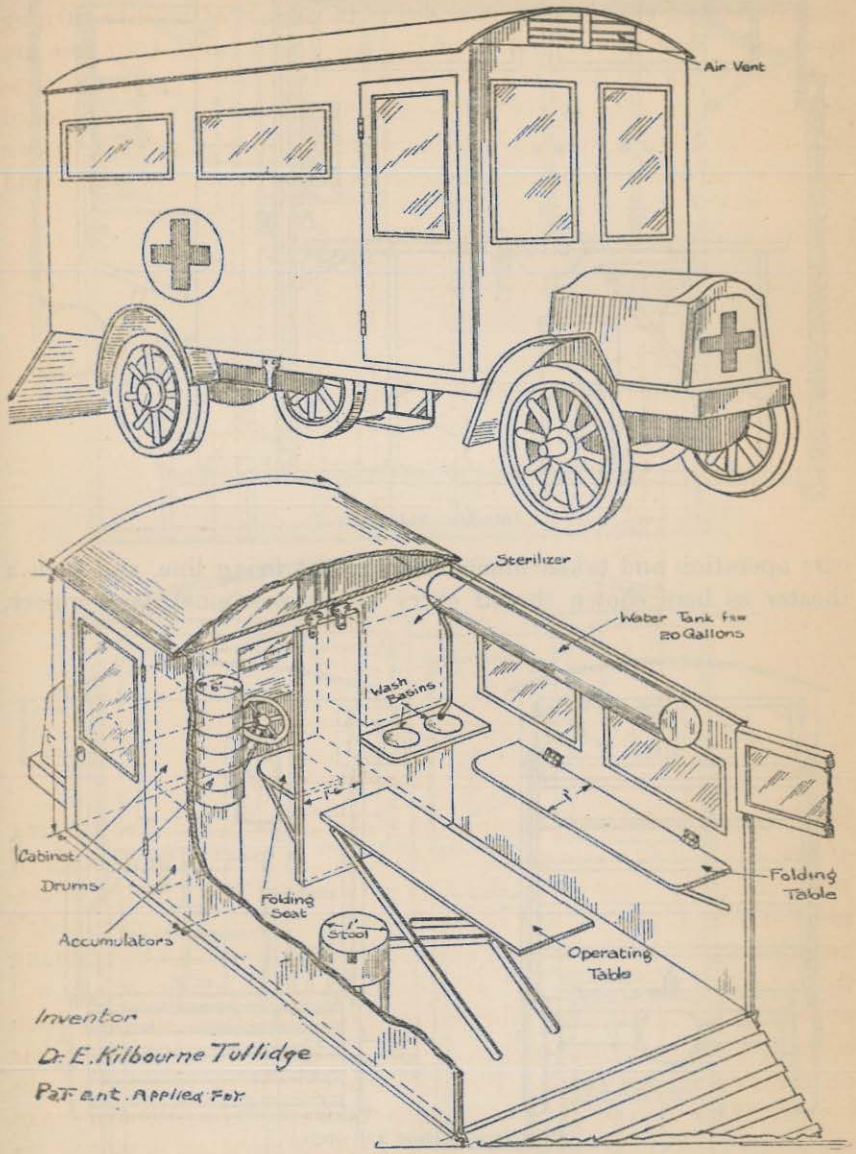


lower borders—the strips being thick enough to allow free turning of the disk. Test cases constructed on this general plan, though of wood and brass, have been used with satisfaction at a number of stations and on shipboard, and eliminate any question of the candidate's memorizing the letters, as only one appears at a time, and by spinning the wheel to right and left all possibility of learning which will appear at any particular time is prevented. Another simplification consists in omitting the useless 15 and 10-foot letters which appear on the present test cards. Brass eyelets should be inserted in the corners of the squares for fastening to the wall. If cardboard is not considered sufficiently durable, some such material as japanned tin might be employed without adding greatly to weight or bulk.

THE MOTOR OPERATING FIELD THEATER.

By E. K. TULLIDGE, Assistant Surgeon, United States Navy.

In an effort to overcome unsatisfactory operating surroundings and to insure early surgical attention under suitable conditions, with

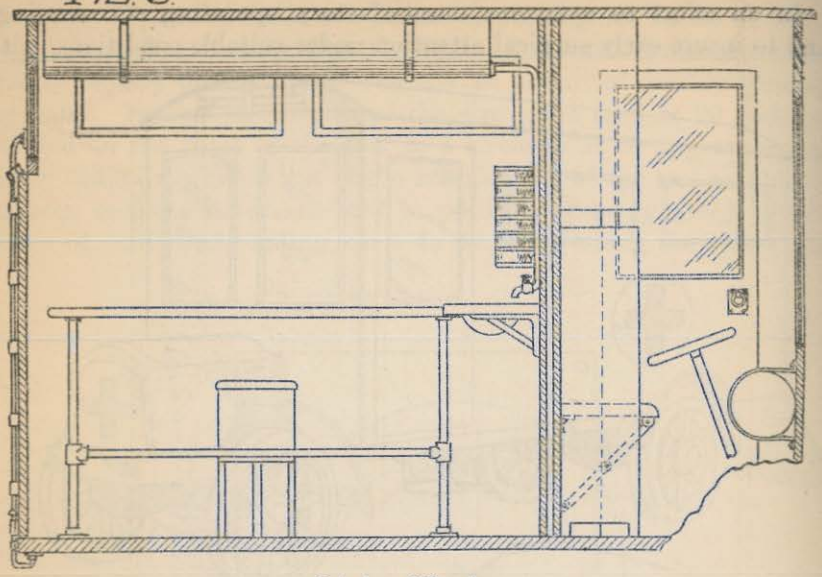


1. Exterior.
2. Interior.

proper provisions for the after treatment, the heads of many of the different army medical corps have decided that a motor operating

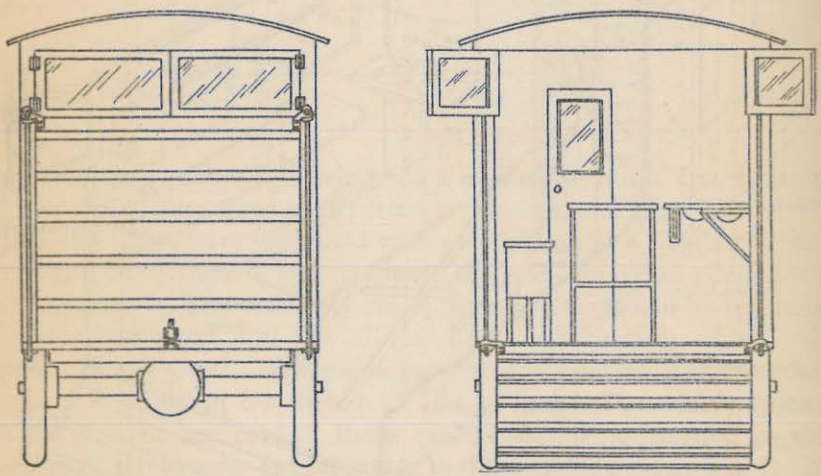
field theater is of the utmost value. These theaters can be equipped with all the modern conveniences necessary to perform the most intri-

FIG. 6.



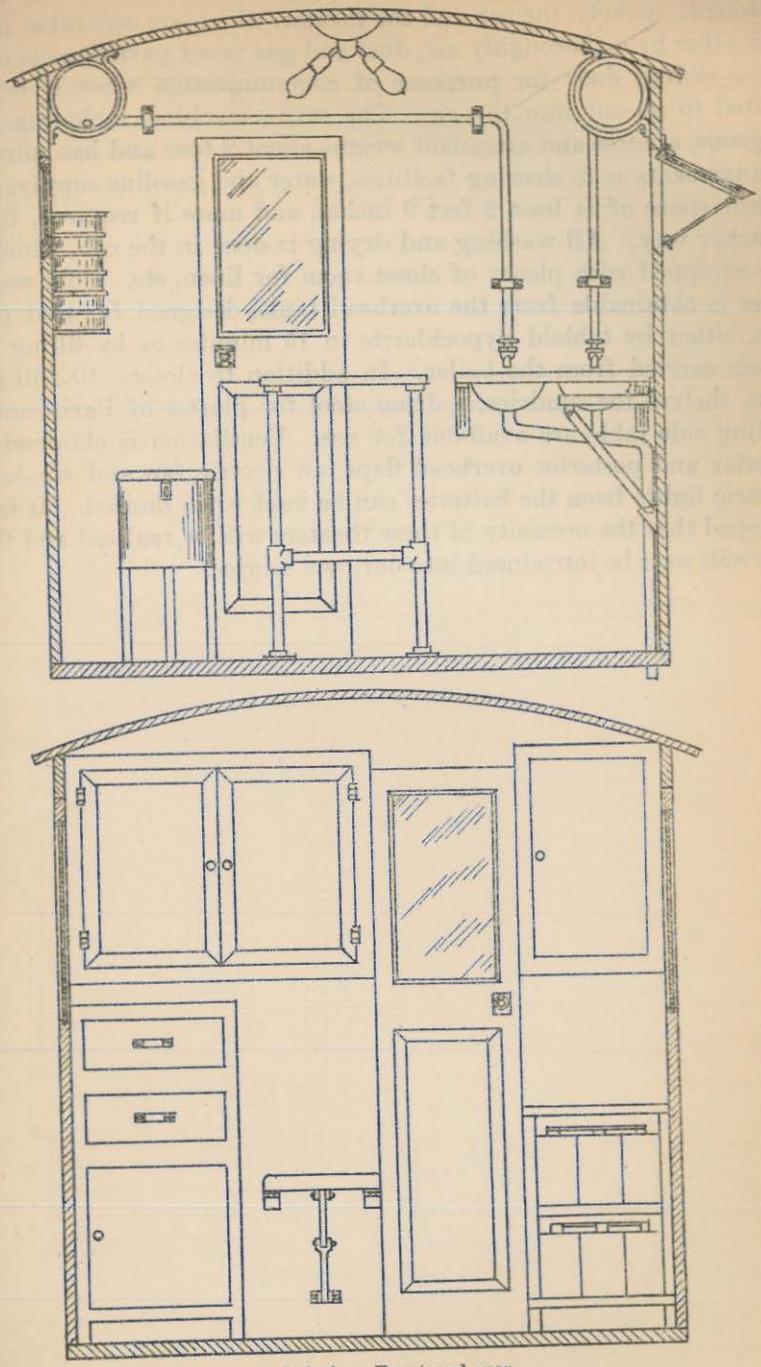
Interior: Side view.

cate operation and taken immediately to the firing line, and such a theater as here shown should carry all its personnel, be compact,



Rear view: Closed and open.

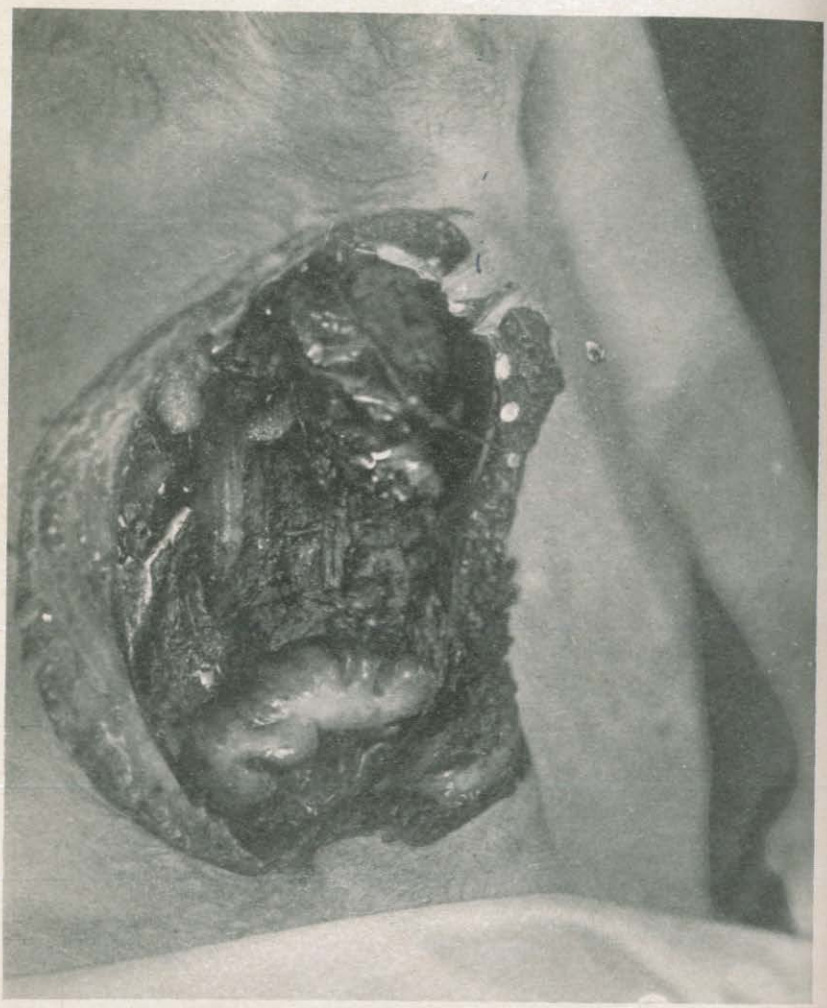
thoroughly dust, dirt and wind proof, of reasonable size and weight, and of reasonable cost; in other words, a completely equipped operating room upon wheels.



Interior: Front and rear.

To describe the pattern above: It contains two divisions or compartments, namely, the cab and the theater, which are separated from each other by a thoroughly air, dust and gas proof partition containing a sliding door for purposes of communication when it is not desired to go out into the air. The entire machine, including two surgeons, a nurse and attendant weighs about 2 tons and has suitable arrangements as to steering facilities, water and gasoline supply, and a clear space of at least 2 feet 9 inches, and more if required, for a stretcher way. All washing and drying is done in the cab, which is also equipped with plenty of closet room for linen, etc. Cold sterile water is obtainable from the overhead tanks designed for that purpose, either by tabloid hypochlorite in 15 minutes or by filling the vessels carried from the boiler. In addition to closets, 10 full-size drum shelves for sundries, a drum stool for plaster of Paris, and a folding side table are available for use. Ventilation is obtained by anterior and posterior overhead flaps, an electric fan and windows. Electric lights from the batteries can be used when desired. It is to be hoped that the necessity of these theaters will be realized and that they will soon be introduced into our own service.

EFFECT OF SHARK BITE. LATERAL VIEW.



EFFECT OF SHARK BITE. ANTERIOR VIEW.

CLINICAL NOTES

A DEATH FROM SHARK BITE.

By P. F. Prioleau, Assistant Surgeon, United States Navy.

Some people have the erroneous idea that sharks will not attack man and as a general rule the noise or commotion of a crowd of individuals in swimming is sufficient to keep them away. Since in tropical waters sharks are quite numerous it is important that none of the men should be allowed to go in bathing alone. Swimming in shallow water or, better, within the inclosure of a "shark net," as provided on some of the naval reservations, is to be encouraged.

The U. S. S. *Dale* at the time of the accident was anchored in Canacao Bay, P. I. About 5 p. m., May 31, 1917, E. E., water tender, attached to the U. S. S. *Dale*, started out for a long swim, accompanied by one of his shipmates. E. E. was a most excellent swimmer and, after a time, his companion becoming tired and not wishing to go further left him, and he continued to swim alone in the direction of the open bay. About 5.45 p. m. a seaman on the U. S. S. *Monterey* happened to notice E. E., who was then some 200 yards from the ship, fall suddenly on his back and then give two or three violent strokes in the water. At the same time the observer saw a shark in close proximity to the bather. It was not hard to conjecture that some accident had occurred, and a boat was rapidly lowered and rushed to the vicinity where the man had last been seen. The body was recovered, but it was evident from the extensiveness of the wound that the man was dead. He was then taken to the morgue of the United States Naval Hospital, Canacao, P. I.

Nearly the entire abdominal cavity had been torn away. Indeed, the wound extended from the ensiform cartilage nearly to the brim of the pelvis. Laterally, from the right mid-axillary line to the left mid-axillary line. The stomach, the small and large intestine, with the exception of a few feet, most of the liver and bladder, half of the left kidney and all of the large abdominal blood vessels were removed. The illustration shows the wound as it appeared a few hours after the accident. A portion of the ribs had been taken out with the nicety of a costotome. Some of the skin along the edges of the wound was in ribbons and bore the imprint of the monster's teeth.

E. E. was of large stature. He was about 5 feet 11 inches tall and weighed approximately 200 pounds. No doubt if he had been of much smaller dimensions the force of the attack might have been sufficient to have cut the body in two.

DERMATITIS PRODUCED BY MATCHES CARRIED IN THE POCKET.

By W. E. Eaton, Passed Assistant Surgeon, United States Navy.

With the onset of hot weather five cases of dermatitis were brought to the attention of the writer. With one exception the dermatitis first appeared on the front of the thigh upon the area covered by the side pocket of the trousers, the exception appearing on the chest beneath the pocket in the shirt or blouse. The area involved appeared pink-red, with slightly raised yet diffused edges which tended to spread and seemed moderately infiltrated. At times there was intolerable itching, and again this was entirely absent. Upon application of mild protective remedies the condition subsided, only to recur upon neglecting treatment.

Upon inquiry it was learned that in each case the patient had been in the habit of carrying a box of safety matches in the pocket overlying the area involved. Upon removal of the matches, washing of the garments, and application of soothing remedy the dermatitis at once disappeared. In three cases, upon the patient again returning the matches to the pocket overlying the previously affected region, the dermatitis recurred. In one case a dermatitis of the fingers of the hand and the eye on the same side of the body as the affected thigh was attributed to the handling of the matches and rubbing of the eye by the hand affected. The outbreak disappeared upon removal of the irritant.

In this connection attention is invited to the apparent impurities and poor qualities of the safety matches now on the market. It seems probable that impurities were dissolved by the perspiration and in this way deposited upon the skin, resulting in an irritation and acute dermatitis. All cases became well promptly upon removal of the irritant.

AMŒBIASIS WITH CONSTIPATION.

By E. A. Vickery and J. J. A. McMullin, Passed Assistant Surgeons, United States Navy.

In connection with amœbic infection in the Tropics it is interesting to note a symptom-complex which has received very little attention in the literature. The symptom-complex so closely simulates that of chronic intestinal obstruction that a tentative diagnosis of

intestinal stasis with autointoxication was made in the two cases herewith presented.

The symptoms were practically identical in the two cases and were as follows: Marked and obstinate constipation, lasting for about a year, movement of the bowels being obtained only with a cathartic for variable periods lasting from one to two weeks; vague pains referred to the abdomen, with a little tenderness in the neighborhood of the cæcum; loss of weight and appetite; lassitude; mild general malaise, with markedly sallow complexion. Both cases showed indicanuria. At no time was there any diarrhea.

One case presented no history of acute attack, and symptoms were somewhat relieved by the administration of Russian paraffin. It was impossible to obtain bismuth plates, owing to the lack of a suitable X-ray machine. The other case had a history of amœbiasis one year prior to symptoms and bismuth meal showed no intestinal stasis.

It is interesting to note that amœbic infection can occur in its chronic stage with absolutely no diarrhea, a point not generally considered in the diagnosis of the infection. The question of infectivity from such a carrier is an important one, as in one of the cases mentioned the amoebæ were found encysted, with but few motile forms. It seems probable that a symptom-complex of this kind in a patient returning from the Tropics would easily escape diagnosis and might well be treated surgically as a case of mechanical intestinal stasis, particularly as encysted nonmotile amœbæ are not easily detected during a routine examination of the feces. We consider the administration of a saline purgative as a necessary preliminary to microscopic examination in these chronic cases, as amœbæ were only found after such a procedure.

Both these cases were extremely obstinate to the emetin-ipecac treatment.

MULTIPLE GUNSHOT WOUNDS RESULTING FROM DEFLECTED BULLETS.

By W. A. Bloedorn, Passed Assistant Surgeon, United States Navy.

The following cases may be of interest in showing the effect of bullets deflected and ricocheting after striking a steel plate. While practicing with a Benet-Mercier machine gun on the quarter-deck of the *Kentucky* the tripod supporting the gun gave way, allowing the muzzle of the gun to be lowered to such an extent that the bullets, instead of clearing the deck, struck the waterway.

It appears that from 9 to 12 bullets struck the waterway in this manner. The muzzle of the gun was approximately 15 inches from the waterway during the firing and was directed almost at a right

angle against the waterway, which was slightly curved at this point with the convexity outboard. The waterway consisted of two steel plates riveted together and measuring in total thickness 1⅞ inches. One bullet, striking at edge of rivet, penetrated both steel plates. The remainder of the bullets penetrated the steel to depths varying from one-half to approximately 1 inch. It appears that these bullets were shattered into fragments varying in size from small bird shot to pieces about the size of a 22-caliber rifle ball and with a few fragments somewhat larger than a 22-caliber ball. These fragments ricocheted, striking three officers and nine men, including the man firing the gun.

The injuries were confined to those men standing behind and at the sides of the gun at distances varying from 3 to 15 feet. The bullets used were 30-caliber and had a core of lead and tin composition in a jacket of cupro-nickel. The weight of the bullet was 150 grains. The standard muzzle velocity of this ammunition in the rifle is 2,700 feet per second.

Case No. 1. Struck by small fragments in center of forehead, right leg and thigh. The majority of the wounds were superficial, one fragment penetrating the deeper tissues of right leg.

Case No. 2. Struck by small fragments on both legs and thighs, one fragment penetrating the deeper tissues of left leg.

Case No. 3. Struck by small fragments on chin, left foot and leg, all wounds being superficial.

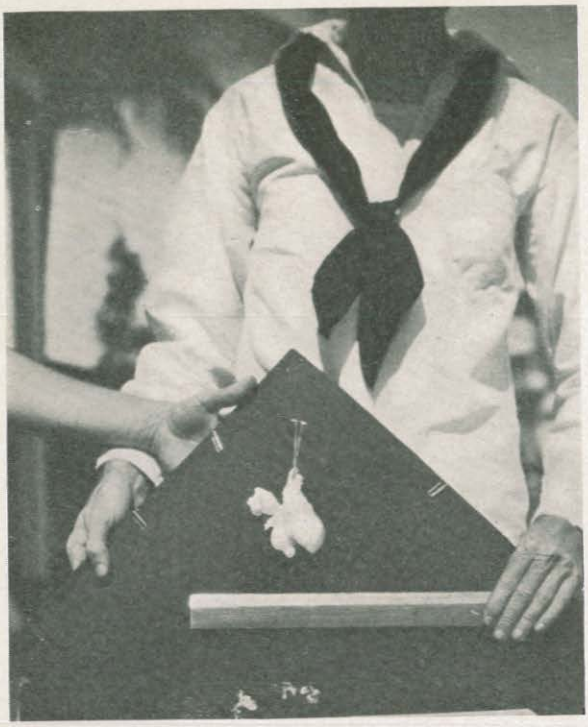
Case No. 4. Struck by numerous fragments on both legs and left thigh, one fragment lodging deeply in each leg.

Case No. 5. Struck by numerous fragments on left leg, left forearm, and right thigh, one fragment penetrating deeply in left forearm.

Case No. 6. Struck by numerous fragments in right leg, left forearm, left thigh, and occipital region of skull. The fragment striking the occipital region penetrated the bone and lodged in the brain. This patient fell to the deck, but immediately got up and walked to sick bay. He complained of no discomfort. Examination showed penetrating wound of occipital bone in median line about one-fourth inch in diameter. Pupils were widely dilated, but reacted to light and accommodation, and examination revealed some dimness of vision.

Case No. 7. Showed numerous wounds of legs, thighs and back. He was literally sprayed with fragments of bullets, the majority of the wounds being superficial.

Case No. 8. Showed wounds of both legs and penetrating wound of right forearm caused by small fragment.



MULTILOCULAR CYST.

One sac is here invaginated into the large one. In this picture the tumor is pinned up by the pedicle, consequently it is "upside down."

Case No. 9. Showed wounds of both legs, both thighs and right forearm, several of the fragments being embedded in deep muscle.

Case No. 10. Showed wounds of both legs, both thighs, left side abdomen and left arm, the majority being superficial.

Case No. 11. Showed slight wounds of nose and left side of face and a small fragment in left buttock. This man was firing the gun and being directly back of the steel plates struck by the bullets, was more slightly injured than any of the others.

Case No. 12. Struck by a fragment which lodged in the deep muscles of left forearm.

First-aid dressings were applied to all the wounds and then each case was examined at length to determine the extent of injury. Owing to the fact that the injured were wearing blue clothes and that bits of clothing were removed from the wounds, all officers and men injured received 1,500 units of tetanus antitoxin.

A MULTILOCULAR CYST.

By W. L. Mann, Passed Assistant Surgeon, United States Navy, and F. L. Conklin, Assistant Surgeon, United States Navy.

A multilocular cyst, in a congenital hernial sac simulating, by physical and clinical symptoms, a reducible hernia.

Patient, native of Guam, age 22, life-term prisoner for murder, first seen October 16, 1916, complaining of pain in left inguinal region, duration two months. Physical examination revealed what was then thought to be a moderately large hernia, easily reducible.

Operation two weeks later, under ether anæsthesia. Sac easily located and incised. Inside of sac was a pedicle of tissue, traction upon which caused a mass of cysts to literally flop out of abdominal cavity through internal abdominal ring.

The two larger cysts were so arranged that abdominal pressure would cause the upper cyst to invaginate into lower one, while scrotal pressure caused evagination into the abdominal cavity.

The pedicle and sac were carefully dissected toward testicle; here the condition was so obscured by adhesions that it was impossible to state exact origin of tumor. In addition to the cysts, there existed a small piece of omentum adherent to fundus of sac, thus causing it to be a bona fide hernial condition.

The sacs were filled with clear, straw-colored fluid. Careful examination of the tissue by two pathological laboratories fails to clear up the etiology of same. For a better idea of the tumor, see illustration. The recovery from the operation was uneventful.

IMPERMEABLE DRESSINGS IN THE TREATMENT OF BURNS.

By J. J. A. McMullen, Passed Assistant Surgeon, United States Navy.

Skin grafts are usually covered with rubber tissue or some other impermeable material. Is it not probable that the satisfactory results are sometimes wholly due to the retentive fabric placed over them?

The universal interest aroused by De Sandfort's ambrine recalls to mind the following case, treated in the naval hospital, Olongapo, P. I.:

C. P., native fireman, first class, admitted April 18, 1916, scalded with live steam from a burst steam pipe while working in the fireroom of the U. S. S. *Pompey*. Both lower extremities, scrotum, penis and lower abdomen involved in burns of the first, second and third degrees (Dupuytren's classification). Worst burns on inner and anterior sides of thighs.

Picric acid was applied upon admission and morphine given to relieve pain.

At the end of four weeks skin grafting was contemplated, as there was no sign of epithelial regeneration anywhere. Instead of applying skin grafts, however, the burned regions were cleansed with warm salt solution and the affected parts covered with rubber tissue. Each morning the rubber tissue was removed, the burns were washed with salt solution, covered with freshly sterilized rubber tissue and bandaged with muslin.

After four days islands of epithelium were apparent everywhere, and the burns rapidly healed without scar tissue, except on the inner surfaces of the thighs. A small area on the inner surface of the right thigh did not heal after three weeks of treatment. There the granulations were exuberant. Silver nitrate was applied and healing promptly ensued.

Too much enthusiasm should not be aroused by a single case, but it seems to me that in warm salt solution and impermeable dressings we may have an effective substitute for ambrine.

A METHOD OF LOCATING BULLETS AND OTHER FOREIGN BODIES BY THE X-RAY.

By Dr. Sinclair Tousey.

I have made a careful study of the 57 methods of X-ray localization of bullets and other foreign bodies which the European war has brought forth. Such a large number of remedies naturally suggests the possibility that none of them is a specific, including one of

my own published a number of years ago. I have therefore made a new attempt to solve the problem, with the following result:

As with all other methods, facilities are required for placing the X-ray tube at a measured distance from the plane of the photographic plate, and, after the first exposure, displacing the tube a measured distance in a plane parallel to the plane of the photographic plate and making a second exposure upon the same or another photographic plate.

The only special apparatus required for my new method is an 8 by 10-inch piece of galvanized-iron wire netting, one-eighth inch mesh and with the thickness of wire such that there are seven meshes to the linear inch. This is laid upon the photographic plate while the exposures are made, and the squares show unchanged in the finished picture. If the displacement of the tube is one-seventh of the distance from the anticathode to the plane of the photographic plate, then the number of squares that the image of the foreign body is displaced in the second picture will show the number of half inches that the foreign body is distant from the plane of the wire netting. For the thigh or any part of the trunk the distance from the anticathode to the plate might, for example, be 21 inches and the lateral displacement of the tube 3 inches; while for the leg or arm the distance might be 14 inches and the displacement 2 inches. Here again each (one-seventh inch) square over which the image of the foreign body is displaced in the second picture will represent a distance of one-half inch between the plate and the foreign body.

In addition to the sheet of wire netting, a small lead marker of a uniform and distinctive character, like a small ring, for exmaple, should be fastened to the skin with adhesive plaster at a place where the skin will be in contact with about the middle of the wire netting when the exposure is made. Before this marker has a chance to become displaced its exact position should be indelibly marked upon the skin. A lead serial number should be laid upon the plate invariably at its lower external corner. This is very important for identifying the picture and avoiding any uncertainty which might result from the plate being film side up or glass side up. The letters "R" and "L" (right and left) in connection with the serial number will be of occasional value, but the essential thing is to mark the number on the lower outer corner. The same serial number had better be indelibly marked upon the patient's skin. As a rule the two exposures had better be upon the same plate and each exposure had better be of the duration and intensity which would be required if only one picture were to be made. If for any reason separate plates are used, a stereoscopic plate holder is an inexpensive and nonbulky apparatus. The lead marker near the middle of the wire netting,

the serial number in the lower outer corner and the wire netting itself should not be displaced, as they are to identify the position of the image of the foreign body upon both plates. Of course the patient's position is unchanged.

The advantage of my new method lies in the small space required for the apparatus and especially in the absence of any mathematical calculations.

It would be of great advantage for the X-ray operators to acquire practical experience beforehand with this method upon different parts of the human body employing the X-ray apparatus that they are to use in actual service, so that the pictures may be perfect from the start (of course this applies to any method).

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Medical Inspector J. C. PRYOR, United States Navy.
Surgeon C. N. FISKE, United States Navy.
Surgeon C. FOX, United States Public Health Service.
Surgeon H. F. STRINE, United States Navy.

GENERAL MEDICINE.

BALDWIN, E. R. **Latent tuberculosis: Its importance in military preparation.** Cleveland Med. Jour., xvi, June, 1917, No. 6.

The author defines latent tuberculosis as, first, "any and all old or recent tuberculous infections that are capable of producing clinical disease, but have never caused recognizable symptoms"; second, "cases whose symptoms were recognizable but unnoticed and transient and now ceased."

He states that infection usually in the tracheo-bronchial lymph nodes occurs in from 75 to 90 per cent of young adults. These lymph nodes and mesenteric glands are "storage places for the tubercle bacillus." The author reminds us that living tubercle bacilli have been found in the most calcareous remains of tubercle.

The period of incubation of tuberculosis appears to be not longer than three months, during which time the organisms produce tubercles and remain encysted indefinitely or die.

The author believes that no one is immune to primary tuberculosis infection if a sufficient number of virulent bacilli enter the body frequently and considers that the disease in the young adults usually is metastatic and the result of infection in childhood or youth.

Physical, mental and occupational strains play their rôle in favoring the development of the disease. Mechanical factors tend to spread the disease from foci where living organisms have been encysted, "but do not act in causing fresh invasions from the outside."

The bearing of latent tuberculosis upon military preparedness is considered very important. The inability to recognize some cases, as well as failure to detect recognizable ones upon examination for enlistment, may result in the development of clinical tuberculosis in these latent cases, many of whom might almost be rejected upon history alone.

The British and German reports concerning tuberculosis are stated to concur in the fact that little tuberculosis is acquired from infection in army service. "The germ enlists with the man" (Osler) and is merely reactivated.

Wetting, cold, overstrain, trauma and hemorrhage are considered causes for the lighting up of latent infections. Chest wounds do not appear to predispose to any unusual degree. It is thought that careful, candid history and thorough examination of the chest and glandular system would have excluded a large percentage of those who already have broken down in military service.

The value of the various diagnostic methods in common use is discussed briefly and the author concludes that "the serum reaction with complement fixation" is of greater value than the tuberculin test.

Those upon whom responsibility rests for sifting out the latent tuberculous at recruiting stations may gain a measure of comfort from the following pronouncement: "It is impossible for sanitorium physicians after prolonged observation to confirm or disprove a considerable percentage of suspected cases."

(J. C. P.)

COLE, R. **Suggestions concerning the prevention and cure of acute lobar pneumonia.** Am. Jour. Pub. Health, June 1917, vii, No. 6.

The author reports briefly some of the late observations and conceptions concerning prevention and cure of acute lobar pneumonia and includes a résumé of some work done at the hospital of the Rockefeller Institute.

He emphasizes the fact that over half the cases of acute lobar pneumonia occur between the ages of 20 and 50 years, "the period of greatest activity." Many laymen and physicians are prone to regard pneumonia as a disease of the very young and the aged.

In discussing the recent observations concerning pneumococci, he calls attention to the several groups which until recently have been classified under the general term "pneumococci" and shows that acute lobar pneumonia may be caused by any one of several groups or types of organisms having definite immunological and less definite morphological differences. About 65 per cent of the cases of acute lobar pneumonia are caused by pneumococci of types I and II, types which are "immunologically quite distinct and have definite, specific characters." The mortality rate among cases infected by these organisms is 25 to 35 per cent. The organisms constituting type III are those having very large capsules, forming sticky exudates, and are known as pneumococcus mucosus. This organism causes pneumonia in only about 10 per cent of the cases, but of the cases caused

by type III the mortality rate is at least 50 per cent. Group IV embraces different strains of pneumococci not falling in any of the above-mentioned three groups. About 25 per cent of cases of acute lobar pneumonia are produced by this group, and its rate of mortality is low compared with the other groups, namely, 10 to 15 per cent.

"Most of the pneumococci found in mouths during health belong to group IV." Of 942 normal individuals studied in the hospital of the Rockefeller Institute, 450, 47 per cent, were found to harbor pneumococci, and group IV claimed 345 out of the total. Types I and II appeared in 56 instances. In all but three of the cases in which types I or II were isolated from normal individuals, the healthy individuals had been in close association with a person sick of pneumonia caused by the same type of pneumococcus. In studying the length of time convalescents or healthy carriers might harbor organisms belonging to types I or II it was found that in most cases the organisms belonging to these types die out in the mouths of convalescents within a few weeks. The longest time in which any organisms have been observed in the mouth of a convalescent has been 83 days. The same facts hold good concerning the persistence of types I and II in the mouths of healthy carriers.

Study of dust in houses where pneumonia was present and in houses where no known cases of pneumonia had occurred showed the following interesting results: From 175 specimens of dust from houses which had contained pneumonia due to type I or II, 73 specimens showed pneumococci, and of this number 47 belonged to types I or II. In only two cases did the type of pneumococcus found in the dust fail to correspond with the type isolated from the patient. Sixty-two specimens of dust from houses where no cases of pneumonia were known to have existed were studied. Of these specimens 18 showed pneumococcus and only 1 was of type I or II and in this case the "known carrier of the corresponding fixed type was found to be visiting at the time." Two small epidemics were investigated and it was shown that a fixed type organism was responsible, carriers of the same type of organism were found and the same type of organism was found in the dust. This evidence all tends to indicate that infection occurs either directly or through healthy carriers. Concerning group IV the author remarks that the cases produced by this group, which is commonly carried in the normal mouth, may be autogenous, as all infections with pneumococcus originally were believed to be.

Infections from type III, which causes the most severe pneumonia are somewhat baffling in the effort to discover their source. In an examination of 450 healthy carriers group III appeared 85 times, "and in practically none of these persons could any association with cases of pneumonia due to the same type of organism be discovered."

It has been proved that these healthy carriers may harbor group III organisms even for years, and as yet no difference of any character has been found between the type III organisms found in disease and those found in the mouths of healthy carriers.

With reference to preventive inoculation the author appears to think that "among troops preventive inoculation might be tried with considerable hope of success," although the results of its use in civil population hitherto have been disappointing.

Concerning serum treatment the author notes the difficulties in determining the type of organism present before administration of the specific serum. He states that a diagnostic method has been devised which "is sufficiently simple to be carried out as a routine measure in any well-equipped laboratory," but does not describe the method. Against pneumococci of type I a serum of a high potency has been obtained; against type II a serum of "considerably less power"; against type III a serum of very slight protective power. Since group IV is a group containing pneumococci which can not yet be placed in fixed types according to present laboratory methods, it has been impossible to prepare specific protective sera. The serum treatment of acute lobar pneumonia appears to be most satisfactory in treating the diseases caused by pneumococci of type I. "In the hospital of the Rockefeller Institute 103 cases of this type have now been treated with but 8 deaths." The New York City and State Health Departments are now determining the "type of pneumococci present in specimens of sputum sent to them for examination."

The author recommends:

1. That pneumonia be made a reportable disease.
2. That patients be isolated, sputum sterilized and that the rooms occupied by pneumonia patients be thoroughly cleansed "at least with soap and water" (if not disinfected).
3. That for statistical purposes health departments should determine the type of pneumococci in pneumonia cases.
4. That utmost speed be exercised in indentification of the type of pneumococcus in a given case when it is intended to employ serum treatment, the greatest benefit being obtained by the earliest possible administration of the serum in appropriate cases.

In cases treated with serum the author states 250 c. c. have been necessary in the average case. This large amount causes the manufacture to be very expensive. No established standard of potency for this serum exists at present. Effort is being made to establish such. The author states that in his opinion a thorough washing with soap and water is "very much more efficacious" than fumigation in the matter of prophylaxis, and states that knowledge concern-

ing persistence of the organism in dust is insufficient. Type I disappears from the dust within three or four weeks.

(J. C. P.)

SMITH, A. L. **Perlèche. Its bacteriology, symptoms, and treatment in 223 cases.** Arch. Pediatrics, xxxiv, No. 4, April, 1917.

"Perlèche is an infection of the labial commissures, manifesting itself, first, by a maceration of the epithelium; secondly, by a desquamation of this tissue, and, thirdly, by a formation of shallow ulcers and cracks."

While occurring chiefly among children the contagion is frequently conveyed to adults (16 cases, 7 being dispensary attendants). An anaerobic streptococcus was isolated from 135 cases, although other common pyogenic organisms may be present, and, in causing secondary infection, starve out the anaerobe. Six times the author infected his own labial commissures with the anaerobe.

Cold weather favors infection through chapping and fissures: buccal and nasopharyngeal conditions which favor increased saliva formation are secondary or contributing etiological factors.

Treatment for this otherwise obstinate affection consists in relieving conditions causing salivation, painting lesions with 50 per cent solution of silver nitrate and when dry the application of Lassar's zinc oxide paste. Spirits of camphor locally and tincture of belladonna internally may be required. For secondary pus infections soaking crusts with 1–1,000 solution of bichloride of mercury followed by 5 per cent ammoniated mercury ointment will prove efficacious.

(C. N. F.)

COPEMAN, A. M. **The prevention and arrest of certain epidemic diseases in war time.** Jour. State Med., xxv, 1917, Vol. 4–5.

In connection with cerebro-spinal meningitis the article states that in the early spring of 1916 it was decided, in view of the possibility of wide extension of the disease, not only to isolate cases, but to segregate contacts and examine bacteriologically for carriers by swabbing the nasopharynx. Under this arrangement it was possible to release about 70 per cent of the contacts within 24 to 48 hours and the majority of the remainder within 2 to 4 days later. Those found to harbor the organism were isolated until positive results were no longer obtained.

To perform the work a central cerebro-spinal laboratory was equipped and 37 district laboratories started or coopted for the purpose.

The culture material invariably employed was trypagar. The work of media preparation was performed in the central laboratory and supplied to the district laboratories as needed. For rapid transportation a motor laboratory was fitted up.

Four specifically distinct types of the organism have been isolated from cerebro-spinal fluid, the serum prepared from one type being useless as a means of treatment in outbreaks associated with other types. Encouraging results have followed the use of a polyvalent serum.

If the organism is isolated from the throat as well as the cerebro-spinal fluid, it will be of the same type. This also holds good for cultures from the nasopharynx of positive contacts of the case. This fact can be made use of in tracing possibly unsuspected carriers. The trend of opinion is that the disease is spread through contact with healthy carriers.

As a prophylactic measure and in the treatment of carriers good results are claimed by nasal insufflation of 0.5 to 1 per cent of a solution of chloramine or of 1 in 5,000 permanganate dissolved in normal saline. On a large scale promising results have been obtained by requiring the men to remain for five minutes in an inhaling room the air of which is charged with steam and fine droplets of either a 1 per cent zinc sulphate solution in normal saline or, in the case of chronic carriers, 1 to 2 per cent of chloramine.

Under beriberi mention is made of a "savory" tablet which is both antiberiberic and antiscorbutic. It is made up of a basis of steam-cooked pea flour with which are incorporated extracts of yeast and also of certain vegetables extracted at a low temperature, together with certain other flavoring constituents. These tablets are quite palatable and weigh one-half ounce, which is the prophylactic dose for one week, the two halves being taken at intervals of three days.

(C. F.)

AULD, A. G. **New treatment for bronchial asthma.** Brit. Med. Jour., May 5, 1917.

In a preliminary note the author refers to his belief, uttered in 1908, that a pure asthmatic attack is a reaction on the part of the lungs to a toxic substance, "either of distinctly pathological origin or else a product of normal metabolism which gradually accumulates in the blood." In the following year Auer and Lewis, of the Rockefeller Institute, showed that the lung of the guinea pig in anaphylaxis presented conditions identical with those of bronchial asthma. They found the pulmonary distention to be due to imprisonment of the air in the alveoli from an intense bronchial construction which was

exclusively of peripheral origin. The symptoms could be relieved or averted by atropine. The anaphylactic nature of bronchial asthma has since been expounded by Meltzer and many others. The author desired to use Witte peptone in the treatment of selected cases of pure bronchial asthma with or without bronchial catarrh or emphysema. The Witte peptone being unprocurable, Armour's was used. He began with one-third gram of peptone dissolved in about 5 c. c. distilled water at blood heat, injecting this (with due precautions) subcutaneously at an interval of three or four days during the first week. The next week two injections of two-thirds gram were given at similar intervals, and during the third week two injections of 1 gram in 7 to 10 c. c. water. This sufficed in some cases. In others 1-gram injections weekly or biweekly were indicated for three weeks more. No apparent constitutional reaction followed.

The author concludes: "In the limited number of cases tried the results have surpassed expectation. In several cases of moderate asthma the symptoms have become perfectly quiescent, while others have greatly benefited. In one case three months have elapsed without recurrence. Sometimes the relief is very rapid, the patient experiencing relief after one injection. Where attacks of great severity occurred every two or three months, a few weeks' treatment beforehand has caused the attack to abort."

(ED.)

SURGERY.

HUGGINS, G. N. **The surgery of amputation of stumps (an experience of 2,000 consecutive cases).** Lancet, London, April 28, 1917.

Until the outbreak of the war modern aseptic methods have meant a negligible number of amputations in this generation. The experience of an earlier race of surgeons is not applicable to present circumstances, because they planned their operations for speed and the eventual use of peg limbs. The classical operations for the foot were devised before artificial joints had been introduced. Amputations must now be done with the idea of ultimately employing a delicate and complicated artificial limb.

Primary amputations are done to arrest infection, and so to save life. Further operation or radical treatment has commonly been necessary in England to prepare or improve the stump for the fitting of an artificial limb. The author aims to elucidate this secondary treatment and at the same time give the basis for action in the case of primary amputations. The cases seen at the Pavilion Hospital, Brighton, had experienced amputation at periods varying from two months to two years before coming under the writer's care. He makes this rough classification: (1) Good stumps not ready for arti-

ficial limb; (2) stumps that have not healed after primary amputation; (3) sequestrum formation; (4) sinus; (5) bad scars and eczemas; (6) pain or tenderness; and (7) joint contractures. Three months is the minimum time in which an amputation stump can be made ready for an artificial limb, and then only if a tight bandage has been worn and massage given daily. These measures accelerate the shrinking of the stump.

Unhealed stumps are usually the result of so-called guillotine amputations, or those in which the flaps have not been stitched up. These should be treated with continuous skin extension from the earliest possible moment until healed or operated on again; continuous extension for a few weeks will almost cover such a stump. Every infected stump, after healing is well advanced, suddenly shrinks and skin becomes loose. This is the time to refashion the stump. The time for this varies, but two or three months or longer are required for the thigh. It is sometimes possible to remove the scar and bring the skin edges together without shortening the bone. The importance of a few inches of bone can not be overestimated, and it is hardly ever necessary to remove more than one-half to 1½ inches. Other reasons for waiting are the improvement in general health and the higher resistance to infection developed by the patient.

Many bad results are due to operating on guillotine stumps in less than two months after the original amputation. Many of the cases of necrosis of bone occurred in guillotine amputations that had been shortened too soon.

No stump is ready to go to the instrument maker until it has been radiographed, as a stump may heal and yet contain a sequestrum, with the result that as soon as the artificial limb is worn an abscess forms, with resulting sinus. If the sequestrum is small, at least two pictures should be taken, so that it can be removed with least possible damage to the stump. Sequestra in stumps are generally buried in new bone thrown out from the end of the shaft. New bone which is cancellous can be chiseled away freely, but the shaft must on no account be injured, as there would be danger of further necrosis.

Sinuses in stumps are due to: (1) Silk ligature; (2) necrosis of bone; (3) foreign matter, such as metal, or, (4) long septic tracks in scar tissue which are unable to close through imperfect drainage and low vitality. The writer uses a crochet hook instead of a probe in examining a sinus, and often removes with it ligatures or small sequestra. A sinus should not be operated on for removal of ligatures unless repeated attempts have failed. When silk is the cause of a sinus there are often several pieces. In one thigh stump 17 silk ligatures were discharged in three months. Four or five is a more usual number. Much harm is done to a stump by exploring for silk. Silk should never be used for ligatures on amputation stumps. It

caused 40 per cent of the sinuses treated by the author and prolongs and increases pain. Necrosis and foreign matter are localized by the aid of X-rays and the remarks under "Sequestrum" apply. The long septic track in scar tissue is hard to diagnose, and can only be demonstrated by exploration. When no foreign body is found, excise the skin around the sinus, remove deep portion of scar, sew up wound. Packing the wound and attempting to obtain healing from the bottom often leads to a bad puckered scar.

Pain and tenderness of stump is due to: (1) Nerves adherent to scar; (2) bulbous nerves; (3) sequestrum in new bone; (4) spurs of new bone; or, (5) chronic abscess.

Adherent nerves (result of not shortening the nerves at time of amputation) always have to be removed. As bulbous nerves which do not adhere to the scar as a rule become painless in three or four months, wait that long before removing. On the other hand, bulbous nerves which are not tender or painful may become so after three or four months. Bulbous nerves may cause extensive symptoms such as large areas of hyperæsthesia. In one case it caused epileptiform fits.

Spurs of new bone are common and every now and then cause pain and require removal. The large amount of new bone formation in stumps that have been infected is striking and it often takes on fantastic shapes and follows muscular attachments and sinuses. It is important to be sure that pain apparently due to a spur is not caused by a bulbous nerve, as the spur alone does not often cause pain.

Often where a diagnosis of bulbous nerve is made a small abscess will be found instead. It may be around a ligature or have no apparent cause.

Scars in stumps that have been infected are due to insufficient covering of bone or to too much covering. If the scar is very large and liable to ulcerate, in the case of insufficient covering, use skin extension and then excise the scar. In the second group, if the edges are very puckered or turned in, the scar is liable to eczema, and after wearing an artificial limb is apt to break down through the softening induced by decomposition of sweat. In excising a scar refashion the deep parts as well as the skin, or the condition will relapse.

The commoner contractures are: (1) Flexed knee, (2) flexed and abducted hip, and (3) adducted shoulder. These deformities are corrected by massage, splints, forced movements, plaster of Paris dressings and, if necessary, tenotomy.

In shortening a stump the author uses only skin flaps and makes them shorter than usually recommended in the text books. Excessive skin flaps are never well nourished. He does not use muscle in the flaps.

For foot amputations the writer finds that as a rule the stump of a Chopart becomes deformed; a Pirogoff is too short to use as a peg and too long to take an artificial foot. He prefers the Syme amputation with section of bone a quarter of an inch above joint surface of the tibia, rounding off all bony projections. This stump is end bearing and short enough to fit an artificial ankle.

For the leg amputation in the middle third at the lower end of the prominence of the calf, use a long anterior and a short posterior flap. Unless two fingers can be placed side by side on the inner side of the posterior surface of a leg stump when flexed, the stump is too short to use a below-knee artificial leg and a kneeling leg will have to be worn.

It is unusual for enough skin to be available for a good amputation through the knee, and if there is enough skin a short below-knee stump can as a rule be obtained. Remove the patella. The best amputation is through the top of the condyles, rounding off all bony projections. The Gritti-Stokes amputation is an unnecessary refinement unless the bone section has to be made above the cancellous part of the femur, and then it should be used to make an end-bearing stump. Every inch of the femur above the condyles is of the utmost value until the upper third is reached. In that situation, unless 2½ inches of bone below the lesser trochanter can be saved, a thigh bucket can not be used. Therefore when this amount of bone is not available it is best to amputate through the neck of the femur, though an equally satisfactory and less severe operation is to go through at the junction of the great trochanter and shaft. The artificial leg for a hip-joint amputation is a sound practical appliance and can be fitted to a subtrochanteric amputation. The conical stump is often satisfactory and must not be regarded as unnecessarily bad. For the wrist and forearm it may be said that one movable finger is better than any artificial device. Every inch of bone from the lower end of the ulna to within 3 inches of the upper end of the ulna is of value. Less than 3 inches can not be utilized, and in such a case amputate above the condyles, removing the supracondylar ridges.

Every inch of humerus above the condyles is useful. The shoulder joint can not be used unless 1½ inches of bone can be saved below the anterior fold of the axilla.

(ED.)

BERNHEIM, B. M. **The limits of bleeding considered from the clinical standpoint.** Am. Jour. Med. Sc., April, 1917.

Bernheim believes that there has been a tendency to overemphasize the importance of blood transfusion methods when in reality there is greater need for a more thorough understanding by the medical

profession at large of the indications for this procedure. It goes without saying, of course, that to achieve the best results one must be prepared to use the method best suited to the case in hand, since no device answers equally well in every instance.

The question to be determined is, When has the limit of bleeding been reached? The author is convinced of the utter futility of having a specific rule by which to be governed, each case being a rule unto itself. Yet one must have some tentative plans by which to be guided, and there are, after all, certain fundamental features which are true to a degree in all cases. For instance, a sudden loss of blood is a more serious matter than a gradual depletion.

A rapidly falling blood pressure is always a warning of value, although it must be remembered that nausea of the slightest degree will send the pressure down. In severe cases, it matters not what the cause, a good working rule is to transfuse if the blood pressure falls as low as 70 mm. of mercury, since life is hardly possible with anything below this level. Pallor, sweaty skin, the anxious countenance, are all danger signals that come to mind at once and air hunger when present is always of true diagnostic import.

Curiously enough, the blood picture itself is of little avail in severe accidental hemorrhage. A patient apparently exsanguinated may have a hemoglobin estimate around 50 per cent, with a red-cell count of over 2,000,000, figures well within the limits of safety. Even in cases of actual air hunger blood counts alone do not indicate the dire need for fresh blood. In fact, so constantly has this state of affairs been found in cases of this sort that the author now entirely ignores this feature. Terrific loss of blood apparently gives rise to the tightening up at first of the vascular apparatus, a narrowing of the vessel lumen, thus causing a concentration of the blood remaining in the peripheral system, and at the same time preserving a blood pressure sufficient to sustain life. The true anemia does not become apparent until later on, when the vessels have relaxed and taken up a renewed supply of plasma with resultant blood dilution. In chronic bleedings and the anemias the hemoglobin is the safest guide.

Drugs are of little aid in acute bleeding, morphin, judiciously given, excepted. It is human nature to try to help, but drug therapy in acute bleeding is misdirected aid. The author thinks a quarter of a grain of morphin seems to be indicated at the start of any hemorrhage to quiet restlessness; after that the doses had better be smaller, because of the depressant effect of this drug on respiration and the blood pressure.

He believes in liquids of any and all sorts, by mouth, per rectum, subcutaneous infusions, intravenously, coffee, tea, water, ice—anything at all that will quench the intolerable thirst and keep up the bulk of the circulating medium—all within reason. Many patients

have been actually water-logged by overadministration of salt solution—a heart can be overdistended and the blood can be made too dilute. If 1,000 c. c. or 1,500 c. c. of salt solution do no good, a greater amount will be equally valueless and may do harm. In cases of severe hemorrhage, if 1,200 c. c. do not steady a falling blood pressure or cause a slight rise, its introduction had better be discontinued. When the bleeding has been excessive a transfusion is indicated, because it has been conclusively shown that blood alone can raise a pressure and sustain it. Salt solution has no sustaining power per se, and when the fall comes after a rise from this means it usually portends the end, for added salt solution is useless. It never raises a pressure twice.

(H. F. S.)

HYGIENE AND SANITATION.

DAKIN, H. D., and DUNHAM, E. K. **Disinfection of drinking water.** Brit. Med. Jour., May 26, 1917.

Sterilization[1] of drinking water by use of bleaching powder or similar hypochlorite or chlorine preparation has been used with the greatest success for relatively large volumes of water when troops are practically stationary. The problem of sterilizing small individual quantities of water, such as are needed by cavalry or rapidly moving troops is much more difficult. For such purposes the instability of small tablets containing the minute quantity of active disinfectant required led the writers to make a number of experiments, which are summarized here.

The first experiment was made with chloramine—T. It was unsatisfactory. If waters were heavily contaminated and hard and alkaline, the concentration required was too great, though this could be reduced by use of citric, tartaric and other organic acids.

The next attempt was with preformed toluene-sulphondichloramines, and first results were encouraging, but when put up in tablet form too much time was required for solution to bring about prompt sterilization.

Greater solubility and stability were obtained with p-sulphondichloraminobenzoic acid. This can be prepared from cheap, readily available material. The formula is $Cl_2N.O_2S.C_6H_4.COOH$. The presence of the COOH group confers a slight but definite solubility in water, which is increased by dispensing it with alkaline salts, such as sodium carbonate, sodium bicarbonate, borax, etc. The writers propose for convenience that the designation "halazone" be used for this substance.

[1] Halazone is now on sale in the United States, conveniently put up in small vials of a hundred tablets each. One to two tablets sterilize a quart of water in 30 minutes.

Tests of the efficacy of this "halazone," both in powder and tablet form, were made, using tap water and B. coli; hard water and feces suspension; hard water and 10 per cent city sewage; tap water and 5 per cent city sewage; hard water and B. coli. The "halazone" was in varying degrees of concentration, as 1:250,000, 1:500,000, 1:1,000,000. The ordinary routine was to take 5 or 10 drops of the treated water, place on agar to count surviving organisms and use suitable controls. The experiments appeared to show that in a concentration of 1:300,000 an ordinarily heavily contaminated water was sterilized in 30 minutes. This concentration could be relied on to remove coli, typhoid, or cholera organisms. The tablets were efficacious when acting on water in aluminum containers, though if the tablets were allowed to remain undisturbed for a long time in contact with the metal a negligible action on the latter resulted. In the concentration prescribed the water acquires a slight taste but is not unpalatable. The active chlorine is used up slowly, and the disinfection continues for a longer time than when most hypochlorite preparations are used.

The starting point in the preparation of "halazone" is p-toluenesulphonamide, which is readily obtained by the action of ammonia on p-toluenesulphonic chloride, a cheap waste product in the manufacture of saccharine, and is available in relatively large quantities. It is now used in the manufacture of chloramine—T.

Toluenesulphonamide is oxidized to p-sulphonamidobenzoic acid, and the latter substance on treatment with chlorine gives the desired dichloramino acid.

Add 250 grams commercial sodium dichromate to a mixture of 200 c. c. concentrated sulphuric acid and 600 c. c. water contained in 2-liter round flask. Then add 100 grams crude toluene-p-sulphonamide and heat on a sand bath with reflux condenser for one hour, using a small flame at first, as the reaction is vigorous. On cooling, wash separated crystals with cold water and dissolve them in hot dilute sodium hyroxide in slight excess. Filter hot and add excess of hydrochloric acid. When cold filter off precipitated acid and wash well with water and dry. Twenty grams of p-sulphonamidobenzoic acid thus obtained are dissolved in 200 c. c. normal sodium hyroxide (2 vols), warming if necessary. Then add 200 grams crushed ice and saturate the mixture with a rapid current of chlorine. The reaction is best conducted in a wide-mouthed flask, which is shaken as the gas is introduced. More ice can be added if necessary. A white, chalky precipitate of the dichloramino acid is at once obtained. Filter off the acid by suction, wash in cold water, dry in vacuo on a porous plate. The dry substance is practically pure, may be powdered and will apparently keep indefi-

nitely. It is sparingly soluble in water and in chloroform and insoluble in petroleum. It readily dissolves in glacial acetic acid, crystallizing in stout prisms, which melt at 213 C. When rapidly heated on platinum foil it explodes feebly, but is remarkably stable when compared with most members of this group.

The sulphondichloraminobenzoic acid behaves equally well whether made into a tablet with salt and either sodium carbonate, sodium bicarbonate, dry crystallized borax or sodium phosphate, but the crystallized salts are undesirable if the tablets are exposed to high temperatures.

A convenient formula for tablets weighing 100 to 105 mg. is: Sulphondichloraminobenzoic acid, 4 per cent; sodium carbonate, 4 per cent (or dried borax, 8 per cent); pure sodium chloride 92 per cent. Grind the acid with the dry salt and then add the sodium carbonate. Pass mixture through a 40-mesh sieve. No lubricant or other addition is necessary. Tablets must be stored in small amber-colored bottles.

One tablet prepared as above sterilizes one liter of moderately contaminated water. If contamination is excessive, use two tablets to liter or quart.

Sufficient time has not yet elapsed for final reports on the stability of the tablets, but under ordinary conditions no decomposition was noted after two months. Bright sunlight acting on tablets in clear-glass bottles did cause decomposition.

The estimated cost in England of disinfecting water by the use of halazone is 2 cents per 100 gallons water.

(ED.)

GUNN, J. A. **Note on prevention of pediculosis.** Brit. Med. Jour., May 5, 1917.

The writer gives very favorable reports on the use of thin undershirts made of muslin (so cheap that the original intention was to throw them away after using once) soaked in the following solution: Naphthalene and sulphur, each, 1½ ounces; benzol or gasoline, 1 gallon. No inconvenience results from the use of undergarments so treated. The effect on pediculi is not immediate. The writer quotes from a letter from France, in which it was stated that 200 dead pediculi were counted on a shirt that had been treated with the above solution. The solution has been applied under a plaster cast without irritation to the skin. [ED.]

BELLI, C. M. **Food ration of the Italian Navy.** Office International D'Hygiéne Publique, ix, No. 5.

This is a résumé of a brochure published in Naples giving the results of a royal commission's inquiry into the subject of the navy ration.

Belli notes that the navy is recruited from a sober, thrifty element of the population, and that, thanks to the influence of German ideas in recent years, a ration has been constructed not only in excess of physiological requirements but unconformable to the previous habits of the men. He quotes Chittenden and his school and the work of the Italian investigators in support of the postulate that man can live and work on less food, especially of proteid character, than has generally been considered necessary.

Since 1912 Tenente-Generale Medico Rho, R. M. I., has contended for this idea. In 1915 he published his views and asserted that all so-called war rations were wrong, in that when more labor is required the ration is supplemented by proteid increase instead of starch increase, which is better calculated to contribute to restoration of strength. No attention was paid to his researches and recommendations because of the unfavorable impression likely to be produced by a reduction of the ration.

During the past year the necessity for economy has triumphed over political considerations. One by one various reductions have been made in the Italian Navy ration. The following tables show the allowance for a period of a week, column I being the issue for men on duty ashore, column II for men at sea:

	I	II
Vinegar ---------- centiliters	3	3
Coffee ---------- grams	105	105
Beef ---------- do	1,200	1,650
Beans ---------- do	235	340
Cheese ---------- do	335	190
Olive oil ---------- centiliters	30	50
Bread ---------- grams	4,270	3,360
Farinaceous material (macaroni, etc.) ---------- do	600	640
Rice ---------- do	380	420
Salt ---------- do	78	96
Wine ---------- centiliters	25	175
Sugar ---------- grams	140	140
Biscuit ---------- do	140	700
Tunny preserved in oil ---------- do	140	50
The above yields per day:		
Proteids ---------- grams	99.8	106.7
Fats ---------- do	15.3	18.9
Carbohydrates ---------- do	524.3	545.3
Or, expressed in calories—		
Calories from proteid sources ----------	409.1	437.5
Calories from fats ----------	142.2	174 8
Calories from carbohydrates ----------	2,149.2	2,224.7
	2,700.5	2,837.0

In actual practice the ration differs distinctly from that of the tables. In addition to the provisions indicated above the navy department allows a varying cash amount for purchase of fresh stores re-

quired for preparing and improving the ration. Furthermore, the commanding officer is authorized to substitute other articles for any or all of those enumerated. This privilege is taken advantage of to a considerable extent among the personnel on shore. The tables are therefore misleading, except where it can be ascertained that there has been no waste and no commuting.

Belli, under orders of the minister of marine, examined 15,000 men, both in barracks ashore and on board ship. He has determined that the ration has a value of over 3,000 calories, which he considers in excess of physiological requirements and entailing a tax on the digestive and assimilative organs of the body. The daily proteid consumption, though actually below that shown in the tables, is, he believes, greater than the bodily requirements, which he fixes at 90 grams per diem.

While the fats furnished are low and derived wholly from oil, the cash allowance permits the purchase of other fats, principally lard, so that column I should actually read 22, and column II, 30 to 35.

The average carbohydrate intake is, column I, 500 grams; column II, 540 grams.

An interesting control test is furnished by a study of the not inconsiderable number of groups who by reason of military necessity are not rationed by the Government but allowed cash for the purchase of an exact equivalent of the ration and permitted to consult their individual tastes and preferences. Two important points are to be noted—first, the money issue is proved to be liberal by the fact that a majority of the organizations thus subsisted are actually able to save on the allowance; secondly, much greater variety in diet is made possible.

The energy obtained from the diet thus selected and bought is represented by 2,700 to 2,800 calories, which is approximately the yield of the Government ration. The average daily proteid ingestion is 90 grams, about what the official ration calls for, but the proportion derived from *animal* sources is much less. The fats selected yield 25 to 28 grams a day, but, on the other hand, carbohydrates in the diet of election reach 500 to 600 grams.

In a word, where there is an option the diet tends to be principally vegetarian, thus conforming to the popular basis of sustenance in the Italian of the working classes. The ration seems to the writer to be adequate except for a lack of variety. His recommendation is to have but one column or table which shall be mandatory for providing a total of 2,600 calories from the morning and midday meal. The remaining 200 calories required are to be obtained by the evening meal, which shall be largely vegetable in character, selected and prepared according to the wishes of the messes concerned.

(ED.)

REPORTS.

A REPORT OF 112 CASES OF CEREBRO-SPINAL FEVER.

By J. T. MILLER, Passed Assistant Surgeon, United States Navy, and D. D. MARTIN, Assistant Surgeon, United States Navy.

It is so seldom that medical officers of the Navy have the opportunity of studying a series of 100 or more cases of cerebro-spinal fever that the following report is submitted, with the hope that it may assist others in caring for and treating this most trying and treacherous disease. It is not our aim to attempt a scientific discussion of cerebro-spinal fever, but, rather, to bring to the attention of medical officers the more important facts as they presented themselves to us during this epidemic.

While the first case was admitted to this hospital in March, 1917, it was not until April that the disease began to assume epidemic proportions. The fact that this first case was admitted before the first draft from the Chicago training station arrived throws some doubt upon the prevailing belief that that station was the original focus of the disease and that all subsequent cases can be traced to men coming from there or to contact with these men, but it must be admitted that there is considerable evidence in support of this belief.

Etiology.—It is, of course, universally accepted now that the causative organism is Weichselbaum's meningococcus and in all of the cases in this report this diplococcus was found in the spinal fluid. Also cultures from the nasopharynx were positive for the meningococcus in practically all cases, and, as has been reported by English army surgeons as well as others, in the few cases in which it has been possible to follow up this line of work the meningococcus has "run true to type," i. e., the meningococcus found in the nasopharynx of a given case is always the same type as that found in the spinal fluid.

Mode of transmission.—While Flexner's experiments have proved that the meningococcus may gain entrance through the nasal cavity, Pizzini has recently incriminated the body louse and reports a series of 77 cases in which all cultures from the nasopharynx were negative and cultures from the blood of the patients positive in every case, remaining so (with occasional intervals of negative cultures) late

into convalescence. The experience of the writers has also been that blood cultures (at least those taken early and during the very acute stage of the disease) have proven positive for the meningococcus, and it does not seem reasonable to suppose, although we have no direct evidence to submit, that the disease may be transmitted by some parasite such as the body louse or bedbug. An interesting fact in support of the former mode of entrance is that the disease frequently complicates or follows measles. It, indeed, would seem that a person in normal health and with an uninflamed nasal mucous membrane is naturally immune to the disease, otherwise it is hard to explain the fact that, with the large number of Hospital Corpsmen, nurses and medical officers who have come in such very close contact with the cases now reported, not one has become infected. It may also be noted that, so far as these cases are concerned, all vermin have been excluded by daily inspection, sterilization of clothing, etc.

Under this heading must be mentioned carriers, those who show no evidence of disease and yet who harbor the meningococcus in the nasopharynx. It probably is not generally known what a large percentage of these exist. Research along this line shows a considerable percentage of noncontacts to be carriers.

Pathology.—It is much to be regretted that no report of the pathology of this disease can be made, as it was impossible to obtain a complete autopsy in any case.

Diagnosis.—This is not difficult in a fully developed typical case, when we find stupor or delirium, stiff neck muscles with retraction of the head, positive Kernig's sign, etc., but in the very early stages all of the symptoms mentioned may be absent. However, there are several symptoms that will invariably be present even in the very early stage before there is any turbidity of the spinal fluid. These are elevation of temperature, perhaps of only 100 F. or 101 F.; headache, generally occipital in type but perhaps described as "all over"; increased leucocyte count. This latter has been found to be over 30,000 per cm. when there was no backache, no stiffness of neck muscles, negative Kernig, and perfectly clear spinal fluid. Finally the lumbar puncture determines the presence or absence of the disease.

It is particularly difficult to diagnose cerebro-spinal fever from other forms of cerebro-spinal meningitis; for instance, that of streptococcic origin, and this can be done only from the bacteriology of the spinal fluid. During an epidemic one must be on his guard not to be deceived by hysteria. The following interesting case was recently seen. The patient was in attendance on cases of cerebro-spinal fever, and, when seen by one of the writers, fear and dread of meningitis was most marked; this is practically never seen in a true case and is a good diagnostic point. Kernig's sign was positive in both legs; intense headaches (occipital) and pain in the lumbar spine were

present. There was history of nausea and vomiting, stiffness of neck muscles with marked retraction of the head, so much so that patient had to lie on the side and head was almost between scapulæ. But temperature was normal and the leucocyte count was 7,000. Lumbar puncture was not done.

During an epidemic cases of meningism or meningismus will also be seen. These consist of cases, clinically, of apparent cerebro-spinal fever but quickly clearing up without treatment. The spinal fluid is normal and there is no increased leucocyte count. These cases are said by some to be due to the invasion of the nasopharynx by the meningococcus.

Symptoms.—The period of incubation is uncertain, probably within 10 days.

1. Fever is constant, possibly only 100 F. if the case is seen early, but it may quickly mount to 104 F., or even 105 F. It generally falls by lysis, but there may be a sudden drop to normal, to be followed by an intermittent course.

2. Headache, generally occipital in character, is a constant and most persistent symptom. Backache (lumbar) is generally present. Insomnia is a constant and distressing symptom.

3. Vomiting, which may be projectile, or history of vomiting is quite usual.

4. Kernig's sign may or may not be present in the early stage, but is generally positive at some period of the disease. Babinski's sign was found in a few cases and Brudzinski's in only one or two.

5. Apathy was found in all cases, and generally stupor or delirium occurred during the height of the disease. Profound coma, with abolition of all reflexes, was noted in a few cases of the severe type.

6. Leucocytosis is constant and may be high even in the early stage, ranging from 20,000 to 35,000 cm.

7. Spinal fluid: Always under increased pressure. If obtained early, it was frequently found clear, but quickly became turbid, this turbidity ranging from slight haze to marked purulence. The cell count was always increased, in some cases only 20 cm. on the first count, with a steady increase as the disease progressed. These cells were found to consist chiefly of polymorphonuclears, and as improvement occurred were replaced by lymphocytes. The meningococcus was invariably found, and in some cases before the spinal fluid showed any turbidity. The albumen and globulin content were increased. The reduction of Fehling's solution was not tested with regularity.

8. Posture, etc.: On account of retraction of head the patient generally lies on his side; the legs and thighs are generally flexed. Face is generally flushed, but this may change from time to time and is later followed by pallor.

9. Pulse is accelerated, but when pressure is marked it may be below normal. The lack of relation of pulse and temperature was quite marked. The pulse rate is of great value in the later stages of the disease when the spinal fluid has become clear and apparently convalescence has commenced. A persistently high pulse rate under these conditions is a warning, and treatment must not be discontinued or a so-called recrudescence will result; pressure symptoms will appear, and a lumbar puncture will show a return of turbidity.

10. Cutaneous: A prodromal rash was noted in a number of cases seen very early. This consisted of discrete maculo-papular spots varying in size from minute points to half an inch in diameter, found on the dorsum of hands and feet and also on forearms and legs. This rash was very evanescent, disappearing in a few hours and was seen only in cases that had not developed well-marked symptoms. In fact lumbar puncture was done on a number of cases when this rash was the only symptom, and diagnosis was confirmed. The nearest approach to mention of this rash that the writers have been able to find in the literature of the subject is made by Horder of the British Army, who describes "large rose spots appearing during the first three or four days, scattered discreetly over the body and involving the arms and legs as well as the trunk." The rash described above does not appear on the trunk or face. Petechial and purpuric rashes were rather the exception, occurring only in the very acute or the fulminant forms. In a few cases these spots were very extensive, appearing over entire body, face, and limbs, including palms of hands and soles of feet and at times attaining the size of a thumbnail. These change color, becoming black and persist far into convalescence.

11. Urine: Albuminuria was rarely found. Polyuria was the rule. Hematuria was not seen, even with marked purpura. Incontinence of urine was frequent and retention was sometimes encountered.

12. Constipation occurred in practically all cases and persisted into convalescence.

Prognosis.—This should always be guarded and depends upon the stage in which diagnosis is made and treatment instituted.

The mortality in this series has been 26.7 per cent. This includes not only cases reaching hospital in moribund state, but also one case dying in transit and one case of cerebro-spinal meningitis of streptococcic origin in the spinal fluid of which a few Gram-negative diplococci were found. Another case included was one in which all meningeal symptoms had disappeared and which developed lobar pneumonia, followed by suppurative pleurisy—and was operated upon.

Complications.—Conjunctivitis was very common. Strabismus occurred in a number of cases, but always disappeared during con-

valescence. Panophthalmitis resulted in three cases. Nystagmus was not noted. Pneumonia developed in three cases and in one was followed by empyema. Deafness occurred in several cases, but disappeared during convalescence. Otitis media was quite common, and in one case resulted in acute mastoiditis and was operated on. Joint affections were rare and became troublesome in only one case (arthritis of shoulder).

Treatment.—(a) Prophylactic: Avoidance of overcrowding and dark, damp living quarters and prompt attention to colds and coryza are important. Swabbing with weak solution of iodine in glycerine of the nasopharynx of not only contacts but all persons in the epidemic area is a good practice and has been carried out at this hospital. All persons should be examined for carriers and when found to be such should be treated. A 2 per cent solution of chloramin in oil of eucalyptol has been found efficacious. Prophylaxis by means of vaccines was not attempted. Isolation was strictly practiced.

(*b*) Curative: Diet should be light but nourishing during the acute stage, but should be increased as soon as appetite returns, as emaciation and prostration tend to become extreme.

Lumbar puncture: This is put down as a treatment in itself and not merely as preparatory to the administration of serum, for it is the opinion of the writers that it is very important, if not the most important, part of the treatment. The relief is frequently instantaneous, and cases in active delirium have become rational in a few hours. Several cases received early were treated by this method only and convalesced quickly and uneventfully. Early diagnosis is most important, as a few hours delay may change a mild case easily handled into a most grave or even fatal one. *In all cases of doubt a lumbar puncture should be done immediately.* Evidently a number of medical officers do not appreciate the necessity for prompt action, as cases are sometimes kept aboard ship without lumbar puncture but "under observation" for 24 hours or more when cerebro-spinal fever is suspected. Certainly every ship should be furnished at least the needles necessary for a lumbar puncture.

General anæsthesia was not used, but ethyl chloride as local anæsthetic was used as a routine measure and gave satisfaction. All spinal punctures were performed with patient lying on right or left side. The following position was found most convenient and satisfactory: Patient on side with back well over edge of bed, and an attendant with his back well up to abdomen of patient and with one arm firmly grasping patient's knees and the other under patient's shoulders, carefully avoiding head and neck. This effectually prevents the struggling of a delirious patient and possible injury by breaking of needle.

Tincture of iodine painted over site of puncture was used as a routine measure and no local infection resulted in any case. The third lumbar interspace was the point of election, but the fourth and second were used in a few cases for irrigating purposes.

Administration of antimeningococci serum, when of sufficient degree of polyvalence, has given good results. Undoubtedly the disappointment experienced by some has resulted from the use of a serum in preparing which too few strains of the meningococcus have been used. A polyvalent serum made from about 80 different strains of meningococci by the Rockefeller Institute is used in this hospital and has given good results. It is given in this manner: In very acute cases from 20 to 40 c. c., according to the amount of spinal fluid withdrawn, are given every 12 hours until three doses have been injected, then every 24 hours, not only until the fluid is negative for meningococci, but for at least several days longer or until there is marked improvement in the patient's condition. It is most important to give this serum in less quantity than the fluid withdrawn; also to obtain the best results the canal should be drained thoroughly, i. e., until the fluid ceases to run faster than normal (one drop every 4 seconds). It is equally important not to drain too rapidly, as this causes intense headache and increases the tendency to hemorrhage.

From this time lumbar puncture is done daily until the fluid becomes clear and there is no pressure. Frequently after active treatment has stopped it becomes necessary in a few days or even a week or more to tap to relieve pressure. Irrigation of the spinal canal with normal saline solution has been found of benefit in those cases with purulent fluid and in the long-continued cases. Morphia for the relief of pain and insomnia is required. Careful watch on the excretions is necessary, as retention of urine may occur.

CONCLUSIONS.

1. The necessity of an early diagnosis with prompt institution of treatment.
2. Importance of thorough drainage of canal, done slowly and of the introduction of serum, being careful not to administer as much and never more serum than fluid withdrawn.
3. Proper position of patient in bed must be obtained.
4. Always administer serum at body temperature.
5. Irrigate canal thoroughly with normal salt solution in cases whose spinal fluid is markedly purulent and those that have a recrudescence.
6. Employ careful swabbing of all contacts.
7. Watch for retention of urine.
8. Institute prompt treatment on the return of symptoms.
9. Watch for complications.
10. Isolate all cases.

Analysis of 112 cases of cerebro-spinal meningitis.

Case.	Rate.	Date of admission.	Via hospital ship.	Name of ship.	Training camp.	Followed other diseases.	Date of first puncture.	No. c. c. withdrawn.	Lumbar punctures.	Serum given in c. c.	Complications.	Died (day of disease).	Recovery.
		1917.					1917.						
1	A. S.	May 1	Solace...	Arizona	Great Lakes		Apr. 28	245	8	125		8	
2	A. S.	May 9		Montgomery			May 11	50	1	30		2	
3	A. S.	May 13	Solace...	Baltimore			May 8	55	21	55		5	
4	F., 2d cl.	May 5	...do...	Rowan		Measles	May 5	195	5	50	Pneum. sup. pleur.	13	
5	A. S.	May 10	...do...	Florida	Great Lakes		May 6	280	10	165		6	
6	A. S.	May 12			Norfolk		May 12	240	5	60		6	
7	A. S.	Apr. 24		Delaware	Great Lakes		Apr. 21	110	3	60			Yes.
8	A. S.	Apr. 27	Solace...	Arizona	...do...		Apr. 24	70	3	20	Diarrhea		Yes.
9	A. S.	May 10	...do...	...do...	...do...		May 7	245	6	90			Yes.
10	A. S.	May 1	...do...	...do...	...do...		Apr. 27	540	20	300	Relapse 4 times	67	
11	A. S.	May 10	...do...	...do...	...do...		May 8	125	4	75			Yes.
12	A. S.	Apr. 27	...do...	...do...	...do...		Apr. 23	220	6	100			Yes.
13	A. S.	Apr. 21	...do...	...do...	...do...		Apr. 17	190	6	140			Yes.
14	Sea., 2d cl.	May 5		Prometheus			May 5	160	4	30			Yes.
15	F., 3d cl.	May 9	Solace...	Vestal		Measles	May 9	295	6	60			Yes.
16	A. S.	May 4	...do...	New York	Great Lakes		May 4	195	6	90			Yes.
17	A. S.	May 1	...do...	Connecticut			Apr. 27	135	5	75			Yes.
18	A. S.	Apr. 23		New York			Apr. 23	260	6	35	Arthritis		Yes.
19	A. S.	Apr. 15		Great Lakes draft.	Great Lakes		Apr. 15	250	7	105			Yes.
20	Sea., 2d cl.	May 6	Solace..	Seattle	Newport		May 4	115	4	110	Orchitis		Yes.
21	A. S.	May 13			Norfolk		May 15	95	3	40			Yes.
22	Sea., 2d cl.	Apr. 27	Solace..	Michigan			Apr. 24	235	7	110	Pan opthalmitis		Yes.
23	Sea., 2d cl.	...do...	...do...	Wyoming	Great Lakes		Apr. 23	253	8	110			Yes.
24	Sea., 2d cl.	...do...	...do...	Connecticut			Apr. 25	170	4	85			Yes.
25	Sea., 2d cl.	Apr. 21	...do...	New York			Apr. 18	270	7	120			Yes.
26	A. S.	May 1	...do...	...do...	Great Lakes		Apr. 28	320	7	175			Yes.
27	A. S.	Apr. 23	...do...	Connecticut	...do...	Measles	Apr. 23	300	7	95			Yes.
28	A. S.	Apr. 21	...do...	...do...			Apr. 21	350	15	90			Yes.
29	Pvt.	May 13	...do...	Utah	Great Lakes	Measles	May 12	260	6	70			Yes.
30	Ms. A., 3d cl.	Mar. 27		Walke			Mar. 26	245	7	110			Yes.
31	A. S.	May 2		Montana			May 1	308	7	90	Malaria		Yes.
32	A. S.	May 5			Norfolk	Measles	May 5	309	8	70			Yes.
33	Sea., 2d cl.	May 1	Solace...		Great Lakes		Apr. 28	355	8	155	Measles		Yes.
34	Sea., 2d cl.	Apr. 17	...do...		...do...		Apr. 17	210	5	90	Mumps		Yes.
35	A. S.	May 10	...do...	Delaware	...do...		May 6	370	7	120			Yes.
36	Sea., 2d cl.	May 21	...do...	Florida	...do...		May 12	300	8	185	Otitis media		Yes.
37	A. S.	May 15			Norfolk		May 15	225	6	60			Yes.
38	Sea., 2d cl.	May 4	Solace...	Baltimore			May 2	110	3	75			Yes.
39	A. S.	Apr. 27	...do...	Connecticut			Apr. 25	125	4	70	Erysipelas		Yes.
40	A. S.	May 16			Norfolk		May 16	175	4	30			Yes.

Analysis of 112 cases of cerebro-spinal meningitis—Continued.

	Rate.	Date of admission.	Via hospital ship.	Name of ship.	Training camp.	Followed other diseases.	Date of first puncture.	No. c. c. withdrawn.	Lumbar punctures.	Serum given in c. c.	Complications.	Died (day of disease).	Recovery.
		1917.					1917.						
41	Sea., 2d cl	May 6			Norfolk		May 6	120	4	30			Yes.
42	A. S	Apr. 27	Solace	Arkansas	Great Lakes		Apr. 26	135	4	80	Orchitis		Yes.
43	Sea., 2d cl	Apr. 24		Michigan			Apr. 24	115	3				Yes.
44	A. S	May 19		Connecticut			May 18	120	8	75	Pleur. ac. fib		Yes.
45	A. S	Mar. 16			Norfolk	Measles	Mar. 16					30	
46	A. S	Apr. 23		Connecticut			Apr. 23	60	1	30		1	
47	A. S	do	Solace									1	
48	A. S	May 4	do		Great Lakes		May 4	60	1	30		1	
49	A. S	Apr. 30			Norfolk	Measles	Apr. 30	110	8	100		6	
50	Ms. A., 3d cl	May 6	Solace									2	
51	A. S	May 9		Michigan		Bronch. ac						8	
52	Sea., 2d cl	Apr. 24		do								10	
53	Sea., 2d cl	May 1	Solace			Measles						1	
54	Sea., 2d cl	Apr. 27	do	Arizona	Great Lakes		Apr. 13	180	5	75	Mastoid ac. (supp. arth.)		Yes.
55	A. S	May 20		Prometheus			May 21	423	12	160			Yes.
56	Sea., 2d cl	May 15	Solace	Nebraska			May 9	310	6	150	Mumps		Yes.
57	H. A., 2d cl	May 6		Montana			May 5	325	8	40			Yes.
58	A. S	May 26			Norfolk		May 26	330	7	60			Yes.
59	A. S	May 1	Solace	Arkansas		Mumps	May 1	290	6	95			Yes.
60	A. S	May 21	Solace	do	Great Lakes	Measles	May 26	258	8	30			Yes.
61	A. S	Apr. 28		Alabama	do		Apr. 28	320	9	25	Bronchitis ac		Yes.
62	A. S	May 6		Delaware	do	Mumps	May 13	269	9	90			Yes.
63	Sea, 2d cl	May 28	Solace	Wisconsin			May 25	495	12	123			Yes.
64	F, 2d cl	June 1	do	Michigan	Newport		May 29	595	14	155			Yes.
65	A. S	May 29			Norfolk	Mumps	May 27	411	13				Yes.
66	A. S	May 9			do		May 9	900	30	200			Yes.
67	A. S	May 29			do	Measles	June 9	380	9	140			Yes.
68	A. S	June 14			do	Lobar pneumonia.	June 14	255	5	110			Yes.
69	A. S	June 16			do	Orchitis	June 16	160	3	60			Yes.
70	A. S	June 4			do	Measles	June 13	300	7	200	D. pan opthalmitis		Yes.
71	A. S	May 28			do		May 28	375	10	45			Yes.
72	A. S	May 1	Solace	Arizona	Great Lakes		Apr. 28	610	17	250	Mumps		Yes.
73	A. S	June 3			Norfolk		June 3	435	11	105			Yes.
74	A. S	June 1			do		June 1	327	11	85			Yes.
75	A. S	May 24			do		May 24	408	12	0	Malaria		Yes.
76	Sea, 2d cl	June 1	Solace	Seattle	Newport		May 28	415	10	135			Yes.
77	A. S	May 29			Norfolk		May 29	210	7	0			Yes.
78	A. S	May 26			do		May 26	435	10	135			Yes.
79	Sea, 2d cl	June 5		Kentucky	do		June 5	480	11	160			Yes.

80	Sea, 2d cl	May 21	Solace	North Dakota	Great Lakes		May 17	725	17	200			Yes.
81	Sea	June 1		Florida		Measles	June 2	140	7	140			Yes.
82	A. S	May 6	Solace	Arkansas	Great Lakes		May 5	895	21	150			Yes.
83	A. S	June 4			Norfolk		June 4	460	12	155			Yes.
84	F, 3d cl	June 18	Solace	Michigan		Mumps	June 24	930	19	250			Yes.
85	Sea, 2d cl	June 26	do	Arizona			June 15	655	19	260			Yes.
86	A. S	July 1			Norfolk		July 1	330	9	110			Yes.
87	Sea, 2d cl	June 30		Rhode Island	Newport	Mumps	June 30	500	12	160			Yes.
88	Sea, 2d cl	June 26	Solace	Nevada			June 21	425	12	140			Yes.
89	Sea, 2d cl	do	do	Michigan	Newport		June 7	475	10	30			Yes.
90	W. T	do	do	Wyoming	Norfolk		June 14	470	10	195			Yes.
91	Sea, 2d cl	June 15		Utah			June 15	170	7	60			Yes.
92	Sea, 2d cl	June 26	Solace	Vestal	Great Lakes		June 4	195	7	90			Yes.
93	F, 3d cl	do	do	Utah	Norfolk		do	405	10	90			Yes.
94	A. S	July 8			do		July 8	230	8	90			Yes.
95	F, 3d cl	June 14	Solace	Nevada	Utah	Measles	June 23	566	20	285		26	
96	M. M., 2d cl	July 4		do	Norfolk	Mumps	July 4	240	7	100	Strep. mening (otitis media).	4	
97	Sea, 2d cl	June 26		Michigan	Newport		June 26	570	12	135		11	
98	F, 3d cl	July 6			Norfolk	Mumps	July 11	140	6	100			Yes.
99	A. S	Apr. 28		Montgomery			Apr. 28	380	11	105		16	
100	A. S	May 8		New York								5	
101	A. S	Apr. 27		Utah								17	
102	A. S	do		Connecticut								10	
103	El, 3d cl	do		Wyoming								42	
104	Sea, 2d cl	June 21			Norfolk		June 21	295	8	80			Yes.
105		May 21		Minnesota								5	
106		May 24		Montana									
107		May 25	Solace	Michigan	Great Lakes							2	
108		May 26			Norfolk							12	
109		May 28			do							9	
110	Sea, 2d cl	June 25		Michigan			June 24	345	9	130			Yes.
111	A. S	Apr. 5			Newport							2	
112	Sea, 2d cl	May 21	Solace	Arizona	do	Mumps	May 17	925	20	255	Otitis media ac		Yes.

N. B.—In cases where data is missing, death had occurred and all papers been forwarded to bureau before the writers assumed charge.

SPINAL IRRIGATIONS IN EPIDEMIC MENINGITIS.

By J. J. O'Malley, Passed Assistant Surgeon, United States Navy.

In treating patients with meningitis during the recent epidemic in the fleet the idea of irrigating the spinal canal with normal salt solution was suggested by the vogue which irrigations of pus cavities have reached in the present European war, and from an acquaintance with the original observation of Flexner [1] that salt solution is toxic to the meningococcus.

Experiments by Shearer [2] showed that the action of sodium chloride is most toxic when the concentration of the salt is not much below 0.85 per cent or above 0.9 per cent and that freshly isolated meningococci were more vulnerable than older cultures, the former seldom resisting its action longer than 20 minutes, while the latter might remain viable for two or more hours.

In our experience with four different 24-hour cultures, emulsions in 0.85 salt solution failed to show a growth after 25 minutes exposure.

In meningitis an increase in the quantity of spinal fluid is present in most cases, with pus cells, meningococci and products of bacterial invasion in varying quantities. Whatever properties the spinal fluid may have normally as a serum in preventing the infection from occurring, as it must do in an epidemic of meningitis where carriers are so frequent, certainly after its resistant properties have been reduced or destroyed and infection has taken place, the fluid becomes an excellent culture medium.

In our laboratory we used fluid obtained from patients as one of our media on an agar-dextrose base and found that the meningococci were more prolific on it than on human blood, horse serum, or horse blood on the agar-dextrose base. The growth appeared about the same time on all our media, but after its appearance it grew much faster on the spinal fluid medium.

That this infected fluid should be entirely removed by irrigation and drainage, leaving the canal clean for the injection of serum, is the strongest argument for irrigation. Normal salt solution is the irrigating fluid of choice because of its toxicity to the meningicoccus and its nonirritating qualities on the cord and membranes.

In doing the irrigations normal salt solution (38–40 C.) is used and kept at the required temperature in a container. A graduated burette, holding about 100 mils, with a hose attachment and a nozzle to fit the lumbar puncture needle and a medicine graduate to measure the return flow is all the apparatus needed.

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[1] Flexner: Jour. Ex. Med., 1907, 9, 105.
[2] Shearer: Lancet, London, November, 1916.

Lumbar puncture is made low down between the fourth and fifth lumbar vetebræ, with the idea of using the lower part of the canal as a reservoir. The head of the bed is elevated and the canal drained of all fluid that will return. As the fluid is generally under pressure, the quantity obtained can not be used as an index for the amount of salt solution in irrigating or the quantity of serum to be injected afterwards. In one of our cases we obtained 96 mils of fluid and could use only 56 mils of salt solution in irrigating, and in only a few instances could we irrigate with a quantity equal to that obtained in drainage. The irrigating fluid or the serum should never be put into the canal in quantities to cause pressure symptoms.

For complete drainage and proper irrigations the position of the patient is very important and provisions should be made for lowering the upper part of the body while fluid is going in and elevating it while draining. Blocks inserted under the legs of the bed will answer this purpose very well.

When primary drainage of spinal fluid is complete the burette is filled and the nozzle inserted into the needle, the burette being held on a plane slightly higher than the needle and from 15 to 20 mils of salt solution are allowed to flow in slowly. The solution is immediately allowed to return, measuring it with the graduate to insure a full return of the solution. The irrigations are repeated at least three times to clean out the lower portions of the canal, or, as sometimes happens, the spinal fluid is quite thick with pus cells and flows very slowly through the needle, and a few preliminary irrigations will tend to dilute this and allow it to drain more freely. Then with the hips elevated the solution is allowed to flow in until the capacity of the canal is reached. The nozzle is detached, the stylet inserted into the needle, and the solution allowed to remain in the canal for 20 minutes to allow for diffusion of the liquid and for its toxic effect upon the organism. The irrigations are repeated until the return flow has become clear or until it is much clearer than the fluid obtained from the puncture.

The capacity of the canal is judged by the pressure symptoms demonstrated by the patient, and these are always referred to the sacral region, hips and lower extremities. When the solution starts to flow in there will be tingling sensations about the thighs and legs or there may be complaints of warmth at the site of injection. Twitching of the superficial muscles about the buttocks and thighs may be seen, and as the canal fills there will be sensation of fullness in the bladder and rectum, with pains about the hips and thighs and usually shooting pains down the legs. When these pains become quite severe the flow is stopped and a few mils are allowed to return to avoid any pressure. The quantity used is noted, and this will be

the guide for the next irrigation and also for the amount of serum that can be injected.

Experience with irrigations will quickly acquaint one with the amount of solution to be used, and neither the salt solution nor the serum should be allowed to remain in the canal under such pressure as to cause discomfort.

The capacity of the canal will vary in different individuals. The largest quantity we used was 56 mils; the least 26 mils. The average capacity in 15 patients who were irrigated a total of 78 times was 32 mils.

If the fluid obtained from the puncture is very cloudy, it is quite impossible to get it to return entirely clear, even with a number of irrigations; but if it contains only a moderate amount of pus, then persistence in irrigation will produce a clear return flow.

In two patients the spinal fluid was so thick that the flow was very slow through the needle and in each case a second puncture was made between the second and third vertebræ. The salt solution was allowed to flow in slowly through the lower needle and, by diluting the fluid, the drainage was much faster through the upper needle. As drainage is the slow process in irrigation, the use of two needles is a timesaver. The principal objection is the fact that it requires two punctures in patients who in the early stages of the disease are hypersensitive and complain very strongly of a procedure that involves any pain; and as they have to be punctured several times during their illness and have considerable tenderness in the tissues surrounding the puncture, it is hardly justifiable in every case to make two punctures at each operation just to save time.

There were 51 patients in our series, and before they were transferred to the base hospital ashore lumbar puncture was performed 211 times, and in each case the canal was drained of all the fluid that would return. Of the 51 patients the last 15 were irrigated and completely drained 78 times, and in not one instance in the entire series was there an untoward symptom associated with the drainage or the irrigation.

Following up the patients to the termination of their illness, it was found that in the 36 cases of the series who were treated by drainage and injection of serum there were 12 deaths, a mortality rate of 33 per cent. In the 15 patients who were drained, irrigated and injected with serum there were 2 deaths, a mortality of 13 per cent. Besides this marked decrease in the death rate, the irrigated cases were more comfortable, rested better and suffered less from headache and other symptoms of the disease.

SANITARY WORK AT CAPE HAITIEN, HAITI.

By R. B. Henry, Passed Assistant Surgeon, United States Navy.

On the arrival of the United States forces in Haiti in August, 1915, the country was found in a most deplorable condition. The city of Cape Haitien, on the north coast of the Republic, a place of about 30,000 inhabitants, was typical of the other towns throughout the country. Abounding in ill-smelling filth, its streets littered with decomposing refuse and the broken-down gutters widening at intervals into little pools covered with a green scum and swimming with mosquito larvæ and water bugs, the town was an object lesson in the futility of negro management.

Passed Assistant Surgeon J. R. Phelps, of the U. S. S. *Connecticut*, was detailed as sanitary or public health officer on September 1, 1915, and given full charge of all matters pertaining to this position. His first work was to organize a much-needed street-cleaning force and, securing the services of a foreman of the long-defunct street-cleaning department as native manager, an English-speaking negro boy as interpreter and a native clerk as timekeeper, together with a force of about 60 laborers, divided into half a dozen gangs under subforemen, he started out to clean the city. A few carts with mules were obtained, and before long a marked change in the appearance of the streets took place. The writer relieved Dr. Phelps on October 1, continuing, in addition, the duties of regimental surgeon and Dr. Phelps returned to his ship after having accomplished much in the short space of one month.

It soon became evident that the street-cleaning force required considerable augmentation in order to bring the town to anything like an American standard of cleanliness. Eventually the main body consisted of 8 street gangs, each with 1 foreman, 12 sweepers, and 3 shovel men with wheelbarrows. In addition, there was a mule-cart gang equipped with 8 carts and with brooms and shovels, who carted to various dumps the refuse collected by the street gangs. Part of this was burned in an incinerator which had been constructed by Dr. Phelps. A dozen men with machetes and rakes were placed in a number of public squares or small parks to keep these places in order.

Most of the streets were paved with large cobblestones, which would catch all sorts of dirt in the interspaces, making them particularly difficult to clean; and as the people live largely on fruit and sugar cane, the skins and leavings from these foods would be thrown about everywhere and, falling between the stones, would soon rot in the heat, attracting great swarms of flies, the sugar cane being especially attractive to them. To meet this difficulty 120 boxes 3 by 2

by 2 feet, with handles for carrying like a sedan chair, were placed in convenient places about the city and two dozen men were employed emptying these as they were filled up.

Another gang was kept busy in cleaning about 20 concrete canals which emptied into the bay and drained nearly all the gutters of the city. Vacant lots scattered about the town had been used as dumping grounds for refuse from the neighborhood, and these were cleaned up and, in some instances, fenced in and wooden refuse boxes placed close by. Special sanitary guards had to be stationed at a number of the largest of these places to prevent their immediately being used for the same purpose.

A difficulty encountered at first was in the distribution of street areas to be cleaned daily by the various gangs. In the beginning the chief foreman laid out the work and the names of the streets cleaned each day were reported to the public health officer the following morning, but this system did not work well. Many of the streets were infrequently cleaned and the men were evidently shirking. A competitive system was then tried, a bonus being paid to the foremen whose gangs cleaned not less than a selected minimum of blocks each day during the whole week and, while this was an improvement over the older arrangement, the plan was still not satisfactory. Constant watching was required to prevent foremen from claiming they had cleaned more blocks than was really the case. The next arrangement tried proved entirely satisfactory and solved the problem. The city was divided into sections and each gang given a section and required to clean from end to end every street in that section running north and south on one day and every one running east and west on the following day, thus insuring that all the streets and the whole city were cleaned each two days. The main street, a long and wide thoroughfare, was given to one gang and cleaned throughout its length every day. An extra gang, called the "utility gang," was maintained to handle special jobs coming up all the time.

The streets in Cape Haitien have long and cumbersome names, such as Rue des Trois Chandeliers, Rue de la Marmousette, and the like, sometimes changing their names once or twice as they come to different sections of the town. This caused difficulty and delay in giving instructions as to localities, and so the streets were given new designations, those paralleling the water front being lettered, and those at right angles to the lettered streets numbered. The letters and numbers were painted on all eight walls of houses on every corner in the city and, as the place is laid out with great regularity, matters were much simplified. Instead of saying, "The corner of Rue de la Providence and Rue du Petit Diable," one simply said, "P 21."

The condition of the paving in different portions of the city had become so bad from years of neglect that to prevent the continuance of stagnant mosquito-breeding pools in the principal streets it became necessary to rebuild many portions of the latter. At first this was done by simply relaying the cobblestone paving, retaining the central gutter characteristic of the place (instead of two side gutters as with us), but later the paving was replaced by crowned streets of a sort of macadam having cemented side gutters. Street, road and culvert construction was gradually taken up in different parts of the city and later extended into the outlying country for 8 or 10 miles. The work outside the city limits was carried on directly by Captain W. W. Low, United States Marine Corps, public works officer, until relieved by the writer in May, 1916. The engineering features were supervised by Mr. Charles Martin, a Haitian engineer in the employ of the department of public works.

The street work in the city was for several months carried on by the department of public health but, as fund requirements demanded its transfer to that of public works, the public health officer was appointed assistant public works officer (and subsequently public works officer) and the work continued under public works without change of organization or personnel.

There is no sewerage system in Cape Haitien and only the better classes have privies, the poorer people passing their evacuations on the water front, in vacant lots, in the near-by ravine and especially in spaces overgrown with vegetation and affording some measure of privacy, though this is by no means deemed essential. The result was that many foul-smelling places likely to become sources of disease existed close to inhabited districts. The vegetation in these places was cut down and burned and the grounds cleaned and, in order to provide for the wants of the population, several wooden privies with corrugated iron roofs were built over the water and two in the town over concrete vaults. At first these were provided with seats after the customary fashion, but these were soon in such condition that no one would sit on them and they were replaced by little compartments, 3 by 3 feet, in which the central plank had been removed from the floor, leaving an opening 1 by 3 feet, over which the occupant squatted after the manner of the Japanese. The arrangement worked very well.

The water supply of Cape Haitien is maintained by means of an excellent hydraulic system built by the French in the eighteenth century. This was thoroughly overhauled and put in first-class condition by Captain Low and the daily supply of water, which is pure and wholesome, much increased thereby. The general health conditions about the town were excellent except for malaria and filariasis which

flourished extensively on account of the swarms of mosquitoes. The breeding places of these pests were numerous and in a house-to-house inspection of premises many were found and destroyed. Great numbers of large iron bowls 4 or 5 feet in diameter at the top, relics of ancient sugar mills, were standing in different places about the city generally filled with stagnant water containing larvæ. These were turned bottom up by a sanitary squad sent around for the purpose. Handbills, in French, were printed and circulated, instructing the population with regard to steps necessary to maintain sanitary conditions, including the destruction of mosquito and fly breeding places.

Close to the north end of the town was a space on the water front, about two city squares in extent, which was covered by a jungle of cactus and other vegetation. Pools alive with mosquito larvæ were scattered about in different situations and cleared areas inside were used by the natives to pass their discharges. Owing to its proximity to habitations, this locality was a distinct menace to the neighborhood, so a gang was put to work to cut down all vegetation; the ground was then graded, the pools filled in or drained and the land subsequently raked and put in order. An ancient stone rampart several hundred yards in length was cleared out in this space and stone steps were built at the ends. Iron settees were procured from the United States and placed on the top and the whole area, which formerly was very generally shunned, has since become a kind of public recreation ground where persons of all classes gather in the evening to walk about and enjoy the breeze and sunset.

The main source of mosquitoes was a large pond situated on low-lying ground about a quarter of a mile north of the town in a district known as the Carénage. In order to abate this nuisance the public health department secured a mile or so of portable track and six steel dump cars and set about to fill the pond up, hauling dirt from different available hillsides during the process. The work required about three months to complete and several thousand carloads of dirt were thrown in the fill, successfully completing the object sought. In this job and the one mentioned immediately before it was necessary to employ some sort of drainage and for this purpose a number of trenches 2 to 3 feet deep were dug and filled with stones, the surface being covered with small stones and pebbles. The plan worked satisfactorily, the trenches carrying off the water as it accumulated.

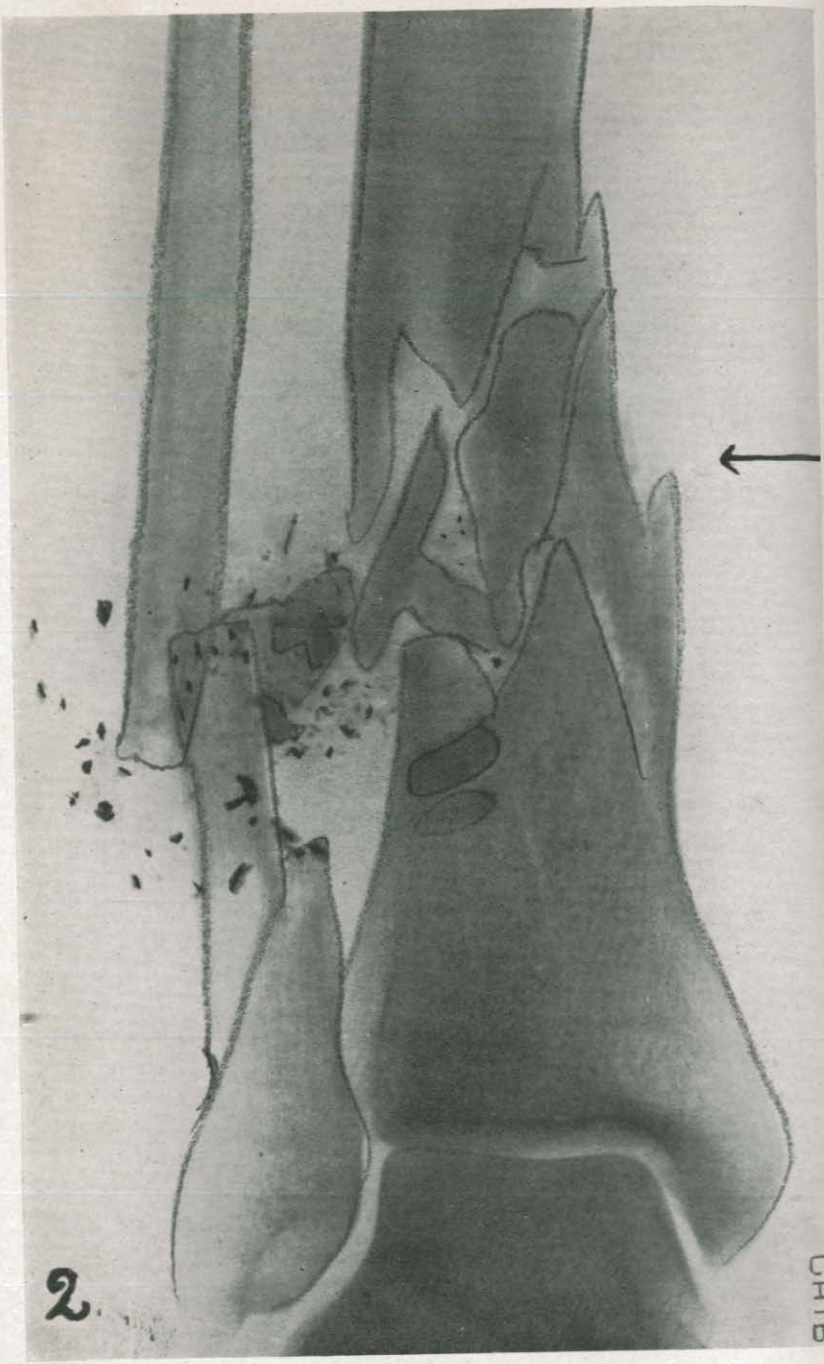
Much of the land near the water front was infested with land crabs and, their holes becoming filled with water, they were prolific causes of mosquitoes. Various methods of combating them were tried but none with much success.

There is a fairly large hospital, the Hospice Justinien, run by French Catholic sisters, but there was no regular medical staff and

SHRAPNEL WOUND, FEMUR.

Tetanus developed. 30,000 units used. Recovered from tetanus. Amputation and recovery. (Russian prisoner.)

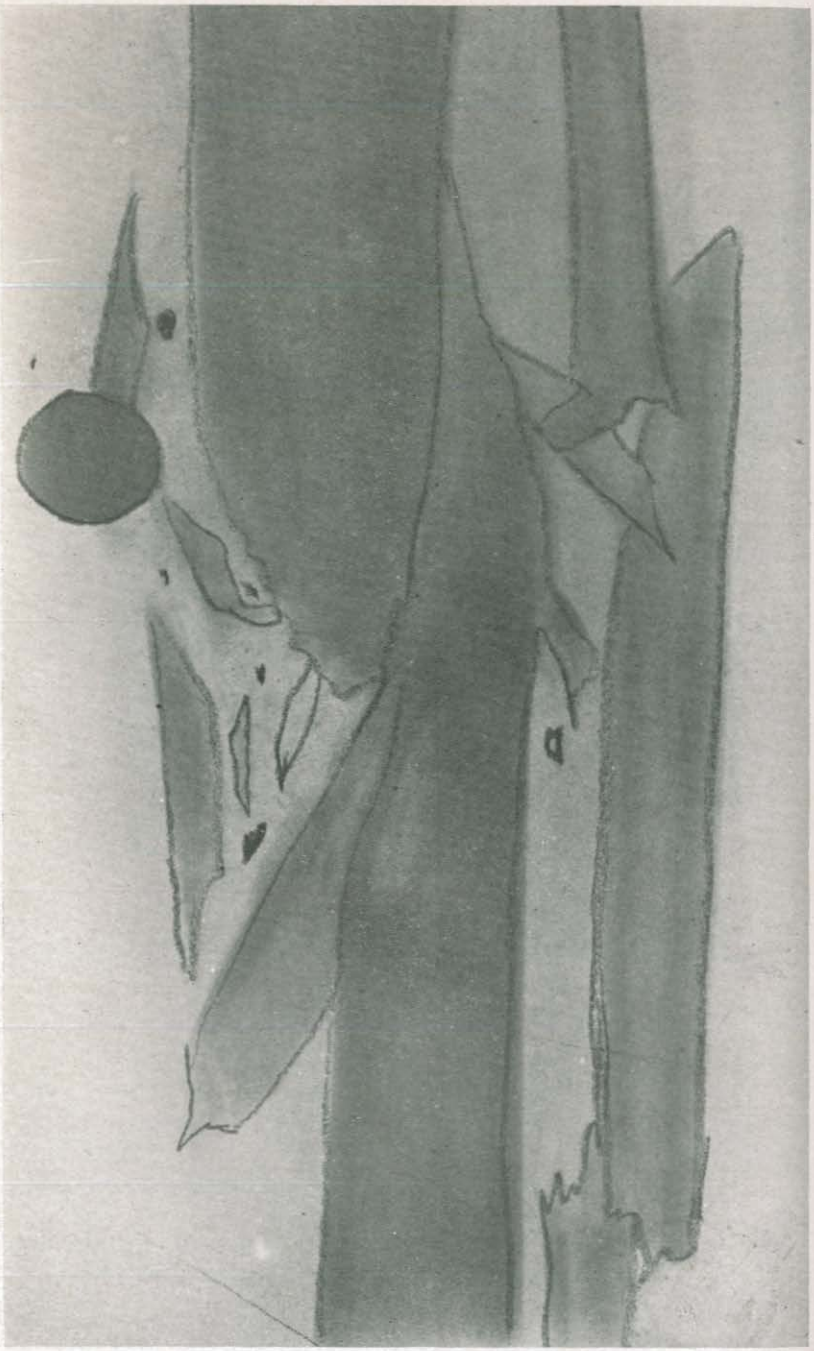
578-1



SHRAPNEL WOUND.

Compound comminuted fracture both bones leg, followed by infection of joint. (Russian front.)

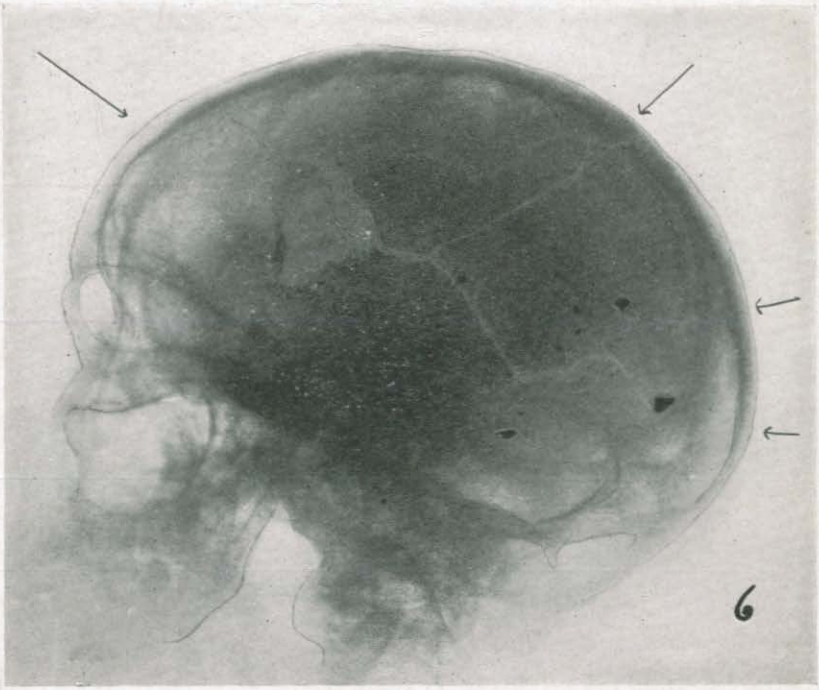
GAS GANGRENE IN SHRAPNEL WOUND, ELBOW.



COMPOUND COMMINUTED FRACTURE OF TIBIA AND FIBULA, SHOWING SHRAPNEL IN TISSUES.

Recovery after removal of loose bone splinters and foreign bodies. (Russo-Austrian front.)

FRACTURE OF LEFT PARIETAL BONE BY BULLET. (1895 RUSSIAN SHARP-POINTED AMMUNITION.)



SHRAPNEL WOUND.

Extensive fracture. Two operations (trephining). Survived 8 days. Infection. Fine fragments of bone driven into brain.

SHRAPNEL WOUND.

Fracture of last two lumbar vertebræ. Paralysis of both lower limbs. Incontinence of fæces and urine. Anæsthesia. Wound cleaned of foreign bodies and bony spicules removed. When last seen was up and about, being taught to walk again after two months dorsal decubitus in plaster.

only a meager surgical equipment. A native physician was appointed city physician under the department and his duties embraced attendance at the hospice as well as on employees of the city injured in the course of their work. He was also employed by the gendarmerie and the prison, under their respective heads. A sum sufficient to purchase a general operating set, with a metal and glass case, was allotted for this institution and the articles were obtained from New York.

Among other work handled by the public health department was the maintenance of the market, including scraping, red leading and painting the market building, an iron structure imported from France and covering four blocks.

A minor work, but not without value, was that of repairing and painting the city band stand and cleaning out the surrounding square which had become overgrown till the weeds stood about 7 feet high. Flowers and shrubs which were contributed by the sisters and other public-spirited persons were planted within.

The port quarantine was under the public health officer, who exercised a general supervision in the matter by authority of the district commander, Colonel Cole, United States Marine Corps. The ordinary routine business was handled by a native physician, Dr. Doucet, holding a Haitian Government appointment as port physician. The Haitian quarantine regulations are excellent and ample.

In July, 1916, there was a definite separation of the activities carried on under public health and public work, respectively, Dr. E. U. Reed, surgeon of the Second Regiment, taking the former, and Captain F. B. Garrett, United States Marine Corps, the latter.

X-RAY PICTURES OF WAR INJURIES.

By E. K. Tullidge, Assistant Surgeon, United States Navy.

When the war broke out I was a postgraduate student in Vienna, and offered my services for the relief of the sick and wounded of the Austrian Army. During the short but interesting period of my connection with that organization I obtained many souvenirs of my service. The accompanying illustrations are of interest as showing the severe traumatism caused by shrapnel on the Russo-Austrian front and also as demonstrating the character of the work accomplished with the portable field X-ray machine used in the Austrian service. The apparatus is transported on a horse-drawn vehicle and can be set up at the dressing station.

CIVIL HOSPITALS AND OTHER AIDS TO THE RECRUITING SURGEON.

By W. G. FARWELL, Surgeon, United States Navy, and E. W. GOULD, Assistant Surgeon, United States Naval Reserve Force.

In the four months following the declaration of war recruiting was extremely active, 10,848 men having been examined at the New York recruiting office, and the class of applicants was far above the average in quality as well as in numbers. Intensive recruiting necessitated a larger staff and the department assigned to duty at this station several members of the Medical Reserve Corps and Reserve Force. Fortunately these men were residents of New York and in close touch with many of the hospitals, dispensaries and research institutions of the city and one was a member of the mayor's committee on national defense.

It was realized that problems of diagnosis and treatment were constantly arising in connection with the examination of the recruits which made it advisable to have the expert opinions of specialists in order to pass more intelligently upon the physical and mental eligibility of applicants. Furthermore, many of these volunteers who were desirable except for minor defects such as hernia, varicocele, varicose veins, etc., welcomed opportunities to submit to operation and thus make themselves acceptable.

An appeal to the civilian hospitals and dispensaries met with a most enthusiastic response and unusual facilities for diagnosis and treatment were at once placed at our disposal. The Cornell University Medical College and the New York Eye and Ear Infirmary and the University and Bellevue Medical College placed their dispensaries at the service of the recruiting station. They arranged to have all men sent by the Navy surgeons examined promptly and without charge and on request sent back sealed opinions as to diagnosis and prognosis. They have been of great help in the diagnosis and treatment of mild disabilities of the ears and throat, of suspected trachoma and other diseases of the eye, of skin diseases and gonorrhea and the medical clinic at Cornell has made a careful study with X-ray plates of all tuberculous suspects.

Most valuable information and advice was derived from consultation hours held at our station by the eminent specialists, Dr. Colman W. Cutler, oculist, and Dr. Bryson Delavan, laryngologist. Dr. A. S. Knight, the medical director of the Metropolitan Insurance Co., offered all the facilities of his excellent laboratory situated directly across the street from us. During the past four months Dr. Knight and his assistants have removed impacted cerumen from over 200 cases, thus allowing us to complete an examination almost immediately which would otherwise be impossible, as neither the time nor the facilities for doing this work were present at this sta-

tion. They have also made urine examinations upon all our candidates for aviation.

A very large number of applicants have required dental treatment. At first the urgent cases were treated by volunteer members of the Dental Preparedness League at Bellevue Hospital and later at their offices. More recently men requiring even a small amount of work have been sent to the New York College of Dentistry, where they have received splendid treatment at the hands of the students. The Dental Preparedness League has now furnished equipment and supplies so that a dental chair may soon be installed in our station, and hopes to furnish competent dentists so that we may have each day the benefit of their advice and may secure prompt treatment for the applicants.

One of the most interesting branches of the work has been the special heart clinic conducted by Dr. Alfred E. Cohn and his assistants at the Rockefeller Institute for Medical Research. Since May 1 almost all of the doubtful heart cases have been referred to him for X-ray and electrocardiographic examination and special exercise tests. In addition he has made a very careful physical examination in each case. Practically no applicants with appreciable enlargement of the heart have been sent, so that the X-ray findings have been largely negative. Curiously enough, cardiac irregularities have been extraordinarily rare, if one excludes the mild cases of sinus arrhythmia, which are of no importance. Among the applicants there have been, perhaps, a couple of dozen with an occasional premature systole and less than a half dozen with any marked irregularity. No cases of heart block, fibrillation, paroxysmal tachycardia, or pulsus alternans have been seen. For this reason the electrocardiographic results have been largely negative also. The chief reliance has been placed upon clinical judgment and the use of the stethoscope, and in certain cases the use of the naked ear. Within one week two cases appeared, both presenting well-marked diastolic murmurs heard clearly with the ear but absolutely inaudible with the four different types of stethoscope used at the station. Every heart that is overacting or at all enlarged should be examined with the naked ear to detect this important and elusive murmur. The value of a special cardiac clinic can not be overestimated as a means of raising the standard of cardiac examinations. It is always a matter of keen interest to see if one can in a necessarily hasty examination grasp the essential features of the case.

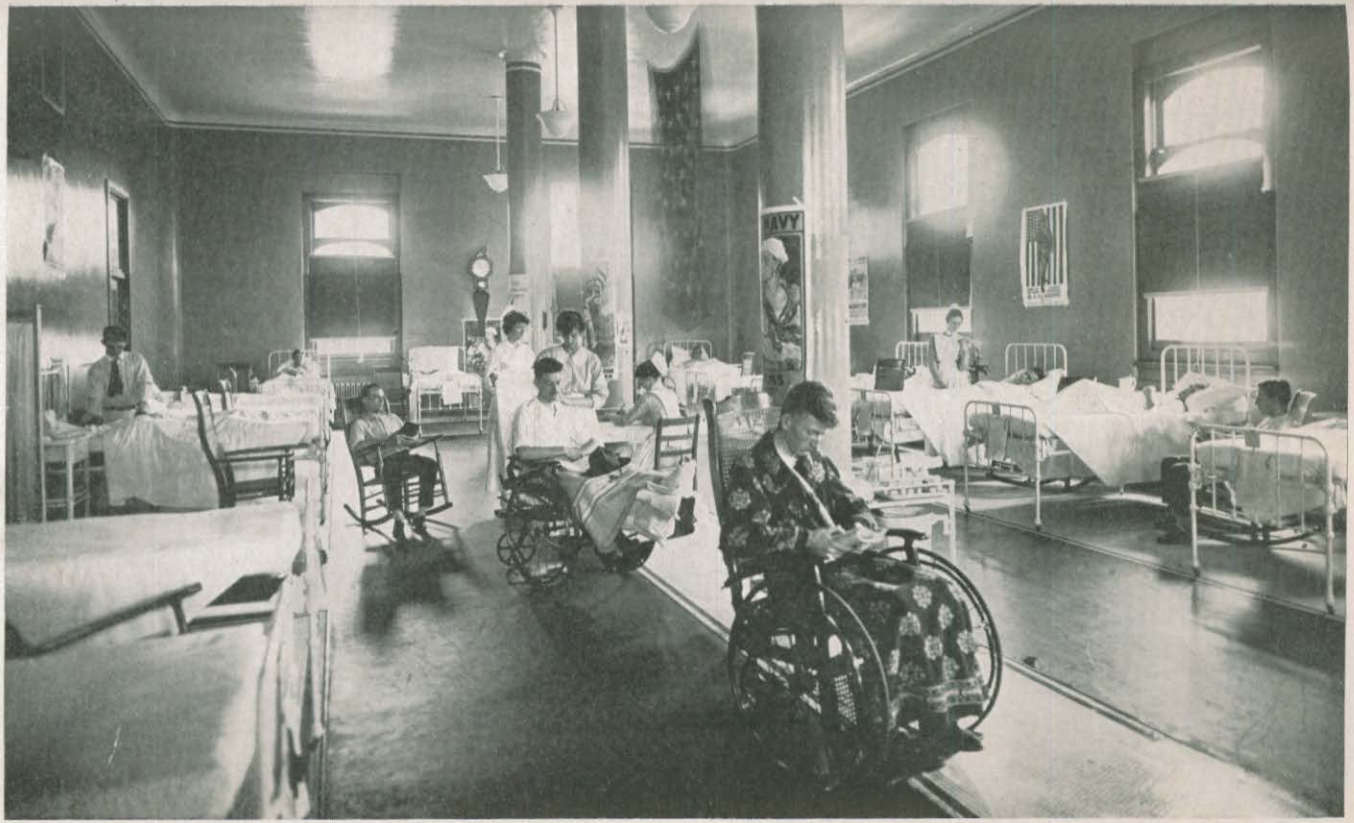
The New York, Harlem and Bellevue Hospitals have received and, without charge, operated upon many of our applicants who have since been accepted and enlisted. St. Luke's Hospital generously opened a ward of 30 beds and placed it entirely at the disposal of the recruiting surgeons. Since May 21 they have operated upon 72 cases and

of these 35 have since been accepted and 22 have already enlisted. The United States army and British recruiting surgeons are now also sending many defective cases to this military ward. The convalescence of these operative cases frequently becomes a difficult social problem, but most valuable assistance has been received from the Burke Foundation, a convalescent home located in the suburbs, where many of these men were most comfortably housed, fed and entertained for periods of two or three weeks.

In order that we might have a convenient and accurate record of these cases which have been referred to various hospitals, a card catalogue system has been instituted and is being maintained by the mayor's committee on national defense, who have kindly furnished the services of a competent civilian clerk. A cross index under the heading of the defect or cause of rejection serves as a ready reference. Entries are made on the name cards whenever the applicant returns to report or is accepted or enlisted. It was intended, furthermore that, by means of these records, a " follow-up " system could be instituted by which we could, by civilian help, keep in personal touch with the recruits at the hospitals and during their convalescence. Their final return for acceptance and enlistment would thus be more easily insured. In this card catalogue were filed under proper headings the records of cases which were, after complete examination, found desirable except for defects which might later be remedied, such as underweight, undeveloped, underage, defective teeth and thus a list of excellent volunteer material exists from which we might later draw should the occasion arise.

The custom of having all surgeons working together in the same quiet room has proved to be of great mutual advantage for, instead of causing interference and confusion, each surgeon has benefited by frequent consultations with others and has thus personally observed the salient and interesting points noted in more than 6,000 cases.

In all this work where the applicant is referred to civilian doctors the final decision in all cases rests with the Navy surgeon. Civilians can not understand service conditions, though their help is often invaluable. Whenever an applicant is sent out for treatment he is given a note made out on a special form and he is required to sign a statement releasing the Government from any financial or moral responsibility. Copies of these special forms and a picture of the military ward at St. Luke's Hospital are shown.



PHOTOGRAPH OF MILITARY WARD, ST. LUKE'S HOSPITAL, NEW YORK, N. Y.

I have been rejected for enlistment in the U. S. Navy on account of _____, and have been advised to have treatment for the same in order to enlist.

I understand that the U. S. Navy assumes no responsibility for the results or expense and can not guarantee to enlist me unless found physically qualified in all respects.

Signed, _____

Witness, _____

Date, _____

_____, an applicant for enlistment in the U. S. Navy, has been rejected on account of _____, and is referred to _____ for

_____

_____

_____

_____

_____

_____,

Surgeon, U. S. N.

(Kindly return this card in sealed envelope by applicant.)

VENEREAL PROPHYLAXIS IN SANTO DOMINGO.[1]

By P. E. Garrison, Passed Assistant Surgeon, United States Navy.

Every endeavor was made to secure faithful use of prophylactic measures against venereal infections. Prophylactic stations, in charge of a hospital steward or apprentice, were maintained at Fort Ozama, the Receptoria Camp and the field hospital. Every opportunity was taken to impress upon the men the necessity of taking prophylactic treatment early after exposure, if possible within one hour. It is believed that the results were as good as could have been expected without authority to inflict punishment for nonobservance of rules.

Records for the last three months of 1916 show that from one-fourth to one-half of the men took prophylactic treatment within one hour after exposure, the proportion varying in different organi-

[1] Extract from Annual Sanitary Report, 1916, Field Hospital, Fourth Provisional Regiment Marines, Santiago, Dominican Republic.

zations and different months. No case of venereal disease developed from exposure when prophylaxis was taken within one hour.

From one-fourth to one-third took prophylaxis during the second hour after exposure. Among these there occurred eight infections.

The remainder managed to get their treatment from two to three hours after exposure, and these appeared to acquire as many infections as those who took no prophylaxis.

The 70 venereal infections acquired during October, November and December were distributed as follows with reference to the interval between exposure and prophylactic treatment:

Time interval.	Number of cases.	Percentage of total number of cases.
1 hour	0	0
1 to 2 hours	8	11
2 to 5 hours	14	20
5 plus hours	27	39
No prophylaxis	21	30
Total	70	100

Gonorrheal and chancroid infections were about equally prevalent. Many of the latter are undoubtedly mixed infections, 8 out of 35 having developed secondary symptoms by the last of December.

ADDITIONAL BORDER-LINE CASES AT THE RECRUITING OFFICE.

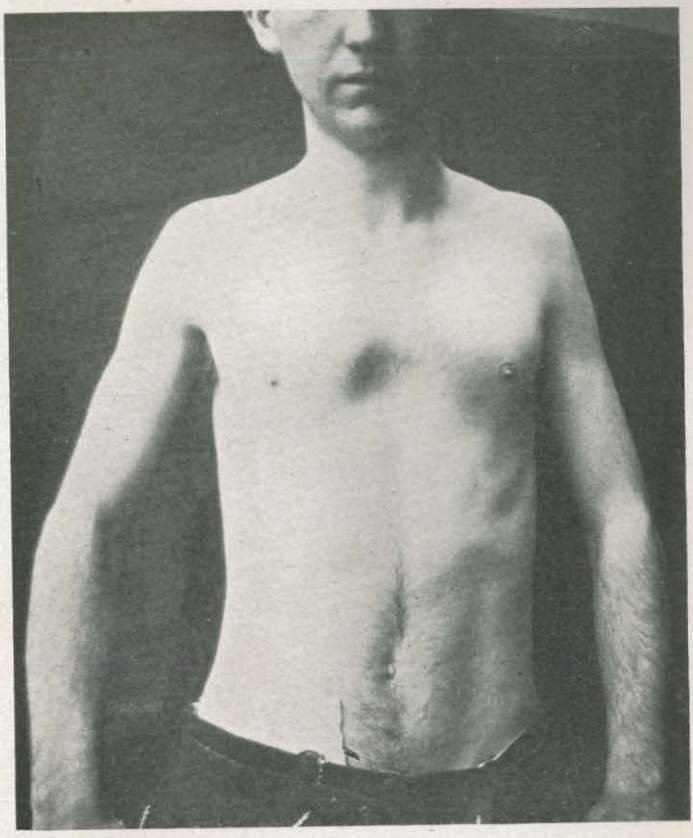
By W. G. Farwell, Surgeon, United States Navy, and E. F. Du Bois, Assistant Surgeon, United States Naval Reserve Force.

In the preceding number of this Bulletin one of the writers[1] has published a series of photographs of cases in which it was difficult to decide whether or not the applicant should be accepted. Through the generosity of the Russell Sage Institute of Pathology it has been possible to increase this series and make an extensive collection. From the large number of photographs available a few have been selected for this publication. Others are being used by the Army Medical Corps for the instruction of surgeons on recruiting duty.

An effort has been made to gather the disabilities of a grade so mild that they are not usually photographed for publication. The text-books are full of pictures of marked cases, but these are the very ones that present no difficulties to the examining surgeon.

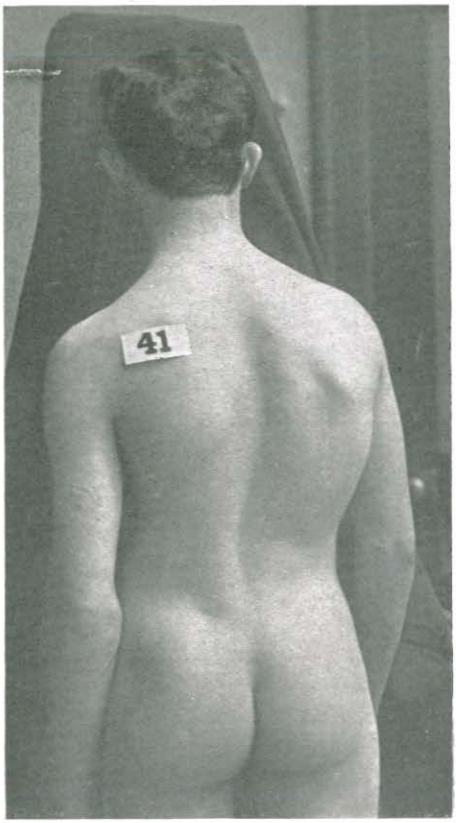
These photographs were made with the cooperation of Assistant Surgeons W. S. Thomas, of the Medical Reserve Corps, and E. W. Gould, of the United States Naval Reserve Force. Our thanks are due to Mr. A. Tennyson Beals for his care and skill in making the photographs.

[1] Farwell, W. G. Border-line cases at the recruiting office. Naval Medical Bulletin, 1917, xi No. 3.



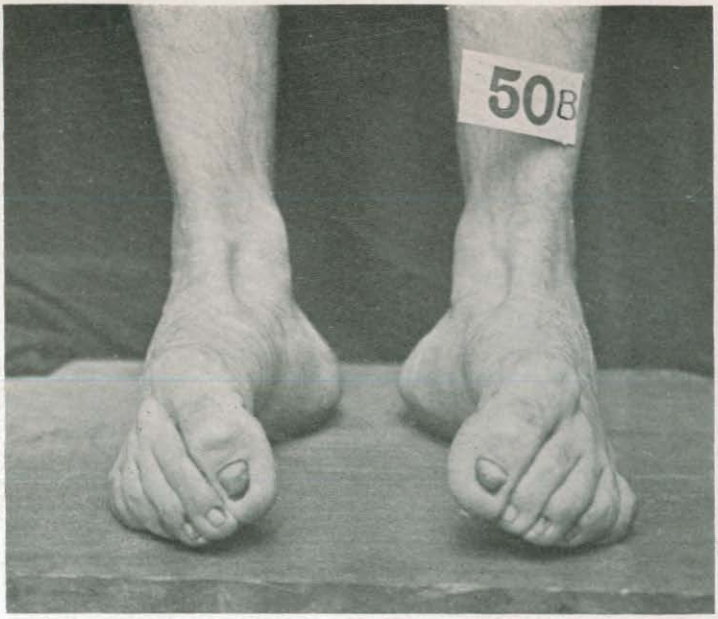
NO. 35.—DEFORMED THORAX.

Age, 19 years, 7 months; height, 69; weight, 133 pounds. Chest measure, 33 inches. Chest expansion 3½ inches. General condition good. His color is rather pasty but the hæmoglobin is 85 per cent. Rejected on account of prominence of middle of sternum, which has been found to be a frequent cause of rejection at this station.



NO. 41.—SCOLIOSIS.

Age, 19; height, 64; weight, 121 pounds. Chest measure 32½ inches. Expansion, 2½ inches. History negative. General condition good. Rejected on account of marked curvature of spine.



NO. 50B.—FLAT FEET.

Shows one of the functional tests for flat feet in use at this office. Function is best tested by making candidate hop 70 yards on each foot. Accepted.

NO. 47.—CLUBBED FINGERS.

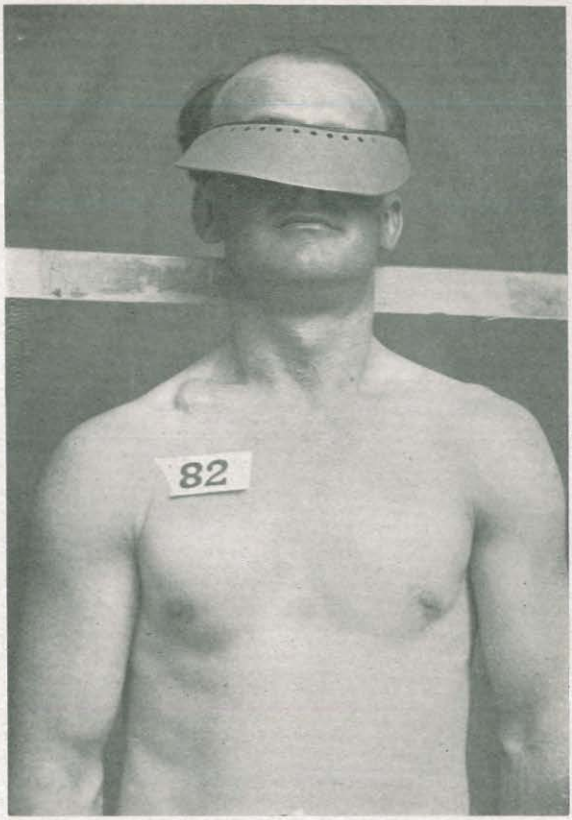
Age, 22; height, 68; weight, 145 pounds. General condition excellent. Finger tips show marked clubbing. Faint systolic murmur at apex of heart believed to be functional. No cardiac enlargement. Lungs and bones normal. Rejected and referred to a clinic for further study, but did not report. Cause of clubbing could not be ascertained.

No. 53.—KNOCK-KNEES.

No. 51.—SCOLIOSIS, KYPHOSIS, LORDOSIS.

No. 53.—Age, 18 years, 8 months; height, 67; weight, 119 pounds. General condition, good. When knees are just touching, the feet are 2½ inches apart. Unable to place inner sides feet in contact without advancing one knee. Undesirable on account unmilitary attitude. Rejected.

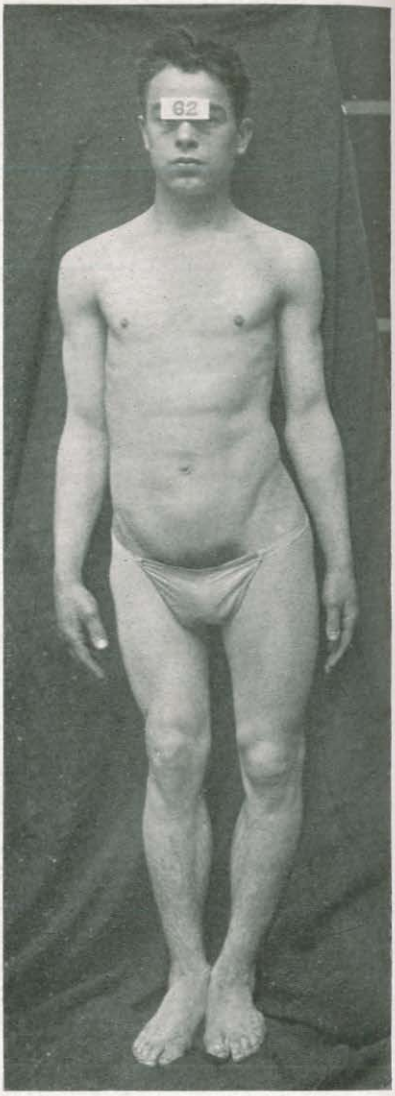
No. 51.—Age, 30; height, 66; weight, 135 pounds. General condition, good. Note tilting of pelvis. Rejected.



No. 82.—OLD FRACTURE OF RIGHT CLAVICLE.

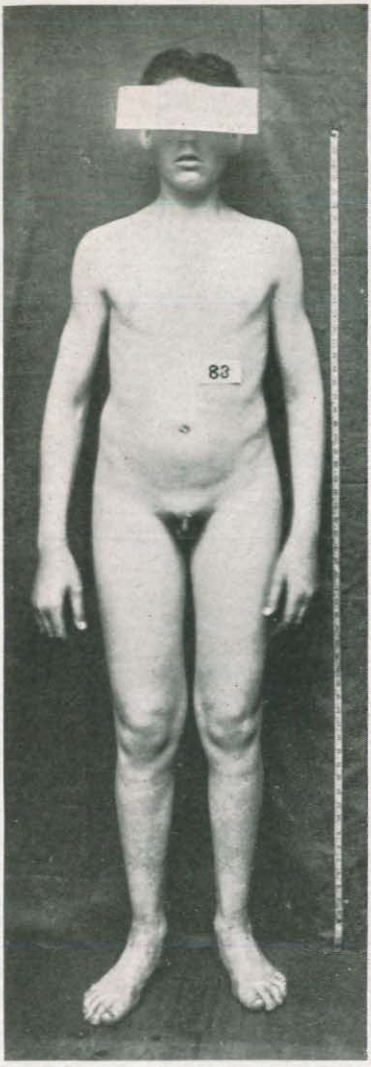
Age, 27; height, 65; weight, 141 pounds. Chest measure, 36 inches. Chest expansion, 3 inches. General condition, excellent. Right clavicle fractured while in Naval Service, 1915. Proper treatment was not available until fragments had already united in malposition. Operation, January, 1917. Discharged, March, 1917, by medical survey. Has worked as fireman; function of arm perfect. X-ray showed bony union. Request for waiver (accompanied by photographs). Accepted as fireman. Would not be acceptable as a marine as he might have difficulty carrying a rifle on his right shoulder.

No. 82.—OLD FRACTURE OF RIGHT CLAVICLE.



No. 62.—SCOLIOSIS AND KYPHOSIS.

No. 82.—Exercising to show normal power in deformed clavicle.



NO. 83.—RETARDED SEXUAL DEVELOPMENT.

NO. 62.—SCOLIOSIS AND KYPHOSIS.

No. 83.—Age, 21; height, 64; weight, 122 pounds. Chest measure, 32. Chest expansion, 2½. The genitalia were extremely small and the male secondary sexual characteristics were absent except that the voice was of masculine type. Rejected.

No. 62.—Age, 17; height, 63; weight, 122 pounds. General condition fair. Showed marked lateral curvature of spine with tilting of pelvis. There was an apparent shortening of the right leg and marked atrophy of the muscles. Rejected.

No. 91.—LARGE BIRTHMARK.

Age, 21; height, 65; weight, 150 pounds. General condition, good. Whole right leg, thigh, and lower abdomen were bright red color. Cutaneous blood vessels were so distended that they would bleed profusely with slight abrasions. Right leg was slightly swollen. Extensive nevi are listed as special disqualifications in Circular for Physical Examination of Recruits. Rejected.

NO. 54.—HARELIP.

Age, 23; height, 66; weight, 140 pounds. The deformity of the lip is a cause for rejection in conformity with Article 2068, Circular of Physical Examination for Recruits.

FOR THE HOSPITAL CORPS.

At a time when economy is being indoctrinated, studied and increasingly practiced in all departments of business and in the home, it behooves every individual in the service of the Government to practice economy in every way possible, not only in his private life, but in the performance of his official duties. There is a disposition on the part of most individuals in times of great stress and in acute emergencies to feel that it is unnecessary to consider expense, provided only the needs of the moment are promptly and adequately met. This is well illustrated on a small scale when an important accident case has to be treated on board ship or when there is a hurry call in a hospital for an urgent operation at some unusual hour. Disturbance of the usual routine leads to haste and confusion and as a result of commendable desire to help on the one hand, but, on the other, of defective training surgical dressings are wasted, bandages, towels, sheets are soiled unnecessarily, and various articles are injured or broken. Upon the advent of war the necessity always arises for a large expenditure of funds, and some waste of money is perhaps the unavoidable result of habitual unpreparedness. This fact, however, should not justify a given individual in wastefulness, but rather make it all the more incumbent upon him to save for the Government in every possible way.

Here and there throughout the service are to be found medical officers who appreciate the necessity of economy in surgical dressings and who not only instruct the Hospital Corps in this matter but painstakingly supervise the expenditure of supplies. This instruction and supervision sometimes provokes antagonism or excites ridicule, but such would not be the case if every nurse and every member of the Hospital Corps were made to feel that economy and care in the handling of surgical dressings is just as much an essential part of his qualifications as is a knowledge of bandaging, bed making, sterilization, etc. At a time when the Nation is preparing to bend all its energies to carrying on a successful war the patriotism of members of the Hospital Corps should show itself by saving every possible penny for the Government. However generous appropriations may be, they are necessarily limited, and waste in any department to-day, even in trivial matters, may involve want in important ones to-morrow.

Here is a simple illustration of the way cotton, for example, is wasted every day in hospitals and aboard ship: The doctor is opening a sty or lancing a small boil. He wants to wipe away a minute drop of pus and, intent upon what he is doing, calls on the nurse for a little cotton. The nurse tears off from the roll a whole handful and hands it to the doctor, who removes and uses the small wisp which is all he requires. The rest can not well be put back on the roll and soon finds its way to the slop pail. A Hospital Corpsman is told to dress a finger or toe presenting a minute and trifling scratch. Very often, if not watched by the doctor, he will use for this purpose a sterilized gauze pad big enough to cover the entire hand and enough bandage to go halfway up the forearm. The chief pharmacist's mate or the surgical nurse himself should have the forethought to see that the dressing room where minor cases are treated is always well stocked with small-sized dressings for this class of cases.

The importance of economy in surgical dressings is thoroughly appreciated in civilian institutions. For example, the superintendent of the Pennsylvania Hospital, Philadelphia, writing in the Modern Hospital for July about surgical dressings, says:

> We are realizing a saving of 65 per cent, and this, at the present time, means a handsome sum every month. For instance, we used only 55,000 yards of gauze last year, whereas, without reclaiming, 200,000 yards would be a small estimate.

In this institution it is found that having gauze examined, trimmed and prepared by the nurses seems to have many advantages over the method of having this work done by maids or by the laundry people.

> The soiled dressings are collected at the bedside, in low-priced, 20-pound, automatic paper bags, held in position by homemade frames. Immediately after the surgical dressings are completed the bags are taken to the laundry, where the dressings are transferred to net bags and placed in cold water in the soaking tank. This water is changed three or four times during the day. The following morning the net bags containing the dressings are transferred to the sterilizing washer and washed by the following process:
>
> 1. Two cold-water washes, without soap or alkali, for 10 minutes each.
> 2. Forty-five minutes' washing in hot water and soap solution.
> 3. Two rinsings in hot water for 10 minutes each.
> 4. After a small amount of hot water is placed in washer the cylinder is run for 45 minutes under steam pressure of 12 pounds.
>
> After the dressings are put through the extractor they are taken, while moist, to the gauze room, where they are stretched, trimmed, and prepared for final sterilization by the probation class of the training school under the class supervisor. Preparation and sterilization of dressings is taught at same time. The class hour is sufficient.
>
> The trimmings, worn-out pieces and pieces of gauze bandages are saved until a considerable quantity has been collected and are then sent away to be picked and carded for absorbent cotton. The amount of gauze cotton thus secured nearly equals the amount of absorbent cotton required.
>
> Dressings properly washed are entirely aseptic before the final sterilization in the gauze room and, after final sterilization, could be used for any purpose,

but as a matter of convenience the new gauze is first used in the operating rooms.

The dressings are first cut large and of uniform size, and as they become smaller, as a result of washing and trimming, they are placed in the next smaller size. Four sizes are convenient for nearly all dressings.

Where the gauze is to be reclaimed a cheaper quality than a heavy 24 by 28 count is not economical. Muslin bandages are washed and ironed, but it does not seem practicable to iron gauze bandages; hence they are used as waste.

Most manufacturers of cotton waste do carding; but if location makes this impracticable a picker may be purchased and the waste used without carding. While carding is very desirable, a carding machine is expensive.

From the periodical quoted above we cull the following notice posted in the New York Hospital for Ruptured and Crippled:

WAR ECONOMIES.

SUPPLIES OF ALL KINDS ARE COSTLY. DO NOT WASTE.

1. The good will and cooperation of the physicians and surgeons, both attending and house, is requested to bring about economic use of drugs, appliances and supplies.

2. Nurses and attendants will collect all gauze and bandages from ward dressing, operating rooms, and out-patient department in bags set for that purpose.

3. To whom it may concern: Do not use two pounds of plaster where one pound only is necessary.

4. Do not use an appliance or a surgical instrument except for the purpose for which it is intended.

5. Save the worn-out article or the broken in order to obtain a new one on requisition.

6. Do not light an electric lamp when not necessary. To do otherwise is wasting money.

7. All lights not actually necessary must be extinguished by 9 p. m.

8. Do not use the printed blanks of the hospital for any other purpose than that for which they are designed. Blank forms cost money.

9. Old rubber is valuable. Don't throw any away. Keep rubber in a cool place. Don't allow any form of grease on rubber, as it causes it to rot.

10. Do not take the elevator to go up or down one or two flights of stairs.

VIRGIL P. GIBNEY, M. D.,
Surgeon in Chief.

Miss Catherine C. McGrath, chief surgical supervisor, Grace Hospital, Detroit, writing in the same number of the Modern Hospital on "Economy in the cutting of surgical dressings," and the importance of eliminating all waste by standardizing preparation of dressings, and the need for practical training of pupil nurses and Red Cross aids, says:

Training in the preparation of cotton surgical supplies and dressings should begin with the pupil nurse, who at the start has little idea of the cost of supplies or the economies of their preparation. It is therefore necessary, first, to present to the pupil nurse a frank statement as to the cost of gauze, cotton, and other accessories that enter into common surgical dressings. The pupil should learn that all waste ends and cuttings in the manufacture of dressings

have a value, even though that value be represented by clean white rags, which are a marketable commodity.

The next general principle to be taught is to the effect that the cutting of gauze for dressings, compresses, sponges, etc., should be arranged on definite geometrical lines so as to fully avoid waste. The pupil should learn that fanciful dressings and surgeons' hobbies in supplies should be discouraged and that compresses, sponges, bandages and all dressing units should be fully standardized and approved by the entire surgical staff.

* * * It should be stated that the majority of these surgical units can be systematically washed and used again. It is the practice of this hospital to wash all gauze dressings and bandages and utilize the washed gauze after proper sterilization and culture for secondary dressings in the surgical department. This has been carried out here for 10 years and in many other large hospitals for a like period. It has been demonstrated that washed dressings are softer in texture and more desirable for redressing wounds than unwashed mill gauze.

The adoption of certain standard types of surgical dressings for ships and hospitals of the Navy is already under way. This will not preclude the employment by surgeons of dressings of special patterns preferred by them, but will greatly simplify the work of preparing dressings for routine cases and, as diagram and specifications can be prepared so as to get the maximum yield from rolls of cotton and gauze of standard size, a marked saving should result.

Here is a simple practical suggestion for the sick bay of a ship: Have a muslin bag hanging near the dressing table and collect in it all the fairly clean odds and ends of cotton and gauze from the outer layers of dressings as they are removed from the patients. When the bag is full the contents can be sorted, some becoming available for resterilization, while the rest can be used for cleaning purposes and thrown away after use, for wiping up a drop of blood from the clean deck, for drying the leakage around steam pipes, etc. The usual practice is to use a towel, and when this article is employed in the dispensary to wipe up the prescription counter it soon becomes unsightly with stains of silver nitrate, picric acid, etc. The Supply Depot is now prepared to furnish on requisition a sort of rough dish toweling to be used for such purposes in the dispensary instead of the regular high-grade, expensive towel. It will be issued in bolts, to be cut up into proper lengths and hemmed aboard ship.

[ED.]

CONSERVATION OF LINEN AND BLANKETS IN NAVAL HOSPITALS.

By SARA B. MYER, Chief Nurse, United States Navy.

Recent experience in naval hospitals has shown that in order to prevent as far as possible wasteful destruction of linen, one person, preferably a member of the Nurse Corps (who by reason of possessing the woman's instinct for the careful use of household supplies, inherited from generations of housekeepers, is naturally better fitted

than a man for this duty), should have entire responsibility for all linen from the time it is received on requisition until it is condemned and turned over to her to be torn up and issued for cleaning rags.

She should have charge of the linen storeroom, keep an inventory, receive and store the new linen. Being familiar with the stock, she should recommend the items for each requisition in order that the hospital shall not run short of pillowcases, for instance, while dozens of extra spreads and nightshirts lie on the shelves year after year, being carelessly added to with each requisition, only to go to pieces from old age when finally issued for use.

She should receive and pass upon all linen turned in for survey, list and store it for the board, mark and issue new in exchange.

She should have full supervision of the laundry to insure that no destructive methods are in use there. In the laundry she will be able to observe the condition of linen from different parts of the hospital and run down various careless habits of destruction, i. e., articles put to uses never intended, wet linen stuffed into hampers and allowed to mildew instead of being dried, nightshirt sleeves cut instead of being slipped off, patients allowed to write on their beds and upset ink bottles, etc. She will also see that worn linen returning from the laundry is sent to the mending room and that the badly worn is turned in for survey instead of being used for rags and appearing minus at inventory time.

She should keep the ward inventory books and count the linen in use at regular intervals. She will be able by word and example to teach those using linen the value of its conservation, and through constant care and interest the life of each article will be greatly prolonged.

The provision of suitably constructed places for keeping soiled linen before sending to laundry, preferably a porch furnished with a wire hamper, also a drying cupboard for wet towels and sheets, which could be used as well to dry cleaning rags and swabs in bad weather, would fill a long-felt want and prevent much deterioration and waste.

It is a question worthy of consideration whether the custom in naval hospitals of using condemned linen and blankets for cleaning rags does not offer too great a temptation to the willing cleaner (on occasions when rags may happen to be scarce and "inspection" very near) to tear up partly worn or even perfectly good articles.

If it were possible to exchange the rags for a cheap substitute to be issued for cleaning, it might be found to eliminate one source of needless destruction.[1]

[1] Rough toweling for cleaning purposes is now procurable by requisition on naval medical supply depots.

NEW ISSUES BY SUPPLY DEPOTS.

In order to avoid the possibility of error in interpreting the value of the various preparations which may be issued, it has been deemed advisable to adopt the following general (class) designations, which will appear on the labels of respective containers in addition to the commercial or registered title:

"Colloidal silver"—to cover a class of preparation containing about 20 per cent silver, with chemical, bactericidal and clinical properties equivalent to those of argyrol.

"Protein silver"—to cover a class of preparation containing about 8 per cent silver, with chemical, bactericidal and clinical properties equivalent to those of protargol.

"Sulphonated oil"—to cover a class of organic sulphur compounds with a sulphur combination and properties similar to ichthyol.

Notwithstanding the relatively lower silver content (8 per cent) of protein silver, protein silver can not be used in solutions anywhere approximating the strength of those in which colloidal silver can be employed. This is readily understood when it is remembered that argyrol, which is of the colloidal silver type, is often employed in 25 per cent to 50 per cent solutions, while protargol, which is of the protein silver type, is probably seldom employed in solutions exceeding 3 per cent strength.

Therefore any preparation issued by naval medical supply depots bearing a colloidal silver label is to be used in solutions of the same percentage strength as argyrol, likewise any preparation bearing a protein silver label is to be used in the same percentage strength solutions as protargol.

Rough toweling for cleaning purposes, etc., will be issued in bolts. It will be torn into proper lengths and hemmed aboard ship.

THE ROUGH FORM F CARD.

By J. R. PHELPS, Passed Assistant Surgeon, United States Navy.

Form F cards contain an important part of the data upon which vital statistics of the Navy are based. It is necessary that every item called for on the face of the card be furnished as accurately as possible. Each and every item is essential, but nothing should be entered on the face of the card except the information demanded by the instructions for numbered lines, which instructions are printed in red on the back of the detachable card designated "Original." Upon disposal of the case, as soon as the proper indicator has been entered after "Disposition," on line 7, the card should be forwarded to the bureau at once. As a rule, it is practicable for all stations and ships in United States ports to forward cards the day they are released.

It is remarkable that in spite of clear and definite instructions many cards are received with errors or omissions and in many cases with both. The name of the patient must be entered, surname first, with the Christian name in full. Frequently, where enlistment records or health records have not been available at the time, cards have been sent in with the line for the date and place of birth blank. Those items are particularly necessary for statistical purposes and, inasmuch as the man himself has furnished the information in the first place, it is suggested that it be obtained from him when the card is filled out instead of waiting for his health record. In filling line 5, "Diagnosis," the official nomenclature must be adhered to strictly. That is very generally realized and yet it is surprising to note the number of cards in which the diagnosis is misspelled and in which other terms have been used. A key letter must be given in the case of each and every injury. When the term "Diagnosis undetermined" is used in the case of an injury, the proper key letter should be given anyway. Frequently line 8 is overlooked. Whenever a patient is transferred as a patient, even though the diagnosis may be "No disease," there should be entered on line 8 the name of the hospital, dispensary, place, or ship to which he has been transferred. Line 9 is the continuation of line 8, and is to be used only when there is not sufficient space on line 8. It is not to be used as a convenience for the filing of notes at the place where the card is prepared, although there is no objection to making such notes, "Typhoid prophylaxis completed," "Contagious influences," etc., separately on the retained duplicate copy after the original has been detached. If line 10 is not filled in properly it is difficult to trace the card. Several hundred cards are received each day and in order to file them it is necessary that each shall plainly indicate the ship, station, or hospital in which the card was prepared.

In the bureau the cards are sorted and all of the data they contain is taken from them on separate punching-machine cards. The latter are sorted and tabulated by an accounting machine under the various classifications required for the preparation of the Surgeon General's report and for the compilation of various special statistical reports from time to time. Form F cards are also used each day as notification cards for communicable diseases. When a case of measles, for instance, is admitted to the sick list at a station or on board a vessel and is transferred to hospital the same day, if it happens to be on the Atlantic coast, in the ordinary course of events the card reaches the bureau the following day, and by means of an appropriately colored spotting pin on a map kept for the purpose the case is immediately recorded as being in the hospital to which it was transferred. For the purpose of keeping track of infective areas the case is also

charged to the vessel or station where admission to the sick list occurred.

As a notice of communicable disease, the card is deficient in only one respect. A certain percentage of acute cases are sent to hospital with the diagnosis undetermined or with the diagnosis in error, as with German measles, when later it may be clear that the correct diagnosis is measles. When the diagnosis is changed by the hospital there is no line on the face of the card for a statement of the new diagnosis. In order to facilitate the work of the bureau, *in all cases when the diagnosis is changed* it is requested that a memorandum be made on the back of the card, typewriting across the red printed instructions, giving the new diagnosis and stating whether the change was made on account of error, complication, or intercurrent disease. For example, "Changed to measles on account of error." At the same time, because the new card will indicate the patient as received from the hospital or place where the diagnosis was changed, a memorandum should be made on the back of the new card giving the former diagnosis and stating the name of the ship or station in which the infection was acquired, as taken from line 4 of the old card, so that eventually when the new card is received in the bureau both can be filed together without trouble.

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