VOL. XIII NO. 1

UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

ISSUED BY
THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF PUBLICATIONS
CAPTAIN J. S. TAYLOR, MEDICAL CORPS, U. S. NAVY
IN CHARGE

JANUARY, 1919
(QUARTERLY)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

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.

NOTE.

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

Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
Volume XII, No. 3, July, 1918.
Volume VII, No. 2, April, 1913.

SUBSCRIPTION PRICE OF THE BULLETIN.

Subscriptions should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C.

Yearly subscription, beginning January 1, $1; for foreign subscription add 25 cents for postage.

Single numbers, domestic 25 cents; foreign, 31 cents, which includes foreign postage.

Exchange of publications will be extended to medical and scientific organizations, societies, laboratories, and journals. Communications on this subject should be addressed to the Surgeon General, United States Navy, Washington, D. C.

TABLE OF CONTENTS.

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, 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 parts 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.

THOMAS HENRY HUXLEY.

1825–1895.

Reproduced from Garrison's History of Medicine by the courtesy of W. B. Saunders Co., Philadelphia, Pa.

1–1

U. S. NAVAL MEDICAL BULLETIN.

VOL. XIII JANUARY, 1919. No. 1.

SPECIAL ARTICLES.

HEART SOUNDS AND THEIR VALUE.

By HOBART AMORY HARE, M. D., Lieutenant Commander, Medical Corps. United States Naval Reserve Force.

A number of years ago I placed the following words on the fly leaf of the seventh edition of my book on "Diagnosis in the Office and the Bedside:" "In the diagnosis of a given disease it is essential that the physician rest his opinion not upon one or two symptoms, but upon a series of symptoms which when properly put together give him a complete, or nearly complete, picture of the malady. It is as futile for a physician to base a diagnosis upon a single symptom as for an architect to attempt to determine the appearance of a house by seeing one of the stones that has been removed from its walls."

I quote these words because at the present time it is of infinite importance to the country as well as to the individual that men really capable shall not be classed as incapable, and because the opinion of an examining physician, if in error, may work great harm.

It is not many years since the presence of a murmur in the heart was supposed to indicate cardiac therapy, whereas we now know that many hearts which greatly need treatment give rise to no murmur at any time, and in some instances only when the heart becomes strong enough to make a murmur audible.

There is in no examination greater need for putting together all of the symptoms before reaching an opinion than when determining the state of the heart, and I am induced to emphasize this point because many persons have been rejected for service when in reality perfectly fit for it.

For the sake of brevity I take the liberty of separating heart cases into groups.

First, those in whom a mitral systolic murmur is definite, distinct, constant, and well transmitted, and in whom there is a history of rheumatism more or less remote. These patients undoubtedly have an actual valvular lesion and their good health depends upon adequate compensation, which is only attained by hypertrophy and the

utilization of some of their cardiac reserve power. It is hardly necessary to state that such persons should be turned down. They are bad risks for service or life insurance.

Second, those in whom a definite presystolic purr, or short murmur, is heard inside the nipple line at about the fourth or fifth rib, accompanied by accentuation of the pulmonary second sound, which murmur is usually made louder by exercise or a fairly full dose of digitalis. If the heart is not tired out, sharp exercise, like the 100-hop test, usually exaggerates this murmur. When the heart is on the verge of fag, however, sharp exercise may cause this murmur to disappear and the patient becomes dyspnoeic and distressed. This type is also to be definitely turned down.

Third, those in whom there is a definite murmur, diastolic in time and clearly aortic in origin. The apex beat is distinctly displaced to the left, downwards, and the heart is manifestly enlarged. Here again there can be no doubt that the man is unfit for service.

Fourth, the individual who has an irritable and rapid heart, with poor development as to the vascular and muscular tissues. All the lines of his body slope sharply from behind forward. The line of the jaw drops sharply, the shoulders droop, the ribs droop, and the knees droop. The figure as he stands presents the lines of a cadaver that hangs from hook or chain. The apex beat of his heart is diffuse, and there is much apparent thrill to the eye of the observer, but little, or none, to the finger tips. Here is a man who lacks tone in his muscular, vascular and nervous systems. He can not stand stress of any kind, he sweats while being examined, particularly profusely in the axillary spaces and on the hands. He bleeds readily into his great vessels. In such a case the heart may be devoid of murmur, of arrhythmia, or any other sign of lesion, but its sounds lack tone. Such a case perhaps should be classed as one of "neuro-circulatory asthenia" of Lewis, but it does not belong to the class called by DaCosta the "irritable heart of soldiers" since in these persons the cardiac state is often due to great physical and mental strain, whereas in the type I have described it precedes strain and is practically a congenital defect. Such a case is well represented by a youth who entered the cavalry. Placed on a horse and ordered to charge over a field, in squadron formation, he lasted the charge but fell off as it ended, in a dead faint. He remained cold and pulseless for some hours. He stated that he had had no sense of fear but that it seemed to him as if he could not get his breath and as if all the blood had left his head. Doubtless this was largely true. His neuropathic vascular system did not meet the strain of excitement and effort. These cases are of course unfit for service, although a gradual course of neurocirculatory training may greatly improve their value as citizens.

At this point we approach the border of what may be called "the land of doubt," namely, as to the value of the systolic murmur at the aortic cartilage transmitted up into the carotid artery, because while it is true that most of these patients should be rejected, many of them are capable of service, and if examined again it may be found that the systolic hum may have disappeared. If the man is over 30 or 35, or there is a history of syphilis or rheumatism at any period in his life, rejection is needful, particularly if the palpable vessels are thickened.

It is not necessary in the types so far discussed to look for collateral symptoms of cardiac origin, for up to this point he who runs may read what should be done.

But now we come to a very considerable class of cases in which much difference of opinion can be conscientiously adhered to. We are now in the land of doubt and just as any one in doubt looks for all signs which may guide him well, so is it imperative that he study not one but all the stones which will form the arch upon which the decision will rest.

Here again we may take up types.

First, the well-built, lithe youth, with no rheumatic history, who presents missed beats or extra systoles, which irregularities disappear upon taking the 100-hop test. At times the disorder of these hearts when at rest, and particularly when they are being examined, is very great, but exercise does not cause dyspnœa. These hearts are often met with in athletic youths who have begun to lead sedentary lives and who may or may not be still using the amount of tobacco which it may have been their custom to use when leading an out-door life. Occasionally a short, quick, murmur, inconstant, is discoverable, because a valve "does not seat well," to use a machinist's phrase. I have watched cases of this kind for many years after first seeing them and they do not come to grief by strenuous exercise; thus one of them was for a number of years a celebrated hockey player, then the captain of one of the great university foot-ball teams, and for more than a year he has been flying in France where he has won the Croix de Guerre. When I last saw him he had found that the only thing that ever caused cardiac irregularities was lack of exercise. This type is a good risk. When, however, such irregularities occur in men past the fourth decade of life and do not pass away on exercise or increase on exercise they possess great importance. They may be due to the excessive use of tobacco, but if they are associated with high blood pressure are usually grave in nature and deserve very careful study with particular reference to the effect of exercise, the condition of the blood vessels, and the state of the urine. None of these cases, however, should as a rule be rejected, unless there are evidences of cardio-vascular-renal lesions, until they have been ex-

amined with the aid of the electro-cardiograph, or at least with the aid of the polygraph, since a purely physical test may be given an erroneous value.

Second, the type that under stress develops a mitral systolic purr. This type was often seen before the war in football players immediately after a hard game, and in oarsmen after a contest. This murmur disappears on rest. It is "a safety valve murmur," due to relaxation of the mitral ring. This type, other things being equal, is a good risk. The persistence of this murmur for more than an hour or two, particularly if the person be over 30 years of age, raises a question as to the quality of the muscular fibers forming the ring at the base of the mitral leaflets, and indirectly raises a question as to the quality or ability of the entire heart muscle to withstand strain.

Third, the type that under the excitement of a physical test presents at a point about 1 inch to the left of the sternum, at or above the nipple level, a short flapping or tapping sound, single or double, not transmitted to the nipple, nor up or down. It is not a murmur but a valve sound; in one sense resembling, except that it is not so loud, the valve sound heard in a motor when climbing a hill which is a little too steep for the high-speed clutch. I wish to put special stress on this sound, as in my experience it has no more significance as to the presence of a heart lesion than the twitching of one of the voluntary muscles justifies a diagnosis of chorea. It is sometimes a sign of nervous stress, and may pass away while the patient is being examined. Exercise may or may not dissipate it. Mental quiet often dissipates it. This is a type of case most frequently turned down without adequate cause. Twenty grains of bromide a few hours before the next examination, alone or with aconite or digitalis, will often let this man pass another test, but even if this tapping valvular sound, heard in the area described, persists, I have never found it to indicate incapacity of the heart for severe effort. This type should not be rejected.

Closely allied to this is a systolic sound, not a murmur, heard, when a towel is used for auscultation, between the base of the heart and the apex beat. It is met with in a nervous person with a rapid heart action and resembles the sound "ching". Often it is heard better on light pressure than on heavy pressure. I described this sound before the Association of American Physicians some years ago. At times it is like a friction sound with a metallic tone. As a rule it is inconstant and is often lost if the patient lies down. It has no evil import.

A cardio-pulmonary murmur, heard below the left clavicle on full inspiration or on full expiration, is without significance as to the heart, although it may in some cases indicate trouble in the lung.

Finally, I would like to emphasize two points, one of which has been especially insisted upon by Sir James Mackenzie, who said: "A perfectly sound heart can give rise to murmurs. If the heart is not otherwise impaired, if it is normal in size, normal in rate, and the response to effort is good, ignore the murmur, it makes no difference where you hear it." From what I have already said it is evident that I do not go as far as this very eminent expert in the study of the heart, but his statement is quoted to emphasize the fact that all unusual heart sounds are not evil things.

The second point is to recall that the heart is not an isolated organ independent of the nervous system and the rest of the vascular system, nor is it like a piece of machinery made of unyielding metal. Its muscle fibers have play, they vary with every need of the body in that play. Its valves are not rigid, the bases on which these valves rest are not fixed or rigid, and the chordæ tendineæ constantly vary in their tension; so, too, do the musculi papillares vary in their form. Last of all it is as important for health and for service that the vessels shall be elastic and well controlled as that the heart shall be normal, for unyielding vessels weary the heart not only by offering undue resistance but by failing in their own contractility to help in the circulation of the blood, as Ludwig and Brunton showed many years ago. Conversely, a vascular system which relaxes unduly when effort is made also exhausts the heart, which works to excess to keep the vessels properly supplied.

ELIMINATING THE EPILEPTIC FROM THE NAVY.

By L. E. Bisch, Lieutenant, Medical Corps, United States Naval Reserve Force.

In eliminating nervous and mental diseases from the service, one of the puzzling problems that presents itself to the medical officer is the discovery and certain diagnosis of the epileptic. Naturally, a typical grand-mal attack, actually seen by a physician, ought to preclude beyond peradventure any doubt whatever as to the nature of the disorder. But, unfortunately, it seldom happens that a medical officer has the opportunity of witnessing a seizure throughout its entire course. As a rule, one's judgment must depend largely upon the reports of a man's shipmates, who are untrained observers, and very often the patient's own account is the only source of information. This latter may bear but little semblance to accuracy because of the man's ignorance of what really happens to him, because of memory defect which is present in varying degree in all epileptics, or because his story may be deliberately colored with a view to bringing about a medical survey. Then, again, epileptic seizures seldom follow the classical picture drawn up in the textbooks, while, lastly, if

one were to include as epileptic only those having definite convulsive seizures, many incipient cases would go by undiagnosed only to be recognized after the disease had developed in all its possibilities, perhaps at a stage where deterioration had already worked incurable havoc with the mentality, and perhaps even only after the epileptic's ever-increasing irresponsibility had done definite injury to himself or his associates.

For a year, in the course of neuro-psychiatric duties, the writer has come into direct contact with the epileptic as he appears in the naval service. These cases have comprised men in the detention unit, cases revealing themselves in the training stations, men from the receiving ship, men from the fleet and patrol boats, cases sent to the naval hospital, court-martial prisoners, and men returned from overseas. Epilepsy appears in all branches of the service, and one may add here, it manifests itself in all degrees of severity, in all forms, and is recognized or discovered at various stages of development. Epilepsy has always been a mysterious and baffling disease. All sorts of theories have been held as to its causation. Being apparently a disturbance of the nervous system and being attended by some degree of violence in its commonly recognized form—the "fit"—may have led to the idea that it was due to some sort of irritation somewhere in the body, causing in some sort of way a nervous explosion. At any rate, on this vague hypothesis surgical interference has frequently been resorted to and, I dare say, practically every part of the human anatomy has been attacked. Disturbances of the alimentary tract have received considerable attention and without a doubt defective chemical digestion, toxic states, secretory anomalies, peristaltic sluggishness, ptoses, dilatations and flexions of the organs are found in many epileptics. Circulatory disorders have been suspected and claim has also been made for the isolation of the "bacillus epilepticus." The glands of internal secretion, particularly the pituitary, have been looked upon as possibly bearing a causal relationship to the disease. Lastly, brain lesions, tumors, hemorrhages—all pressure phenomena in the sensorimotor region of the cortex—have had their particular advocates. Suffice it to say that the cause of epilepsy remains about as baffling as ever. Operations and treatments along such lines have resulted in benefit in isolated cases, but nowhere has the causal relationship between pathology and symptoms remained constant, logical, and clear. At the present time the exact pathology and pathological physiology of epilepsy remain unknown.

Epilepsy has been subdivided in various ways by different authors and perhaps the commonest classification is that of grand-mal, petit-mal, Jacksonian seizures and hystero-epilepsy or psychic epilepsy. The Navy nomenclature employs but two terms: Epilepsy and Jacksonian epilepsy; presumably grouping grand-mal and petit-mal

together, designating as Jacksonian the cases of localized spasms, and putting the psychic seizures under the heading of hysteria.

A grouping like the latter has at least one merit—its simplicity. Yet if it tends to imply that these conditions are definite and well-defined clinical entities, the assumption is not warranted by our present knowledge of the numerous clinical varieties of the disease.

If anything at all certain can be said about this strange malady, one may venture to state that epilepsy is not a single disease with but slightly varying symptomotology. Quite the contrary, epilepsy is strikingly variable in its manifestations. There is no set rule as to the age at which it may appear and scores of cases give a history of the first convulsion from babyhood up into the thirties. It seems to be precipitated by manifold causes from such as "indigestible" food to worry or emotional excitement. Its clinical picture is not exactly alike in any two patients and even successive attacks in the same individual show differences.

It is but natural that most consideration has for years been given to the convulsion. Its striking dramatic quality was sure to fix the attention and accordingly treatment has often, and still is, directed to this symptom alone. Yet the muscular paroxysm of epilepsy is not the disease. It is about as scientific to say that the convulsion is epilepsy as to say that a rise of temperature means pneumonia.

In many cases a careful study will reveal what might be termed the precipitating or exciting causes of the paroxysms. In some patients it will be certain kinds of food, in others constipation, heat exposure, etc. Simply by removing these causes the frequency of attacks can often be reduced. On the other hand, such therapy, even if the usual administration of bromides and a salt-free and meat-free diet be added, does not bring about a cure.

Another type of case in which the apparent cause seems close at hand are the traumatic epilepsies. A man falls down a hatch and afterwards suffers periodic convulsions. One naturally deduces that the epilepsy resulted from the fall. Yet this man may have had epilepsy before he fell, the accident occurring solely because he became dizzy or unconscious and lost his balance. Furthermore, in such cases even a decompression operation may not effect a cure.

Again, a man has a convulsion and somehow we suspect specific disease and do a Wassermann. The test shows a strongly positive reaction. How tempting it is to link the two together and diagnose the case as epilepsy due to syphilis. However, we treat the syphilis, finally render the Wassermann negative, and still the convulsions persist. Surely we have not cured the epilepsy.

Undoubtedly there are many similar examples where the precipitating cause or the apparent cause is treated without avail. On the other hand, cases have responded to treatment where one has been

working completely in the dark because neither exciting causes nor apparent causes could be made out. Munson[1] puts it this way, "Therapeutic failure is due in such cases to the fact that the syndrome is not the result of one definite factor but rather to the sum of the activity of other causes besides the apparent cause."

In a graphic way he goes on to express the various factors that combine to produce epilepsy in the following mathematical formula:

(a plus b, plus c, plus —, plus m, plus n, plus p, plus —, plus x, plus y, plus z) the brain equals the syndrome.

In other words, "the sum of certain known causes of epilepsy (a, b, c) added to certain variable quantities (m, n, p) and to certain unknown agencies (x, y, z), all acting together on the brain, produce (=) the syndrome we call epilepsy."

As he states further, the value of such a fanciful formula "emphasizes the multiplicity of factors which may be active in any case; it shows, too, that since the component etiological factors may differ, there may be an almost indefinite number of etiological complexes at the basis of epilepsy syndromes, and hence points out that to some degree each patient with epilepsy is peculiar to himself and is both similar and different from all others; at the same time, by demonstrating the plural nature of the conditions underlying the syndrome, it indicates a comprehensive mode of treatment and explains why treatment along narrow conventional lines is so often unsuccessful."

With these viewpoints in mind it is obvious that the number of epileptics surveyed from the service would be conditioned largely upon the medical officers' conceptions of what constituted the condition. If older theories and groupings were adhered to comparatively few men would be so classified, especially if to make a diagnosis it should be considered necessary to accurately witness a convulsion. But if a broader interpretation of the disease as a syndrome with multiplicity of causes and determinants were adopted, no doubt many more cases would be classified as epileptic than now appear in the health records.

The following table shows the classification of 130 epileptics diagnosed by the author. The chief complaint for which the patient was examined is given in each instance, and the tabulation is made according to ages. The cases are classified according to the existing nomenclature which *ipso facto* emphasizes the conclusive seizure or repeated attacks of dizziness, and whenever there were witnesses to such paroxysms they were interviewed. All cases were given an intensive psychiatric examination, consisting of a complete survey of mental and neurological status, of family and personal history,

[1] J. F. Munson: Modern treatment of nervous and mental diseases, Vol. II, p. 228.

together with the performance of psychological tests. Those that revealed confusion, memory, concentration, or other defects are noted as showing "mental deterioration." The term "recruit" is restricted to men who had but recently entered a training station.

Age.	Complaint reported.	Aura.	Grand-mal.	Petit-mal.	Jacksonian.	Hystero-epilepsy.	Sun exposure.	Observed by witnesses.	Mental deterioration.	Recruit.
16	Selected at "mast"—asleep on duty	...	X	X	...	...	...	...	X	X
16	Fainting spell	...	X	...	...	...	...	...	X	X
17	History of epileptic attacks	...	X	...	...	...	...	X	X	X
17	Fainting spells	...	X	...	...	...	...	X	X	...
17	Slow at drills and irresponsible	...	X	...	...	...	...	...	X	X
18	Tremor in both hands—had a convulsion	...	X	X	...	...	...	X	X	...
18	History of nervousness and fainting spells	...	X	...	...	...	...	...	...	X
18	History of fainting spells	...	X	...	...	...	...	...	...	X
18	Had two epileptiform seizures	...	X	...	...	...	...	X	X	X
18	Had a fainting spell	...	X	X	...	...	...	X	X	X
18	Had a spell in detention	...	...	X	X	...	...	X	X	X
18	Had an epileptiform seizure	...	X	...	...	...	...	X	X	X
18	Had a convulsion	...	X	...	...	...	...	X	...	X
18	Peculiar behavior	...	X	X	...	...	...	X	...	...
18	Had fainting spell in examination room	...	X	...	...	...	...	X	X	X
18	Had a convulsion in hammock	...	X	...	...	...	...	X	X	...
18	Had a convulsion in hospital	...	X	...	...	...	...	X	...	...
18	Had a maniacal attack	...	X	...	...	...	...	X	...	...
18	Had an epileptiform seizure	X	X	...	...	...	...	X	...	X
18	Had a fainting spell	...	X	X	...	...	...	X	...	...
18	.....do	...	X	X	...	...	...	X	...	X
18	Nervous and fainting spells	...	X	X	...	...	...	X	...	...
19	Had a convulsion in dentist's chair	...	X	...	...	...	...	X	...	X
19	Selected at "mast" because he gave peculiar excuses for being over leave	...	...	X	...	X	...	...	X	...
19	History of epileptic attacks	...	X	...	...	...	...	X	...	...
19	History of dizzy spells	...	...	X	...	...	X	X	...	X
19	Had "fainting spell"	...	X	X	...	...	...	X	...	...
19	History of having epileptic attacks	...	X	X	...	...	...	X	X	...
19	.....do	...	X	X	...	...	...	...	X	X
19	Had an epileptiform seizure	...	X	X	...	...	...	X	X	...
19	Dizzy spells	...	...	X	...	...	...	X	...	...
19	Epileptic attack	...	X	...	...	...	...	X	...	...
19	Ear trouble and fainting spells	...	X	...	...	...	...	...	X	X
19	History of epileptic attacks	X	X	...	...	...	...	X	...	...
19	Fainting spells	X	X	X	...	...	...	...	X	X
19	Had a convulsion	X	X	X	...	...	...	...	X	...
19	Nervousness	X	X	X	...	...	...	X	...	...
20	Failure in preliminary tests	...	...	X	...	...	...	...	...	X
20	Tremor in hands and positive Romberg	...	...	X	...	...	...	X	...	X
20	Selected at "mast" charged with being over leave	...	X	...	...	...	...	X	...	...
20	Illiterate, slow, and childish	...	X	...	...	...	...	...	X	X
20	History of epilepsy	...	X	...	...	...	...	...	...	X
20	Lazy and shiftless	...	X	X	...	...	...	...	X	X
20	Had a fainting spell	...	X	X	...	...	...	...	...	...
20	Headaches	...	X	...	...	...	X	...	X	...
20	Fainting spells	...	X	...	...	...	...	X	X	...
20	History of epileptic attacks	...	X	...	...	...	...	...	...	...

Age.	Complaint reported.	Aura.	Grand-mal.	Petit-mal.	Jacksonian.	Hystero-epilepsy.	Sun exposure.	Observed by witnesses.
20	Fainting spells	...	...	X	...	X	...	...
21	Had a convulsion	...	X	X	...	...	...	...
21	History of dizzy attacks	...	X	...	...	...	...	X
21	Nervousness and history of dizzy spells	X	X	...	...	...	...	...
21	Fell in a creek and not knowing how it happened	X	X	...	...	...	...	...
21	Low score in preliminary psychological tests	X	X	X	...	...	...	...
21	History of having been in an insane asylum	...	X	X	...	...	...	...
21	Fainting spell	...	X	X	...	...	...	X
21	.....do	...	X	X	...	...	...	...
21	.....do	...	X	X	...	...	...	...
21	Dizzy spells	...	X	X	...	...	...	X
22	Fainting spells	...	X	X	...	X	...	X
22	History of epilepsy	...	X	...	...	...	...	X
22	History of epileptic attacks	...	X	...	...	...	...	X
22	Fainting spells and nervousness	...	X	...	...	X	...	X
22	History of epileptic attacks	...	X	...	...	...	...	X
22	Diagnosis of epilepsy in health record	...	X	X	...	...	...	X
22	Had a fainting spell	...	...	X	...	...	...	X
22	Inability to control mind and having dizzy spells	...	...	X	...	...	...	...
22	History of epileptic attacks	...	X	X	...	...	...	...
22	Diagnosis of epilepsy in health record	...	X	...	...	...	...	X
22	Selected from sick bay because of fainting spell	...	X	X	...	...	...	...
22	Convulsions	...	X	X	...	...	...	X
22	Had an epileptic seizure	...	X	...	...	...	...	X
22	Fainting spells	...	X	X	...	...	...	X
22	.....do	X	X	X	...	...	...	...
22	.....do	...	X	X	...	...	...	X
23	Had a convulsion in operating chair	...	X	X	...	...	...	X
23	History of epileptic attacks	...	X	...	...	...	...	...
23	History of fainting spells	...	X	...	...	...	...	X
23	Having a convulsion	...	X	...	...	...	...	X
23	Had a "fit" in his hammock	...	X	...	...	...	...	X
23	Gave history of epileptic attacks	...	X	X	...	...	...	...
23	Had three epileptiform attacks	...	X	X	...	...	...	X
23	Had an epileptic attack in detention	...	X	X	...	...	...	X
23	Convulsions	...	X	...	...	...	...	X
23	Fainting spells	X	X	X	...	...	...	...
24	History of epileptic attacks	...	X	...	...	...	...	...
24	Had an epileptiform attack	...	X	...	...	...	...	X
24	Childish and silly behavior and always teased	...	X	...	...	...	...	...
24	Had a convulsion	...	X	...	...	...	...	X
24	Fainting spells	...	X	X	...	...	...	X
24	Had an epileptic attack in detention	...	X	X	...	...	...	X
24	Had an epileptiform seizure	...	X	...	...	...	...	X
24	Diagnosis of epilepsy in health record	...	X	X	...	...	...	...
25	Epileptiform attacks	...	X	...	...	...	...	...
25	Had an epileptiform attack in hammock	...	X	...	...	...	...	X
25	History of dizzy spells	...	X	X	...	...	...	...
25	History of epilepsy	...	X	X	...	...	...	...
25	History of epileptic attacks	...	X	...	...	...	...	...
25	History of fainting spells and weak heart	...	X	X	...	...	...	...
25	Convulsions	...	X	...	...	...	...	X
25	History of convulsions	...	X	...	X	...	...	...
25	.....do	...	X	...	...	...	...	X

Age.	Complaint reported.	Aura.	Grand-mal.	Petit-mal.	Jacksonian.	Hystero-epilepsy.	Sun exposure.	Observed by witnesses.	Mental deterioration.	Recruit.
26	Fainting spells	...	×	×	...	...	...	×	...	...
26	Convulsions	...	×	...	...	...	...	...	...	...
26	Had a convulsion	...	×	×	...	×	...	×	...	×
26	Fainting spells	...	×	×	...	...	...	×	...	...
26	Pains in head and eyes	...	×	...	...	...	...	...	×	×
26	History of epileptic attacks	...	×	...	...	...	...	×	×	...
27	Had a convulsion on board ship	...	×	...	...	...	...	×	×	...
27	Had an epileptic attack in building	...	×	...	...	...	...	×	×	...
27	Selected when asking for advice	...	×	...	...	...	...	...	...	...
27	Pains around heart and fainting spells	...	×	×	...	...	...	×	×	...
27	Dizzy spells	...	...	×	...	...	...	...	...	×
28	History of epilepsy	×	×	...	...	...	...	×	...	...
29	Fainting spells	...	×	...	...	...	...	×	×	×
29	Pains in cardiac vicinity and fainting spells	...	×	...	...	...	...	×	...	...
29	History of fainting spells	...	×	×	...	...	...	×	...	×
30	Dizzy spells	...	×	...	...	...	...	...	×	×
30	Diagnosis of epilepsy in health record	×	×	×	...	...	...	...	×	...
30	History of epilepsy; dull and apathetic expression	...	...	×	...	...	...	...	...	×
31	Fainting spells	...	×	...	...	...	×	×	×	...
32	Dizzy spells	...	×	×	...	...	...	...	×	...
32	Convulsions	...	×	×	...	...	...	...	...	×
33	Continual headache	...	...	×	...	...	...	×	×	×
33	Fainting spells	...	×	...	...	...	...	×	×	...
33	History of convulsions	...	×	...	...	...	...	×	×	...
33	Fainting spells	...	×	×	...	...	...	×	×	...
33	....do	...	×	...	...	...	...	...	...	...
33	Pains around heart	...	...	×	...	...	...	...	×	...
33	History of fainting spells	...	×	...	...	...	...	...	×	...
33	Dizzy spells	...	×	...	...	...	...	...	×	...

SUMMARY.

Number of cases	130
Number observed by witnesses	77
Number of recruits	65
Number having grand-mal attacks only	66
Number having petit-mal attacks only	13
Number having both grand-mal and petit-mal attacks	51
Number of cases diagnosed Jacksonian	2
Number of cases diagnosed hystero-epilepsy	5
Number of cases due to sun exposure	3
Number of cases in which aura was present	13
Number of cases in which mental deterioration was present	70

In the list only three cases appear in which the precipitating cause seemed to be "sun exposure." One of these was a petit-mal case with no deterioration, although the history and general make-up clearly proved epilepsy. The other two cases showed distinct mental deterioration following repeated major seizures.

One would naturally suppose that drilling in the sun would be a very favorable cause in precipitating epilectic attacks in one already predisposed before enlistment. As a matter of fact, many cases of

fainting and dizziness while at drills were reported and, although notations of the facts observed and the facts brought out by examination were made in the health record, the evidence at hand did not seem to warrant a definite diagnosis of epilepsy according to prescribed standards.

The handicap of not being able to secure a previous history from a reliable source free from bias or design other than that of the patient himself was especially forceful in these cases. Many of the patients presented what might be called suggestive epileptic constitutions, but it was felt that here the risk of wrong diagnosis was too great to recommend medical survey.

Undoubtedly some of these "sun" cases were truly epileptic. On the other hand, some undoubtedly adjusted themselves later on and, although of epileptic make-up, their ability to adapt themselves to their new surroundings and duties was sufficient to prevent further explosions of the "fit-gun."

In nine other cases epilepsy was diagnosed in which there were neither witnesses nor mental deterioration. In these, however, the evidence was positive that an epileptic make-up existed, and this make-up alone, aside from the paroxysms, was considered of sufficient moment to render the men unfit for service of any kind, if not perhaps even dangerous.

And this brings up the question of malingering—so important in a military organization. In diagnosing epilepsy its possibility should be held constantly in mind, especially when seizures have not been observed by reliable witnesses and when no mental defects of any kind are present.

The whole question of malingering is a fascinating psychological study but the limits of this paper restrict me to stating merely that in my own experience in the Navy not a single case of epilepsy-simulation was found although it was often suspected. "Déjerine[1] found no instance of actual malingering among all the nervous cases seen by him during the first six months of the war." And it is interesting to quote Buzzard[1] in this connection. He defines a malingerer as one "who with perfectly clear and well-balanced mind confesses to himself quite frankly that for some definite purpose he will assume a certain disability." He concludes that persons of this type are extremely rare.

Reference has been made in this paper to the epileptic make-up—in other words, the predisposing groundwork which acts as a favorable soil for the sprouting of essential epilepsy as it is commonly conceived. Clark,[2] who has studied epilepsy from all points of view

[1] Déjerine; Buzzard: Noted in War and Neurosis, by Capt. C. B. Farrar, C. A. M. C., Nat. Com. for Mental Hygiene, 1918.

[2] Clark, L. Pierce: Some Suggestions for More Accurate Mental Therapy in Epilepsy; Jour. Am. Med. Assn., July 27, 1918.

for years and is undoubtedly an authority on the subject, describes this summation of predisposing factors as follows:

The epileptic constitution, or make-up, has long been recognized as the enduring mental stigma of essential epilepsy itself. Only recently have studies disclosed that the main tenets of such a character are present years before the nervous disorder of epilepsy is shown in fits. The chief instinctive defects of the potentially epileptic individual are egocentricity, supersensitiveness and emotional poverty. The potential epileptic is intensively self-centered and fails to project his life interests into his environment in a normal and healthy manner. Partly because of this innate character fault, he is or soon becomes unduly sensitized to all forms of extra stress and annoying demands. He either extroverts his supersensitiveness by exhibitions of rage and tantrums beyond those which may be seen occasionally in passionate children, or, he introverts this feeling and represses the feelings engendered by his environmental conflict, causing him to develop a very unstable, irritable and sensitive emotional life. This emotional state paves the way for larger and more difficult adaptations which he can not meet; outspoken fits may then occur. Previously endowed with these defective instincts, the increased demands of adolescence and adult life enlarge the difficulties which such individuals are compelled to meet until they reach the breaking point in a fit or seizure. A disintegration of habits and character, known as deterioration, occurs more easily in one thus handicapped by a defective endowment. Therefore, mental or behavior deterioration often precedes actual epileptic seizures for a considerable time.

The men entering the naval service are young men and many are still in their adolescent period or have but recently emerged from it. A large number come from farming districts where emotional stresses and life's complexities are at a minimum. Very suddenly new and more exacting duties are thrust upon them; many for the first time have left their homes; their altered method of living and even thinking must needs appear cold and severe. Surely, we have here a very exacting test of an individual's ability to adjust himself. And given an epileptic constitution—a tendency to faulty adjustment—it is small wonder that many cases are overwhelmed, that something breaks, and that the epilepsy at last appears in its more glaring symptoms. This, it would seem, should adequately explain the relatively large number of epileptics found among recruits.

Aside from the "chief instinctive defects of the potentially epileptic individual" rather well-defined behavior characteristics can be discovered after the convulsions have actually developed. These changes are present irrespective of the frequency of attacks—in fact, constitute the behavior noted in epileptics between seizures—and should be distinguished from the well-known mental symptoms when definite dementia has set in.

Such epileptics are generally unreliable. They are irritable, unstable, frequently suspicious, and often fly into a rage at the slightest provocation. Some are good-natured and philosophic but even here there is a tendency toward periods of depression and ill-humor, when they are rude and quarrelsome. The disease necessarily re-

stricts freedom of activity and this narrows the field of interest and makes the epileptic self-centered. Due to the chronicity of the seizures the epileptic is constantly reminded that he is handicapped, and often this leads to self-pity combined with hypochondriasis and sentimentalism. They may develop a sympathy-seeking attitude and, in institutions, distinct laziness is common. To maintain self-respect stern discipline is often necessary while others again are most efficient and happy under gentle guidance. Religious fervor lacking in true piety is not uncommon. As a rule, the sex feelings of epileptics are easily aroused and by many varied stimuli. Ethical judgment is frequently lowered.

Between seizures epileptics sometimes display periods of marked confusion in which they may wander off and lose themselves not unlike the automaticlike states seen during grand-mal attacks. Sudden episodes of maniacal excitement have also been noted as well as periods of exaltation with delusional ideas concerning their own cure. Such episodes may have a marked religious coloring.

The heredity of epilepsy also throws interesting light on the condition, and studies of the family trees of epileptics seem to support the view that the epileptic constitution is a thing that can be transmitted.

C. B. Davenport and David E. Weeks,[1] have carefully investigated 177 pedigrees of epileptics. These findings would seem to indicate that what is transmitted from the parents to offspring in the case of epilepsy is not something present in the germ plasm, but rather that the inherited germ plasm is deficient in something the presence of which in nonepileptics makes for normality.

The summary of conclusions in this study follows:

1. The method of field-study of epileptic families combined with the modern biological methods of analysis of hereditary data constitute a vastly improved means of inquiry into inheritance of epilepsy.

2. Epilepsy and feedle-mindedness show a great similarity of behavior in heredity supporting the hypothesis that each is due to the absence of a protoplasmic factor that determines complete nervous development.

3. When both parents are either epileptics or feeble-minded all their offspring are so likewise.

4. The conditions named migraine, chorea, paralysis, and extreme nervousness behave as though due to a simplex condition of the protoplasmic factor that conditions complete nervous development; i. e., persons belonging to these classes usually carry some wholly defective germ cells. Such persons may be called "tainted."

5. When such a tainted individual is mated to a defective about one-half of the offspring are defective.

[1] "A First Study of Inheritance in Epilepsy," by C. B. Davenport and David F. Weeks, M. D., Jour. Nerv. and Ment. Disease, vol. 38, no. 11, pp. 641–670, 1911. The study is on cases at the New Jersey State village for epileptics at Skillman.

6. When a simplex normal is mated with a defective about one-half the offspring are normal; the others are defective or neurotic.

7. When both parents are simplex in nervous development and tainted about one-quarter (actually 30 per cent) are defective.

8. The proportion of tainted offspring is not noticeably higher when both parents show the same nervous defect.

9. Normal parents that have epileptic offspring usually show gross nervous defect in their close relatives.

10. While we recognize that epilepsy is a complex, yet there is a classical type numerically so preponderant that, in the mass, epilepsy acts like a unit defect.

Epilepsy of long standing always leads to dementia. By dementia is meant gradual deterioration of intellectual and emotional processes, marked by sluggishness of thinking, haziness of mental imagery, lowering of the emotional tone, and memory defect. The personality of the patient which differentiates him as an individual distinct from others gradually disappears; life becomes an existence and the end-result is a vegetative state in which the patient must be cared for in every way—fed, clothed, and cleansed—the mind no longer being a dynamic, controlling mechanism, but to all practical purposes little more than a functionless organ.

This picture of dementia is not overdrawn but its application must be restricted to prevent misconception. There are various degrees of dementia. It is true that all epilepsy leads to dementia but the rapidity of its appearance and the swiftness of its development depends upon the age at onset of the disease, the degree of native mental endowment, the frequency and severity of attacks, the efficiency of the treatment employed, and the span of life of the patient. Only a comparatively few epileptics live long enough for the severe stages of dementia to become manifest, many being carried off by intercurrent diseases, such as pulmonary tuberculosis, pneumonia, etc.

The mental effects of epilepsy, in other words, dementia in greater or lesser degree, may be summarized as follows:

1. Sluggishness of thinking.
2. Lengthening of reaction time.
3. Paucity of associations.
4. Lack of productivity.
5. Haziness of mental imagery.
6. Impaired attention and concentration.
7. Narrowing of the field of interest.
8. Monotonous speech and thinking.
9. Impaired judgment, reasoning, and powers of inference.
10. Memory defect marked.
    (*a*) Immediate or rote memory often tolerably good but soon failing after a few hours or days, except for daily routine impressions.

(*b*) Remote memory fair, but mainly for vivid impressions of childhood or early life, especially as regards matters of personal interest, while matters of general interest and school knowledge are forgotten.

(*c*) Logical memory uniformly poor.

11. General motor retardation and often clumsiness of movement.

12. General emotional deterioration and inadequacy marked by indifference, lowering of emotional tone, etc.

Often certain physical signs are of help in diagnosing a doubtful case of epilepsy. Among these may be mentioned a lifeless disinterested expression; vasomotor disturbances; tendency to obesity; scars on the tongue, face, and head; "sore" muscles due to nocturnal convulsions; general awkwardness of gait; and the so-called "epileptic voice sign," which is described by Clarke and Scripture[1] as "an expressionless quality of the voice" rendering the speech monotonous, and instead of there being "the continual rise and fall in melody, the vowels and phrases run along on even tones."

CONCLUSIONS.

1. Since the epileptic is a peculiar and unreliable individual at any stage of his development—whether actual convulsions have appeared or not—it would seem that, whenever he can be discovered and diagnosed, he should be considered unfit for the naval service, and recommended to a board of medical survey.

2. The obvious places to weed out such cases are the recruiting and training stations.

3. Special attention should be directed toward a previous history of epilepsy in the patient or his family, to the epileptic make-up, to mental deterioration, and to suggestive physical signs.

THE USE OF SERUM IN LOBAR PNEUMONIA.

By E. W. Gould, Lieutenant, Medical Corps, United States Naval Reserve Force, and M. Shaweker, Lieutenant, Medical Corps, United States Navy.

The use of serum in the treatment of lobar pneumonia during the past few months at the United States Naval Hospital, New York, has followed the generally accepted belief that it is contra-indicated, except in those cases that have been demonstrated to belong to Type I. It has been very difficult to reach definite conclusions in regard to the value of serum in this particular type, because of various factors which it is frequently impossible to control.

In spite of specific orders that, when any case of pneumonia is admitted, strenuous efforts should be made at once to secure a satis-

[1] Clarke, L. Pierce, and Scripture, E. W.: The Epileptic Voice Sign; Med. Rec. New York, Oct. 31, 1908.

factory specimen of sputum and that it be sent to the laboratory with the request that the pneumococcus grouping be determined.

Satisfactory specimens frequently can not be secured, many cases are admitted several days after onset, and unavoidable delays are frequent. The results of typing are, therefore, received in many cases at or about the time of crisis and no serum is indicated. Nevertheless, it frequently happens that a day or two and sometimes a longer period elapses before results can be obtained.

During the past four months 45 cases of Type I have been admitted and of that number 25 have received serum. Four deaths have occurred among cases belonging to Type I since we began to demonstrate the type, and these cases will be further described below. Although this is a very low mortality rate, great credit can not be given to the serum, for there has been undoubtedly a radical change in the virulence of the pneumococcus of all types during the past few months.

During the first quarter of 1918 when 155 cases of pneumonia were treated our mortality rate was 21.93 per cent, while only 4 deaths have occurred in the last 85 cases of pneumonia treated at this hospital. The fatal cases all belonged to Type I.

It is not the purpose of this short report to express any opinion in regard to the efficacy of serum treatment, but several cases have recently shown clinical symptoms and definite results which it has seemed advisable to record.

The use of serum has brought to our attention several possible criticisms of the ordinary methods employed and has resulted in the adoption of an apparatus devised and described below by one of our number.

In all our cases the anaphylactic reaction is determined by the intradermal injection of a 1 to 10 dilution of normal horse serum with a normal saline control. The serum used was furnished by the Bureau of Medicine and Surgery and was prepared by two commercial drug firms.

Both the Krumweide and mouse methods have been used in determining the types, and in all cases in which the Krumweide method was successful the mouse method gave the same determination.

Case I; T——, Eng. 1c.; age, 45 years.

This case was admitted on the first day of his illness, showing physical signs of consolidation in the left lower lobe. There was considerable cardiac embarrassment and stimulants were necessary. There was very marked agglutination by the mouse method, determined on the third day of illness. Serum was at once administered and one-half hour afterward the patient had a severe chill and his temperature rose to 105°. Two hours thereafter, however, his symp-

toms were markedly improved and he made a rapid and uneventful recovery. The severe reaction and chill in this case was thought to be due possibly to the temperature of the serum injected and led to the more exact method of determining this factor, as described below. Only one dose of serum was given.

CLINICAL CHART

CASE - I - T. (NAME) ENG. ½c (RATE) 45 (AGE) W. (COLOR)

GREECE (NATIVITY) PNEUMONIA LOBAR (DISEASE)

MONTH	DAY	TIME	PULSE	RESP.	REMARKS
JULY	22	1 4 P.M.	120	28	AMBULANCE STRETCHER CASE
		8	110	40	BED BATH.
	23	2 8	112	34	
		12	126	60	
		4	112	50	
		8	100	50	
		12	104	36	
	24	3 4	98	32	
		8	102	34	11 40 A.M. 50cc ANTIPNEUMOCOCCUS
		12 25	140	56	SERUM.
		2 30	130	38	12 25 TO 12 40 CHILL
		4	96	32	2 30 SPONGE
		8	96	34	
		12	88	22	
	25	4 8	90	24	
		12	74	20	
		4	72	22	
		8	68	22	
	26	5 8	90	24	
		12	88	22	
		4	80	34	
		8	82	24	
	27	6 8	80	26	
		12	92	26	
		4	90	38	
		8	88	36	
	28	7 8	96	40	
		12	86	34	
		4	86	32	
		8	84	34	

97° 98° 99° 100° 101° 102° 103° 104° 105° 106° 107°

RECTAL

Case II; F——, M. M. 2c; age, 25 years.

This case was admitted on the first day of illness and he was not so seriously ill, although he had distinct signs of consolidation in the left lower lobe. He showed immediate response to the serum, though not so marked as in the preceding case, and four doses were given before satisfactory results were obtained.

Case III; C——, Sea. 2c.; age, 18 years.

This patient was admitted on the second day of his illness, and showed signs of consolidation in his right upper and lower lobes. He was actively delirious, seemed very toxic, required urgent stimulation, but in spite of several attempts, the typing was not deter-

CLINICAL CHART

CASE - II - F- (NAME.) M.M 2/6 (RATE) 25 (AGE) W (COLOR)
PNEUMONIA - LOBAR (DISEASE)

MONTH	DAY	TIME	PULSE	RESP.	97° 98° 99° 100° 101° 102° 103° 104° 105° 106° 107°	REMARKS.
17	1	3PM	108	28		STRETCHER CASE.
		8	94	36		8 P.M.-50cc ANTIPNEUMOCOCCUS
		12	108	36		SERUM.
18	2	8	102	32		11 45 A.M. 50cc SERUM.
		12	100	30		11 45 A.M. BLOOD PRESS. 112-64
		4	92	28		2-P.M. BLOOD PRESSURE 96-50
		8	94	24		4 45 P.M. BLOOD PRESSURE 94-50
		12	96	26		5 00 P.M. 50cc. SERUM
19	3	8	86	26		
		12	96	36		
		4	86	30		4 00 P.M-50cc SERUM
		8	100	36		SPONGE.
		12	108	30		
20	4	8	90	32		
		12	80	28		
		4	84	28		
		8	76	26		
21	5	8	78	24		
		12	80	26		
		4	68	22		
		8	72	20		
22	6	8	66	22		
		12	62	24		
		4	70	20		
		8	70	20		
23	7	8	78	20		
		12	78	20		
		4	78	20		
		8	72	18		
24	8	8	72	18		
		12	72	18		
		4	66	18		

mined until the fourth day of his illness. The serum was administered and a distinct chill followed soon afterward. Within a few hours, however, the symptoms had markedly improved, but the temperature rose the succeeding afternoon, when another dose of serum, the temperature of which was very closely watched, was given, and all the symptoms rapidly improved.

Case IV; R——, B. M. 2c.; age, 20 years.

This patient was admitted on the first day of his illness with consolidation in the middle lobe of the right lung. The typing was determined by the Krumweide method on the second day, and five

CLINICAL CHART

CASE-III-C- (NAME) S % (RATE) 18 (AGE) W (COLOR)
PNEUMONIA-LOBAR (DISEASE)

MONTH	DAY	TIME	PULSE	RESP.	97° 98° 99° 100° 101° 102° 103° 104° 105° 106° 107°	REMARKS
JULY. 30	2	4 PM	128	30		BATH
		8	120	48		SPONGE
31	3	12	126	42		
		4	120	36		
		8	104	32		
		12	104	40		
		4	100	40		
		8	100	36	RECTAL	SPONGE
AUG. 1	4	8	102	32	R	
		12	104	42	R	
		4	100	38	R	
		8	84	42	R	SPONGE
2	5	12	114	42	R	
		4	114	42	R	
		8	96	34	R	
		12	100	36	R	
		4	108	33	R	6 40 PM. - TO 7 00 PM. CHILL.
		6 45	126	66	R	6 00 PM. 50cc ANTIPNEUMOCOCCUS
		8	128	44	R.	SERUM.
3	6	12	96	22		
		4	84	26		
		8	72	26		
		12	84	24		
		4	98	42	R.	5 00 PM. 50cc SERUM.
		8	104	34	R.	
4	7	8	112	32		
		12	92	32		12 00 N - 50cc - SERUM.
		4	86	32		
		8	80	22		

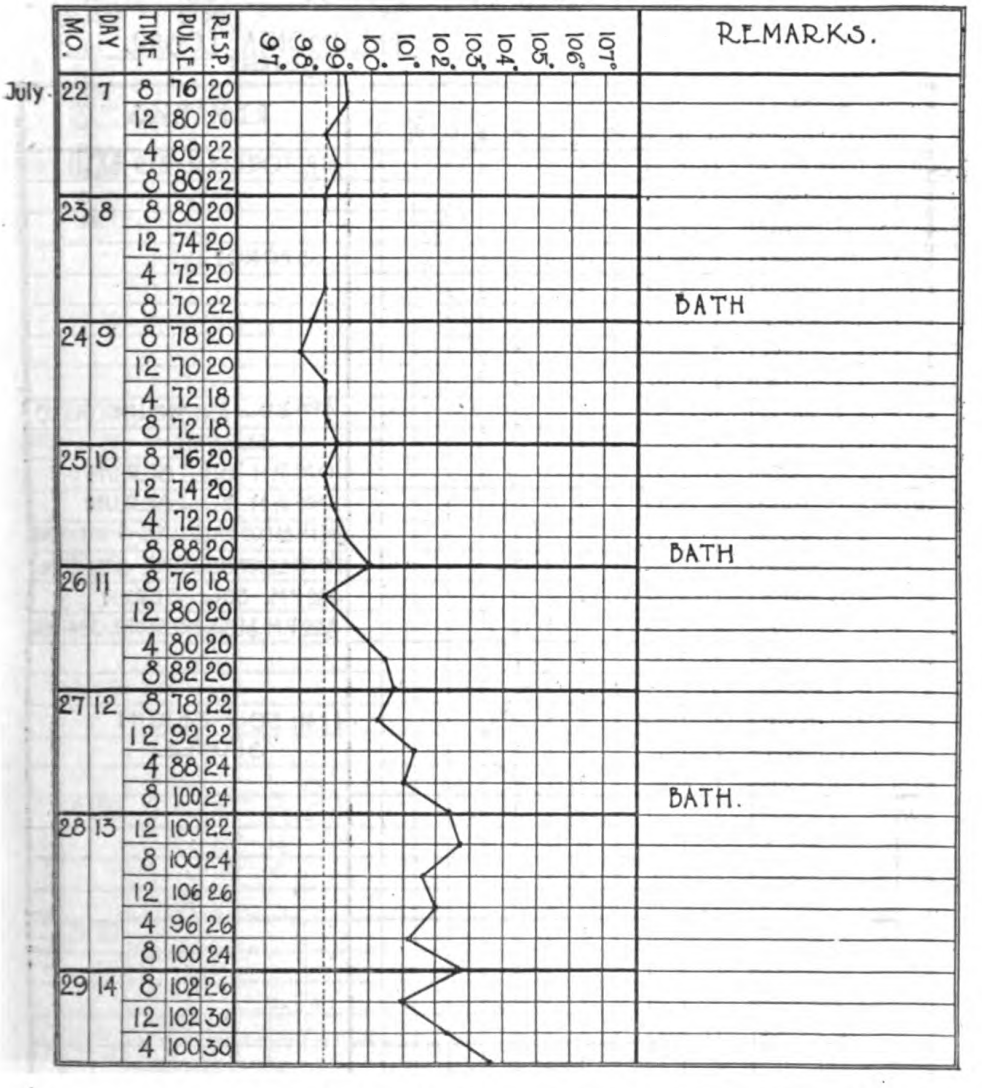
doses of serum were administered. He showed a slight maculopapular eruption on the second and third days, but no distinct anaphylactic reaction till the twelfth day, when a marked urticarial rash appeared over his entire body. He had a rise of temperature lasting five days and a severe general arthritis. The temperature

rose to 104° on the fourteenth day. A blood culture on that day proved to be sterile. The rash persisted for several days, and later resembled closely a severe case of measles.

CLINICAL CHART.

CASE - N - R - (NAME) B.M 2/c (RATE) 20 (AGE) W (COLOR)

PNEUMONIA - LOBAR. (DISEASE)



FATAL CASES OF PNEUMONIA, TYPE 1, OCCURRING SINCE MAY 1, 1918.

Case V; B ——, Sea. 2c; age, 20 years.

Case VI; D ——, BM. 2c; age, 29 years.

Both of these cases were admitted on the first day of their illness, and the typing was determined early on the third day. One case was given five doses of serum and the second one six doses at intervals of

8 to 12 hours. In neither case could we detect any effect from the serum. The area of lung involved was confined to one lobe at the beginning, but gradually spread till both lungs were involved, and both patients died of cardiac failure with pulmonary oedema.

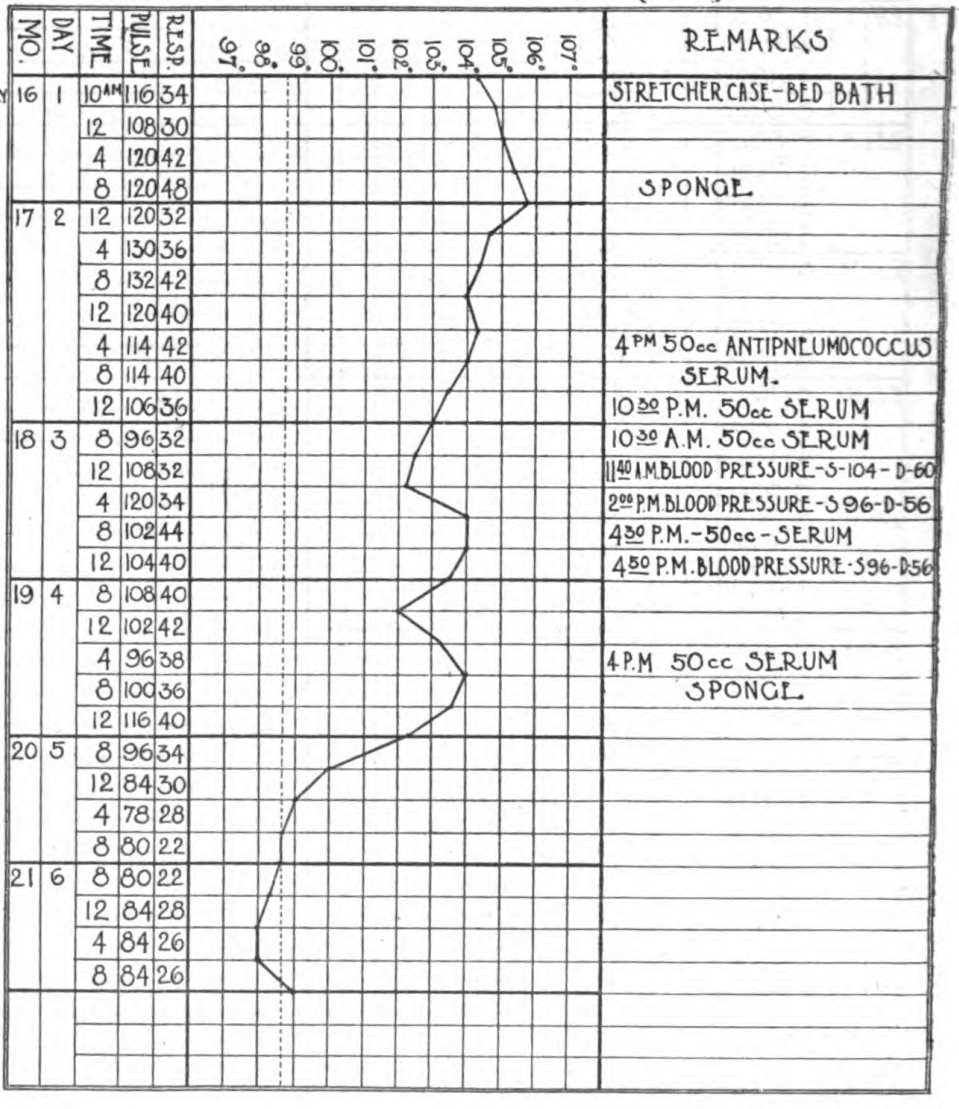
Case VII; C ——, Sea.; age, 19 years.

CLINICAL CHART.

CASE - IV - R - (NAME) B.M. 2/c (RATE) 20 (AGE) W (COLOR)

PNEUMONIA - LOBAR (DISEASE)

MO.	DAY	TIME	PULSE	RESP.	REMARKS
JULY 16	1	10 AM	116	34	STRETCHER CASE - BED BATH
		12	108	30	
		4	120	42	
		8	120	48	SPONGE
17	2	12	120	32	
		4	130	36	
		8	132	42	
		12	120	40	
		4	114	42	4 PM 50cc ANTIPNEUMOCOCCUS
		8	114	40	SERUM.
		12	106	36	10 30 P.M. 50cc SERUM
18	3	8	96	32	10 30 A.M. 50cc SERUM
		12	108	32	11 40 A.M. BLOOD PRESSURE - S-104 - D-60
		4	120	34	2 00 P.M. BLOOD PRESSURE - S 96 - D-56
		8	102	44	4 30 P.M. - 50cc - SERUM
		12	104	40	4 50 P.M. BLOOD PRESSURE - S96 - D56
19	4	8	108	40	
		12	102	42	
		4	96	38	4 P.M 50cc SERUM
		8	100	36	SPONGE
		12	116	40	
20	5	8	96	34	
		12	84	30	
		4	78	28	
		8	80	22	
21	6	8	80	22	
		12	84	28	
		4	84	26	
		8	84	26	



This patient was admitted on the second day of illness with small area of consolidation in left lower lobe. The typing could not be determined till the sixth day on account of unsatisfactory specimens of sputum. He had then begun to defervesce and no serum was given. Soon thereafter he showed a distinct suppression of urine, became

actively uraemic, and died on the 17th day of his illness. A post-mortem examination showed large white kidneys with marked parenchymatous changes. Several areas of consolidation had not resolved. No predisposing cause nor previous history of involvement of kidneys could be elicited.

CLINICAL CHART

CASE - W-R (NAME) B.M. 2/c (RATE) 20 (AGE) W (COLOR)
PNEUMONIA - LOBAR (DISEASE)

MO.	DAY	TIME	PULSE	RESP.	REMARKS.
JULY	29	14 8	106	25	BATH
	30	15 8	90	22	
		12	102	22	
		4	124	36	CHILL
		8	96	28	
	31	16 8	96	24	
		12	84	22	
		4	92	24	
		8	80	22	BATH
AUG.	1	17 8	72	20	
		12	72	18	
		4	78	18	
		8	74	18	
	2	18 8	72	18	
		12	72	18	
		4	84	18	
		8	76	20	BATH
	3	19 8	72	18	
		12	70	18	
		4	68	20	
		8	60	18	
	4	20 8	60	18	
		12	62	18	
		4	70	18	
		8	56	18	BATH
	5	21 8	84	20	
		12	68	24	
		4	68	20	
		8	88	22	

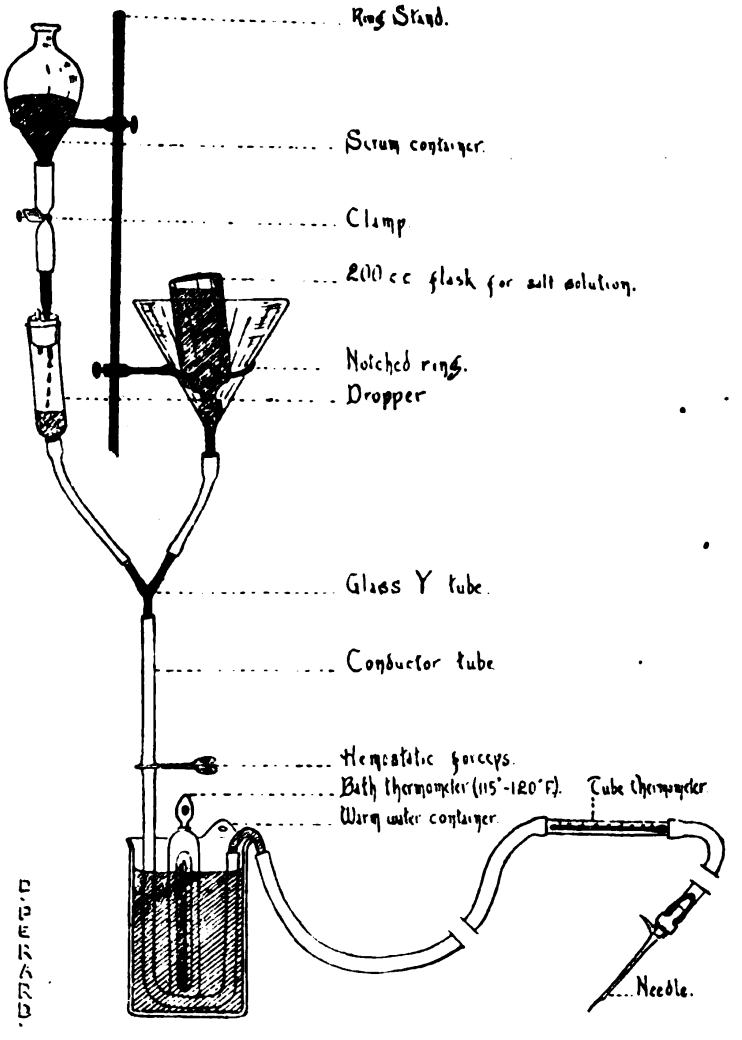
Case VIII; M ——, Sea. 2c; age, 18 years.

This patient was admitted on fourth day of illness with involvement of left lower lobe and a temperature of 106°. It was impossible to determine the typing till the third day of illness, and no response was detected to the two doses of serum which were given. He died

on the fourth day of his illness from extension of process to the lung, and consequent cardiac failure.

In all of our cases the serum was given in the following ma considering as an ideal method one which would deliver the s by the gravity method in high dilution at or slightly above th tient's temperature.

A ring stand is used with two rings, one to accommodate a f and the other a serum container. To the funnel is attached the



ductor tubing to the needle. To the container is attached a length of rubber tubing on which is placed a Hoffman clamp. this tubing is placed a dropping device similar to that used i Murphy drip method for proctoclysis. A very efficient drop device can be made by employing a discarded 20 c. c. serum syr a two-holed rubber stopper to fit same and a short length of tubing. On the ring stand the dropping device is placed at the of the apex of the funnel or slightly above. A Y-tube from the

ADMINISTRATION OF SERUM IN PNEUMONIA.

24-1

ping device connects the conductor tube from the funnel. Below the Y-tube is placed an ordinary hemostat until the vein is punctured and all is ready for administering serum.

The conductor tube is 65 inches long from the Y-tube to the needle, 24 inches of which is placed in a container of water at 115° to 117°, about 36 inches from the needle, in order to regulate the temperature. The tube is interrupted a short distance from the needle and a tube thermometer placed to determine temperature. We have found that it is important to have the temperature very nearly or slightly above the patient's temperature and never below, as low temperatures seem to cause considerable reaction in the form of chill and temporary rising temperature. The toxicity of a foreign protein has also been offered as a cause of this occasional chill. However, the same phenomenon has been noticed when normal salt solution or Fischer's solution has been given intravenously. It has also been suggested that the water used in the salt solution may cause same if not freshly distilled.

A 200 c. c. flask is provided for the normal salt solution. This filled flask is inverted into the funnel. It will be noted that the fluid passes into the Y-tube and rises in the dropping device to the level corresponding with the mouth of the said 200 c. c. flask. The serum is placed in the container above the dropping device, 50 to 100 c. c. being given as a dose.

The apparatus having been set up and the containers filled, as described above, the arm is sterilized in the usual manner for venipuncture, and a tourniquet applied to the arm above the elbow. A salvarsan or similar needle is convenient to use. After the puncture is made and the blood flows freely from the needle, the tourniquet is removed, the conductor tube is attached, and the hemostat removed. Be certain that all air has been forced out of the conductor tube before adapting it to the needle.

It will now be noted that as fluid enters the vein, bubbles of air will arise in the salt solution container inverted into the funnel. When this flow is satisfactory, gradually release the Hoffman clamp below the serum container, allowing the serum to drop at about 150 drops per minute, depending on the size of the drops. The rate of flow of the salt solution is in inverse proportion to the rate of flow of serum. A small amount of adjusting will be required to control the dilution. By observing the glass Y-tube, the mixing of the two fluids can be seen. After the serum is exhausted, the rate of flow of salt solution will again be the same as before the serum was allowed to drop into the conductor tube. No adjustments are required for the salt solution; it automatically adjusts itself inversely to flow of serum, as indicated above.

88977—18——3

The apparatus is sterilized without disconnecting any parts excepting the needle, the rings on the ring stand having small arcs sawed out so as to allow the funnel and container to be slipped in and out without disconnecting. This same method has been used for administering salvarsan and other intravenous medication.

The advantages of this method are:

I. We have a visible index of the rate of flow of both fluids used, any irregularities in the flow being at once apparent.

II. The adjustment of the dilution is made with a single Hoffman clamp.

III. A careful control of the temperature is obtained.

IV. All manipulations of finding vein, etc., are done using salt solution alone, the diluted serum being sandwiched, as it were, between the trial flow of normal salt solution and the after flow of the salt solution. After the serum solution has been exhausted, the remaining salt solution washes down the serum which may remain in the tube.

V. The serum being introduced high in the tubing gives ample opportunity for thorough mixing of solution.

VI. Apparatus is easily assembled from materials always on hand in hospitals.

DIAGNOSIS AND TREATMENT OF PNEUMONIA AND EMPYEMA AT THE UNITED STATES NAVAL HOSPITAL, NEWPORT, R. I.

By F. A. Asserson, Commander, Medical Corps, United States Navy, and W. L. Rathbun, Lieutenant, Medical Corps, United States Naval Reserve Force.

During the past fall, winter, and spring months the training camps of both services were visited by very serious epidemics of pneumonia. These epidemics were universal, apparently affecting camps located in every section of the country, showing that climate had very little to do with their spread. Numerous articles have been written on the subject, all emphasizing the widespread virulence of the infection and the prevalence of the streptococcus haemolyticus.

Rufus Cole (1) in his report to Surgeon General Gorgas on the epidemic at Fort Sam Houston, Tex., divided the cases into acute lobar pneumonia, broncho-pneumonia, and a combination of the two. A large majority of the cases of broncho-pneumonia followed measles and was caused by the streptococcus haemolyticus. Influenza bacilli as well as streptococci were found in the sputum of 13 cases and in 5 cases coming to autopsy, influenza bacilli were present in the lungs of all. The streptococcus haemolyticus was seldom found in the blood stream, and according to McCallum is rarely engulfed by leucocytes. W. G. McCallum (1) in a pathological study of the patients dying at Fort Sam Houston, divides the broncho-pneumonia

into the usual lobular type and an "interstitial" type. Eleven out of 15 cases studied were of the latter class. McCallum emphasizes the importance of the streptococcus haemolyticus as the causative agent in "interstitial" broncho-pneumonia. This form of broncho-pneumonia has been described before, but the importance of the streptococcus haemolyticus in connection with its etiology has been overlooked. McCallum alludes to the "organization of the exudate," which he states is very common in the "interstitial" form and also says that on microscopical examination of cross sections some of the areas closely resemble miliary tubercles. He feels that this appearance accounts for many diagnoses of pulmonary tuberculosis made at autopsy following deaths from measles. This is a very important observation, as it exonerates the tubercle bacillus (an organism that needs no mistakes to bolster up its reputation) from at least a small part of its mischief.

In a recent letter to Lieutenant Martin B. Hiden, Medical Corps, United States Navy, Major A. G. Wilde, Medical Corps, United States Army, in charge of the camp hospital at Douglas, Ariz., stated that the deaths there have been approximately 25 per cent, which, he said, was about the average mortality in the other Army camps. In cases developing empyema he states, without giving figures, that the mortality was very high. The greater portion of his pneumonias and empyemas was apparently due to the streptococcus haemolyticus. Most of the cases treated at this hospital came from the Southern States, and a large number (as many as 60 per cent in one command, comprising a brigade) were infected with hookworm. Major Wilde is sure that hookworm, by its devitalizing influences, has been an important factor in connection with the poor reaction of his pneumonia patients, predisposing them to development of empyema, as 100 per cent of the latter cases had hookworm ova in their stools.

Alexander (2) states that at Camp Zachary Taylor definite changes occurred in the type of the predominating infecting organism from time to time since last fall. During September and October, the infection was principally due to one of the various types of pneumococci. Following an epidemic of measles, infection by streptococcus haemolyticus became prevalent, and likewise there was a decided increase in the percentage of empyemas (30 per cent) at the base hospital. Alexander found the streptococcus haemolyticus present in the throats of 24 out of 34 men convalescing from bronchitis and infections of the upper respiratory tract, in the dust from the floors of barracks where most of these men were quartered, in specimens of cow's milk, and from the nasal secretions of three out of four sick horses. The horses were stationed several miles away and apparently had no connection with the epidemic.

Hamburger and Mayers (3) at Camp Zachary Taylor found hemolytic streptococci in 52 out of 93 empyema fluids. These organisms were also found in the blood stream, pericardial pus, lung smears, and the heart's blood. Lieutenant Samuel Kennison, Medical Corps, United States Navy, of the United States Naval Hospital, Newport, R. I., also found these organisms in the blood from the cerebral arteries at autopsy, and in three cases in the spinal fluid.

Our morbidity and mortality from broncho-pneumonia following measles were very low during 1918 as compared with a like period in 1917. The measles patients are protected from droplet infection by a sheet screen attached to the side of each bed, and are also sprayed with argyrol solution a number of times each day. We know nothing about the effect of argyrol upon the streptococcus haemolyticus, but there is no contradicting the fact that a plentiful supply of this infection was present, and broncho-pneumonia was an infrequent complication of our patients with measles, only 7 cases developing in 211 consecutive patients admitted to the measles pavilion.

From January 1, 1918, to July 23, 1918, 28 cases of broncho-pneumonia were treated at the United States Naval Hospital, Newport, R. I., with a mortality of 25 per cent. This low mortality was evidently due to our low percentage of infections following measles. Only seven measles patients developed broncho-pneumonia, and four of these died. The majority of our patients were very ill and their convalescence was slow, but most of them were not handicapped by the measles infection and were able to pull through.

From January 1 to August 1, 1918, 183 cases of pneumonia, lobar including those with complications of pleurisy, suppurative, were treated at this hospital with a mortality of 32,[1] or 17½ per cent. The total number of deaths from pneumonia, lobar alone (166 cases were treated), was 19, or 11½ per cent.[2] The number of cases operated upon for pleurisy, suppurative, was 50, with 12 deaths, or 24 per cent. Of our pneumonia cases (up to July 23) 3.4 per cent developed tuberculosis, chronic pulmonary.

Hamburger and Mayers (3) in classifying their fulminant atypical lobar pneumonia, described two types based on the prodromes: "First those starting with 'sore throat,' 'cough,' and 'grippe' for a few days, progressing gradually until frank signs of consolidation could be elicited; second, cases starting abruptly, severely with sudden overwhelming prostration and collapse; profoundly toxic; progressing rapidly to death within three or four days with symptoms so profound as to suggest a general sepsis." We had many cases corresponding to their first class at Newport, the majority admitted with bronchitis acute, influenza, and pleurisy, acute fibrinous. The

[1] Five of these patients were found to have pleurisy, suppurative, at autopsy.

[2] This includes cases recovering from pneumonia, but that developed empyema la

patients puzzled us a great deal at first until we found that in practically all instances the pneumonia was located centrally along the larger ramifications of the bronchi and slowly extended toward the surface. In most of the cases it was possible to locate these lesions by careful comparison of the whispered voice and breath sounds of corresponding areas on the two opposite sides. The distant pectoriloquy and high pitched bronchial breathing could often be made out a day or two before the frank signs of consolidation appeared. Another mistake often made is to depend too much upon the lower lobes, particularly posteriorly in the region of the angle of the scapula, to furnish us the signs we are looking for, when the lesion is so located that the signs are best heard in the axilla, over the upper lobe, or occasionally at the anterior base. This is particularly true in lesions on the right side. Percussion, inspection, and tactile fremitus were not always helpful during the first stages. Crepitant râles generally appeared fairly early. In the second group of cases these observers noted an extremely high percentage of empyemas. This was not true of our cases corresponding to this group, as most of them had little or no fluid, even when there was extensive fibrinous pleurisy present.

The development of effusions in our cases seemed to be an indication of an attempt at resistance on the part of the body and our patients of the second class were powerless to assist themselves in the slightest degree from the very beginning. Among those patients developing fluid, those with a pleural reaction sufficient to produce large quantities of effusion did better than those developing severe fibrinous pleurisies, with but little or no effusion. It seems only reasonable, when we consider the severe pleural shock that sometimes follows the insertion of a needle into an acutely inflamed pleura, to assume that the prostration, as well as discomfort caused by the constant rubbing of roughened pleuræ is very considerable and is bound to have a decidedly bad influence upon the patient's general condition. When these layers are separated, this debilitating influence is removed and with a good flow of fluid, the mechanical effect on the lungs by producing more or less immobility is a therapeutic factor of no mean importance and will be referred to later. According to our observations, the absorption of toxin from the plural fluid is not very great and is more than counterbalanced by the lessened absorption from the immobilized lung. Owing to the layer of plastic lymph coating the pleuræ in these cases, it is quite possible that the absorption of toxin is very much interfered with.

We have divided our cases into four types: First, uncomplicated lobar pneumonia caused by types one, two, and four pneumococci, that invariably terminated favorably. The temperature reaction

was often fairly high but the pulse and respiration remained relatively low during the entire illness.

Some of these cases had upper lobe involvement. (In upper lobe pneumonias very low pulse and respiration was noted in a number of cases.) Some of those with upper lobe lesions had a temperature swing resembling that of pulmonary tuberculosis and a few of the cases required careful observation to rule out this disease. Patients of this type occasionally developed pleural effusion, but those going on to empyema invariably recovered with drainage and some were cured by Potain treatment.

Second. Same as the second class mentioned above, invariably fatal in spite of any treatment. Both lungs were usually involved and the infection appeared to be of the creeping variety, spreading from one lobe to another until the patient was practically asphyxiated. Most of these cases were haemolytic streptococcus infections or infections of haemolytic streptococci mixed with pneumococci. At autopsy occasionally only a portion of the upper lobes were found uninvolved. Lieutenant M. B. Hiden, Medical Corps, United States Navy, observed that the blood expectorated by these patients was much darker than in our other cases, apparently due to the amount of lung tissue involved and the resulting deficient oxygenation of the hemoglobin.

Third. Lobar pneumonias that were between the first two classes in severity. The symptoms were severe but not such as would lead one to expect a necessarily fatal outcome. The great majority of these cases recovered. Delayed and false crises were noted in a large number of these cases and their convalescence was slow.

Fourth. A pneumonia similar to class 3, but with pleural involvement and complicating empyema.

These cases are difficult to handle, but with conservative treatment, until the pleural sac is well walled off, a very great majority of them can be pulled through. Early operation gives much poorer results and a big reduction in recoveries. After observing the effect of early operations upon our empyema cases, conservative treatment became our routine. Experience at the United States Naval Hospital, Newport, R. I., in the management of pleurisy with effusion complicating pneumonia developed the following method of treatment:

The exudate is allowed to accumulate until there is evident mechanical embarrassment of the heart or lungs, when from 200 to 600 c. c. are removed by the Potain procedure. This operation is repeated from time to time as indicated by symptoms of overloading. Our technic for removal follows: The skin is prepared by painting the area of operation with tincture of iodine. The sixth or seventh interspace in the midaxillary line is generally selected and the tissues along the track of the needle, including the parietal pleura,

are infiltrated with a generous amount of novocain (0.5 per cent) injected through a long, fine hypodermic needle. After waiting for about 10 minutes, a small caliber needle (spinal puncture needles are excellent for this use) is introduced while attached to a syringe containing about 2 c. c. of novocain (0.5 per cent). If the patient complains of pain a small amount of novocain is injected as the needle is slowly inserted, particularly when the parietal pleura is reached.

This procedure not only helps to control pain but, in case of an erroneous diagnosis, tends to protect the lung by pushing it away from the needle point. The needle should not be pushed from side to side, after the pleura is reached, unless there is a free flow of fluid. Ethyl-chloride spray is contraindicated, as it fails to control pleural shock. The fluid should be withdrawn slowly and, if the patient complains of thoracic pain or has a coughing attack, the needle is removed and aspiration stopped for the time being, on the assumption that the pain and cough are due to contact of roughened pleural surfaces. It has been found unwise to remove large quantities of exudate, owing to the pleural shock which occurs when any considerable areas of parietal and visceral pleura are approximated. This has been the cause of considerable prostration and discomfort, two things that should be avoided if possible. In addition, the resulting increase of cough has a decidedly bad influence on the cardiac action and draws upon the reserve power of the heart. There is also danger of tearing the lung, in case organized pleuritic adhesions are present, when too large an amount of fluid is withdrawn and the lungs are forced down violently by severe coughing.

As a result of our experience we feel that the effusion per se has no harmful influence upon the patient's condition that would necessitate any considerable removal, so its mechanical action has been made use of as a therapeutic measure in the same way as nitrogen is used in the artificial pneumothorax treatment of tuberculosis. We found that pneumonias did very well when the affected lung was collapsed by an effusion, and of late it has been a part of our plan to keep the lung compressed until the pneumonic process was well under control and the effusion had become purulent.

The keeping of visceral and parietal pleurae apart during the acute stage tends to obviate the formation of adhesions and thereby facilitates operative procedure when the effusion is ripe for surgical intervention.

By the above method it has been found possible to tide over even the very severe pleural cases, provided there was profuse exudation. It seems probable that the amount of pleural effusion is a good index of the patient's reacting powers, and a profuse flow should be looked upon, not as a menace to the life of the patient, but as nature's

method of combating the infection. This should be curbed, during the acute stage, only when nature becomes too radical in her fluid production.

In lobar pneumonia we found auscultation of the whispered voice and breath sounds; percussion; inspection and tactile fremitus, with careful comparison of coresponding areas on the opposite sides, of importance as diagnostic measures in the order given. In empyema, cardiac displacement was frequently of great assistance in diagnosing effusions. Marked flatness, with the characteristic resistance offered to the percussing fingers by fluid accumulations, also pectoriloquy (ægophony) and tympany above the fluid level, were very constant signs. In accumulations filling the left pleural sac, tympany disappeared last in the second and third interspaces, near the sternum. Inspection and tactile fremitus were of service. The latter was not always absent over the fluid, as stated in most textbooks, but there was a characteristic relative difference in intensity in favor of the unaffected side. In pneumonia this difference, when accompanied by other physical signs that would lead one to expect a marked increase, is a valuable diagnositc sign of fluid.

The breath signs are usually transmitted clear to the base, but comparison of the breathing from the fluid level to the base will show a gradual diminution of the sounds downward. The X-ray was also of service in some cases, but could not be made use of in severe cases as it was considered unsafe to move them to the X-ray room.

On many occasions reflex abdominal pain and tenderness from diaphragmatic pleurisy have been mistaken for symptoms of acute abdominal conditions, such as appendicitis, gall bladder conditions, etc. This error has frequently been responsible for needless operative interference and has affected materially the patient's chances of recovery. The following procedure has been found of great service in differentiating between reflex abdominal pain and tenderness caused by diaphragmatic pleurisy and the pain and tenderness resulting from an acute abdominal condition. The abdomen is first examined while the patient is breathing normally and the point or points of maximum pain and tenderness are mapped out. The patient is then instructed to take a breath and hold it. If the pain is reflex from diaphragmatic pleurisy the abdominal pain and tenderness disappear until respiration is again commenced. The explanation of this phenomenon seems to be that when the diaphragm is immobilized there are no afferent impulses of an irritative nature passing to the nerve centers. When the diaphragm is in motion the irritation caused by friction of the roughened pleural surfaces excites an afferent impulse that is transmitted to nerve centers lying

in close juxtaposition to centers supplying the abdominal wall. This impulse is referred to the abdominal centers and efferent impulses are sent out to the abdominal skin areas supplied by these nerves, producing the symptoms of an abdominal lesion.

This sign has been present in 100 per cent of our diaphragmatic pleurisies with reflex abdominal symptoms. In so far as we can find out, this procedure has never been used before. Reflex abdominal symptoms occur in tuberculous diaphragmatic pleurisy and there have been many abdominal operations performed, only to find normal viscera present. One of the chief methods of diagnosis used to demonstrate this condition has been the use of X-ray examinations to demonstrate diaphragmatic adhesions.

We found the history of chill; cough, with bloody expectoration; pleuritic pain; prostration and high temperature; accelerated pulse and moderate dyspnoea to be the most constant symptoms. In addition to some of the above symptoms, cyanosis, marked dyspnoea, marked restlessness, high pulse, great prostration, tympanites, and delirium were always present in the severe type. It was interesting to note that some of our patients with severe pleuritic pain were very uncomfortable while lying on the affected side. Patients with pleurisy, complicating pulmonary tuberculosis, are practically always relieved by lying on the affected side.

In the Army camps it was found that a large percentage of patients were infected with streptococci in the wards with a few days after admission. Cole (1) found 11.4 per cent positive for streptococcus haemolyticus on admission to the ward; 36.6 per cent positive 3 to 5 days later, and 56.8 per cent positive in from 8 to 16 after admission. Cole says that conditions in hospitals are not unlike those surrounding puerperal fever and surgical wound infections. While in measles, raw surfaces do not exist on which infection can occur, this disease renders the respiratory mucous membranes especially vulnerable to infection.

Levy and Anderson (4) feel that the cubical method of isolation is not successful in protecting measles patients from carriers of streptococcus haemolyticus, when they are quartered together in the same ward. They advise that carriers be segregated in separate wards and that throat cultures be taken on noncarriers from time to time to insure that they are still free from this infection. A further precautionary measure that would seem to be of the utmost importance is the institution of *a more gradual scale of exercise for hardening the men immediately after entering the service.* A large number of our pneumonia patients developed the disease very shortly after arrival at the training station. Many of these men are thoroughly exhausted after a long trip on the train, with but little sleep for 48 hours or more. In addition a great number of them are not accus-

tomed to the heavy exercise incident to the training which is started at once. While in this condition they are exposed to heavy doses of infection, which they are totally unable to overcome. Furthermore, many of them are not acclimated, which also predisposes them to infection. It would seem fair to assume that fewer cases of pneumonia would develop if the hardening process was commenced with easier stages. Lynch, Cummings, and Spruit (5) advocate the active immunization of all men (presumably on entering the service) by the administration of streptococcus vaccine, combined with type one and two pneumonococcus vaccine.

The medicinal treatment was purely symptomatic. Digitalis and its alkaloids were used for a flagging heart and morphine or codeine for pain, severe cough or restlessness. Tympanitis, always a bad symptom, was controlled by milk and molasses enemata (1 cup of milk and 1 cup of molasses); by turpentine stupes and by the administration of compound jalap powder in the severe cases.

Sponging for high temperatures was found useful. Careful nursing and judicious feeding are of the utmost importance and the patient should be given the maximum amount of nourishment that can be assimilated. The drain on the patient's reserve is excessive and a high calory diet, composed of easily assimilable nourishment is of vital importance. The well recognized stimulating properties of food are also an additional indication for its administration in maximum amounts. Except in a very few instances, our patients were able to take very satisfactory quantities of food, if proper attention was paid to the bowels. The pain of diaphragmatic pleurisy was controlled by a tight abdominal binder.

REFERENCES.

(1) Pneumonia at Base Hospital. Rufus Cole, M. D., and W. G. McCallum, M. D. Jour. Am. Med. Assn., April 20, 1918, p. 1146.

(2) Hemolytic Streptococcus Causing Severe Infections at Camp Zachary Taylor, Ky. H. L. Alexander, Lieut., M. R. C., U. S. A. Jour. Am. Med. Assn., March 16, 1918, p. 775.

(3) Pneumonia and Empyema at Camp Zachary Taylor, Ky. Walter W. Hamburger, Maj., M. R. C., U. S. A., and Lawrence H. Mayers, Lieut., M. R. C., U. S. A. Jour. Am. Med. Assn., March 30, 1918, p. 915.

(4) The Predisposition of Streptococcus Carriers to the Complications of Measles: Results of Separation of Carriers and Non-Carriers at a Base Hospital. Robert L. Levy, Capt., M. R. C., U. S. A., and H. L. Alexander, Lieut., M. R. C., U. S. A. Jour. Am. Med. Assn., June 15, 1918, p. 1827.

(5) The Pneumonias: Streptococcus and Pneumococcus Groups. Charles Lynch, Col., M. C., U. S. A., James G. Cummings, Maj., M. R. C., U. S. A., Charles B. Spruit, Lieut., M. R. C., U. S. A. Jour. Am. Med. Assn., April 13, 1918, p. 1066.

DEVELOPMENT OF SPECIFIC SERUM THERAPY IN PNEUMONIA.

By W. R. Redden, Lieutenant, Medical Corps, United States Navy.

As early as 1891 Foa and Carbone, Emmerich and Fowitsky, and Klemperer discovered that animals rendered immune to pneumococci produced a serum which caused a passive immunity against pneumococci when injected into animals or man. From that time until 1910 antipneumococcus serum produced without any conception of groups was used in the treatment of pneumonia in man, with indifferent results.

Then Neufeld and Handel in 1910 discovered that there were certain strains of pneumococci which fell naturally into one group because of common immunological and serological reactions and certain other strains which fell into a second group because of common immunological and serological reactions and which were not related to the first group by such reactions. With strains of this latter group Neufeld immunized a horse, whose serum he named Serum Franz. This serum later was found to correspond to the Type II serum of the Rockefeller Institute. The organisms of the first group which Neufeld sent Cole all fell into the Type I group, later developed by Dochez and Gillespie. However, no attempt was made to work out this group problem or to place specific serum therapy on a rational basis until Cole and his coworkers at the hospital of the Rockefeller Institute for Medical Research took up the problem in 1912.

Then it was that Dochez and Gillespie, by immunizing rabbits against numerous strains of pneumococci obtained from pneumonia patients, were able to pick out two distinct types and a group which included a large number of races without common immunological characteristics. For convenience they arbitrarily called races that fell into a definite group Type I pneumococcus, those that fell into another definie group Type II; then because streptococcus mucosus of Schotmuller was known to cause a certain number of lobar pneumonias and because it exhibits the characteristics of a pneumococcus, it was called pneumococcus mucosus and Type III. All pneumococci not included in these three types were designated Group IV.

The basis for calling an organism a pneumococcus was bile solubility, inulin fermentation, methemoglobin formation in the presence of hemoglobin, and encapsulation.

The next logical step was to determine the frequency of occurrence of these types in lobar pneumonias, not only in New York but elsewhere. In New York 150 cases showed the following percentages.

Type.	Number of cases.	Percentage.
I	57	38
II	44	30
III	17	11
IV	32	21

That is, about 80 per cent fell among the so-called fixed types I, II, and III, and about 20 per cent into the IVth or heterologous group. As I have mentioned above, the predominating German strains supplied by Neufeld proved to be of Types I and II. Walker at the Peter Bent Brigham Hospital, Boston, Lewis at the Pennsylvania Hospital, Floyd and myself at the Boston City Hospital. and Lister in South Africa produced similar evidence, to say nothing of the more recent confirmatory evidence from the numerous military camps where correct grouping has been carried out.

Following the grouping of cases in New York, the workers at the Rockefeller Institute developed a high titer immune horse serum against Type I and a weaker serum against Type II. Then, by preliminary protection experiments on mice, established justifiable grounds for specific serum therapy in man.

Results with the use of Type I serum against Type I pneumonias in man have proved satisfactory, reducing mortality from about 25 to 30 per cent to about 8 per cent. These results, now more or less universal, have placed Type I antipneumococcus serum in the class of specifics, and make it almost unpardonable for a practitioner to treat a case of pneumonia without attempting to work out the type, and to administer Type I serum if the organism be of that type. This is further emphasized by the following statistics for New York in 1914. The approximate number of pneumonias was 15,000. The probable number of Type I would be 5,000. Of the deaths due to pneumonia, in all likelihood, 1,500 were of this type. This number of deaths is considerably more than all the deaths from typhoid fever, scarlet fever, and cerebro-spinal fever combined during the same period. (Cole, 1915.) If the Type I serum prevented death in only half instead of three-fourths of this 1,500 one can readily see the justification for Type I antipneumococcus serum. However, the case is not the same with Type II serum. From the beginning the Rockefeller workers found it practically impossible to produce a Type II serum above one-tenth the titer of Type I serum as demonstrated by protection tests in mice. Moreover the therapeutic results in man showed a less potent serum, for instead of reducing mortality to one fourth of that before serum treament, it barely cut it in two. Then Moore, and Moore and Chesney spent two years or more attempting to enhance the therapeutic value of Type

II serum, by the use of ethylhydrocuprein, a quinine derivative which had been shown to have a marked germicidal action on pneumococci. But it was found that the margin between an effective therapeutic dose and marked toxicity was so small that one could not tell whether the result would be blindness, death, or recovery. Moore himself feels that its use is not justifiable.

On the other hand, the Type II antipneumococcus serum produced for Massachusetts by Dr. Kohn at Forest Hills shows a protection in mice equal to the Type I serum produced by the Rockefeller Institute and the results in the patients look promising. However, it is still too early to make a statement stronger than this. If a patient has Type II pneumonia, give him the benefit of the Type II serum, especially if early in the disease, or if extension is going on in the lung tissue. I have seen excellent results.

Up to the present time no satisfactory antiserum has been developed for Type III. Wardsworth of the New York State Research Laboratories at Albany, first produced a serum sufficiently strong to use in grouping. In all probability further attempts will be made to make a higher titer Type II serum.

Turning to Group IV, one readily recognizes the impossibility of producing a therapeutic antiserum in view of the fact that every Group IV strain produces a serum which has absolutely no effect on any other strain.

A brief consideration of some of the factors involved in producing passive immunity may shed some light on the subject of serum therapy in pneumonias. The standard potency of antipneumococcus serum Type I is measured as follows: 0.2 c. c. of the serum introduced into the peritoneal cavity of a mouse with 0.1 c. c. of a Type I culture, 0.000001 c. c. of which kills a mouse in 24 to 48 hours, should prevent death in that mouse for at least a period of 5 days. Thus far 0.2 c. c. of Type II serum protects against 0.01 c. c. of Type II culture. A curious phenomenon is noted here. If more than 0.1 c. c. of a virulent culture of pneumococci is injected into a mouse, no amount of homologous antiserum will save him, thus showing a limit of protective power. Yet as far as active immunity is concerned in all types of pneumococci, the limit of protection has not been reached (Cole), for animals may be actively immunized so that they will stand many times the maximal dose above described. I might say in passing that this indicates excellent possibilities for prophylactic vaccine treatment in the prevention of the fixed types of pneumonia.

It is evident from the above that there are at least two immunity factors, one which is transferable in serum and a second which may or may not be transferable. It would appear that with Type I serum the second factor is not so essential. That with Type II serum the second is more important, and with Type III absolutely essential. (Cole.) There is another important point which may throw some light on the failure of Type II serum to react as well as Type I. Last year Cole found that empyema fluids resulting from pneumococcus infection contained large amounts of soluble substances which have the property of neutralizing pneumococcus antibodies. He also showed that when immune serum is administered to patients severely infected with pneumococci, the immune bodies may also disappear very rapidly; that is, as soon as 8 to 12 hours

after intravenous injection, as shown by the disappearance of agglutinins. This disappearance is probably due to the presence of such a soluble substance in the blood. Apparently the serum only becomes effective when these substances are neutralized. A study of the agglutination curve of the patient's serum is of value in showing why, in some cases, favorable results have not followed the use of immune serum.

Now it is possible that Type II serum is less effective than Type I, not only because the immune bodies are not so well developed, but because the power of Type II pneumococcus to produce these soluble substances is more highly developed.

Administration of serum.—As soon as a pneumonia patient is seen he should be given 1/10 c. c. of a 1/100 dilution of horse serum intradermally. If there is no reaction to this test within 15 minutes to an hour, 0.5 c. c. of horse serum may be given subcutaneously as a desensitizing dose.

The sputum is washed and injected into the peritoneal cavity of a mouse, where the pneumococcus develops rapidly and produces an exudate. This exudate is removed from the cavity at the end of 12 to 18 hours and centrifuged. The clear supernatant fluid contains a specific precipitinogen, which, if caused by Type I, II, or II, pneumococcus, will precipitate out of the corresponding immune serum a specific precipitin, which shows up as minute white particles or definite flakes, which later settle out and leave a clear fluid. With proper dilutions of sera there is no cross precipitation; in other words, the reaction shows definitely whether the organism belongs to Type I, II, or III. If there is no reaction and the organism is a pneumococcus it is called Group IV.

If the case is a Type I or II, 100 c. c. of the proper type serum, diluted with an equal amount of fresh sterile physiological salt solution, is slowly injected intravenously, at body temperature, either by a large syringe or preferably by gravity. It is essential that the first 15 c. c. should be given slowly, over a period of 15 minutes, in order to avoid the possibility of a sudden anaphylactic reaction which may not have been evident in the preliminary tests. The remainder of the serum may then be given rapidly enough to finish the amount within a half hour. Usually a chill with a rise in temperature and pulse follows within 30 to 60 minutes the intravenous injection. Although violent at times, it is never fatal. If the case is Type I and the patient is sensitive to serum, it is worth while desensitizing as follows: First give 0.025 c. c. horse serum subcutaneously; in one-half hour to an hour give 0.05 c. c., etc.; continue increasing the dose each period until 1 c. c. can be given intravenously, then it is safe to proceed slowly with the whole amount. It usually takes about 8 to 12 hours to carry out this procedure, but in Type I infection it appears to be worth while.

The second injection of serum should be given about 8 to 12 hours after the first, and the third about 8 to 12 hours after the second. If by this time temperature, pulse, and respiration have dropped to normal, no further injections need be given. But in the light of present knowledge, it is dangerous to stop short of three doses, even if the symptoms have subsided after the first or second. On the other hand, Cole has given as high as 1,600 c. c. of serum at 8-hour intervals in some of his cases. If the symptoms subside, then appear again, even during serum treatment, complications such as empyema, pericarditis, or meningitis, or involvement of other lung tissue must be looked for. One of these is usually found. While discussing the question of empyema after pneumococcus infection, Cole told me that there has been a definite increase of empyemas in Type I pneumonias after serum therapy, an increase from 1 to 2 per cent up to 16 per cent. In all probability this 16 per cent represents a definite number of cases formerly fatal, but which by aid of the immune serum are now able to develop a resistance sufficient to localize the infection in the pleural cavity.

May I state here that I believe free drainage of an empyema following a lobar pneumonia due to pneumococcus is still the proper procedure as soon as pus is found? For after carefully following the reports from various camps as well as considering the facts presented in previous reports here, it appears that the rapidly fatal empyema cases have been those which developed pneumonia after measles, or those in whom the pneumococcus had not been demonstrated, but whose chest fluids have yielded pure cultures of streptococcus. In both types the pneumonia is usually broncho-, and the causative agent streptococcus. Frequently there has been no demonstrable pneumonia, just a primary streptococcic empyema.

Attempts have been made to concentrate the immune principles of the type sera. Gay and Chickering, in 1915, demonstrated that "a water-clear extract of pneumococci added to homologous antiserum produces a voluminous precipitate which carries with it practically all the protective bodies against pneumococcus infection in animals. This precipitate washed and resuspended in saline solution protects as well as whole serum, but contains only 0.09 to 0.34 per cent protein as against the original 6 per cent." However, no use has been made of this concentrated precipitin. Avery has demonstrated that the immune bodies of antipneumococcus serum are completely precipitated by 38 per cent to 42 per cent saturation of ammonium sulphate. Yet no use has been made of this fact. It is interesting to note that whereas the diphtheria antitoxin is associated with the pseudoglobulin fraction of horse serum antitoxin, yet the immune bodies of antipneumococcus serum are associated with both the englobulin and the pseudoglobulins. In all probability the time will come when

these less toxic globulin fractions will be used to combat pneumococcus infection.

Nature of the infection.—We know that mere growth of organisms does not necessarily mean disease. Note the ever increasing number and varieties of carriers who rarely ever come down with the disease. It was formerly thought that either people carried parasitic organisms more or less constantly in the upper respiratory tract, and that under conditions of lowered resistance these invaded the blood stream and lungs, or else people carried saprophytic organisms which under certain conditions suddenly acquired virulence and became parasitic with a resultant invasion of the body, or that disease was caused by a pathogenic organism different from the ordinary mouth organisms, acquired by the individual from outside his own body.

Recent studies, by Avery and Dochez and others, have demonstrated that although pneumococci are present in 80 per cent of normal mouths, in no case out of 20 first studied were types I, II, or III found. All were group IV. Later studies showed that patients ill with the fixed types of pneumococci carry the same fixed type in the sputum from a few weeks up to 90 days after crisis. It was noted that delayed resolution or complications such as empyema favored the persistence of the fixed type. It was further noted that people associated with such patients often became carriers of the same type of organism, yet without coming down with the disease. When the type which caused the disease disappears from the sputum, Type IV is frequently, though not always, found. It would appear from the above that in all probability the ordinary mouth variety of pneumococci are Type IV; that these are usually saprophytic, but under conditions of lowered resistance, such as exposure or devitalizing work, became parasitic; but that the large majority of pneumonias, as high as 70 to 80 per cent are caused by the introduction of fixed types of pneumococci, which are usually parasitic, though they may remain harmless to certain resistant individuals called healthy carriers; that the chief epidemiological factor of lobar pneumonia is the transmission of fixed types from people recently ill from the disease, or from those associated with them and who have become carriers of the fixed types; that aside from the organism itself, lowered resistance due to exposure, exhaustion, etc., plays an important part.

Let us consider for a moment how disease develops. We know that diphtheria bacilli and tetanus bacilli in their growth produce a definite toxic substance both within the body and in the media. Apparently this is a part of the growth process. We also know that the chief symptoms of these two diseases are caused by the elaboration of the toxins and their action on the tissues. But as far

as is known, no such toxin is produced, by the pneumococcus either inside or outside of the body. However, it has been definitely demonstrated that when pneumococci are ground up with salt solution, or dissolved by sodium cholate, then filtered through a Berkfeldt filter to remove all bacterial bodies, a clear solution of high toxic and hemolytic titre is obtained. This is called pneumococcus hemotoxin, and has been demonstrated to be a definite preconstructed endotoxin, and not a toxin elaborated by enzymatic action on the bacterial protein after autolysis has taken place. In other words the substance is a true endotoxin, as named by Pfeiffer. There is considerable evidence that the initial symptoms of pneumonia are not due to the dead organisms with the subsequent release of this hemolytic endotoxin, but that rather the symptoms are produced only when living organisms are actively multiplying. Peabody has demonstrated that during the terminal stages of fatal cases of pneumonia there occurs a progressive decrease in the oxygen content and oxygen combining capacity of the blood. This evidently is due to the ability of the growing pneumococcus to transform oxyhemoglobin into methemoglobin. Now if growing pneumococci are able to produce this change in red blood cells merely by contact, by changing oxidative processes, it is possible they may in a similar way produce other important changes in other tissue cells. It may be that the entire specific action of the pneumococcus on the tissues is in the lung or in the local lesion, and that the general symptoms may then be nonspecific in character like that produced by any similar local lesion induced by any cause. This is a bit of Cole's theory. However, Cohn of the Institute has demonstrated by the electrocardiogram that certain changes take place in the heart muscle, changes which can be reversed to normal by digitalis. Porter of Harvard has also demonstrated that serum from pneumonia patients has a toxic effect on the hearts of experimental animals, which causes death if the hearts are not subsequently perfused with normal serum before the toxic action has gone too far. This would seem to indicate that the endotixin of the pneumococci may play an important rôle in cardiac failure after or during pneumonia. If this substance causes symptoms which can be demonstrated in the above manner, there is some ground for belief that it may affect other tissues in a detrimental manner. I have already mentioned the fact that certain soluble fixing substances which have the power to neutralize antibodies are also developed by pneumococci. These soluble fixing substances may appear in the urine of pneumonia patients in the form of a precipitinogen which acts the same as that developed in pneumococcus cultures, or in the peritoneal cavity of a mouse injected for typing purposes. That is, it will cause a precipitation in a specific homologous antipneumo-

coccus serum. This has been used for diagnostic purposes. When found it is usually a bad prognostic sign.

The question naturally arises, how does the specific immune serum act toward the pneumococcus and its products? In the first place, Bull has demonstrated that it clears the blood stream of organisms and causes agglutination; that it opsonizes the organisms so that after agglutination they are phagocyted in enormous numbers. Blake showed that when pneumococci were agglutinated by specific antiserum, methemoglobin formation was diminished or lost. In vitro, antipneumococcus serum inhibits the growth of the homologous organism, inhibits or markedly delays fermentation of inulin, and the splitting of protein. And lastly, Cole has demonstrated that the immune serum has a high antitoxin and antihemolytic titre, which in all probability play an important rôle in combating the strong endohemotoxin. I simply present this data and offer the suggestion that here is at least one possibility why specific antipneumococcus serum is of use in combating type pneumonias.

In order not to confuse the grouping of pneumococci, I have discussed the four main groups first. Now just a word about Avery's subgroups of II—namely, IIa, IIb, and IIx. All these subgroups are included in type II because of agglutination in type II antiserum, but they are subgrouped because specific serum developed for "a" will not agglutinate "b" or "x," nor is there cross agglutination with specific serum developed for "b" or "x." Moreover, type II serum has no protective action against IIx strains. Type IIx shows another peculiarity which suggests an approach to group IV, namely, each strain is different from every other strain in its immunological and serological reactions.

In passing, I might suggest that some of the earlier cases of type II pneumonias were really subgroups of type II, and that the failure to get results with type II antiserum was due, in some degree at least, to this fact. However, within the past month we treated two cases of type II subgroups with excellent results.

Aside from giving an opportunity for serum treatment in favorable types, grouping aids in prognosis for group IV almost always run a mild course or recovers. About one-fourth of type I die, about a third of type II die, and nearly half of the type III die.

To summarize, then, the etiological factor in 98 per cent of all lobar pneumonias is the pneumococcus. Eighty per cent fall seriologically into three groups called fixed Types I, II, III. II is further subdivided into a, b, and x. The remaining 20 per cent is called Group IV and is made up of numerous distinct races.

Group IV may be found in 80 per cent of normal mouths. But the fixed types are found only in the mouths of those recently ill with such a type or in one who has been in contact with such a type

case. This points to carriers of the fixed types as the chief epidemiological factor.

About 38 per cent of all cases are Type I; about 30 per cent of all cases are Type II; about 11 per cent of all cases are Type III. Against Type I an immune serum has been produced which reduces mortality by three-fourths. Against Type II a less potent serum which reduces mortality by about one-half has been produced. All cases of pneumonia should be typed as early as possible in order to give patients the benefit of antiserum, if of Type I or II. Practically all cases which fall into these two groups can be given serum without danger. Even if one of the Type I cases shows sensitiveness to the serum, an attempt should be made to desensitize in order to make serum 1 available. Serum should be given as early as possible and in 100 c. c. amounts at eight-hour intervals for at least three doses, intravenously. Probably the action of the growing pneumococcus plays an important part in producing the local lesion.

There is little doubt but that the endotoxin of the pneumococcus plays an important part in the cardiac failures of pneumonia patients and may affect other tissues in a detrimental manner.

It is likely that the curative power of antipneumococcus serum depends much on its agglutinating action, its opsonizing power, its antitoxic effect, its ability to inhibit the growth of the organisms, and to retard methemoglobin formation. It is also probable that there is an action not measurable by present methods. Serum not only cures but also shortens the course of disease by three to five days.

Grouping not only makes serum therapy available but aids in prognosis, the order of increasing mortality being IV, I, II, III.

Experience points to crowded quarters, exposure to severe weather, and devitalizing labor as important predisposing factors in the develoment of the disease.[1]

FLAT FOOT, A NEW STATEMENT OF OLD TRUTH.

By L. R. G. CRANDON, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

"Nothing is settled till it is settled right" is as true in the surgical world as in the ethical.

Since 1906 the writer has practiced and written on the concept that weak foot, pronated foot, and flat foot should be treated not as an anatomical but as a physiological entity. From the practical side of function and treatment the human foot has no more fixed arch

[1] The writer lays no claim to originality, but has used freely data gathered during a year's stay at the Rockefeller Institute, and from the numerous reprints and lectures published by Doctor Cole and his coworkers. The attempt has been to present briefly the problem of serum therapy in pneumonias.

than the extended hand till the muscles make one. Every detail of our mental attitude toward the care of feet changes if, always, for the word arch we substitute the word arching. In short, as far as examination and treatment go, with certain exceptions, flat foot is not organic but functional only.

In 1903 at one large orthopedic hospital, 10 to 15 pairs of plates were made for feet daily; in 1914, 2 pairs were made in the whole year! Except in the practice of those who will not see, the flat-foot plate has gone. So, also, the shoemaker has begun to recognize the human foot not as the stumpy end of a limb, but as a live, flexible, prehensile extremity. Thus, in place of the stiff-shanked shoes which our new Filipino soldiers used to sling over their shoulders on a hike, Army and Navy bootmakers now produce a roomy, flexible shoe which allows all the 23 interrelated joints of the foot a chance to work. The whole surgical world is coming to see anew the demands of the bony and muscular complex of the foot and to restore to it, so far as modern underfoot conditions permit, some of its barefoot freedom.

The bare foot on nature's own surfaces—sand, turf, and in forest—comes down on the round unstable heel, falls forward on the outer edge, then the whole plantar surface grasps the surface beneath and pushes backward. The ideal shoe, to allow the simulation of this sequence on the hard planes of man-made surfaces, must have an unstable (rubber or partly rubber) heel, a broad outside curve, a wide toe and is shankless to allow a gripping action by the whole foot.

Ideal shoes of this type are made; regulation shoes of Army and Navy approximate it; surgeons approve; those who wear such shoes become disciples; but a definite lack of practical application of this knowledge still prevails in draft boards and enrolling offices.

In time of peace or in a country unendingly rich in men, it may be defensible to reject applicants on inspection or on anatomical measurements of their feet, but when the whole man power of a nation is drafted, when so many hundreds of valid disqualifications appear, it is both ignorant and wasteful to reject a man for an anatomical variation in feet which are functionally good.

The perfect foot of a baby gives the complete print of "flatfoot." A foot with an arch which appears perfect may have no muscles and collapse on the first hike. The man who has tramped all winter in a logging camp or a professional athlete may have a pronated foot and yet can march 30 miles. Excepting for those feet where the astragulus is practically on the ground, the test should be; Does he walk with the splay-footed shuffle of the obviously collapsed foot? If so, reject. If not, can he balance with any degree of steadiness on one foot straight forward, with the other foot curled round the

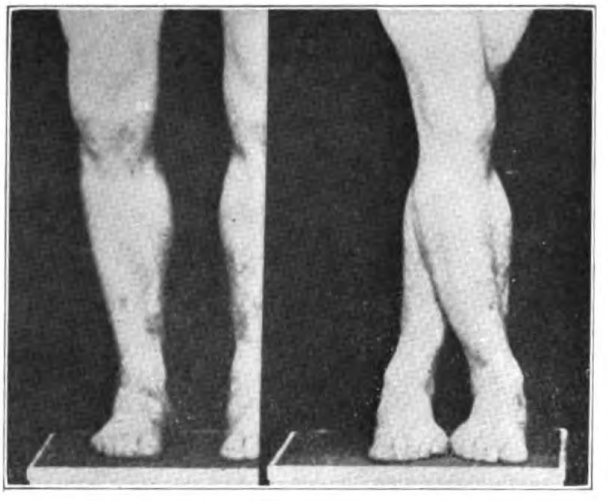


Fig. 1. Fig. 2.

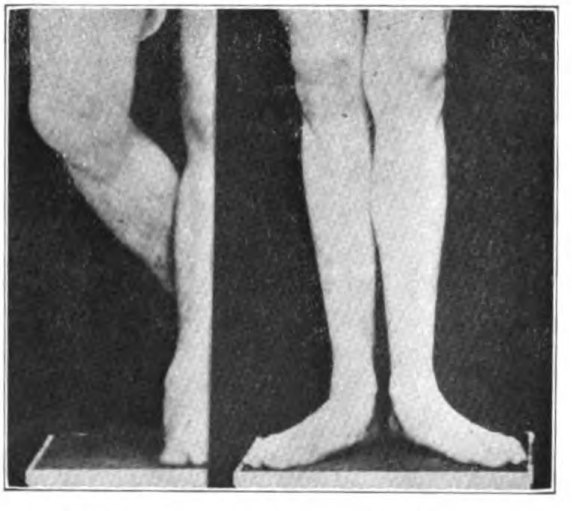


Fig. 3. Fig. 4.

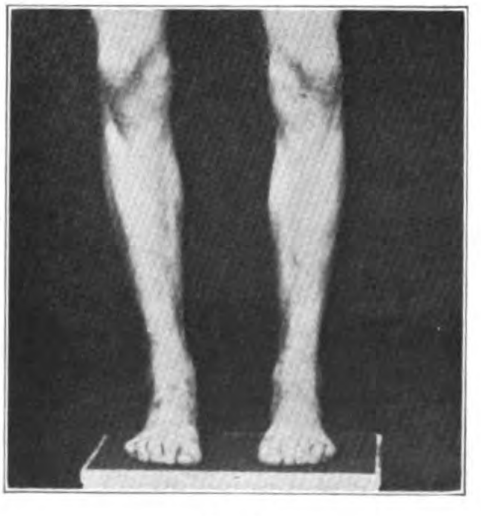


Fig. 5.

ankle? (Fig. 3.) If he can, so far as the feet are in question, accept him. Men accepted by this standard, with graded training up to the maximum use of the feet, are less likely to be invalided by foot trouble than those taken by inspection only.

The care of the foot of the recruit, outside of cleanliness and right shoeing, as described, should include the prevention of that form of break-down commonly called "flatfoot." This preventive care should consist in three exercises added to the daily setting-up drill:

1. Stand with feet parallel, about 4 inches apart, with the weight on the outer edge of the feet; let the big toe grasp the ground, "break" the knees slightly; bend the knees outward as if bowlegged. (Fig. 1.)

This is the position of greatest stability, unconsciously taken when using binoculars on deck at sea.

2. Stand with feet crossed, the weight divided equally between the two, then cross the feet in the opposite way. (Fig. 2.)

3. Stand on one foot straight forward, curl the other foot behind the standing ankle and balance. (Fig. 3.)

The last two exercises bring into use all the muscles of the leg and especially the intrinsic muscles of the foot.

The absurd so-called "military" stance with feet at a 60-degree angle, based only on the whim of Napoleon, contrary to all instincts, should be abolished. Guard duty in this position precedes a large number of the cases of acute flat foot seen in military practice.[1]

The treatment of an actually developed case consists in:

1. Rest for a few days with not too much hot bathing (which will reduce muscle tone).

2. The use of the exercises given above in graded amounts, up to 50 times a day.

3. Flexible shoes, preferably low-cut (Oxford).

4. Obstinate cases may call for S-strapping or rubber sponges under the arches for a short time.

SUMMARY.

1. Acute flat foot, especially in young men, is not anatomical but is functonal only.

2. It should be recognized in enrolling offices by functional tests and not by inspection.

3. Experience shows that few young men are rejectable for flat or weak foot.

4. It is to be treated by exercises to restore muscle tone and never by apparatus such as built-up shoes or plates.

[1] So far as the naval service is concerned, the attitude to which the writer very properly objects is not assumed to any great extent and plays no conspicuous rôle in the production of the disability under discussion. (Editor.)

5. These exercises (described above) should form a part of daily drill.

6. The so-called military stance (60°) for the feet should be abolished.

THE PRESENT STATUS OF THE TREATMENT OF FLAT FEET.

By S. B. Burk, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

The causes of flat feet may be considered as predisposing or constitutional and local.

The constitutional or predisposing causes are usually grouped under (1) congenital (a shortened tendo Achillis diminishes the flexion of the foot in walking and causes weakening of the dorsal structures if pronation of the foot and abduction of the toes do not compensate); (2) neurotic; (3) inflammatory; (4) traumatic; and (5) toxic conditions resulting from altered physiological processes, with the production of an overstrain in using the lower extremities. Occupation, unless accompanied by other conditions, is rarely responsible for flat foot (Merrill).

The local changes are knock-knee, poorly fitting shoes, and such other conditions which produce "toeing out." The latter forces the body weight obliquely on the arch of the foot, producing an inward cross strain. The position of the leg in which the toes fall outside of the line of progression shortens the stride, lessens the important element of thrust of the great toe, and diminishes the force of propulsion. Toeing out produces:

(1) External rotation of the legs.

(2) Twisting of the knees and straining of the joints.

(3) Outward rotation of the femur, which favors backward rotation of the pelvis on its transverse axis, with elevation of the pubis and a decrease in the normal lordosis.

(4) Forward displacement of the hips and shoulders, thereby increasing the lower thoracic curve, and a stoop-shoulder position is favored.

Meisenbach describes two types of flat foot, the flexible and the rigid. The flexible is associated with a low posterior or longitudinal arch, pronation or weakness of the ankle, and a general atonic condition of the muscles of the leg and foot, the toes usually being straight. There is pain over the metatarsals in the weight-bearing position.

The rigid or reversed arch is caused by (1) thickening of the metatarso-phalangeal girdle, (2) apparent shortening of the flexor tendons of the second, third and fourth toes, and (3) the presence of deep-seated callouses on the under surface of the arch.

Katzenstein holds that the weakness is primarily in the ligaments. Soule summarizes the pathology as an ultimate change in the astragalo-navicular articulation, which is readily seen on X-ray examination. At the same time he urges an examination of the foot for old inflammations of the tarsus as the underlying factors.

The symptomatology depends upon the degree of involvement with the production of pain and the objective phenomena resulting from toeing out. The shoes show an unequal wearing down. The trudging gait and the stooping shoulders are characteristic. In addition, the patients are easily fatigued and are mentally apathetic. On taking a tracing in the weight-bearing position the inner margin of the foot is prominent. The treatment depends upon the degree of the flat foot. In all cases attempts should be made to relieve local and underlying constitutional causes. For the mild cases adhesive strapping, proper shoes, and graded exercise are recommended. These exercises as described by McKenzie are:

(1) Patient sitting, leg extended and supported just above the ankle. Grasp the right foot just above the ankle with the left hand. Place the right hand on sole of foot, with thumb pointing toward the toes, grasp foot firmly, circumduct foot slowly as follows: Extension, inversion, flexion, and eversion. This should be done by the attendant with as much force as can be used without pain, and repeated 30 times.

(2) These same movements should be done by the patient without help.

(3) Patient standing, toes in and heels out, and about 12 inches apart; rise on toes and press out slowly. Repeat 30 times.

(4) Patient standing, feet parallel and 6 inches apart. Raise the inner side of the feet, throwing the weight on the outer side. Repeat 30 times.

(5) Patient standing with feet parallel, weight resting on outer side of the feet. Walk forward and backward 30 steps, keeping feet parallel and forcing down ball of feet.

(6) Patient standing, feet 12 inches apart and parallel, knees bending and outward pressing.

(7) Patient standing, feet 6 inches apart and turned in, rise on toes and walk forward and backward 30 steps, crossing feet and keeping toes in.

(8) Standing firm, right lunge forward, neck firm, bend right knee until heel is forced from floor, keeping weight on outer side of foot. Repeat 10 times and do same with the left.

(9) Standing, feet parallel, 6 inches apart. Sway slowly forward and backward on heels and ball of feet, chest active, and chin in.

(10) Raise heel 1 inch from floor and walk without bringing heel down, as if heel was painful. This may be done repeatedly with both heels.

For the severe cases operative treatment is advised. Katzenstein injects 0.5 c. c. of 4 per cent formaldehyde into the weak points of the tibio-navicular ligament, with the idea of hardening this ligament, and then puts the foot in a plaster of Paris cast for a month. Local anesthesia is necessary in this treatment. He often gives small amounts of morphine also if necessary.

Meisenbach operates on the rigid type. He performs an osteotomy of the second, third, and fourth metatarsal bones, places a felt pad under the arch, and then a plaster of Paris cast up to the knee. He claims good results, and claims the following advantages for the operation:

(1) The immediate relief of the symptoms and a dropping off of the callouses.

(2) The straightening of the toes, with a high anterior arch and no deformity of the foot.

(3) The metatarso-phalangeal joints are not opened and the heads of the metatarsal bones are not resected.

(4) It is a bloodless procedure, and the danger of infection is negligible.

Arnd transfers the tendo Achillis to a deeper groove chiseled into the posterior aspect of the scaphoid. If the tuberosity of the scaphoid does not protrude enough for the purpose, the articulation between the scaphoid and the astragalus can be opened and a groove dug for the tendon here, suturing the tendon again. The results of this method of correcting have been satisfactory during the 18 months to date.

Soule denudes the head of the astragalus and the concave surface of the navicular bone and unites them with an autogenous bone peg from the crest of the tibia. He claims excellent results.

REFERENCES:

1. Anderson, W. L., Med. Times, New York, 1916, XLIV, 144.
2. Arnd, C., Cor. Blatt f. schweiz Aerzte, 1916, XLVI, No. 34, p. 175 Ab. Jour. Am. Med. Assn., LXVII, No. 14, 1049.
3. Bendixen, P. A., Med. Herald, 1915, XXXIV, 368.
4. Katzenstein, M., Therap d. Gegenw., Dec. 15; Jour. Am. Med. Assn., LXVI, No. 7, 543.
5. Lovett, R. W., Pediatrics, 1916, XXVIII, 16.
6. Meisenbach, R. O., Amer. Jour. Orthop. Surg., 1916, XIV, 206.
7. Merrill, W. J., Surg. Gyn. & Obstet., 1916, XXII, p. 366.
8. Packard, G. B., Colorado Med. Jour., 1914, XL, 406.
9. Roberts, P. W., New York Med. Jour., Aug. 28, 1915.
10. Soule, R. E., Amer. Jour. Orthop. Surg., XV, 4, 292.

EAR PROTECTION.

By G. B. Trible, Commander, and S. S. Watkins, Lieutenant, Medical Corps, United States Navy.

Conditions surrounding the present conflict are radically different, so far as the weapons are concerned, from those of any previous time in history. The increasingly large proportion of high-explosive shells, grenades and bombs, and the relatively confined spaces occupied, such as trenches and dugouts, all tend to an augmentation of ear injuries. Last, but not least, the employment of corrosive and

noxious gases has caused a limitation of the available means of ear protection.

Injuries to the ear, may be classified broadly, as:

1. Direct—
   - (*a*) Loss of tissue.
   - (*b*) Injury by missiles.
   - (*c*) Gas injuries, producing irritation or caustic action in the external canal or drum.
2. Indirect—
   - (*a*) Rupture of drum from changes of pressure.
   - (*b*) Commotion of the labyrinth.
   - (*c*) Deafness from long-continued or excessive noise.
   - (*d*) Driving in of the foot-piece of the stapes, with an intact drum.

All variations and combinations of these types may be encountered.

So far as the direct injuries are concerned, no practical method of protection is available against the first two, and some devices may increase the danger by acting as secondary missiles, or by becoming fragmented or embedded in the tissue of the canal. It is likely, however, that with such direct injuries, the ear condition will be but a minor part of the damage sustained. With regard to the third, gas injuries, the corrosive gases, such as chlorine, render the efficacy of metal protectors with delicate springs or parts that should coapt, rather problematical and mustard gas, through its action and affinity for fats and oils, as well as its persistence in these substances, makes useless employment of cotton impregnated in vaseline, or similar substances, and makes it necessary to change rubber protectors frequently. This opinion is substantiated by the following report from Dr. J. Gordon Wilson to Lieutenant Colonel Milliken, under date of July 20, 1918:

1. In regard to the action of mustard gas on rubber and metal, I had a talk with Stieglitz. The action on copper or any metal is negligible, especially in such dilutions as are used in warfare. At the chemical laboratory of the university it was found that a very strong concentrated solution had no effect on copper which enters into the make-up of the protector. If it does anything at all, it forms a thin coating of sulphide, not harmful.

2. The action of the gas on the spring is now undergoing investigation, but it does not appear to have any effect.

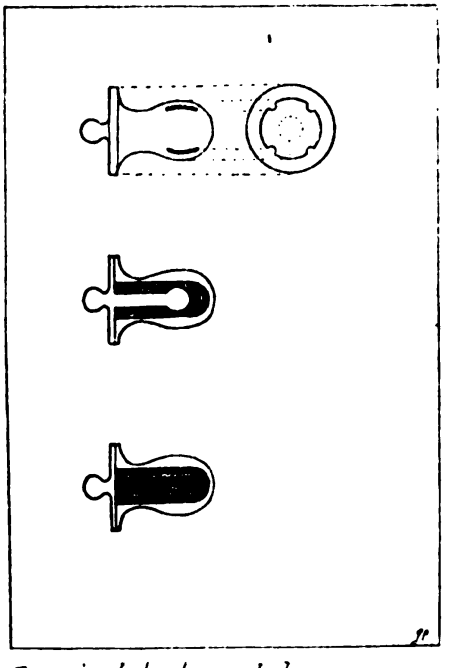
3. The rubber of the protector will absorb the gas; if the rubber be left in the ear long there will probably result injury to the canal, but if at the end of the gas attack the rubber be removed, which can easily be done, and replaced with fresh rubber, which can easily be supplied, there is no fear of injury.

4. As the ear contains usually a lot of fatty matter, sebaceous secretion and wax, the gas, getting into this material and being absorbed, will probably act in a very harmful manner on the canal for an indefinite period.

The ear plug will protect from this, as the gas is not likely to get past the rubber.

By far the most important, and those which to a certain degree can be prevented, are the indirect injuries. Rupture of the drum is

a very frequent injury, may occur in any portion, though commonly thought to be more often found in the lower half; whether in the anterior or posterior quadrant, is a matter of dispute. Ruptures are made more easily with a previously existing catarrh, or its sequelæ, or in those cases with scars and atrophic areas. Strangely enough with the ruptured drum, or one with a previously existing perforation, fewer internal ear complications are found after exposure to heavy detonations. The status of the partial vacuum following an explosion and the rôle it plays, if any, in the production of perforations, has up to the present remained uninvestigated so far as can be learned. Protection against the above form of damage is theoretically very simple, as any agent that will stop the inrush of air and prevent the change of pressure will suffice, and it is believed that no other will. All half-way measures are only relatively useful. Cotton saturated with vaseline or glycerin and compressed, or molded with wax or clay, if air-free, protects. The various plasticine preparations protect against this form of injury. Of the patented devices, those that simulate or are modified ear plugs, and make less pretense of allowing slight sounds and air waves to pass, show excellent results on tests. Among these are the British "Tommy" and the later productions of Baum. The last have been so modified that at present they represent diametrically opposed ideas to the ones originally exploited, and consist simply of a filled cylinder capped, and inserted in the ear.



BAUM'S latest model (rubber) Ear-protector.

Commotion of the labyrinth, organic disturbance of the internal ear, and interference with the central nervous system and cerebral pathways, are very hard to prevent. The part played by bone conduction is in dispute; the matter has been thoroughly presented pro and con in recent literature, but apparently no decision can be reached. So far as trauma, from changing pressure or intense sound aerially conducted, is concerned, and against changes causing driving in of the foot piece of the stapes as well, protection is secured by interposing an object to break the impact, and the more nearly complete the break is the more nearly perfect the protection. Protection against constant noise is, for practical purposes, out of the ques-

tion, particularly on ships. It would involve ear stoppage and insulation by rubber-soled shoes and rubber gloves. Gradual deterioration of hearing developing from this cause must be considered a professional deafness similar to that of ironworkers in general.

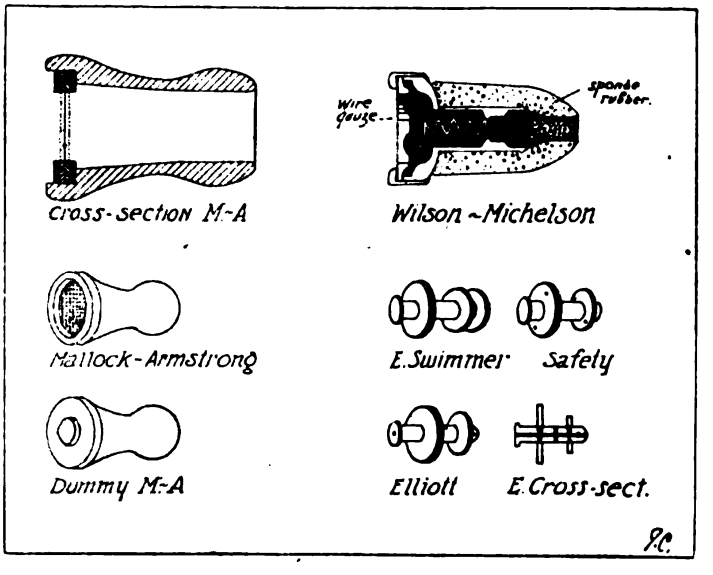
So far as ear protection can be secured, the conditions surrounding naval warfare are highly favorable for its adoption. The time of an engagement is limited, the element of surprise is practically eliminated, the question of interfering with the hearing is of little importance; the noise around the ship renders sharp distinction in sound out of the question, so that actual protection is the main item to be considered. The explosive effect and disturbance in air pressure would be intensified in close compartments, so that protection must be secured even at the expense of loss of acuity of hearing.

One of the most common methods of protection, and that shown in nearly all pictures taken at the front where batteries are engaged, consists in stepping back, half opening the mouth, and stopping the ears with the fingers, probably one of the best methods of protection, but naturally not practicable for those being shelled. Cotton is in common use in nearly all services, and while tests show that it affords scant protection when used dry, practical experience seems to indicate that it is of some value; its efficacy undoubtedly depends to some extent upon the individual and his skill in successfully introducing it so as to exclude air. Cotton-wool or lamb's wool was used as a means of protection in the British Navy, and reported April 26, 1916, as follows:

> For protection of hearing, cotton-wool or lamb's wool is chiefly relied upon. This simple method is still found to be the best for general purposes, and the great majority of officers and men still continue to prefer it. The wool should be applied in layers or flakes, and should not be rolled into a hard ball. The men are instructed to keep their mouths open during exposure to the noise of gunfire. The Mallock-Armstrong patent ear defender is supplied to ships, and any officer or man can provide himself with this contrivance on payment. Though in theory the Mallock-Armstrong defender should give better results than wool, experience does not show that it is in any way superior as a protection, though possibly orders may be heard more distinctly with it than with wool. The objections to the Mallock-Armstrong defender are its rigidity and the difficulty of insuring an accurate fit.

Cotton possesses the advantages of simplicity and cheapness, and for use in a campaign of rapid movement, it is probably the most practical measure, though surpassed in tests by other substances. In the tests carried out by Guild at Ann Arbor, it showed up very poorly, the excursions or tambour tracings being 56.50 mm. using dry cotton plugs, while they were only 61.67 mm. with the ear open. Water-soaked cotton gave a reading of 1.17 mm., glycerin-soaked cotton 0.35 mm., and vaseline-soaked cotton 0.30 mm. The results of experiments here and at Indianhead will be tabulated later.

The Elliott Perfect ear protector has been more or less extensively used in the Navy for several years, and has given a certain amount of satisfaction. The principle underlying these patented protectors, with the exception of the "Tommy," and the old ear stopple of Frank, is the production of a sort of double chamber, guarded in some cases by a valve, or with the inlet and outlet at right angles, or guarded by a tortuous channel. The idea is to admit ordinary sounds, but to interfere with the free entrance of intense and powerful air waves and sound vibrations. The theory seems correct, but experience and practical results do not show the protection desired. The Elliott "Swimmer" differs from the "Perfect" ear protector, in that the central column is not perforated, and it is supposed to be water-tight. Theoretically, it should give excellent protection, and does show up better than the "Perfect." Guild's experiments showed an excursion



on the register of 48.77 mm. with the "Swimmer," as compared to 54.65 mm. with the "Perfect." Both have the disadvantage of acting as secondary missiles, and the same criticism applies to the next type patented under the name of "Safety," which is very similar to the Elliott types, and on superficial examination differs from the Elliott "Swimmer" only in that the discs are perforated to admit air waves, these perforations being so situated that the under ones are 90° on an arc away from the upper. The discs are not fixed, and it can readily happen, that they may rotate, so that the holes are in a straight line, one above the other. On similar principles is the obturator of Verain, a French device, which is an ovoid prolonged at one end by a conducting cylinder. Air enters at a small orifice, which leads into an interior chamber, where the effects of vibration are supposed to be diminished; air escapes through a small

orifice leading out at right angles to the entrance. None of these could be secured, and no experiments were carried out with them.

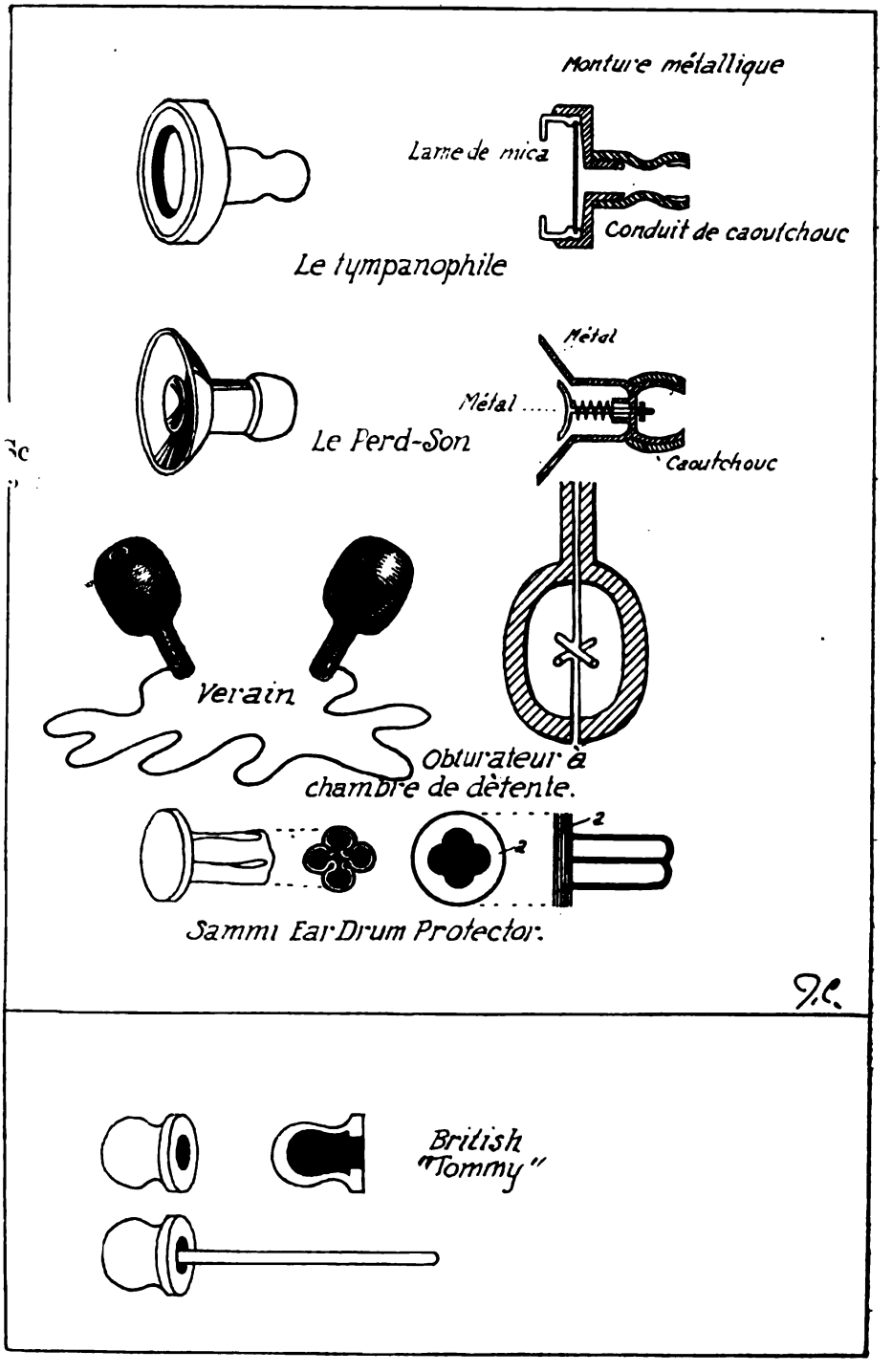
The Mallock-Armstrong ear defender has been used quite extensively by the British. It consists primarily of a body resembling an ear speculum, closed off by two screens of fine wire gauze, and between them a vibrating membrane. This device was gotten up by Mallock for his own personal use at the Armstrong Gun Factory, and has been used by their employees for a number of years with satisfactory results. Its relative value in the Guild experiment was 1.02 mm. compared to 61.67 mm. with the ear open. The "Tympanophile" which might be considered a French counterpart, consists of a metallic mounting, with a hard rubber speculum attachment, having mounted over the entrance a thin, mica disc. None could be obtained and no record of their tests could be found.

The Wilson-Michelson may be considered representative of another group, based upon a valve action which is theoretically so adjusted, that waves produced by detonation, will cause the valves to move inward and close the inlet. The entrance is protected by a fine wire gauze, and the portion to be inserted into the external canal is covered by a layer of rubber sponge. In Guild's experiments, the excursions with the Wilson-Michelson, measured 13.42 mm. Against this type, there are many disadvantages; rust, dirt, corrosive gases or liquids, would all interfere if not destroy the valve action, and the protector itself could easily become a secondary missile. The Perd-Son is similar in construction, having a small concave aluminum disc, supported by a spring. It was devised with the idea of allowing ordinary sounds to pass wthout diminution but to arrest loud sounds, and violent displacements of the air. It is open to the same objections and probably more than the Wilson-Michelson.

The next group embraces the "Tommy," and similar non-perforated ear protectors, made of rubber for the most part, and making no pretense of allowing direct transmission of sound waves. The "Tommy" is patented in Great Britain and France, and consists of a hollow, soft rubber bulb, resembling a miniature nipple, or rubber cap of a dropper. In the Ann Arbor experiments, the excursions on the registering paper were only 0.27 mm., surpassing in theoretical protection the wax cone and impregnated cotton. The Baum as now made, consists of a fluted rubber bulb with a sort of flange or collar, and the top is covered with a thin, rubber membrane. As made in the tests reported, it consisted of a similar shaped contrivance made of oiled silk or muslin, and was impracticable, not durable, and unless filled with silk floss or made of double thickness, did not protect.

A gelatine capsule was tried out, following an idea reported from the French service, but was of no use as it shattered from a simple

concussion produced by pistol shot. Various mixtures of wax and clay have been recommended, and undoubtedly protect. One in use



in the Italian Navy, consists of yellow wax with 36.4 per cent of liquid vaseline. They are issued in cone-shaped gauze bags.

The matter of protection of the hearing of aviators or others obliged to work around aeronautical engines has been considered, and Lieutenant Colonel C. W. Richardson, forwarded some protectors to Engineer of Tests, Aeronautical Engine Testing Laboratory, and a copy of his report is inserted. Similar experience was had at a naval air station and the medical officer recommended plugs of treated cotton, whose effect would be practically the same as cotton and vaseline. The possibility of the constant use of an ear protector with comfort is rather slight.

From: Engineer of Tests, Aeronautical Engine Testing Laboratory.
To: Bureau of Steam Engineering.
Via: Officer in Charge, Engineer Officer and Commandant, Navy Yard, Washington, D. C.
Subject: Report of test of Wilson Ear Protector, Baum Ear Protector, and Elliott Ear Protector.

1. The ear protectors noted above were tested as follows:

(*a*) Wilson ear protector. Pair No. 1 was given to one of the men with instructions to use during five-hour test of Curtiss 200 horsepower motor, one of the noisiest motors in use. At the end of 1½ hours the protectors had to be removed, the man complaining of a headache and stating that there was practically no reduction in sound as compared with the unprotected ear. Pairs Nos. 2, 3, and 4 were tested by three different members of the laboratory force. The protectors were used in close proximity to the engine for short periods of time. In every case the result was unsatisfactory, the reduction of sound as compared with the unprotected ear being very slight. Besides being ineffective, these protectors are very uncomfortable to wear and are apt to fall out of the ear.

(*b*) Baum ear protector: One pair of these was tested by use in close proximity to the engine for short periods. This protector gave absolutely no reduction in sound over the unprotected ear; therefore, further tests were not conducted. It also has the serious disadvantage that it required special instruments to insert and remove it.

(*c*) Elliott ear protector: This protector was tried out by using in a five-hour test of the Curtiss 200 horsepower engine. At the end of the test, the user complained of a headache and only a slight reduction in sound over the unprotected ears. These protectors were also used close to the engine for short periods by three other members of the laboratory force. The reduction in sound was found to be less than when ordinary absorbent cotton was used. It is more convenient to use and slightly more effective than the other two types.

None of the above ear protectors are suitable for use in testing airplane engines. Ordinary dry absorbent cotton is as effective as any of them. Cotton soaked with vaseline, is the most satisfactory protector that has been found at this laboratory.

DESCRIPTION OF MECHANICAL TESTS FOR EAR PROTECTORS.

These tests were made at the United States Naval Medical School, Washington, D. C., and at the United States Naval Proving Ground, Indianhead, Md.

The following ear protectors and substances were tested. The tests were made during the firing of a United States Marine Corps revolver and the following guns: 3 in. 50, 4 in. 50, 13 in. 50, and 14 in. 50.

The apparatus used for the tests consisted of a human auricle and membranous canal (resewed to a rubber tube, 2 inches long and one-fourth inch in diameter) removed from a cadaver, an Eyster tambour, and a kymograph with a revolving drum and smoked paper. The auricle and membranous canal were connected by means of a piece of rubber, and glass tubing to the tambour, 10 inches long, which in turn was so set up that the aluminum lever (or needle) recorded on the smoked paper as the drum of the kymograph slowly revolved. All connections of the tubing were made air-tight with wax and carefully tested to prove it.

The revolver tests were made at the United States Naval Medical School, Washington, D. C. In some of these tests a small hemisphere of rubber 1½ inches in diameter was used, instead of the auricle, to collect the concussion waves. In all of this group of tests a large wooden partition, measuring 7 feet by 4, by ½ inch was used to protect the tambour membrane from waves other than those transmitted through the ear protectors. It was placed lengthwise upon a concrete floor and made steady by means of heavy crosspieces at each end. The crack between it and the floor was filled with closely packed soil on each. A hole one-half inch in diameter was bored at a height of 1 foot from the floor and on an equal distance from each end. The auricle was placed against this hole on one side of the partition and the apparatus on the other side of it, the rubber tubing passing through the above-described hole, which was just wide enough to permit passage of the tubing without constriction. There was a layer of closely packed soil 1 inch thick between the concrete floor and the kymograph, and also the iron stand holding the tambour. On the other side beneath the auricle a wooden block was set up, which was used as a rest for the revolver when firing. With this arrangement no external concussion waves affected the tambour, as was proved by the following test. The auricle was completely plugged with wax, and a number of shots fired with the revolver in the same position as in the tests of the ear protectors. No excursion of the tambour lever was recorded in the tracings. Then the wax was removed and very definite excursions of the lever were recorded in the tracings. Thus, it was proved that the partition completely protected the apparatus from external concussion waves and that there was no perceptible vibration of the floor. Also, it proved that the above-described apparatus successfully registered the concussion waves. The position of the revolver in the tests was with the muzzle 2 inches outward and 1 inch behind the auricle.

All of the above-named protectors and materials were in turn inserted carefully in the auricle and a number of shots fired while each was in place. Also, records were made without anything in the auricle, in order to determine the maximum excursion registered and for comparison. (The records will be described later.)

The tests with the guns were conducted at the United States Naval Proving Grounds, Indianhead, Md. The same apparatus was used as in the revolver tests, but the partition was discarded. Because of the great increase in air pressure and vibration during the firing of heavy guns, it was found necessary to entirely inclose the apparatus in a box, with only the auricle on the outside. A small hole one-half inch in diameter was made inside of it, through which ran the rubber-tubing connecting the auricle with the tambour. The box measured 3 by 2½ by 2 feet and was made of wood three-fourths inch thick. On the side opposite to the small hole there was a door which swung from the top. All seams were tightly covered over with strippings and the entire inside of the box, including the door, was lined with heavy felt 1 inch thick. (The iron stand which held the tambour was firmly fixed in place and there was a platform upon which the kymograph rested.) On the bottom there was a layer of felt 2 inches thick, underneath which was a heavy cardboard. The door was so arranged that it could be quickly closed and tightly locked. The entire outside of the box was covered with heavy tar paper to protect it against the weather. In all of these tests the box was placed on a concrete foundation of 4 or more feet in thickness, and during the firing of the 13 and 14 inch guns it was on a separate concrete brick foundation of about 15 feet thickness. This box was found to be practically proof against concussion and vibrations, for when the ear was completely stopped with wax practically no excursion (except one-half mm. when the heavier guns were fired) of the tambour lever were made on the tracings.

The same ear protectors and substances as were used in the revolver tests were tested with the heavy guns and in the same way, except for the use of the box instead of the wooden partition, and that the distance of the apparatus from the guns was, of course, much greater than from the revolver in the tests with it. Because of the limited number of shots fired with these guns, only two or three were fired with each ear protector in place. Also because of the small number of shots fired (or the rapidity of the firing) from the 1, 5, 6, and 7 and 16 inch guns, tests were not made with these guns. Again, more records could not be made because many times the firing was at plates to test them on the shells when, of course, it was impractical to carry on the tests.

Using the rubber bell as a collecting agent, firing the Marine service revolver, fixed charge, 2 inches out, and 1 inch behind bell, using a

cotton packing, six charges, caused tracings ranging from 28,106 microns to 38,585, an average of 31,832; cotton saturated with vaseline had a variation from 1 to 3 mm., an average of 1.917 mm. Cotton and glycerine had a range from 3 to 6 mm., averaging 3,666. Cotton impregnated with wax, a tracing ranging from 0.978 to 1.931, an average of 1.333.

Taking the patented protectors, under these conditions, the Wilson-Michelson varied from 2,311 to 9,546 microns, averaging in six shots 6,349⅔, Baum, original type from 15,691 to 32,771, averaging 23,147⅔, Mallock-Armstrong from 18,320 to 25,459, averaging 22,661⅔, while the "Tommy," gave a negative tracing ranging from 9,435 to 17,210. (Below the line.)

On checking the work, under the same conditions, using first, a gelatine capsule, no diminution could be noted; in fact, there was an exaggeration of the tracing ranging from 29,858 microns to 37,054 and this broke in many fragments. Wilson-Michelson ranged from 2,259 to 6,488, plain cotton, from 5,760 to 21,068—while nothing in collecting bell gave tracing ranging only from 7,674 to 14,305.

The Elliott under these conditions and in this series gave from 1,997 to 2,465 microns. Baum again ran very erratically, ranging from 1,734, one tracing, to 32,621. Mallock-Armstrong ranged from 19,977 to 28,939, while no protector gave a tracing of only 17,437 to 22,882.

It can be readily seen that an accurate approximation of human conditions, or a relatively constant finding, could not be secured, but the idea was merely to conduct a comparative examination to determine the efficiency of each as a means of protection, under identical circumstances. Cotton impregnated with glycerine, vaseline or wax showed up well; the "Tommy" cut off sound waves so effectually that it gave a negative pressure resulting from the partial vacuum.

Approximating human conditions so far as possible, except in an in vivo experiment, which naturally is impossible, the dissected human auricle was next used as a sound collecting agent, other conditions being identical with the foregoing.

Using the Baum original type in 14 successive shots, a variation ranging from 2,429 to 14,279 microns was recorded. Mallock-Armstrong, five shots, gave from 2,245 to 6,867, Elliott from 0.689 to 2,516, plain cotton from 4,372 to 7,186, Wilson-Michelson from 4,696 to 8,954. There was no protection from 26,407 to 28,512, while using cotton and vaseline. In two series of shots, one showed practically no excursion, and the second a slight negative pressure, while the "Tommy" showed practically no excursion. This record is considered to be the most accurate of all, the variations in excursion with no protection were slight, and the results of the individual tracings

in a series varied but slightly, except in the Baum, which as originally made was extremely light and practically impossible to maintain in accurate position.

Transferring the work to Indianhead, where the tests were carried out in the manner noted above, the first series was run with a 3-inch, 50-caliber fixed charge; distance, 18 feet. The following results were obtained:

The "Tommy," two tests, averaged 10,952 microns; cotton and vaseline, two tests, averaged 14,148½; cotton and wax, two tests, averaged 14,316; Wilson-Michelson, two tests, averaged 19,025½; Elliott, "Perfect," two tests, averaged 29,571½; Baum, "Uncle Sam," averaged 40,502½; no protection, 50,432; Mallock-Armstrong, 54,302. This last gave evidence of very little protection. Under these conditions, same membrane, Elliott "Swimmer," gave in another test, 21,415, somewhat better than the Elliott "Perfect"; Safety gave 20 mm.; Wilson-Michelson, 8,690 microns; no protection, 37,172; cotton and vaseline, 26,532. Using a new drum, the results varied; wax averaged 11,004; cotton ran 22,401; Wilson-Michelson averaged about 17 mm.; Mallock-Armstrong, 27,692½; "Tommy," 20,652; Elliott, 19,664.

In another series, cotton showed up best with 16,535; cotton and vaseline, second, with 17,808; cotton and wax, third, with 19,521; Elliott, fourth, with 19,677; Baum, double thickness, fifth, with 20,798; "Tommy," sixth, with 21,005½; Wilson-Michelson, seventh, with 31,648½; Baum, single thickness, eighth, with 34,851½; Mallock-Armstrong, ninth, with 51,061; while no protectors ranged from 38,898 to 52,001. The cotton in this case was undoubtedly very firmly packed in.

One series of tests was made, using the various types of Baum's, as then designed, and in his presence in order to demonstrate the technique used. This was done with a 3-inch 50-caliber gun, distance 18 feet, Baum double thickness; ranged from 8,125 with cap, to 21,247 microns; no protection showed a tracing of 32,724, one test, and 33,354 another; three tests with the "Safety" gave an average of 13,521. Fourteen-inch, 50-caliber, at 19 feet, gave the following records:

	Microns.		Microns.
"Tommy"	34,494	Wilson-Michelson	53,288
Cotton and wax	42,239	Safety	56,137
Cotton and vaseline	44,287	Cotton	56,151
Elliott	51,861	No protection	53,047

From this, it can be seen that very little protection was afforded by anything except the "Tommy," and the cotton wax or cotton vaseline. Plain cotton and the Wilson-Michelson registered actually higher than no protection; the Elliott was slightly under. Another test with the 14-inch, 50 caliber, at 90 feet, gave the following.

	Microns.
"Tommy"[1]	29,164
"Tommy"[1]	30,893
"Tommy"[1]	33,826
Baum, double thickness and with rim	41,571
Baum, "Uncle Sam"	48,132
Baum, single thickness	47,173
Baum, double thickness	41,663
Mallock-Armstrong[2]	42,724
Mallock-Armstrong[2]	49,000

These tests differ to some extent in results from those reported by Guild, of Ann Arbor, who was a pioneer in this work, and to whom great credit is due. From a practical standpoint, endeavor was made to try out various types of protectors around the guns, distributing them to the men engaged in work with them. The results were rather contradictory, some of them appeared to like the Baum, as it was then made, chiefly because of the ease with which it was worn. It is apparently not possible to wear many types of these protectors with comfort. The Mallock-Armstrong showed up particularly badly in these tests, and the Wilson-Michelson did not perform as well as expected. Cotton and vaseline, cotton and wax, and cotton and glycerine to a less degree, show that they afford protection against changes of pressure. Of the patented protectors, only one, the "Tommy," was a consistent performer and is the only one that can be recommended as a result of these tests. For use on shore with landing parties, or with the Marines serving in the Army, or in any capacity in those likely to be exposed to the action of mustard gas, protectors containing oil or fats, and probably wax, are unsuitable. This probably applies to clay as well. This leaves only those made of rubber, since other gases with a heavy chlorine element would render metallic protectors unsuitable, and, in addition, such protectors or similar ones, such as the Elliott or the "Safety," could act as secondary missiles. It is impossible to delay the tests further, to work out the new Baum, which is made of rubber. It should be satisfactory, as the design and principle are good. Up to the present, it is only possible from a standpoint of safety, simplicity, and cheapness, to recommend the "Tommy."

Great credit is due to Rev. Father Torndorf, of Georgetown University, who kindly put the instruments of his laboratory at our disposal, and who so accurately made the measurements of the various tracings. Lieutenant Commander F. P. Hough, Medical Corps, United States Navy, cooperated in this work up to the time of his detachment from the naval proving grounds. Lieutenant Colonel C. W. Richardson, Medical Corps, United States Army, has worked in conjunction and along similar lines in the Army for the past year, and his conclusions as reported to the Surgeon General of the Army are in favor of the "Tommy." Experimental work with animals was contemplated, but found impossible owing to pressure from increased office work, due to the great number of war workers who, as members of the enlisted personnel, are entitled to treatment.

[1] Averaging 31,294⅓ microns.

[2] Averaging 45,862 microns.

HISTORICAL.

THOMAS HENRY HUXLEY.

(1825–1895)

By F. J. B. Cordeiro, Lieutenant Commander, Medical Corps, United States Navy, retired.

Thomas H. Huxley was born in Ealing, a suburb of London, the son of a schoolmaster. He received a little schooling in the public schools, but got most of his education from his father, his brothers-in-law, who were physicians, and from his own efforts. He said that at 12 years of age he used to get up before dawn, pin a blanket round his shoulders, light a candle, and sit up in bed reading Hutton's Geology. "He discussed all manner of questions with his parents and his friends, for his quick and eager mind made it possible for him to have friendships with people considerably older than himself." "As I grew older my great desire was to be a mechanical engineer, but the fates were against this, and while very young I began the study of medicine under a brother-in-law. But though the Institute of Mechanical Engineers would certainly not own me, I am not sure that I have not all along been a sort of mechanical engineer. The only part of my professional course which deeply interested me was physiology, which is the mechanical engineering of living machines; and notwithstanding that natural science has been my proper business, I am afraid there is very little of the genuine naturalist in me."

In 1841 he went to live in the East End of London, where he functioned as assistant to the district physician for the poor. This was preliminary to "walking the hospitals of London" in order, finally, to obtain his medical degree.

He says, "It so happened that the shortest way between the school which I attended and the library of the college of surgeons, where my spare hours were largely spent, lay through certain courts and alleys 9 or 10 feet wide, with tall houses full of squalid drunken men and women and the pavement strewed with still more squalid children. The place of air was taken by filthy exhalations and the only relief to the general dull apathy was a war of words—filthy and brutal beyond imagination—usually ending in a general row. Nobody would have found robbing me a profitable employment in those

days, but I used to wonder why these people did not sally forth in mass and get a few hours eating and drinking and plunder to their hearts' content before the police could stop them and hang a few." We can hardly doubt that it was the practice then, as it is to-day, for young medical students, when visiting in such quarters, to make learned diagnoses, consisting of two Latin terms, which were followed by elaborate prescriptions in which the drugs were compounded, secundum artem. We get a glimpse of the sound common sense which was ever the basic characteristic of Huxley's mind, in the following: Of one of his visits in these slums, he says, "After due examination, even my small medical knowledge sufficed to show that my patient was merely in want of some better food than the bread and bad tea on which these people were living. I said so as gently as I could, and the sister turned upon me with a kind of choking passion. Pulling out of her pocket a few pence and half-pence, she said, 'That's all I get for 36 hours' work, and you talk about giving her proper food.'"

Huxley was now attending lectures at Sydenham College in preparation for the matriculation examination at the University of London. He attained considerable success, winning, besides certificates of merit, a prize—his first prize—in botany. Speaking of these student days, he says: "I worked extremely hard when it pleased me and, when not, I was extremely idle or wasted my energies in wrong directions. I read everything I could lay my hands on." He was particularly interested in physiology and, recognizing that this study was nothing more than the physics and chemistry of living bodies, delved deeply into these branches.

He had not been deeply grounded in mathematics or physics, but one of the matters which he speculated upon much in those days was the possibility of free energy, or perpetual motion. He says: "I remember how my long-brooding perpetual-motion scheme had been working upon me, depriving me of rest even, and heating my brain with chateaux d'Espagne. I finally tremblingly betook myself one afternoon to the Royal Institution and asked the porter, 'Is Dr. Faraday here?' 'No, sir; he has just gone out.' Strange to say, I felt relieved, but as I was hurrying out a little man with a brown coat came in at the glass door. 'Here is Dr. Faraday,' he said, and he turned to me and courteously inquired what I wished. 'To present to you a matter, if your time is not occupied,' I said. 'My time is always occupied, but step this way.' He examined my drawings, but did not think my plan would answer. Was I acquainted with mechanism—what we call the laws of motion? He said that, were perpetual motion possible, it would have occurred spontaneously in nature and would have overpowered all other forces. I saw it was all up with my poor scheme and, after trying a little to explain, in

the course of which I certainly failed in giving him a clear idea of what I would be at, I thanked him for his attention and went off as dissatisfied as ever."

We have here a truly historical incident. We can picture in our minds the room in the Royal Institute. The great physicist, entirely impersonal and unaffected with any sense of his own importance, courteously and patiently listening to the earnest young man whom he knew to be entirely astray in the field in which he was supreme. The young man, who was destined later to contribute fully as much to science as his kindly adviser, going away "dissatisfied" but not crushed. He adds, "I do not appreciate the force of his objection, but did not feel competent enough to discuss the question. However, he exorcised my devil and he has rarely come back to trouble me since."

Huxley now, after having passed his M. B. examinations at the University of London, obtained a commission as assistant surgeon in the Royal Navy. After some months at Haslar Hospital, he was detailed to the *Rattlesnake*, which was about to be sent out to New Guinea on an exploring expedition. Besides his strictly medical duties he was to do work as a naturalist.

It is a curious coincidence that, like two other leaders in science, Charles Darwin and Joseph Hooker, their close friend Huxley began his scientific career on board one of Her Majesty's ships. He lived in the gun room (steerage) with the middies, some of whom were hardly yet in their teens. A man in the midst of a lot of boys with hardly any grown-ups has an unenviable position, but one of these middies, writing afterwards as Captain Heath, said that "Huxley's constant good spirits and fun, when he was not absorbed in his work, as well as his freedom from any assumption of superiority over them, made the boys his good comrades and allies."

The *Rattlesnake* did not return to England for four years, and during that time Huxley was able to keep contented by hard work. He made a great number of drawings of various kinds of animals and sent a number of scientific papers to England, but worried greatly about the latter, as no word ever reached him as to their fate. There were times in the monotony of the cruise when he envied greatly those who were actively engaged in the work of surveying when he could do nothing. His diary and his letters home were intensely human. He writes:

"Of all extant lives, that on board a ship-of-war is the most artificial—whether necessarily so or not is a question I will not undertake to decide—but the fact is indubitable. How utterly disgusted you get with one another! Little peculiarities which would give a certain charm and variety to social intercourse under any other circumstances, becomes absolute sources of pain and almost uncon-

trollable irritation when you are shut up with them day and night. One good friend and messmate of mine has a peculiar laugh, whose iteration in our last cruise nearly drove me insane. There is no being alone in a ship. Sailors are essentially gregarious animals, and don't understand at all the necessity under which many people labor—I among the rest—of having a little solitary converse with oneself occasionally. Hence all sorts of petty intrigues, disputes, grumblings, and jealousies which to the eye of an 'idler' give to the whole little society the aspect of nothing so much as the court of Irenaeus in Kater Murr's inestimable autobiography."

He thus describes sea life in the Tropics: "For weeks, perhaps, those who were not fortunate enough to be living hard and getting fatigued every day in the boats were yawning away their existence. Rain! rain! *encore et toujours*—I wonder if it is possible for the mind of man to conceive anything more degradingly offensive than the condition of us 150 men shut up in this wooden box and being watered with hot water as we are now. Moving about in the slightest degree causes a flood of perspiration to pour out; all energy is completely gone, and if I could help it I would not even think; it's too hot. It's too hot to sleep and my sole amusement consists in watching the cockroaches which are in a state of intense excitement and happiness."

On returning to England Huxley found that his scientific papers had been duly received and much appreciated. The Royal Society shortly took steps to publish them under Huxley's superintendence. He was made a fellow of the Royal Society (F. R. S.) and the next year was awarded the Royal Medal for his work while on the *Rattlesnake*.

He had now been in the Navy eight years and he was forced to choose between a career in pure science or remaining in the service. Happily, after much deliberation, he decided for the former. It was a momentous decision and he knew very well that it meant for him a life of strenuous toil and incessant fighting. The mere existence of a man of science at that time was apt to be precarious and from his intimate acquaintance with the leaders of English science he knew that such a life must be one long battle in which he must expect to take and give many heavy blows. His life, in fact, was one long fight, but there was nothing he delighted in more than a fight for truth. He only demanded fair play and the only complaints he ever made were when this was not forthcoming.

Before leaving the Navy, he had, in 1852, delivered his first lecture at the Royal Institution and had sent his Memoir on the Morphology of Cephalous Mollusca to the Royal Society. Writing of this to a friend, he says: "It is perhaps the best thing I have done, but I do

not know whether they will print it or not. That will require care and a little maneuvering on my part. You have no notion of the intrigues that go on in this blessed world of science. Science is, I fear, no purer than any other region of human activity, though it should be. Merit alone is very little good; it must be backed by tact and knowledge of the world. I am sure if the paper I have sent in is referred to the judgment of my particular friend ———, it will not be published. He won't be able to say a word against it, but he will pooh-pooh it to a dead certainty. The necessity for these little stratagems utterly disgusts me. I am so utterly unable to comprehend this petty jealousy, but I see that ——— is determined not to let me rise, or any one else, if he can help it. Let him beware. On my own subject I am his master and quite ready to fight half a dozen dragons. And, although he has a bitter pen, I can match him in that department also." And he adds, "Science in England does everything but pay. You may earn praise, but not pudding. Last year I became a candidate for a professorship at Toronto, and presented many testimonials, but have heard nothing of the business. I believe the chair will be given to a brother of one of the Canadian ministry. Such a qualification as that is, of course, better than all the testimonials in the world."

Huxley's life now became one of so many interests and his work was so diversified, that to follow his purely scientific investigations alone would give a very inadequate impression of his labors. Great as was the impression left by those researches in purely scientific circles, it is not by them alone that he made his impressions upon the mass of his contemporaries. They were chiefly moved by something over and above his wide knowledge in so many fields—by his passionate sincerity, his interest not only in pure knowledge but in human life, by his belief that the interpretation of the book of nature was not to be kept apart from the ultimate problems of existence; by his love of truth, both theoretical and practical, which gave the key to the character of the man himself.

One of the most extraordinary intellectual combats which the world has ever witnessed, took place in England 30 years ago. It was the celebrated religious controversy which Huxley started by his repeated attacks on systemic theology. As in all such controversies, it was out of the question that he should have convinced the churchmen, but it marks a great advance that those churchmen should have abandoned their attitude of former times, viz, that their position being absolutely unassailable, there was nothing to argue about. They admitted with Huxley that where the truth was concerned all sincere and honest arguments were permissible, and they answered his arguments to the best of their ability. It is further much to the credit of all the participants that they displayed usually the greatest

courtesy and the highest breeding. They gave and took hard blows, but always in a knightly manner.

There was a time when Huxley's pointed thrusts would have been answered by the faggot and torch. It was during this controversy that he added the word "Agnostic" to the English language.

What astonishes us most in Huxley's life is his ceaseless and untiring energy, both mentally and physically—his enormous capacity for work. The popular idea is that genius is spontaneous and that it accomplishes its work automatically—that some men are born great, others achieve greatness, while still others have greatness thrust upon them. In scientific matters, nothing could be further from the truth. The outstanding difference between the giants of science and their lesser brethren seems to be their capacity for withstanding strains, both physical and mental, of which the latter are incapable. Newton, when asked how he was able to make his extraordinary discoveries, replied, "By intending my mind." In other words, his was what would have been an everyday mind, had it not achieved greatness through the discipline of hard work. And so, in looking over Huxley's busy life, we find that for 13 years he was examiner in physiology in the University of London, Hunterian professor of comparative anatomy in the College of Surgeons, Fullerian professor of physiology in the Royal Institution, and an officer in so many other institutions, both public and private that the list is bewildering. We can get a slight idea of some of his activities from a letter written to Charles Darwin in 1863. "You ask me what I am doing, so I will enumerate a few of them:

A. Editing lectures on Vertebrae skull and bringing them out in the Medical Times.

B. Editing and rewriting lectures on elementary physiology just delivered here.

C. Thinking of my course of 24 lectures on the mammalia at College of Surgeons next spring and making investigations bearing on same.

D. Thinking of and working at a manual of comparative anatomy (may it be d——d), which I have had in hand these seven years.

E. Getting heaps of remains of new labyrinthadonts from the Glasgow coal field, which have to be described.

F. Working at a memoir on Glyptodon based on a new and entire specimen at College of Surgeons.

G. Preparing a new decade upon fossil fishes for this place.

H. Considering writing up a lot of Indian fossils.

I. Being blown up by Hooker[1] for doing nothing for the Natural History Review.

K. Being bothered by sundry editors just to write articles "which you know you can knock off in a moment."

[1] Sir Joseph Hooker, the great naturalist.

L. Conscious of having left unwritten letters which ought to have been written long ago, especially to Charles Darwin.

M. Ten or twelve people taking up my time all day about their own affairs.

N. O. P. . . . W. X. Y. Z.

Societies, clubs, dinners, evening parties, and all the apparatus for wasting time, called 'Society.' Finally pestered to death in public and private because I am believed to be what they call a 'Darwinian.'"

His ideas on medical education are as valuable now as they were when given, and there could be no more competent judge. Strange to say they have never received any attention. He had a good knowledge of mathematics and physics and he recognized that the exact science of "mechanics" was the substratum upon which the more inexact sciences must perforce rest. He was generally credited with being a hard examiner, but he says "I have asked for some knowledge of the physics and mechanics of the human body and I have been met with a talk about cells. I declare to you I believe it will take me two years at least of absolute rest from the business of examiner to hear the word "cell," "germinal matter," or "carmine," without a sort of inward shudder. It is a comparatively easy matter to learn anatomy and to teach it; it is a very difficult matter to learn physiology and to teach it. It is a very difficult matter to know and to teach those branches of physics and those branches of chemistry which bear directly upon physiology. . . .

. . . I do not believe that all the talking about and tinkering of medical education will do the slightest good until the fact is clearly recognized that men must be thoroughly grounded in the theoretical branches of their profession, and I would cut down these branches to a very considerable extent. The next thing to be done is to go back to primary education. The great step toward a thorough medical education is to insist upon the teaching of the elements of the physical sciences in all schools, so that medical students shall not go up to the medical colleges utterly ignorant of that with which they have to deal; to insist upon the elements of chemistry, and the elements of physics being taught in our ordinary and common schools, so that there shall be some preparation for the discipline of the medical colleges. And if this reform were once effected you might confine the "Institutes of Medicine" to physics as applied to physiology—to chemistry as applied to physiology—to physiology itself, and to anatomy. Afterwards, the student, thoroughly grounded in these matters, might go to any hospital he pleased for the purpose of studying the practical branches of his profession.

But you may say, "This is getting rid of a good deal; you are getting rid of botany and zoology to begin with." I have no doubt they

ought to be got rid of as branches of special medical education. They ought to be put back to an earlier stage and made branches of general education. I believe that comparative anatomy ought to be absolutely abolished. Make it part of the arts teaching if you like, but abolish it.

I recollect that when I was first under examination at the University of London, Dr. Pereira was the examiner, and you know that "Pereira's Materia Medica" was a book de omnibus rebus. I recollect my struggles with that book late at night and early in the morning—I worked very hard in those days—and I do believe that I got the book into my head somehow or other, but then I will undertake to say that I forgot it all a week afterwards. Not a trace of the knowledge of drugs has remained in my memory from that time to this; and really, as a matter of common sense, I can not understand the arguments for obliging a medical man to know all about drugs and where they come from. Why not make him belong to the Iron and Steel Institute, and learn something about cutlery because he uses knives?"

Huxley's greatest service was, of course, the placing of the doctrine of evolution upon an impregnable foundation. Broadly, this doctrine is that after the earth had acquired, on its long evolution from the original nebula, conditions where life was possible, such life did appear in its most primitive forms, and that from these primitive beginnings our present fauna and flora have gradually evolved. The palaeontologist does not concern himself with the actual beginnings of life, for he recognizes that no records of such an actual beginning could possibly have been preserved, but only in tracing the gradual development of such records as exist. It is natural that mankind should have believed until yesterday, as it were, that all the different types of animals and plants which we find upon the earth were created originally exactly as they are now and that they will persist forever in their present forms. Even such learned naturalists as Buffon and Cuvier could find no other explanation and looked upon every animal and plant as a special creation. In other words, there was an instant when these organisms were nonexistent and an instant directly after when they possessed their present unalterable forms, and, according to the Scriptures, they were all created at the same time, or practically so, in various groups.

Palaeontology showed that many of the forms which once existed no longer exist, and that many other forms did not come into existence until long after certain other forms. Hence it was evident that if every form was the result of a special creation, these creations were not simultaneous but distributed over immense periods of time. As long as it was generally held that all science (or knowledge) must be based upon the biblical account of the creation, there was

an irrepressible conflict between "science" and "religion," and science was forced to stand still and deny the evidence of its senses under various dire penalties.

As Huxley says, "It is, indeed, a conceivable supposition that every species of rhinoceros and every species of hyena in the long succession of forms between the Miocene and the present species was separately constructed out of dust, or out of nothing, by supernatural power; but until I receive distinct evidence of the fact, I refuse to run the risk of insulting any sane man by supposing that he seriously holds such a notion."

In many cases there was evidence of a gradual and almost insensible change of one form into another, but in many more instances all "links" of evidence were entirely wanting and seemingly undiscoverable. Granting the probability or only the possibility of a gradual chain of descent, it was *a priori* evident that many of the links must have been irrevocably destroyed and lost forever. But it was the work of evolutionists, by slow and painful toil, to build up these chains wherever possible, and in this Huxley did yeoman service. Of the links still existing, but as yet undiscovered, it will take centuries of the most difficult labor before a majority of them are unearthed, and many of these can never be unearthed. Nevertheless, the science of probabilities, upon which, after all, all our positive knowledge is founded, tells us unmistakably that all forms of life, our own included, have developed from simple and primitive forms through a long chain of gradations over immense periods of time. "If that is contrary to religion," said Huxley, "then so much the worse for religion."

It would be impossible in a sketch like the present one to give a list of even his more important papers and scientific activities. These were each separate insets into the general mosaic of his life-work. Likewise to give a record of his degrees and honors, and the various positions he occupied in learned societies of the most diverse character would be to present a catalogue which would weary the reader.

But more important than these things is an appreciation of the character of the man, which alone made his work possible. In his mind no compromise was possible between truth and untruth. His passion for truth[1] was his strongest characteristic, with complete disregard of personal consequences in uttering unpalatable facts.

Against authorities and influences he published his "Man's Place in Nature," though warned by his friends that to do so meant ruin

[1] Once when writing a eulogy of a dead friend, he said, "The only serious temptation to perjury I have ever known, has arisen out of a desire to be of some comfort to people I cared for in trouble. Mrs. ——— is such a good devoted woman, and I am so doubtful about having a soul, that it seems absurd to hesitate to peril it for her sake."

to his prospects. The lie from interested motives was only more hateful to him than the lie from self-delusion or foggy thinking. With this he classed the "Sin of faith," as he called it—that form of credence which does not fulfill the duty of making a right use of reason: which prostitutes reason by giving assent to propositions which are neither self-evident nor adequately proved. Truthfulness, in his eyes, was the cardinal virtue, without which no stable society can exist. He wrote: "Warfare has been my business and my duty," and when he died, unlike the great mass of individuals whose existence is entirely immaterial as regards the progress of mankind, he left the world distinctly richer.

EDITORIAL.

ACCURACY.

One is sometimes forced to believe that Lord Bacon's famous dictum: "Writing maketh the exact man" is more honored in the breach than the observance. One of the startling surprises, and it must be said also one of the pleasant disappointments, of the writer's early service in the Navy was the discovery that one could be guilty of truly appalling errors and of many sins of omission and still go unpunished. The outsider often has an exaggerated idea of the severity of Navy discipline. Perhaps after all the discipline is severe as regards the punishment inflicted but the people higher up considerately omit to act upon all of the omissions of the people lower down.

"I hate that accurate, methodical fellow," you say. "This other chap is careless and absolutely unreliable, but I love him."

Very true; but if you robbed the first man of his accuracy you would still dislike him, and if the second man mended his ways he would be just as lovable. Virtue is not a crime, but it is very unattractive in uncongenial people.

Many young officers turn up their noses at paper work and disdain to take pains with regard to reports. "I am a surgeon, not a clerk," says one. "I'm hanged if I will drive a quill all day for anybody," says another. The former is often less of a surgeon than he is pleased to suppose and might perhaps be of some positive value in the world if he had in him the making of a good clerical assistant; the latter might be in real danger of suspension if he did write.

Recently in looking over some hundreds of death reports and health records it was astounding to note how common were errors due to carelessness and how willing medical officers were to sign their names to papers they had not read over, or that charity presumes they had not read over. If accurate reports were wanted merely for dry statistical charts, one could perhaps forgive the man who is guilty of errors, but reports are for something more than the annual statement or the weekly bulletin. Accuracy in the tabulation of facts and phenomena and in their proper interpretation is the basis for any legitimate inferences to be drawn from them. Every clinical case inaccurately reported and every record failing to make its significance clear have to be thrown out by the seeker after truth. An incident of sickness and treatment which might furnish a strik-

ing illustration and convincing argument in some important advance in the profession is often useless as evidence *in the form in which it is reported.*

A concrete example may make clear the far reaching and often unexpected result of an apparently trivial omission. A certain medical officer desiring to reply to the frivolous charge that anesthetics were not competently administered in the Navy undertook to look up the number of deaths following anesthesia in the service and it was naturally incumbent upon him to discriminate between the effects of the operation itself and the effects of the preexisting condition on the anesthesia. Naturally in a limited number of anesthetizations the cause of death in the case of two or three patients affects the per cent enormously. In one report many details were omitted and doubt was entertained as to the actual cause of death. It was carefully stated that death occurred at 3 p. m., but there was no statement as to the hour at which the operation had taken place. As a mere death certificate the document was clear enough and the writer of it doubtless had an opinion of his own as to what killed his patient, but it contained no data of value for the investigator.

Failure to make the necessary entries in a health record resulted recently in a young man's getting no less that eight inoculations against typhoid fever within a period of six months. He was a recruit for war service, a college man, and evidently a chap with something more than the ordinary allowance of good nature. Apparently the subject of these repetitions assumed that they were a part of the Navy routine and in the spirit of true discipline endured them without complaint. Later a civilian physician treating him for some obscure form of jaundice stumbled upon the history of these repeated inoculations and tried, not without a show of reason, to establish a genetic connection between the antityphoid treatment and the disturbed gall bladder. Had the patient or physician been given to what the Italians call *pettegolezza* there might have been results "to the prejudice of good order and discipline." Parenthetically it may be remarked that, if our figures can be relied on, there is no evidence of any increase of jaundice or gall bladder infection in our personnel since antityphoid vaccine was introduced into the Navy. It would be interesting if one could go further and declare that cystic disturbances have actually been less prevalent since the antityphoid injection became general in view of the important rôle played by Eberth's bacillus in gall bladder infection.

The medical officer should make it a point to be painstaking, methodical, and accurate in all written reports. If he can not have that larger view of the question which these paragraphs aim to inspire then he should have sufficient personal pride to make his reports carefully. Most of us have pride, but we often discredit ourselves

through not understanding how and when pride may properly modify conduct. Many a man is reticent of speech and slow to compromise himself by uttered words, thus passing for wise until he puts on paper some vulgar, ungrammatical or impossible statement and signs his name to it. Those who heard the spoken word forget or forgive it or better still die and so become unable to cherish it against him, but the written word may remain to provoke mirth or scorn or pity from generation to generation, whether he referred to the deep *Palmer* arch, or spoke of a recommendation for *waifer* of physical defects, or described a movement in space as horizontally upward.

MITITARY TITLES AND MILITARY BEHAVIOR.

By a recent ruling staff officers are henceforth to be addressed by the titles of their rank. The discussion of the wisdom and propriety of this radical innovation has no place here, but, as it was undoubtedly intended to enhance the standing and facilitate the performance of duty, some reflections on the altered situation may be in order, and it is certainly pertinent to consider whether the change in question involves an obligation for the staff officer to modify his conduct in any particular.

For years it has been the contention of many members of the medical corps that their position in the Navy entailed duties essentially different from those discharged by physicians in civil life. It has been insisted by many and perhaps felt by all that if a doctor was a member of a military organization he necessarily had a certain military status in that body and had a right to a clear definition of his duties in respect to all and not merely in respect to part of his duties and that justice was not done him if there was not official recognition of all of them. Being, necessarily, from his very presence on board a participant in military drills, having frequently to perform duties by no means medical (for example, sitting as member of a court-martial) and having to receive and give orders, even though the latter were in a restricted field, he deserved the full recognition of his military status.

Whatever the justice of this and other claims might be there was one argument which could too often be properly advanced against them. The doctor brought with him from civil life much of that dislike for business, for orderliness, for methodical procedure which is a common failing of physicians. The medical officer did his duty by the sick but often chafed under military restrictions and requirements and neglected or escaped them whenever he could. The unmilitary spirit was often most conspicuous in matters that related to his own corps. The younger men, who of course consider them-

selves vastly superior in knowledge to their seniors in years, liked to think that they were all doctors together and could simply relax and lay aside military etiquette when there were no outsiders present. The doctor who was scrupulously careful to salute his executive officer or the commanding officer on board ship felt no compunction in passing his corresponding superiors in the hospital with a friendly nod, a wave of the hand, a grimace, or a familiar jest. When differences of professional opinion arose the medical officer was prone to say to himself and even to say aloud that a doctor was a doctor and that in the matter of treating the sick rank did not count. This may or may not have been the proper spirit but it was in marked contrast to the attitude maintained by the medical officers to their superiors in the line whose orders were always received with respect and deference even when they derived their source from vested authority rather than from special knowledge, and it was in marked contrast to the bearing of the best military men. The best military men not only render what is due to their superiors but have the moral courage to exact what is due from their subordinates. In a word, medical officers constantly showed that while they understood discipline and were able to observe military etiquette toward those in other corps they regarded these things very lightly among themselves, and yet they showed surprise or resentment if others declined to make careful the distinctions toward them which they themselves laid aside in their dealings with each other. It never seemed to occur to them that organizations and bodies of men, just as is true with individuals, are taken by others at their own valuation. When an assistant surgeon was ordered to duty as the relief of a medical inspector, while other officers at the station where he reported were carefully assigned according to rank, the effect upon them was to emphasize the fact that rank was a secondary consideration in the medical corps, and the conduct of medical officers often bore out this belief. As a Nation we are not inclined to attach much weight to the externals of military life, forgetting that supposedly minor details of outward bearing are often the index of vital things under the surface. The man who despises the essentials of military organization and is incapable of conforming to them should not masquerade in a uniform. The medical officer, alas, needs too often to be reminded of the old saying about the depravity of those feathered folk who are careless as to the hygienic standard of their own nests. What we owe to others we also owe to ourselves. A proper sense of dignity includes our corps and our calling. Whatever we render to Caesar we should render also to Herod.

SHELL SHOCK.

Those whose good fortune may not take them to France and even those who may never be called on to treat a case of this kind should attempt to gain some idea of its nature. Whenever a case of nervous disorder is returned from the American Expeditionary Forces abroad the fact gets out through relatives and friends and makes an impression on the local community to which the patient belongs. Medical officers are likely at any time to be asked questions on the subject and so they should be fully informed about it. There are so many sad truths about the Great War that it is most undesirable for any false ideas to gain credence and circulation in regard to it.

In another section of this magazine an attempt has been made to present the views of a number of authorities on the subject of so-called shell shock. This term is objectionable, if taken to mean that a condition resembling traumatic shock and one involving some molecular disturbance of brain matter or nerve elements results from the near-by explosion of a shell, but it hits the popular fancy and would do well enough for popular use if it were made clear that it simply typifies the whole complexus of disconcerting, overwhelming experiences of modern war tending to bring out any latent nervous instability or weakness and to break down the acquired fortitude necessary to endure hardships and trials greater than any previously known in war—experiences operating with especial force on a civilian soldiery whose whole mode of life has been subjected to the most radical change.

SUGGESTED DEVICES.

TYPHOID PROPHYLAXIS CARDS.

By R. B. Henry, Lieutenant Commander, Medical Corps, United States Navy.

Naval Instructions, Article 3212, provide that: "Typhoid prophylactic shall be administered to all persons upon their first entry into the Navy or Marine Corps," and that "The only acceptable evidence of administration of the prophylactic shall be the entry on the health record signed by the medical officer."

In spite of the above, out of the last 500 health records received on the receiving ship at Norfolk, Va. (not including records of recruits or others due to receive the prophylaxis after arrival here), 64, or more than 12 per cent, were defective in that they contained no entry of the administration of the typhoid prophylactic, or only an incomplete entry.

Sometimes an entry of this kind is found: "States that he received typhoid prophylaxis on the U. S. S. *John Doe*, in March, 1918," a statement doubtless entirely correct, but which, in view of the second paragraph of instructions quoted above, is valueless as evidence. In a case of this sort the medical officer has no choice but to administer the prophylactic, and men frequently complain that they have been compelled to receive several series of injections because of defective records and through no fault of their own.

In other instances the instructions have been strictly complied with and the entries carefully made, but the health records have been lost. It is manifestly unfair to such a man to compel him to take the injections again, and yet there is nothing else to do, there remaining no record of the previous administration. Incidentally, this useless revaccination results in much waste of valuable vaccine.

The remedy is simple; let an order be issued directing that every man already in the service who has received the prophylactic be given a certificate of prophylaxis, with dates of injections as gathered from the health record, and that every man inoculated in the future be furnished with such a certificate at the time of inoculation. The men should be enjoined to carefully preserve these cards and informed that they must be shown in order to get liberty; then they will take care not to loose them.

For the medical officer the situation would be much simplified, as he would have only to direct that prophylaxis cards be shown at muster to learn the number of men still unprotected.

Below are the facsimiles of two cards in use on the receiving ship at Norfolk. One is a certificate of prophylaxis, and the other a "temporary" card for issue to men pending the arrival of health records, or while undergoing inoculation. No man can go on liberty unless he has one or the other of these cards in addition to his liberty card.

THE RECEIVING SHIP AT NORFOLK.

TYPHOID PROPHYLAXIS CARD.

..... (Name in full.)

..... (Rate.)

1st..... Dr.....

2d..... Dr.....

3d..... Dr.....

C. P. Vac..... Date.....

THE RECEIVING SHIP AT NORFOLK.

TYPHOID PROPHYLAXIS CARD.

..... (Name in full.)

..... (Rate.)

TEMPORARY.

Not good after.....

A SURGICAL DRESSING TRAY FOR TRANSPORT AND HOSPITAL SHIPS.

By M. J. Price, Lieutenant, Medical Corps, United States Navy.

With the increased transportation of wounded from overseas requiring extensive and repeated surgical dressings, there is a great need for some type of a portable dressing tray that can be handled with dispatch in crowded surroundings.

With this in view the following tray has been devised for use on board the U. S. S. *Northern Pacific*, and has met with such satisfaction that two are in constant use.

The tray consists of a box made of one-half-inch pine. It is 28 inches long, 17 inches wide, and 6 inches deep. (Fig. I.)

The back part of the tray is divided into seven equal compartments, 3½ by 3½ by 6 inches.

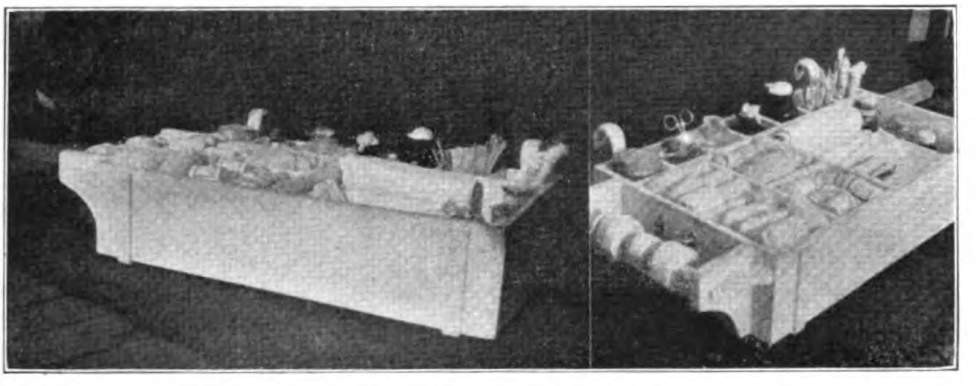
The left side is subdivided into four spaces 5¾ by 5¾ by 6 inches.

At the right side are four divisions 2⅝ by 3 by 3 inches.

Brass handles are located on either side.

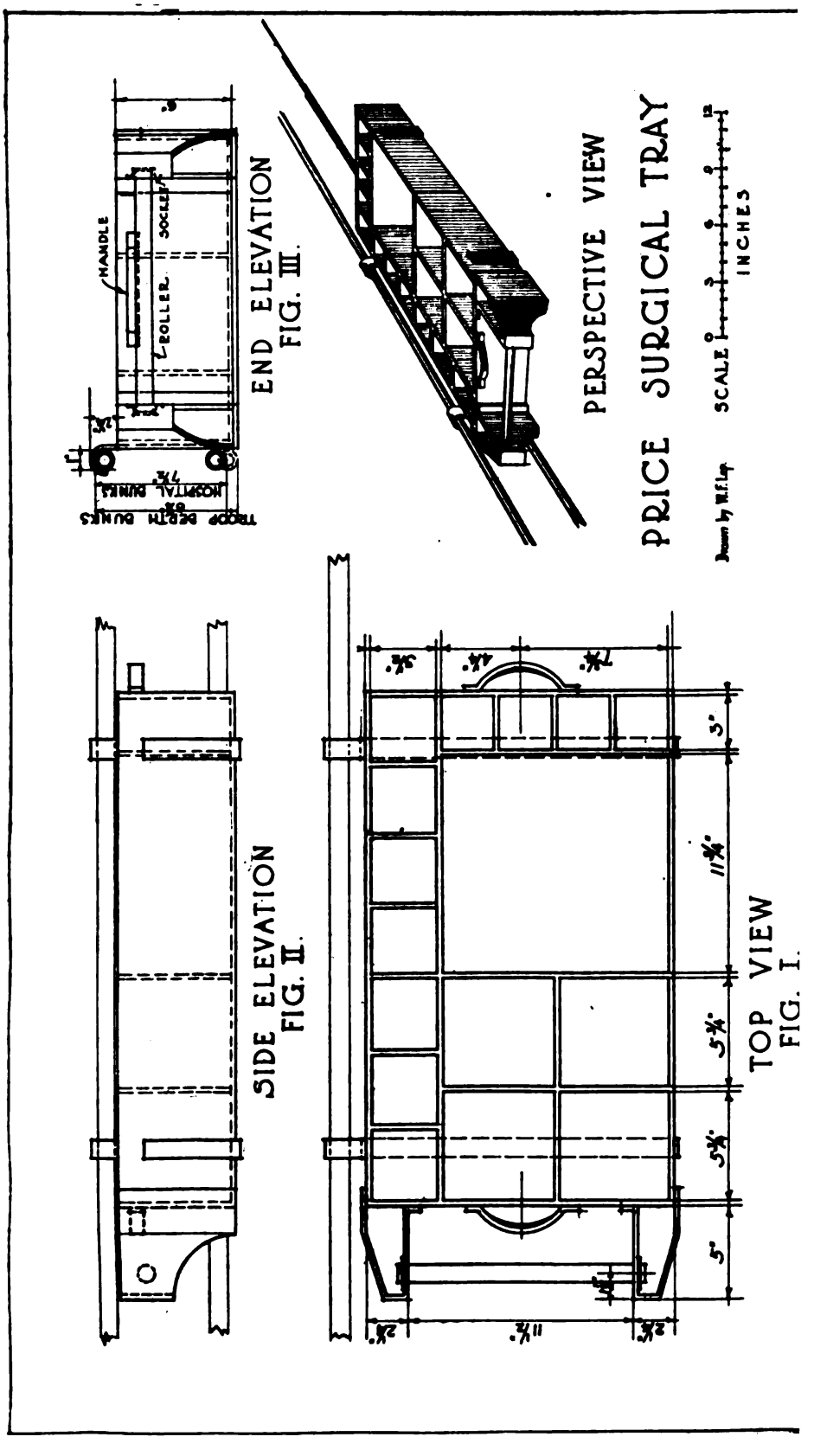
Projecting from the left side of the tray is a roller for adhesive tape. (Fig. I.)

Two iron bands, 1 by 1¼ inches, extend from the front of the box around the bottom and end at the back in two hooks. These hooks



HANDY TRAY FOR SURGICAL DRESSINGS TO BE USED ON TRANSPORTS, ETC.

79-1



have a radius of ¾ inch, extend 1½ inches above the level of the box and are padded.

These iron bands are placed 2½ inches from either end of the box. (Figs. II and III.) Extending between the iron strips on the posterior surface of the box and flush with the bottom is a rubber strip 2½ by ⅜ inch. (Fig. III.)

In use the hooks are attached to the upper rail of the bunk and the rubber strip acts as a bumper against the lower rail of the bunk.

From past experience we have arranged our trays as follows: The four large spaces are used exclusively for sterile dressings and bandages. The after compartments hold: Zinc oxide paste; Ol. terebinth; alcohol sponges; Dakin's Sol. or eusol; tongue depressors; applicators; sterile Carrel and drainage tubes; sterile gauze drains and packs. The smaller right-hand spaces contain: balsam Peru; thymol iodide; talcum; and smaller bottles of silver nitrate, iodine and potassium permanganate, etc. The big compartment contains 20 to 30 sets of sterile instruments and one instrument tray.

This dressing tray can easily be modified to suit surroundings and should prove a great time saver.

A USEFUL AND INEXPENSIVE FLY TRAP.

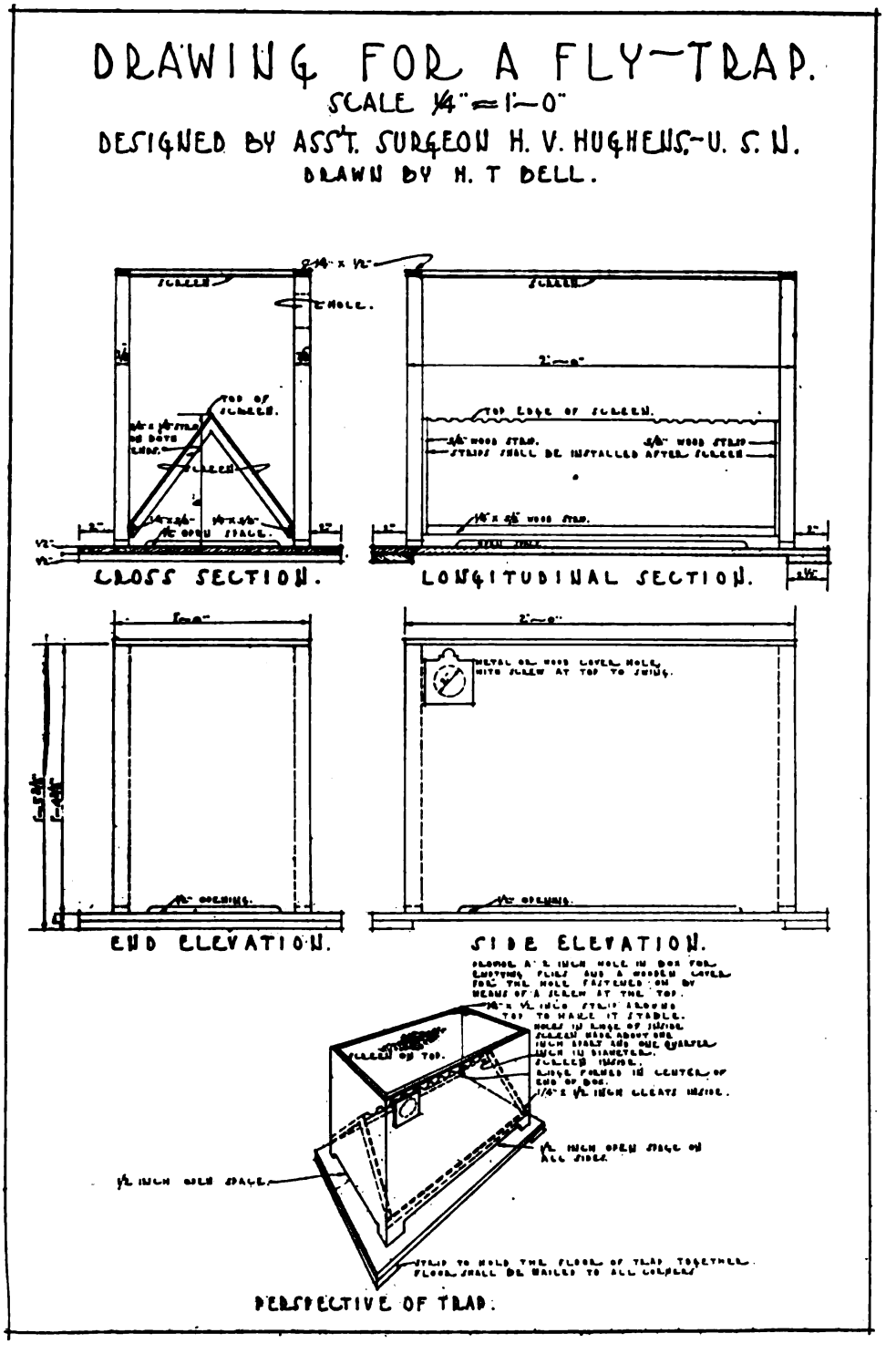
By H. V. Hughens, Lieutenant, Medical Corps, United States Navy.

The sanitation officer of Camp Lewis, Wash., whose name I do not recall, when here in the early summer stated that he was using discarded boxes for making fly traps. An accurate description of the type of trap made by him was not obtained. From his suggestion that discarded boxes be used we perfected the trap shown in the accompanying illustration. We compared this trap with others and found that it caught a larger number of flies, everything else being equal, than the other traps.

The trap is simple and inexpensive, costing about 45 cents when copper wire is used and 30 cents when common iron wire is used. The cost is less for smaller boxes because of the smaller amount of wire required. Any kind of box may be used in the manufacture of the trap. The smaller traps, being about as efficient as the larger and costing less, are preferred.

The construction is simple. An opening one-half inch deep is cut on all sides of the bottom of the box, starting about 3 inches from the corners. This space is to be used for baiting the trap as well as for the flies to pass in. A hole 2 inches in diameter is bored near the top and one corner of the box for emptying the flies, should it be desired to do so. This hole is covered by a piece of board about

3 inches square, fastened to the top by a screw. I consider it unnecessary to empty the trap of flies, because it works much better



when dirty and full of flies. The flies when trapped only live four or five days. A piece of screen is cut an inch longer than the length

of the interior of the box and wide enough to form a roof, the ridges of which will come about the center. The screen is then tacked in at ends and sides of the box. Next some one-fourth by one-half-inch strips are mitered and tacked around the edge of the screen in such a way as to pull it taut. The screen is tacked over the top, the one-fourth by one-half inch is mitered and tacked around the edge.

Along the ridge of this inside screen one-fourth inch holes are made about 1 inch apart by taking a pair of pointed scissors, clipping one wire and turning the scissors, making the round hole. The platform is made about 2 inches wider and longer than the box and is nailed to the box at all corners. Trap may be painted green and stenciled "Sanitation."

SCALE FOR MEASURING FLAT FOOT.

By B. DUNHAM, Lieutenant, Medical Corps, U. S. N. R. F.

The device illustrated below has been employed at the recruiting office in Buffalo with marked success. It effects a saving of time and gives accurate, uniform results.

1. DESCRIPTION OF SCALE.

(*a*) A right angle piece (*abc*, Fig. I) consisting of a horizontal arm (*ab*) and a vertical arm (*bc*) with graduations on left edge.

(*b*) A vertical sliding piece (*de*, Fig. I) with graduations on left edge produced to right in arcs of circles radiating from end *d* and with lines radiating from end *d*.

(*c*) A diagonal piece (*fg*, Fig. I) sliding laterally to right and left and sliding upward and downward between ends *d* and *c*.

(*d*) The opposite side of the scale is similar in all respects to that of the view presented.

(*e*) It has been found that the scale constructed of metal (German silver) is preferable to celluloid.

2. OPERATION OF SCALE.

(*a*) Have the applicant stand on a smooth table in a good light. To measure the left foot, for example, grasp the scale at *c* (Fig. III) between the index finger and thumb of the left hand. Stand to left of applicant and with right hand posteriorly to ankle palpate the scaphoid tubercle (*r*) with the right index finger. Place and keep the lower end of scale *d* (Figs. II and III) opposite tubercle *r*, and depress scale *abc* to the surface of the table (*hh*).

(*b*) With the third and fourth fingers of the left hand (Fig. IV) hold the base *ab* to surface of table and with the right hand slide bar *fg* along slot in scale *ab* until pin *k* is opposite the center of the prominence formed by the articulation of the great toe with the first metatarsus (Fig. II).

(*c*) With the right index finger (Fig. IV) palpate the lower border of the internal malleolus and depress bar *fg* until the lower edge is opposite the lower border of the internal malleolus (Figs. II and IV). As constructed the lower

edge of bar *fg*, produced coincides with the line *pm* connecting the lower border of the internal malleolus *p* with the lower tubercle *m* of the first metatarsus (Feiss line).

3. READINGS OF SCALE.

(*a*) Feiss measurement: This is the depression (*rn*, Fig. II) of the scaphoid tubercle below the Feiss line and is equivalent to the reading at point *o* on the

A

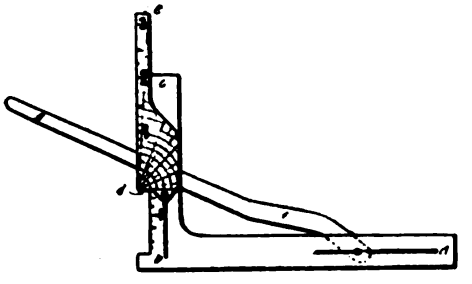


Fig I.

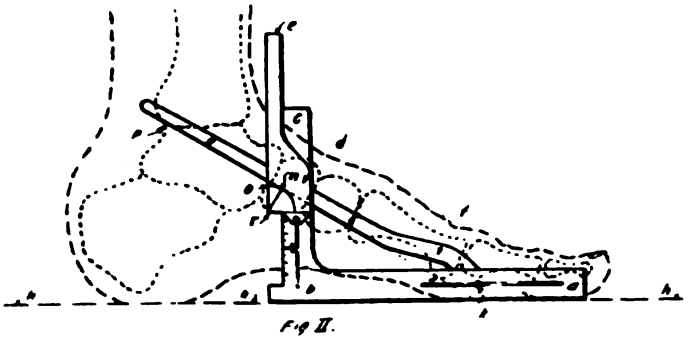


Fig II.

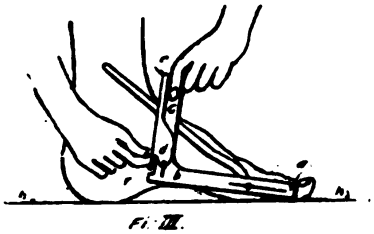


Fig III.

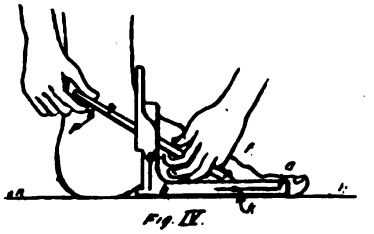


Fig IV.

scale *de* on which *n* is the point of tangency of the lower border of the bar *fg* (Feiss line) with the circle whose radius is *rn* and whose arc is *no*.

(*b*) Height of arch: This is the elevation (*rh*, Fig. II) of the scaphoid tubercle above the weight-bearing surface of the foot or plane of the table *hh* and is equivalent to the reading on scale *bc* opposite the lower end of scale *de*.

CLINICAL NOTES.

A CASE OF STATUS LYMPHATICUS.

By E. L. Rice, Lieutenant, Medical Corps, United States Navy.

Lieut. C. C. N., age 29, was and had been in good health when he was given one-half cubic centimeter of standard United States Army typhoid bacterin containing paratyphoid A and B about 4 o'clock on the afternoon of August 13, 1918. The bacterin was given under the subcutaneous tissue of the left arm over the deltoid, and he neither complained nor demonstrated any symptoms of shock, but during dinner he complained of a headache and indefinite hot and cold flashes in his lower limbs. Without eating as much as usual he left the table and went to his room, after which he was not seen during the evening. Nothing unusual occurred in his room, but one of the officers thinks that he went to the bathroom and vomited about 11 p. m.

The following morning he did not come to breakfast, and some one went to his room about 7.30 a. m., where he was found dead in his bunk. I arrived at the ship about 8.45 a. m. and the body had not been touched. He was lying on his back in a comfortable position, one hand resting on his abdomen, the other at his side, the fingers relaxed. His pupils were equal and normal, and neither the tongue nor lips had been bitten, nor were there any signs of a struggle or of violence about the body. There was still considerable warmth along the under surfaces, and I thought that he had been dead for four or five hours.

Ecchymotic hemorrhages had filled the subcutaneous tissues of the back; there were smaller areas on the posterior surfaces of the buttocks and legs, and the ecchymoses extended up over the neck and face, the body being in a position of dorsal decubitus.

At 4 o'clock that afternoon, August 13, I did an autopsy in the officer's room, and found a complete picture of status lymphaticus.

The body was that of a well-nourished male weighing 185 or 190 pounds, and of an apparent age of 30. Excepting for the large subcutaneous hemorrhages there were no unusual external marks. I noted a small wart on the right sternum and a 4-inch linear scar on the right shin that had no significance. Subcutaneous fat was heavy,

and the muscles of the abdomen were not well developed. The heavy muscles of the chest were dark red in color. There was no excess of fluid in the abdomen or pleural cavities, and the lungs were free from adhesions. There was a small excess of straw colored fluid in the pericardium, the right heart showed some dilatation and the musculature was flabby, but there was no hypertrophy.

All valves were normal except the aortic and they showed some thickening of no importance. The aorta was strikingly small in contrast with the size of the man, and measured 6 centimeters in circumference. There were several atheromatous patches in the arch, and one of them encircled the right coronary, but the coronary was patent throughout its length and showed no evidence of sclerosis, nor was there any sign of an embolus.

The thymus was large, thickened, and extended down over the right auricle. On cross section it was congested and meaty. Its dimensions were: Length, 7 cm., width, 4.8 cm., with an average thickness of 1 cm. to 1.2 cm.

The lungs showed no fibrosis and were crepitant throughout, but they were dark on section and full of blood. Stomach and intestines were normal, the mesenteric glands were large, and the spleen was twice its normal size, dark red and bloody on section, and the follicles were prominent. The liver and kidneys were congested, but otherwise normal.

I cut down on the brachials, femorals, and carotids. None of them were more than two-thirds the normal size, the right brachial being the smallest, and none of them were sclerosed.

To summarize: The lymphatic system showed hypertrophy and the thymus was very prominent in this change. The heart, although dilated, was not larger than normal, and the whole arterial system had been dwarfed. An atheromatous change beginning in the arch of the aorta had not extended to the kidneys and the smaller vessels.

The exciting cause of death was the first injection of triple vaccine, but since we know that the body tolerates well the foreign protein contained in dead typhoid and paratyphoid bacilli, there was no true anaphylactic reaction, and the cause of death was a toxemia which might have, during the course of the next two or three months, been induced by any of the infectious fevers or follicular tonsillitis with the same fatal results.

At the same time that Lieut. N. received his injection of typhoid bacterin, 18 other men were given injections from the same ampoule, with no unusual symptoms or abscess formation, and since the bacterin was not cloudy, we must conclude that it was sterile. That remaining in the ampoule was immediately discarded, and to culture it was impossible.

I have no library and no access to the recent literature, hence references can not be submitted, and my conclusions may be wrong. Without being able to read the French literature, we are pretty well isolated over here, and depend upon the quarterly BULLETIN and the confidential bulletins for our recent information.[1]

SOME PRACTICAL AND THEORETICAL CONSIDERATIONS.

By J. J. A. McMULLIN, Lieutenant Commander, Medical Corps, United States Navy.

There are certain points which may profitably be emphasized in connection with the widely different topics of dengue fever, the transfusion of blood, the intravenous injection of oxygen, epididymotomy, urethroplasty, and lastly lesions of the brain following external injury, and erroneously attributed to fracture or dural hemorrhage.

(A) *Dengue.*—The cause of dengue is unknown. The general belief is that it is caused by a filterable virus. Transmission of the disease through the culex fatigans seems to be a well-established fact. Demonstrated facts are immeasurably better than theories, but I would like to advance the idea that dengue is due to some protein poison in the salivary secretion of the mosquito, which is injected by the mosquito into man, causing sensitization; and that some time later the man is bitten by the mosquito having a similar protein in his salivary secretion, and that this particular protein produces the symptoms of the disease. Perhaps a somewhat similar explanation may be advanced for smallpox, mumps, measles, trench fever, etc., substituting insects other than the mosquito as the carrier of the anaphylatoxin or foreign protein.

A fact connected with dengue, which is not mentioned in the text-books, is enlargement of the spleen, occurring usually about the time of the secondary rise of temperature. The patient should lie on his back, flex his legs, relax his abdominal muscles, and breathe deeply in and out through his mouth. If carefully and properly sought for the edge of the spleen will glide back and forth over the ends of the fingers. Sometimes the spleen is markedly enlarged.

It is not possible that the enlargement of the spleen noted is due to error in diagnosis or because the patient had previously had malaria. The writer observed an epidemic of dengue in a draft of men all of whom had recently arrived from the United States, had never had malaria, and showed the text-book symptoms of dengue—the initial chill or chilly sensation, erythema, the pains and aches, the "saddle-

[1] The health record shows that typhoid prophylaxis was administered on board the U. S. S. *Sterrett*, June, 1914.

back" temperature curve, the morbilliform eruption, and the leukopoenia.

(B.) *Transfusion of blood.*—Medical publications are teeming with articles on the transfusion of citrated blood. Transfusion is much abused, but it has come to stay, especially in acute hemorrhage.

I recently gave an exsanguinated patient a transfusion of defebrinated blood, and feel certain that the measure was life saving. Aboard ships or in out-of-the-way places, if no sodium citrate is available, the blood of the donor may be collected, allowed to clot, and the clot broken and strained. In other words, defibrinated blood, which has not been mentioned very much recently, is a useful substitute for whole blood.

In the service some definite arbitrary plan for grouping blood should be adopted, and *each officer and man should have his blood group ascertained and stamped in his health record.*

(C.) *Intravenous injection of oxygen.*—Various experiments have been performed by the writer, which prove that oxygen may be slowly injected into the veins of animals without harm. Anyone who has given very much intravenous medication can vouch for the fact that the injection of small amounts of air intravenously cause no harm. Intravenous oxygen is suggested in the treatment of gas poisoning, anaerobic infections and pneumonia.

(D.) *Urethroplasty for stricture of the urethra.*—Operations for stricture of the urethra are less common than formerly, because there are fewer strictures, and also because surgeons prefer to dilate strictures with sounds rather than to cut them. The operation of urethroplasty is not new, but the results are so satisfactory that after dividing a stricture in external urethrotomy the insertion of a fascial flap should be a matter of routine. I recently used a fascial flap in an impermeable stricture of the membranous urethra. The stricture was divided longitudinally, a piece of fascia was cut from the perineum, the edges of the divided urethra separated, and the piece of fascia united to the cut urethra by a continuous suture of fine chromic gut. The catheter was left in the urethra 21 days. The result was most satisfactory.

(E.) *Epididymotomy.*—This operation is not sufficiently employed in the service for gonorrheal epididymitis. The saving in sick days and damage to the service would be stupendous if it were generally carried out. In our cases we most frequently find pus in the globus minor. Physical examination often shows adhesions of the skin and underlying tissues to the testicle or epididymis at the point of maximum inflammation.

The best results are obtained at the beginning of an attack, before free pus is formed. The epididymis is incised in several places with a small knife. The tunica vaginalis is invariably turned inside out,

and sewed back of the epididymis. There are usually numerous adhesions uniting the tunic to the testicle. A small rubber drain is inserted for two or three days.

(F) *Lesions of the brain erroneously attributed to fracture or dural hemorrhage.*—These cases are of medico-legal importance, besides being at times puzzling from the standpoint of diagnosis and treatment. The last case of this sort which came to my notice was a white man 50 years old who had been in a fist fight and who bore no marks of external violence at the end of the fight except a right "black eye." Shortly thereafter he suddenly developed an incomplete right hemiplegia, with aphasia, but was not unconscious. Systolic blood pressure 160, diastolic 65, temperature 98, pulse 84, respiration 20. Physical examination showed more marked sensory than motor paralysis on the right side, but on examination of the heart a loud diastolic murmur was heard at the aortic cartilage, and there was dullness over the arch of the aorta. The diagnosis of aneurism of the arch of the aorta and cerebral embolism was made. The following day the fluoroscope showed a large aneurism of the arch, which confirmed the physical examination. The blood and spinal fluid were positive to the Wassermann test. Lange's colloidal gold test gave a typical paretic curve.

The possibility of rupture of damaged cerebral vessels from increased blood pressure during or shortly after a fight, or the possibility of an embolus from a valvular vegetation or a clot from an aortic aneurism, causing paralysis, unconsciousness, or death under similar circumstances is of vital medico-legal importance. I recently gave testimony in a case of this sort which saved an innocent man from being convicted of homicide.

PAIN IN HYPOCHONDRIUM WITH PERNICIOUS ANEMIA.

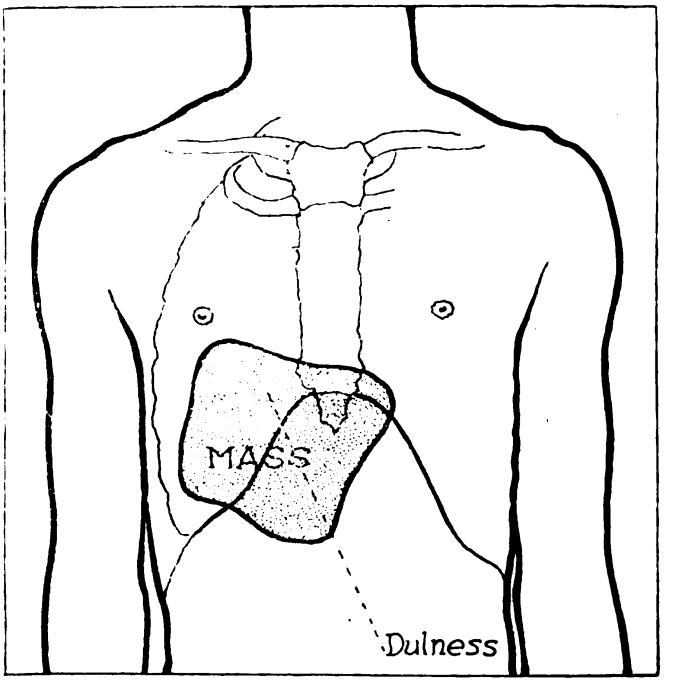
By H. M. STENHOUSE, Medical Corps, United States Navy.

Ah S., ship's cook, 1 C.; age 39; native of Canton; 15 years in United States Navy. Reported at sick bay, December 3, 1917, complaining of pain on both sides of the belly, which seems worse after eating; he has no appetite, had a chill on the previous afternoon, and vomited once or twice during the night; he had no cough; he weighed 125 pounds on enlistment.

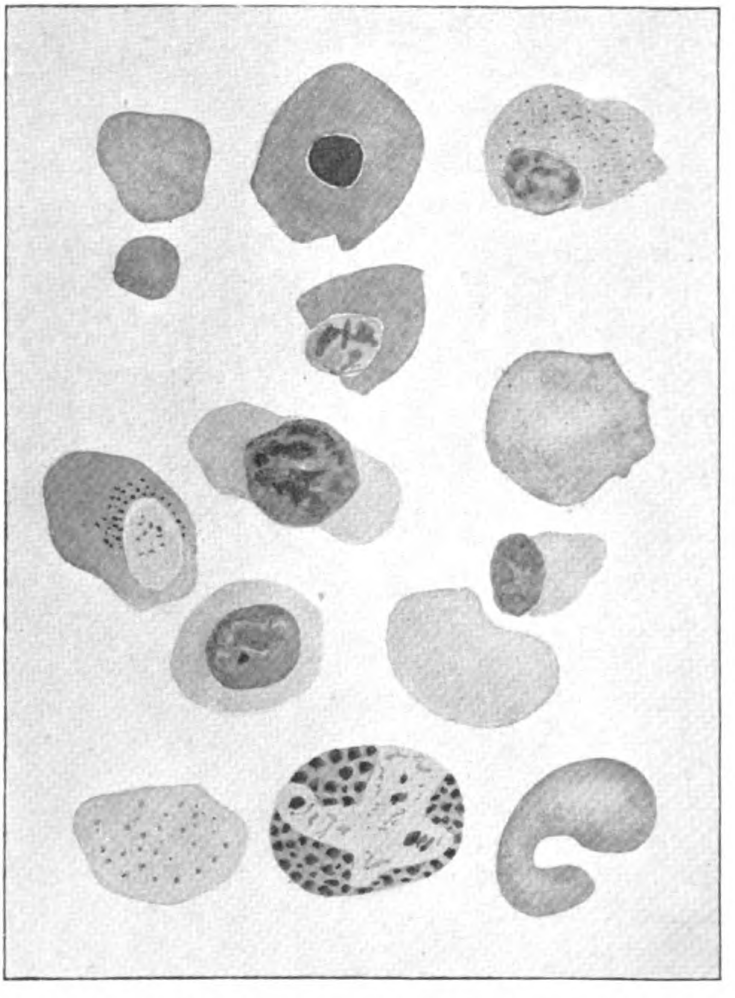
Physical examination.—Nothing worthy of note was found in the heart or lungs; he was slightly jaundiced; tongue was heavily coated and breath foul; no swelling of his feet or ankles; belly tender beneath the ribs on both sides; spasm of right rectus on palpating near the gall bladder; liver dullness extends up to fifth i. c. s. in

midaxillary line; unable to detect downward enlargement because of muscle spasm; spleen not palpable; temperature, 98.8 F.; weight 107.5 pounds.

Previous history and family history.—Says he has had dysentery three times. Seven years ago he had "sore teeth and sore eyes." No previous attacks of pain in the belly. Entry on the health record of "chancroid" in 1914. No other entries in the health record. Mother still alive and well. Father, who was alcoholic, died at 42. One brother died of "bubo." One sister died at birth. Patient is married and has one child 9 years old and well. Wife is well and has had no abortions or children born dead.



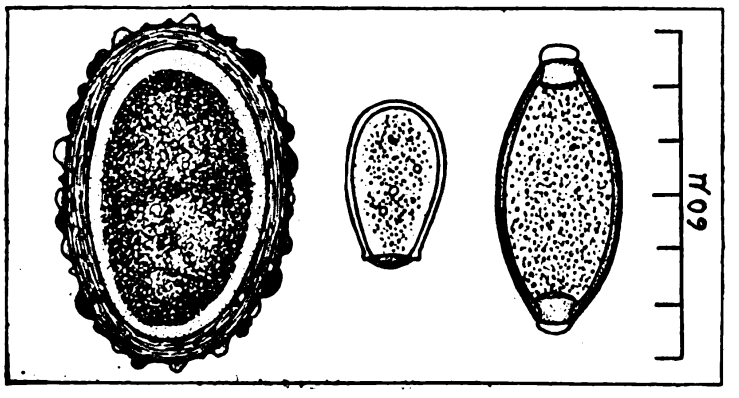
Discussion.—Pain and rigidity, as found in this man, might mean gall stones, liver abscess, syphilis of the liver, hypertrophic cirrhosis, and possibly malignant disease. The history alone favors either syphilis of the liver or liver abscess. Gall stones seemed improbable because there was no history of any previous attack, nor was there the intense pain, frankly expressed, radiating out from the gall bladder, as in a case of gallstone colic. The "sore teeth and sore eyes," which the patient mentioned, the history of "chancroid," and the racial incidence of syphilis, make one consider this seriously. The chill and the pain over the left side might lead us to inquire about malaria; but the absence of splenic enlargement tends to discourage that idea. It looked more like a case of beginning liver abscess than anything else. The history of dysentery, the pain, the enlargement of the liver upward, the chill, and the slight fever; the jaundice, and the preponderence of pain over the liver all pointed to this diagonosis.



BLOOD EXAMINATION. NUCLEATED RED CELLS, STIPPLING, MALARIAL PARASITES, ETC.

91-1

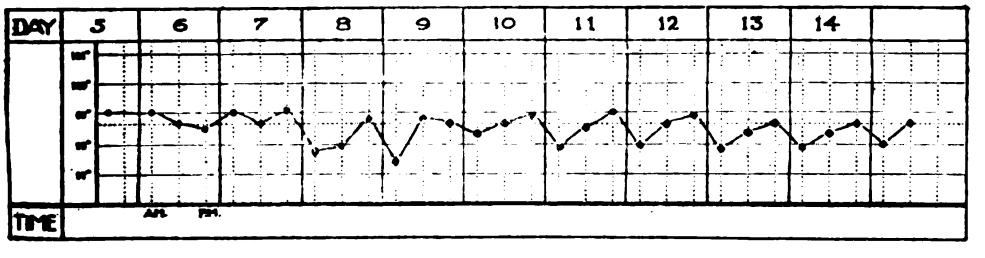
Laboratory findings.—These made the diagnosis even more difficult. On December 5, 1917, the leucocytes were 18,000. Temp. was 99. On December 6, the white count showed 16,000; but to add to the difficulties, nucleated reds, stippling, and other signs of red-cell degeneration were found along with tertian malarial parasites in the stained smears. The red count was 3,400,000. Hb. 75 per cent. Urine was of high specific gravity, small in amount (400 c. c.);



no sediment, no albumen or sugar. Feces: Ova of clonorchis sinensis, Ascaris, and Trichiuris found; no ameba motile or encysted.

On these findings a tentative diagnosis of pernicious anemia was made. But what was causing the anemia?

The most likely answer to this question seemed, "rapid destruction of red cells in the liver from some process due to the small fluke." The anemia proved to be progressive, while the leucocytosis gradually fell to a normal white count. By the 17th the reds had fallen



to 1,200,000. Hb. 70 per cent. Fowler's solution was being given with the hope that it would serve the double purpose of stimulating red-cell production and at the same time exert some destructive influence on the flukes. It was also believed that it would to some extent combat the malaria.

On the 17th and 18th a large dose of quinine was given. This was followed by chilly sensations, ringing in the ears, dizziness, and enuresis. On the 20th the patient was no better. Although no

ameba had been found 30 miligrams of emetin was given to note the effect. The pains, which had subsided somewhat, returned, as did the rigidity over the right rectus. The temperature remained around 99 without any great change from day to day. On the 20th a course of santonin was given. No worms were passed. On the 21st santonin was given again. On the 26th there were signs of improvement. R. b. c., 2,920,000. Hb. 75 per cent. Leucocytes had fallen to 11,000.

Whether this was the actual turning point we do not know. Possibly he would have recovered without further medication. On the 26th the patient was seen by Dr. McCartney, an American doctor at Chungking, who advised a mixture of iron with 4 grains of quinine to the dose t. i. d. He did not favor the beginning-abscess theory. The prescription was given as advised. On December 30 Dr. S. Sakamoto, medical officer of H. I. J. M. S. *Toba*, was asked to give his opinion on the case. He went over the man carefuly and emphasized the following points: (1) Liver enlargement, (2) anemia, (3) icterus. He believed the fluke infection of the liver responsible for the anemia.

Outcome.—January 7, 1918, Rbc 3,800,000; Hb 85 per cent; leucocytes, 8,700. January 26, 1918, Rbc 4,230,000; Hb 80 per cent; appetite good; walks about considerably. February 2, 1918, salvarsan, 0.6 gm. intravenously. February 16, 1918, returned from French hospital. February 18, 1918, Rbc 4,800,000; Hb 80 per cent; clonorchis and ascaris in stools.

The future for this man does not seem bright, certainly not so far as total recovery is concerned. But the case illustrates the great resistance that the Chinese exhibit against the inroads of disease. The man may live along in moderate health for a number of years.

This case, along with contemporaneous observations on the Yangzte River, has awakened the writer's interest in the question of the multiple effect of a number of infections on a living organism. One who knows China will readily appreciate the fact that an individual in his lifetime must be inoculated with all manner of infections. At some time or other in life he therefore has malaria, smallpox, tuberculosis, typhoid, and in fact everything there is in the country in the way of disease. He takes each infection as a matter of course, unless it results in gangrene of the face, loss of eyesight, paralysis, or other quite evident complication.

It is impossible to think that a Chinaman can reach adult life without thus accumulating antibodies and immunity against all manner of maladies to which the ordinary white man would doubtless succumb. That accounts for the statement which medical officers on Yangzte gunboats like to repeat: "Perform any operation on

a Chinaman and he will get well. Do the same thing to an American and he will die."

This man had a history of chancroid in 1914. He may have had syphilis. He had malaria, intestinal parasites, and it appears a fluke in the liver. He seems to have had a secondary infection resulting in inflammation and leucocytosis. And he gives a history of dysentery. He had a combination of several things which for a time seemed to thrive, a sort of symbiosis. Then the bodily resistance began to respond to the calls made upon it, and either the opposite effect from symbiosis ensued, the parasites starved out some disturber, or else we must give credit to the medication for eliminating the offender.

PERFORATING WOUND OF INTESTINE AND MESENTERY.

By G. G. Ross, Lieutenant, Medical Corps, United States Naval Reserve Force.

F. G., B. M. 2d class, age 25, from U. S. S. *Bridge*. Admitted January 11, 1918, at 10 a. m., to United States Navy Base Hospital, Brest, France.

On January 11, at 9 a. m., while working in the gun room aboard ship in the harbor of X, a .45-caliber Colt automatic was accidentally discharged, the bullet striking the patient in the right lower abdomen after having passed through the chest wall of another sailor. The wound of entrance was one-half inch to the inner side of and 1 inch above the anterior superior spine of the ilium. The bullet ranged downward, inward, and backward. Patient was in a mild state of shock. Temperature 97.4, pulse 108, respiration 26. He showed evidence of acute anemia, presumably due to hemorrhage. The abdomen was opened at 11 a. m. by a right rectus incision just outside the linea alba. On opening the peritoneum, blood and intestinal contents escaped. The small intestines were delivered into hot towels and nine holes in the ilium and two rents in the mesentery were discovered. The holes were closed by through and through sutures of catgut and oversewn by Lembert sutures of linen thread. Further examination disclosed a hole in the sigmoid, which was closed by the same method. The bullet was not found, although it was certainly in the patient's body, there being no wound of exit. The pelvis was drained by a rubber tube and cigarette drains. The wound of entrance was treated by *débridement*. Before closure the wound was sprayed with dichloramin-T, 7½ per cent.

The patient had a rather stormy convalescence due to suppuration along the drainage tract and to a sharp attack of acute bronchitis. Bowels moved on the third day. On the 10th day he was put on full diet. The wound healed slowly by granulation. He was discharged to full duty April 2, 1918.

Two of the openings in the ilium were about 2 inches apart and their closure seriously diminished the lumen of the gut. It was a grave question whether to resect this portion of the gut or to be satisfied with the closure.

The lesson we learned from this case was that the reparative power of the small intestines is very considerable, and that what seemed to be an almost complete occlusion of the lumen was sufficient for this man's physiologic needs and permitted a complete recovery.

NOTES ON THE TREATMENT OF SCARLET FEVER.[1]

By W. C. Newton, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

It is very interesting to observe how successfully cross-infections may be prevented by the employment of the unit system. In the institutions visited cross-infections have occurred only when inexperienced attendants were employed.

The use of antiseptic solutions and gaseous disinfectants is slowly giving away to the cleanliness which follows the generous use of soap and water, fresh air and sunshine. Formaldehyde gas is used in some institutions for disinfection of mattresses and blankets.

Place, of Boston, is very enthusiastic over results obtained by doing tonsillectomies in the early days of scarlet fever. This was done quite accidently at first. A few cases having been operated upon during the incubation period, it was noted that these patients had a smoother convalescence, in that there were fewer ear, heart, and kidney complications. So, encouraged by these facts, a number of cases were operated on during the febrile stage which also did particularly well. These were selected cases with obviously hypertrophied tonsils and large adenoid growths. There were no operative complications such as hemorrhage or sepsis following the procedure. There was no case of lung abscess.

The use of the naso-pharyngoscope is a most efficient means of detecting areas of diseased tissue—adenoids, turbinates, etc., and upon the removal of these infective areas the muco-purulent discharge will cease, whether from antérior nares or naso-pharynx and the patient may be released from quarantine much earlier than would otherwise be possible.

At the Boston City Hospital and at the city hospital at Providence, it is a universal rule that patients sick with scarlet fever, of however mild a type, should remain in bed at least three weeks in order to avoid kidney complications.

---

[1] Extract from report of inspection of contagious hospitals at Boston, Newport, and Providence.

It would seem that the use of the Moshier speculum should be more universal, for in no other way can a satisfactory culture from the larynx be made in cases of laryngitis, which present the symptoms of expiratory distress.

Such cases are worthy of the most careful consideration and the presence or absence of the Klebs-Löffler bacillus must be demonstrated. Dr. Place believes that neglected cases of diphtheria with marked edema of the neck, pallor, prostration, and rapid pulse should receive a dose of 70,000–80,000 units of antitoxin given intravenously. He has never seen a case of anaphylactic shock follow the use of large doses of serum.

Dr. Richardson at Providence is allowing his patients a fairly generous proteid diet during the convalescence of scarlet fever, and the cases that are allowed white meat and fish show no increase in the number of cases of nephritis as compared with those recovering from the disease that have been placed on a fairly free meat and egg diet.

ILLUSTRATIVE CASES OF ATYPICAL ACUTE ABDOMINAL CONDITIONS.

By G. D. Hale, Lieutenant Commander, and J. C. Adams, Lieutenant Medical Corps, United States Navy.

In the diagnosis of acute abdominal conditions requiring prompt surgical interference there is probably no class of cases of more interest to the medical officer and more commonly met with than that composed of appendicitis, peritonitis, and intestinal obstruction. While this group is by no means the only class of surgical cases met with in the service, yet it is fairly typical of those requiring prompt surgical measure and with which every medical officer should constantly be familiar, both as to the correct diagnosis and the necessary surgical procedure.

Ordinarily in making a diagnosis the information is derived from the history of the case, the symptoms, the physical findings, and the laboratory findings, all of which in the typical case tend to point to a clear diagnosis. The other group of cases, the atypical, may be classified as follows: (1) Those in which the history of the case is obscure or confusing; (2) those in which the symptoms are wanting or possibly contrary; (3) those in which the physical findings are confusing; (4) those in which the laboratory findings may prove negative or confusing; and (5) the group in which there are few symptoms and physical findings together with negative laboratory findings.

It is to the last two groups that particular attention is called, and the following illustrative cases are reported:

Case No. 1.—B.—R. H., private, United States Marine Corps. Admitted June 17, 1918, complaining of slight nausea and pain on right

side. Patient stated that he vomited once before coming to sick bay. Physical examination disclosed a distinct tenderness on right side in appendix region. No rigidity and no history of previous similar attack. Otherwise the physical examination was negative.

Temperature on admission was normal. Pulse, 68. W. B. C. 13,400. Differential count showed 67 per cent polynuclears. A warm enema was given and no food was allowed. On the following day, June 18, patient rested well, having been much relieved by the enema. Tenderness over appendix still present. Very little rigidity. W. B. C. 12,800. Pulse and temperature remained normal.

June 19, condition apparently improving. W. B. C. 6,600. Temperature and pulse normal. S. S. enema daily.

June 20, patient in excellent condition. Has not vomited since admission. Pulse remains around 68. Temperature normal. W. B. C. normal.

Owing to the persistent tenderness and slight rigidity over appendix it was decided to operate. At operation two-thirds of the appendix was found to be in a gangrenous condition. There was a well-defined local peritonitis, well walled off and containing a small quantity of sero-purulent fluid.

The appendix was ligated and removed but no attempt was made to invaginate the stump. The abdomen was drained. Patient ran an uninterrupted and rapid convalescence.

The interesting point in this case is, of course, the abdominal condition found at operation, with such few diagnostic signs.

Case No. 2.—H.—E. F., private, United States Marine Corps, age 23. Admitted May 1, 1918, complaining of abdominal cramps, nausea, and vomiting. Patient vomited a large quantity of clear green fluid a few minutes after admission, and stated that the cramps and vomiting began the previous evening.

Examination shows a well-nourished and developed man. General tenderness over entire abdomen but no distention and only slight rigidity in epigastric region. Reflexes normal. Temperature 98, pulse 60.

Laboratory findings: W. B. C. 19,600. D. C. . Polys. 72 per cent. Urine negative.

Past history: Acute appendicitis July 28, 1917, and appendix removed at United States Navel Hospital, Mare Island, Cal., same date. Restored to duty in 23 days and had been well since. History otherwise negative. Patient was given soapsuds enema, which returned with good results. No food allowed.

May 2, patient continues to vomit bile-tinged fluid. Vomitus devoid of fecal odor. Soapsuds enema and gastric lavage with relief

of cramps. Abdomen still tender but no rigidity or distention. General appearance of patient excellent. Pulse 60. Temperature normal. W. B. C. 18,400.

May 3, general appearance of patient good. No change in physical signs. Vomited twice during forenoon. Temperature normal. Pulse 70. W. B. C. 22,000.

May 4, no vomiting for 36 hours. Soapsuds enema returned clear. Temperature normal. Pulse 98. W. B. C. 9,000. Proctoclysis given at regular 4-hour intervals to relieve thirst. Albumin water and chicken broth given toward evening.

May 6, on the sixth day after admission patient appeared bright but showed signs of exhaustion. Has not vomited for 72 hours. Has been taking liquid food for past two days. Temperature normal. W. B. C. normal. Soapsuds enemata continue to return clear. Abdomen tender but soft.

During the early part of the afternoon patient vomited profusely. The vomitus contained all the food eaten the previous day. No fecal odor.

It was decided to operate, and in transferring patient to hospital he vomited a large quantity of decidedly fecal matter for the first time since admission.

At operation the upper part of the small intestines was found moderately distended. A double obstruction was disclosed, caused by two firm omental bands. The first obstruction, just below the duodenum was only partial, while the second, situated about 5 feet lower down, was quite complete.

Following operation, for the first week, patient ran an irregular temperature ranging from 100 to 102; pulse 120 to 130, which gradually returned to normal. June 21, to duty well.

The points of interest in this case are the confusing laboratory findings, the mild general symptoms, and the delay in fecal vomiting.

Case No. 3.—S.—private, United States Marine Corps, age 20. Patient reported complaining of constipation and dull pain over entire abdomen. The symptoms had existed for several days. Past history otherwise negative. Examination showed a well-nourished young man with a decidedly prominent abdomen which was tender but soft. All other physical signs were normal. Temperature was normal. Pulse, 78. Urine normal. Blood examination normal with exception of hemoglobin per cent of 75.

During the next four days abdomen became rapidly more distended, with very definite signs of fluid. Tapping and removal of 3,500 c. c. of clear fluid gave relief. No masses or other abnormalities could be made out in the abdomen either before or after the removal of the fluid. The temperature reached 99.2 on two evenings, but the remainder of the time it was normal.

Examination of the fluid showed a preponderance of lymphocytes. No erythrocytes and only a very few polynuclears were seen. No organisms could be found. The albumen content was exceedingly high.

The patient was in excellent condition throughout, but on account of the commencing reaccumulation of the fluid in the next few days he was transferred to a naval hospital. The interesting point in this case is the presence of a large amount of fluid in the abdomen of a young man apparently in good health. An exploratory operation or animal inoculation would probably have confirmed the tentative diagnosis of tubercular peritonitis, but these methods were not possible in camp. Recent report from the hospital, 14 days later, stated that the man was in excellent shape, although the fluid seemed to be increasing. No operation had been done nor were there any laboratory findings to report.

The above cases demonstrate the fact that diagnosis should not only mean the determination of the disease or malady but should also take into account the severity of the illness. In other words, how sick is the patient? In the typical case it is usually possible to arrive at a correct diagnosis, but the actual seriousness of the case is often never determined until operation, when the pathological findings will often prove most serious. In this respect there is of course no possible means of describing a method whereby the seriousness of the condition can be determined and undoubtedly the most dependable resource in an instance of this kind is experience.

The apparently mild cases, also the obscure and atypical, should be the ones to receive the greatest care and attention and should be regarded with suspicion. They are the ones which should receive the special attention of the experienced medical officer lest operation be postponed too long.

VARIETIES OF HYPERSUSCEPTIBILITY: THREE CLINICAL CASES.

By L. K. McCAFFERTY, Lieutenant, Medical Corps, United States Navy.

The following are selected from the many interesting cases seen at the United States Naval Dispensary, Washington, D. C., from January to July, 1918:

Case I. Angio-neurotic edema, or Quincke's disease.—This patient was referred to the naval dispensary by a relative in the Marine Corps, who desired to know if his condition would prevent him from enlisting in either branch of the service.

He is a civilian, 24 years of age, single, white; nationality, Hebrew; occupation, business.

His main complaint was of local swellings, limited in extent and of transient duration. His family history is entirely negative. Past history elicits nothing of importance, as the patient has never been seriously ill in his life.

The present illness began two years ago when the patient noticed a swelling on his arm about the size of a hen's egg, which came on insidiously and remained for several hours. There was no pain connected with it, and if it had not been in a prominent place he would never have noticed it. There was no change of color over this swelling; when pressed small indentations would remain for several minutes, although this was not a true pitting as seen in edema. One morning two years ago the patient awoke and to his surprise found his scrotum markedly swollen, being about the size of a coconut; this frightened him so that he consulted a physician. At another time he had an engagement to play golf the following morning, but when he awoke, to his astonishment, both hands were swollen three times the ordinary size so that the patient was unable to bend his fingers. On one occasion his tongue swelled to such an extent that he was unable to contain it within his mouth. As the patient says, "practically every feature of the face has undergone a similar fate." There has been no premonitory sign nor any disturbance of the gastro-intestinal tract accompanying these attacks. Except for the unsightly swelling, the condition would probably never have caused him difficulty, unless the larynx were involved. Preceding each one of these attacks there was a history indicative of an error in diet, which will be discussed subsequently.

On physical examination we found a robust, healthy man, somewhat plethoric. His examination was entirely negative throughout. Urinary and blood examinations were negative. Wassermann was negative.

The special laboratory tests proved to be quite interesting and important. As we saw from the clinical history that certain foods produced this transient edema it was therefore advisable to test the patient's susceptibility to certain food proteins. There were given intradermally minute amounts of protein from the hog, such as pork, ham, and lard, and soon after administration, the patient gave a positive cutaneous reaction. Fish, crab, lobster, and chicken were also tried with positive results. Lamb, veal, beef, and egg were tried with negative results. This proved conclusively that the patient was hypersensitive to the above articles of diet, both intradermally and when ingested in large amounts.

It might be added here that soon after the protein was given intradermally there appeared a small papule surrounded by an erythematous areola. This was considered a positive reaction.

As was said in the beginning of this paper, the patient came to us for our opinion as to his fitness for military service. We therefore had to reject him, as it would be practically impossible for him to secure the necessary diet in order to maintain a normal life.

Case II.—This case is very closely allied to Case I, being another example of anaphylaxis.

The patient is a male, age 24 years, occupation, sailor, who presented himself to the dispensary complaining of severe headache.

The usual routine examination was made and nothing remarkable was found, except hypertension. We prescribed aspirin, grains v, at once, and within one hour the patient returned to the dispensary, appearing quite alarmed about himself.

At this time he was complaining of shortness of breath, a sensation of pressure over the top of his head. He said his scalp felt tightly compressed and that his face felt flushed. He also had a severe pain over his epigastrium. The skin over his body felt warm and there was a sensation of itching present. On examination we found the patient quite nervous, having a marked tremor of his lips, tongue, and hands. He spoke rather anxiously, having some trouble in articulation.

His face and neck presented a diffuse erythema. There was some edema around his naso-labial fold, lips, and tongue. His lips appeared quite cyanotic. On the trunk, upper and lower extremities, palms, and soles of feet was a pronounced urticarial eruption. The urticarial wheals were so diffuse that the tip of the index finger could not be placed on the cutaneous surface without overlapping an urticarial papule. The papules were white on their summit with an erythematous areola. The intervening cutaneous surfaces were erythematous. Some of these lesions appeared on the face and neck, but were not so numerous. Intense itching accompanied the appearance of these lesions.

There was a marked tachycardia; the heart sounds at apex were rather distant. The diastolic phase was reduced to such an extent that it was quite hard to distinguish first and second sounds. The blood pressure at this time showed a systolic of 170 mm. Hg. and a diastolic of 110.

This whole picture developed in two hours after the ingestion of 5 grains of aspirin. The condition had never occurred before, but the author produced the same picture twice since. The patient gave no history of this idiosyncrasy in his family.

The whole picture disappeared within 12 hours. The eruption gradually faded so that there was no trace 12 hours thereafter. The epigastric pain was relieved by sodium bicarbonate. The tachycardia and cyanosis disappeared soon after he returned home and reclined.

There was another interesting feature which was discovered while we were making the routine examination, namely, hypertension.

The patient is 24 years of age, of very good habits. He has never worked with lead in any form nor is there any history in his family of early degeneration of the cardio-vascular system. He has complained occasionally of headache, nausea, and dizziness, all of which could be ascribed to this hypertension.

On physical examination we found the cardio-vascular system entirely negative. Repeated examinations of the urine have been negative. Eye grounds are entirely negative, thus ruling out any encephalopathic condition. Wassermann was negative. The only finding was a systolic pressure averaging around 170 mm. Hg. and a diastolic pressure of 100 mm. Hg. by the auscultatory method. We have had him under close observation for two months, taking blood-pressure readings three times a week at different times during the day. The finding always remained practically the same.

The etiology of this condition is quite obscure, as we have been unable to find any pathological condition to account for this hypertension, except a vague vasomotor disturbance and a tendency to a neurasthenic state, both of which might produce this so-called idiopathic hypertension; but the hypertension in either one of these conditions would probably not be permanently present, nor would we expect to find the diastolic pressure quite so high. There was a suggestive thyroid enlargement which might possibly produce this hypertension, but the various authorities disagree as to the blood-pressure findings in hypertrophy of the thyroid.

Whatever the etiological factor is, the fact remains that he has a hypertension, which was not discovered on entrance to the Navy, and only accentuates the importance of auscultatory blood-pressure readings, both systolic and diastolic, when a recruit is examined.

It is hardly possible that his hypertension will be reduced to normal, as we have placed him on a meat-free diet, moderate exercise, and potassium iodide for some two months, and it has made no appreciable change. In all probability he will eventually be surveyed from the service, an unnecessary procedure had the blood pressure been taken on his first examination.

Case III. Hay fever.—This case is of interest merely from the point of view of desensitization treatment and because it falls in the same group as cases I and II.

He is 36 years of age, a marine by occupation, of good habits, and married. His complaint is hay fever. The family history is negative, as there is no tendency to hay fever or asthma. The past history is essentially negative.

The present illness began at the age of 12 years, when late in the summer the patient developed the typical symptoms of hay fever.

He had paroxysms of lacrymation, rhinitis, and laryngitis throughout August, September, and sometimes late in October. These attacks were present late each summer unless he sought another climate, either in Europe or by the seashore. In 1915 he visited Dr. Robert Cooke in New York City, who began his pollen protein tests upon him to determine which one he was sensitive to. These tests were carried out as follows: One would take the various pollen proteins, and after making an extract of them with normal salt solution a minute amount would be given intradermally. Wherever there occurred a subcutaneous reaction it would be called positive to that particular pollen protein. By ophthalmic test we would determine the degree of sensitiveness. This would be the plant to which the patient was hypersensitive, and to what degree.

It was found by intradermal injection that this patient was sensitive to ragweed. As ragweed is one of the plants whose pollen produces hay fever, especially in this case, the patient was given desensitization treatment for this plant.

This treatment is best given in small subcutaneous injections once weekly until 12 doses are given, gradually increasing the dose each time, usually beginning the treatment about six weeks prior to the onset of symptoms and continuing throughout the season. This will produce an active immunity in many cases, but occasionally slight symptoms occur.

At the present time I am administering the pollen protein extraction of ragweed to this patient, and have been doing so for the past six weeks, and up to the present time he has shown no symptoms, nor did he show any symptoms in 1915, 1916, and 1917 while under the treatment of Dr. Cooke, of New York. It may be added here that this active immunity which is produced will usually last one or two seasons, but by the third symptoms arise unless prophylactic treatment is again begun.

In summarizing Cases I and III it can be stated that they are due either to a toxin or to a protein reaction in sensitized individuals; in other words, anaphylaxis. In Case II the reaction is due to a drug which may be classified under hypersensitiveness. Dunbar maintains that the protein of the pollen in hay fever is a toxin belonging to the albumen group, but Cooke, of New York, and others are inclined to believe it a true anaphylaxis. Assuming, then, that any individual, for reasons still unknown, has become naturally sensitive to some protein or drug, the production of symptoms is readily understood. Many believe the reaction is cellular and not humoral. For example, the clinical reaction depends largely on the cells that are sensitized. Thus we have in hay fever a sensitization of the mucous membrane of the eyes, respiratory tract, together

with a general cutaneous sensitization, whereas in urticaria following aspirin the sensitization is essentially in the cells of the epithelium. In angio-neurotic oedema the sensitization is of the connective tissue cells in the subcutaneous tissue. While each case is distinct, producing different symptoms, they may all be classified under anaphylaxis or hypersensitiveness.

REPORT OF A CASE OF VARIX SIMULATING INGUINAL HERNIA.

By E. J. CUMMINGS, Lieutenant, Medical Corps, United States Navy.

Several months ago my attention was called to the report of a case of saphenous varix simulating a femoral hernia, written by E. H. Richardson, of Baltimore, published in the April number, 1918, Annals of Surgery. Since the report of his case I have had the good fortune to come in contact with a case of varix simulating inguinal hernia. Like Richardson's case, this one is also the confession of a mistaken diagnosis.

The patient was a young man 21 years old, admitted to the surgical service of the United States Naval Hospital, Washington, D. C. The diagnosis on admission was right inguinal hernia. In the region of the right inguinal canal there was a definite swelling about the size of a small hen's egg, which showed some increase in size when the patient changed from the recumbent to the standing posture. The swelling apparently took up the entire length of the inguinal canal, transmitted an impulse on coughing, but could not be reduced by taxis. In the recumbent position the tumefaction, though reduced in size, stood out prominently.

The history of the condition is interesting, inasmuch as the patient firmly states that he was never aware of the existence of any swelling until about one week previous to the time of entrance to the hospital. There were no subjective symptoms associated with the existence of the swelling. No varicosities were noted in either leg. For the preoperative diagnosis two views were shared: One, that the tumefaction was an inguinal hernia; two, that the tumefaction was an encysted hydrocele of the cord.

Commander H. F. Strine, Medical Corps, United States Navy, operated, making the usual incision as for inguinal hernia directly over the mass. In the subcutaneous tissue lying directly over the inguinal canal and slightly above the external ring a circumscribed mass of fatty tissue and dilated veins was encountered. The lower limit of the mass was about the level of Poupart's ligament. The mass was excised and reserved for pathological inspection, the report later showing the tissue consisted chiefly of dilated veins. To insure against the possibility of an associated hernia, the external oblique

was split, and no sac being found, a hernia suture with a cord transplant was then done. The vein involved was unquestionably the superficial epigastric with some adjacent tributaries. The condition was indeed unusual, and I must frankly say that the possibility of a varix never entered our heads.

After a careful search of the literature in an endeavor to find reports of other cases, I have only been able to find one writer who has reported a somewhat similar case. A French writer has published two cases of lymphatic varix simulating inguinal hernia under the title "Pseudo hernies inguinales dues à des varices lymphatiques des opérations qui conviennent et qui peuvent être faites avec succés." It is interesting to note that the writer in his dissertation on these cases states that the tumor, which descended into the scrotum as far as the testicle, had all the characteristics of an inguinal hernia containing a small quantity of fluid. The condition also led observers to believe that there was adherent omentum in the sac. There have been reported several cases of varix of the superficial epigastric vein, of which I have appended references. None of these cases, however, of varix of the superficial epigastric vein have simulated hernia.

REFERENCES.

Lucas Championnière: Assoc. Franc. de chir., Proc. Verb., Paris, 1904, XVII, 662–661.
Roth, A. H., and Gulde, A.: New York Med. Jour., 1905, LXXXII, 851–854.
Sommer, G.: Philadelphia Med. Jour., 1902, X, 201.
McGavin, L.: Proc. Roy. Soc. Med., London, 1910–11, IV, Chin, Sec. 51.
Richardson, R. R.: U. S. Nav. Med. Bull., 1910, IV, 196.

ACUTE APPENDICITIS COMPLICATED BY IDIOPATHIC HEMORRHAGE FROM RUPTURED MESO-APPENDIX ARTERY.

By F. H. Bowman, Lieutenant, Medical Corps, United States Navy.

P. S., fireman, second class, was admitted to the United States Naval Hospital, New York, N. Y., on July 16, 1918, with the following history:

Previous history.—The patient stated that as far back as he could remember he had had attacks of cramplike pains, similar to the present one in character, but that they had always passed off within a few hours. With these attacks he had never had nausea or vomiting nor elevation of temperature.

Present history.—On July 16, 1918, the evening of the day of admission, the patient was walking along the street, when he experienced a severe, cramplike pain over the entire abdomen. This pain was general at first but soon became localized in the epigastric region. No

nausea or vomiting was present, but the patient experienced a feeling of fullness in the upper portion of the abdomen. He went to bed and, in order to relieve the pain, drank a considerable amount of whisky, but without any relief. The pain became more and more intense. He was then brought to the United States Naval Hospital, New York.

On admission his temperature was 97.6 F., his pulse 84, and the respirations were 20. His skin presented a pale ocher color. Lungs and heart were negative. The abdominal walls showed no marked rigidity, but there was an arc of decided tenderness over McBurney's point. Dullness was marked in both flanks. Urine negative. Blood count: white cells 6,200; polynuclears 62 per cent; lymphocytes 34 per cent; eosinophiles 1 per cent; transitionals 3 (200 cells counted).

July 17: Operation. Ether anesthesia. Righ rectus incision. The abdomen was found filled with blood, both fresh and clotted. The bleeding point was located in the meso-appendix, near the base, in a ruptured vessel. The appendix showed an inflammatory area at the base with much congestion of all the blood vessels in that location. All other organs were negative. The bleeding vessel was ligated and an appendectomy performed. Wound closed. The patient made a rapid recovery.

AN UNUSUAL CASE OF WOUND CONTAMINATION WITH THE GONOCOCCUS.

By E. A. STEPHENS, Lieutenant, Medical Corps, United States Navy.

History.—F. M. D., age 27 second lieutenant, United States Army, received September 23, 1918, for passage to the United States. In a French hospital on July 21, 1918, he had an amputation of the right thigh following a gun-shot wound. The following morning hot normal saline solution was, according to the patient's own statement, given subcutaneously in left thigh; the solution was too hot, resulting in a burn of that area. Two days later the superficial tissues sloughed, leaving a second degree burn. The burn was circular and about 3 inches in diameter. He had gonorrhea at 17, but has had no active symptoms since then.

Examination.—The stump of the right thigh has entirely healed except for a small, oval, granulating area about one-half inch in size. The wound is clean and has made good progress since the amputation.

On left thigh, anteriorly in the middle third, is a circular area 3 inches in diameter, with an angry, granulating base and undermined edges, the result of the burn from hot saline solution, mentioned above. The base is covered with thick yellow pus but is without any distinctly offensive odor. The wound has drained profusely

since the beginning, eight weeks ago. A burning sensation has been present almost continually during the past five weeks and at times it has been very painful. There has been no tendency toward healing.

Smears made from the pus revealed Gram negative, intracellular diplococci. Some of the leukocytes contained 8 to 12 pairs. The smear was made primarily in order to do a bacterial and cell count. A count of 10 fields showed an average of 120 pairs of diplococci and an abundance of pus cells per field. The nuclei of the polymorphonuclear cells were not destroyed. A few pairs of diplococci were found extracellularly but no other organisms were present.

Cultures on ordinary media at 37° were negative. Cultures on blood serum and blood agar were negative. It did not ferment glucose. The organism grew slowly as minute dew-drop colonies on blood streaked agar. It was agglutinated by serum from a known gonorrhoeal blood. Complement fixation test was not done. It seemed to me reasonable to identify this organism as the gonococcus. Smears of the healing stump showed a few staphylococci but no diplococci.

Smears from the anterior urethra were negative. The anterior urethra was irrigated with sterile water, the washings caught upon return and centrifuged. Examination of sediment revealed no organisms. Successive smears of urethra and urinary sediment following prostatic massage were negative.

Course and treatment.—Dichloramine-T was used for four days with no material change in bacterial count or cell count. Silver nitrate in 10 per cent solution was then applied, followed by wet dressings of silvol 10 per cent for three days. Organisms per field 35, pus cells 28. Ten fields counted. Discharge has lessened considerably. Same treatment continued. Four days later there were organisms per field, 7; pus cells, 4. Discharge scanty. October 5, 1918, smear shows two diplococci per field and an occasional pus cell. The wound has stopped draining. Healing has progressed, until now only an area about one-half inch in diameter remains.

Conclusions.—While it is true that the identification of the organism is not absolute, nevertheless the only other organisms, the meningococcus and micrococcus catarrhalis, have been excluded as etiologic factors. The gonococcus will attack any mucous surface, but its appearance in a wound of this nature has been rare. It is probable that the moisture and warmth beneath the undermined edges furnished a suitable medium for their growth.

The source of contamination can only be problematical. It is fair to assume that the urethra of the patient does not harbor the organism, although the proximity of the lesion to the penis would make contamination from that source easy.

It has been shown that the gonococcus can be transmitted by unclean dental instruments.[1] This organism is known to have little resistance to drying or exposure to air, yet one can easily imagine how a highly virulent germ could be quickly transmitted by means of the fingers of a careless attendant or nurse. The patient has been dressed by scores of attendants, and during a rush period in the hospital the wound remained uncovered for two weeks.

The result following more specific treatment confirms the opinion that the infection was Neisserian. There is no ground for assuming that the infection might have been hematogenous.

A CASE OF SUBLUXATION OF CERVICAL VERTEBRA BY MUSCULAR ACTION.

By I. S. K. Reeves, Commander, and M. K. Miller, Lieutenant, Medical Corps, United States Navy.

N., R. C., F–3c, was walking down a low incline on board the U. S. S. *Delaware* on September 2, 1918, when both his feet slipped. He fell flat on his back and in order to prevent injury to his head threw it forward with a jerk. He immediately noted severe pain "in the bone" of his neck with complete loss of motion in the cervical vertebræ. Guarding his head against movement he turned in. The next morning the pain was so severe that he reported for treatment. When seen he walked with great caution, holding his head rigid between his hands with face looking a little to the right. The facies showed great suffering and anxiety. The muscles of the neck were rigid and a distinct prominence could be felt to the left of the middle line and above the sixth cervical vertebra. Any attempt to manipulate the head casued such pain that the patient was anesthetized. Under the anesthetic the fifth cervical vertebra appeared to be in unilateral subluxation forward, the left side being pushed forward until its posterior edge passed the anterior of the sixth and the upper articular surface of the sixth cervical vertebra became prominent. The motion in the cervical region was much limited even under complete anesthesia.

To reduce the subluxation the face was turned to the right, the head abducted and rotated backward while traction was made. At the stage of backward rotation a distinct snap was felt by both the operator and assistant, the latter at the time having his finger on the prominence of the sixth cervical. The deformity disappeared and motion became normal. When the patient recovered from the anesthetic he could move his head in any direction, but flexion caused

[1] Mayhew, J. N.: Gonococcus Infection of the Mucous Membrane of the Oral Cavity. Jour. Am. Med. Assn. Apr. 27, 1918, p. 1223.

severe pain. The patient was kept in bed until the next day, when he could walk a bit with caution, having a splint of reinforced plaster from occiput to mid-dorsal region. For several days motion of the head caused some pain, but the patient soon made a complete recovery.

REPORT OF A CASE OF FRACTURE OF THE SKULL.

By R. I. Longabaugh, Lieutenant Commander, Medical Corps, United States Navy.

Q. R., corporal, Company G, Three hundred and sixty-seventh Infantry, was brought to the sick bay on June 15, 1918, having been injured in a row over a crap game. Another soldier during the progress of this row seized a bayonet by the blade and drove the ring which fits over the rifle barrel into R.'s forehead. The bayonet guard was so firmly embedded that the assailant was obliged to call upon another soldier to help him pull it out.

R. walked up two ladders to the sick bay accompanied by other soldiers but unaided. Examination showed a hole in the frontal bone, a small trickle of blood down the face, but no symptoms that would point to brain injury. Under ether I explored the wound, which was almost centrally located in the frontal bone, the uninjured roof of the frontal sinuses, mostly the left, forming the lower margin. The depressed and roughened edges of bone were removed.

The probe disclosed fragments of bone at a depth of about 1 inch in the left frontal lobe. These I proceeded to remove as gently as possible. Two were approximately about one-half inch square and very rough and there were several smaller ones. The dura was so badly lacerated that it was not possible to make any attempt at suturing it. A piece of rubber dam was laid in the wound and a cigarette of rubber dam brought to the surface. Recovery uneventful. Rubber dam removed after 48 hours. Transferred to a hospital in France after five days; wound entirely closed. No loss of memory, or in fact any symptoms of brain injury apparent. Inquiry at the above hospital one month later shows this man as cured and with no bad after results.

My reasons for reporting this case are: (1) To again invite attention to the amount of trauma and abuse the frontal lobes will withstand without any discoverable symptoms; (2) to show again how promptly the dura takes care of injuries to it, even where the surgeon is unable to offer it help.

REPORT OF CASE OF STENOSIS OF WHARTON'S DUCT.

By J. A. Halpin, Lieutenant, Medical Corps, United States Navy.

Patient E. H., age 27, sea. 2c., entered hospital with "diagnosis undetermined, probably mumps." He stated that some two weeks

before, about the 10th of November, 1917, his jaw suddenly became swollen and painful while he was eating. Reporting at the sick-bay he was isolated for mumps and transferred to this hospital for isolation, observation, and treatment. Between meals he noticed that the swelling of jaw receded slightly, but as soon as he began to eat a mass appeared just below jaw and rapidly extended upward on the face. It was painful to the touch and felt hard and indurated.

On admission to hospital the right side of face was swollen, tense, and tender on pressure. Examination revealed a hard mass just below the ramus of jaw which extended upward on the face to about the region of the angle of jaw. He was given a piece of dry toast to eat, and while masticating same this mass began to swell rapidly. Examination of mouth and teeth was negative. The temperature, pulse, and respiration were normal.

A fine lachrymal probe was introduced into Wharton's duct, which was found to be constricted about 1 inch from the external orifice. On withdrawing the probe and at the same time applying pressure on the submaxillary gland a large amount of saliva was expelled, the gland collapsed, and only a small mass about one-half an inch in size was left. The probe was then reintroduced and an X-ray taken, which showed that no stone was present either in the gland or duct and that only a stenosis existed.

This condition of swelling after the ingestion of food continued for two days, and each day a larger probe was introduced into the duct and it gradually dilated until after the fifth day it remained patent and saliva did not accumulate in the gland, but was expelled through the duct into the mouth during the act of mastication.

As far as I can trace the history of the case, this is the first time that such a condition has occurred. There is no history of trauma, infection, or injury. The only incident apparently bearing on the case is a severe attact of tonsillitis six months ago. The infectious process may have extended down the duct where an inflammation was set up unnoticed by the patient, and the consequent proliferation may have caused narrowing of the duct. On the other hand the suddenness of the onset casts some doubt on this explanation.

The case is interesting from (1) The negative history with sudden onset; (2) the rarity of the occurrence; and (3) the ease with which the condition could be mistaken for mumps, as it was in this particular case.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Lieutenant Commander R. B. HENRY, Medical Corps, United States Navy.
Lieutenant Commander W. A. BLOEDORN, Medical Corps, United States Navy.

GENERAL MEDICINE.

GARRAGHAN, E. F. **Status lymphaticus.** Illinois Med. Jour., October, 1918.

The writer reviews the history of the subject from the time of Felix Plater, in 1614, down to our own time. Carl Rokitansky considered that the abnormal enlargement was almost entirely restricted to children and it was associated with the general enlargement of the lymphatic system, rickets, and enlargement of the brain. Many cases of sudden death without apparent cause were shown by autopsies to be connected with enlargement of the thymus gland. Sudden death during the course of surgical narcosis established for tonsillectomy and the removal of adenoids can be explained in this way. In 1895 Kundrat reported 10 cases of death during or after anesthesia collected from the autopsy records of Vienna which all showed a distinct lymphatic diathesis. All showed enlargement of the thymus, of the spleen, and of the retroperitoneal and cervical glands. The follicles at the base of the tongue were prominent, the tonsils were enlarged, and the heart muscle was flaccid. While the possible existence of status lymphaticus is the cause of sudden death in children operated on for defects of the naso-pharynx, the abnormality is of a more general interest in connection with the administration of diphtheria and other antitoxins to adults. Much attention was attracted to this subject on the occasion of the sudden death of the son of Prof. Langerhans, of Berlin, after the injection of a small dose of diphtheria antitoxin. The post-mortem examination gave evidence of the existence of status lymphaticus and death was ascribed to this cause by prominent pathologists consulted.

Hassler reported in the California State Journal of Medicine for May, 1917, a case of great interest. The health department was called upon to administer a prophylactic dose of diphtheria antitoxin to a 7-year-old boy whose sister had been ill with diphtheria and had

been removed to an isolation hospital. The boy was apparently in sound health. One thousand units of a standard brand of antitoxin were injected under the skin. Ten minutes later the child was seized with violent cramps, had difficulty in breathing, and died in the midst of what his mother called "a severe convulsion." It should be noted that on the previous day this boy's sister, the actual sufferer from diphtheria, had received 2,000 units of the same antitoxin by intravenous injection, followed in 24 hours by an additional 1,000 units. At the post-mortem examination of the boy the existence of status lymphaticus was clearly demonstrated. As a direct result of this fatal case, the health department of California now requires the written consent of parent or guardian prior to the administration of antitoxin to the child. Furthermore, the sanitary inspector must remain in close touch with the patient for at least one hour after the antitoxin is given.

The author recites other interesting cases and comments upon the lamentable fact that in all the cases recorded the existence of status lymphaticus was clearly demonstrated after death. He points out that an effort should be made before operating on children and before administering sera or antitoxins to discover the presence of status lymphaticus by looking for abnormalities of tongue, tonsils, and pharynx. Investigation of the child's previous health may disclose a history of attacks of dyspnea. Some writers claim that a large area of dullness may be found to the left of the manubrium sterni. Friedlander maintains that an enlarged thymus may be diagnosed by the use of the X-ray. Until recently thymectomy was the only curative measure available, and according to the statistics of Parker these operations had a mortality of 33⅓ per cent. Now it is claimed that the roentgen ray is not only of great value in diagnosis but is a therapeutic measure which can be used with safety. In 100 cases in Cincinnati, reported by Friedlander, there were but four deaths. The dose depends upon the severity of the case, and in mild cases a single exposure is often sufficient and leads to improvement within 48 hours.

SALISBURY, E. I. **Epidemic of an unknown intestinal infection.** Proc. Med. Assn. of the Isthmian Canal Zone. Meeting of February 17, 1917.

The author describes in detail the mysterious epidemic of gastro-intestinal disturbance which occurred in the Panama Canal Zone shortly after the Christmas holidays, and was at once regarded as due to the dietary indiscretions with which the modern world is in the habit of celebrating the birth of Christ. The first case to appear did not suggest the development of an epidemic, and therefore a correct count of the cases was not made from the beginning, but it is estimated

that 450 adults and 250 children were affected, the cases being about equally divided between the Atlantic and Pacific ends of the canal. The figures given include cases from the crew of the U. S. S. *Charleston*, which was at that time at anchor in the harbor of Colon. The majority of the patients were white people. Among the children the girls affected outnumbered the boys, but of the adults more males were affected. Fully one-third of the men on the U. S. S. *Charleston* were taken sick. Many of the cases were mild, and did not entail the cessation of work. The symptoms were headache, loss of appetite, slight fever, general malaise, pain in the abdomen, mild bronchitis, and pharyngitis; vomiting was rare, and was usually a sequence to the ingestion of oil. The severe cases were admitted to the hospitals and for a majority of them the diagnosis of appendicitis had been made. The onset was marked by colicky pain in the abdomen, fever ranged from 100° to 103 F. and an exaggeration of the symptoms previously named. The marked prostration and toxicity amounted almost to a typhoid state in the case of many children. Tenderness in the right lower abdominal quadrant was marked and there was decided rigidity of the right rectus. In 13 of the cases a distinct mass could be palpated in the region of the appendix. The leucocytes ranged from 10,000 to 50,000 and the lymphocytes in uncomplicated cases ranged as high as 75 per cent, the small cell variety preponderating. Blood cultures were made for the patients with a high temperature. They were all sterile except three, which showed streptococcus. Acetonuria and indicanuria were present, the former being most pronounced among the children.

The ordinary case ran its course in from one to four weeks, beginning with an elevation in temperature, commonly 102° to 103 F. (39° to 39.5 C.), and remaining so for a few days, then becoming intermittent in type, lower in the morning and rising in the evening, and finally becoming remittent and then normal in the average case by the second week. With but few exceptions these patients seemed and felt quite comfortable, complaining only of headache. After the fourth day about 50 per cent of the children had mucus, pus, and less frequently blood in the stool; a diarrhea developed in some, and these represented the most severe cases among the children.

At the onset of the epidemic many cases were operated on for appendicitis and these all recovered, 14 of the operative cases with palpable masses in the abdomen, which proved to be enlarged glands of the mesenteric and appendix region. Six men of the U. S. S. *Charleston* were operated on for supposed appendicitis, but the condition of the appendices demonstrated that the symptoms were not traceable to the incriminated organ; of the three cases whose cultured blood showed a streptococcus, two were from the U. S. S. *Charleston*.

No diagnosis was agreed upon. Typhoid fever was excluded by

the high leucocyte count. The colon bacillus infection would show in the blood cultures.

The first step in the treatment was isolation. The 450 men of the *Charleston* were examined and 143 suspects were put in camp at Coco Solo. At some of the military bases the soldiers were prohibited from swimming, as some of the cases had manifested their first symptoms just after coming out of the water. The diet was limited to liquids. The preliminary purge was followed by an exhibition of alkalies, bismuth and an intestinal antiseptic. In conclusion the author declines to make a diagnosis, but considers that the symptoms resulted from infection rather than from poisoning.

In the discussion which followed the reading of this paper Dr. L. B. Bates laid stress upon the fact that sections of the appendices and glands did not show any streptococcus. He considered it established beyond a doubt that the cases were not typhoid or paratyphoid in spite of the gross appearance of the gut. He pointed out that the epidemic of influenza with symptoms limited to the gastrointestinal tract was unknown. Major Russell thought that the symptoms were particularly suggestive of a severe disease and one that is not supposed to affect human beings, namely, hog cholera, and he adverted to the fact that the bacillus of hog cholera is not the etiological agent in hog cholera, but merely the secondary invader.

WARTHIN, A. S. **The new pathology of syphilis.** Am. Jour. Syph. July, 1918.

The author has conducted extensive investigations into the pathological anatomy of syphilis and has brought forth facts regarding the microscopic pathology of latent syphilis which are of great interest.

The statements in our own textbooks concerning the pathology of this infection are based almost without exception upon the occurrence of the gumma, and syphilis of an organ is said to be frequent or rare according to the frequency of gumma of that organ.

Virchow in 1858 clearly distinguished the simple inflammatory and the gummatous lesions of syphilis and showed for the first time the part played by this disease in producing inflammatory conditions of the most varied organs and tissues. This article really laid the foundation for the modern knowledge of the pathology of syphilis obtained since the spirochete was discovered. But his separation of syphilitic lesions into the two types made little impression upon the syphilology of the next 40 years.

As the relationship of tabes and paresis to syphilis became more evident during the next two decades the conception of "post-syphilitic," "metasyphilitic," and "parasyphilitic" processes arose in explanation of this relationship. Fournier was chiefly responsible

for the use of this term and for the view that a large number of pathologic conditions bore a definite relationship to syphilis, but were not syphilis and were not necessarily caused by it.

With the discovery of the etiologic agent of syphilis in 1903, it was to be expected that a change would take place in our concepts of the pathology of the disease. Parasyphilis has disappeared as the various parasyphilitic affections have been shown to be active syphilis with living spirochetes still present in the affected tissues.

The author has demonstrated that the gumma is not the type of lesion of late or latent syphilis, and that the viscera are involved in all cases of latent syphilis, not by gummatous processes, but by specific inflammatory processes, eventually fibrosis, usually mild in character, but acquiring pathologic importance because of their progressive character.

In studying the pathology of congenital syphilis, the author has shown the constant presence of spirochetes in the hearts of cases of congenital syphilis dying before or at birth, the occurrence of focal fatty changes in the myocardium due to the colonization of the organism, and of a specific type of interstitial myocarditis due to the same cause.

In acquired syphilis it was not possible to demonstrate the presence of spirochetes so readily, but the demonstration of the organism was successful in such a large number of cases as to make the specific syphilitic nature certain.

In the progress of these studies the author found specific inflammatory lesions of spirochete localization in the myo-, endo-, and pericardium, the large arteries, nervous system, liver, pancreas, adrenals, testis, prostate, prevertebral, and mesenteric tissues. These lesions vary greatly in size from minute collections of cells to larger infiltrations just visible to the naked eye. Every stage of development, from early active lesions to complete healing and fibrosis was observed; but no case was found in which there was no active lesion. Complete healing throughout the body was never observed.

The author gives a detailed description of the lesions of latent syphilis in the various tissues of the body.

In the nervous system the most constant changes were those found in the meninges. In practically every case of latent or clinical syphilis autopsied some degree of thickening of the meninges was found. Focal infiltrations of lymphocytes and plasma cells were found in both brain and cord in cases not regarded clinically as paresis or tabes. The character of these minute scattered lesions is precisely identical with those found in the brain and cord, in paresis and tabes, the difference being only those of number and degree. This raises the question as to whether every case of syphilis is not,

to a slight degree, at least, a paretic or a tabetic. Similar infiltrations were frequently found in and about the spinal ganglia, spinal nerves, and the sympathetic nerves and ganglia.

The heart in every case showed microscopic lesions characteristic of spirochete localization, and in this organ more frequently than in any other has the spirochete been demonstrated. The essential lesion of cardiac syphilis is an interstitial myocarditis characterized by infiltrations of lymphocytes and plasma cells along the vessels between the muscle fibers. All of the author's cases of angina pectoris were syphilitic.

Clinically these heart lesions showed disturbance of rhythm of every variety. "Functional" murmurs were common. The clinical picture in all was that of an insufficient heart. The majority died a cardiac death as shown by hypertrophy and dilatation of the heart, and the chronic passive congestion of lungs and other organs. The chief pathological findings at autopsy were those of myocardial insufficiency ("fibroid heart") without, in the great majority of cases, accompanying valvular lesions.

The aorta when examined microscopically showed in every case of old syphilis characteristic syphilitic infiltrations in its media and adventitia. The author insists that no positive exclusion of syphilis of the aorta can be made without a microscopic examination.

The pancreas in all of the old cases of syphilis showed a greater or less degree of atrophy and interstitial fibrosis. Syphilitic pancreatitis may be a common cause of diabetes.

The adrenals showed characteristic infiltrations of plasma cells and lymphocytes in all cases of known and latent syphilis.

The liver showed chronic passive congestion and atrophy in every case.

In all male cases the testes showed varying degrees of atrophy and fibrosis; many of the cases had complained of premature loss of sexual desire.

Changes in the kidneys were found in practically all cases. The proportion of cases of chronic parenchymatous nephritis was very striking.

It appears then that syphilis as a latent infection is much commoner than generally supposed and the author estimates that about one-tenth of all deaths occurring in the United States can be attributed to syphilis.

It is further evident that infection with syphilis means spirochete carrying in many, if not all cases.

The spirochete carrier is immune to new infection only as long as he carries spirochetes.

The author states that he has never seen pathologically a cured case of syphilis.

The syphilitic is pathologically "damaged goods," and the damage is a progressive one.

The author arrives at the following conclusions:

1. The gumma is not the essential typical lesion of old or latent syphilis. It is a relatively rare formation; and the great majority of cases of syphilis run their course without the formation of gummatous granulomata.

2. The new pathology of syphilis is based upon the demonstration that the essential tissue lesion of either late or latent syphilis is an irritative or inflammatory process, usually mild in degree, characterized by lymphocytic and plasma-cell infiltrations in the stroma, particularly about the blood vessels and lymphatics, slight tissue proliferations, eventually fibrosis, and atrophy or degeneration of the parenchyma.

3. These mild inflammatory reactions are due to the localizations in the tissues of relatively avirulent spirochetes.

4. Syphilitic inflammations of this type occur in all tissues and organs, but are most easily recognized in the nervous system, heart, aorta, pancreas, adrenals, and testes.

5. The syphilitic is a spirochete carrier. In this respect the spirocheta pallida is to be classed with the trypanosome, the malarial organisms, lepra and tubercle bacilli, streptococcus, etc.

6. Syphilis tends to become a mild process, but at any time the partnership between the body and the spirochete may become disturbed and tissue susceptibility or virulence of the spirochete become increased so that the disease again appears above the clinical horizon.

7. Immunity in syphilis depends upon the carrying of the spirochete. A price is paid for this immunity in the form of the defensive inflammatory lesions previously described.

8. Syphilitic death occurs most frequently in males between the ages of 40 and 60. Chronic myocarditis is the most common form of death due to syphilis.

9. The pathologic diagnosis of syphilis is essentially microscopic. Only in a relatively small number of cases are the gross lesions (tabes, gumma, aortitis, etc.) typical enough to be recognized by the naked eye. (W. A. B.)

MENTAL AND NERVOUS DISEASES.

Rogers, A. W. The relation of the temperament to the psychoses. Wisconsin Med. Jour. September, 1918.

The author adverts to the history of the classification of temperaments and holds that we have advanced considerably beyond the point where varieties of temperament were restricted to the san-

guine, the lymphatic, the bilious, and melancholic and he declares that the extreme optimist is just as incapable of forming sound judgments on any proposition in life as the pessimist. The extreme optimist inclines to egotism and recognizes no difficulty as unsurmountable. When people of this type are patients, while their physical functions may be excellent, in other respects they incline to vascular disturbance which manifests itself in mild cerebral congestion and the tendency to insomnia. Just as the men of sanguine temperament may develop periodic states of exaltation, so men of pessimistic temperaments have states of undue uneasiness and depression. These individuals tire easily and will be bothered by depressing dreams whose effects extend into the waking hours. They are discouraged by trifles and are overwhelmed by events which the average person meets with pleasure. In this type there are alternating varieties of depression and exhilaration with an intervening period of normality in between. Temperament and personality not only influence the functional psychoses but play a part in the development of the organic mental disturbance known as paresis, though this form of insanity is invariably due to syphilis.

Temperament plays a large part in the development of the psychoneuroses of war. The author cites a series of 100 cases of war psychoneuroses and of 100 cases of somatic injuries produced on the firing line. In 74 per cent of the first series the family history of neurotic or psychotic stigmata, including insanity, epilepsy, alcoholism and nervousness was obtained. In 72 per cent of that series the patients themselves gave evidence of a very neuropathic condition.

The author concludes his interesting paper with the declaration that while heredity plays a permanent part in temperament, parents, teachers and physicians can do much to mold the individual make-up by proper training and education.

KENNEDY, F., SALMON, T. W., ROUSSEY, G., HOLMES, G., and MARIE, P. **War neuroses.** War Medicine, Am. Red Cross, Paris, August, 1918.

In the able report of the meeting of the Research Society of the American Red Cross in France, June 28–29, 1918, published in No. 1, vol. 2 (August, 1918), of War Medicine, there is an interesting symposium on war neuroses. Major Foster Kennedy, R. A. M. C., criticizes the term "shell shock" as inaccurate and misleading and calculated to do harm, as conferring a brevet of respectability on symptoms which though not necessarily blameworthy actually represent a certain degree of inferiority from the point of view of military efficiency. He admits the extreme difficulty in many cases of positively excluding a minor coexistent physical injury, but points

out the extreme rarity of generalized psychoneuroses in soldiers suffering from gross physical wounds. In the normal soldier fear is consciously or unconsciously submerged beneath loyalty to officers, regiment, and nation, dominated by ideals. In the victim of so-called "shell shock" personal considerations have obtruded themselves through and obscured the gregarious instinct. Maj. Kennedy holds that the distinct interval so common between the date of the supposed physical injury and the manifestation of the symptoms under discussion proves the psychogenetic character of those symptoms and points out how readily unwise suggestion from medical officers may tend to originate or perpetuate somatic symptoms of psychic origin. He points out that among enlisted men a single external catastrophe is the exciting cause of psychic manifestations, whereas in officers these are more often the result of prolonged strain and mental conflict. He lays stress on the extreme importance of accurate technical knowledge on the part of the medical attendant. Suggestion plays so important a rôle in the disorder under discussion that any doubt on the part of the medical officer as to whether he is handling an organic or a functional trouble is sure to be reflected in the patient and tends to intensify the nervous weakness. Therefore the first step in curative treatment of these cases is a definite and positive diagnosis. This strengthens the hand of the physician and contributes in no small degree to restoration of inhibitory power in the patient.

Maj. Kennedy rejects the term "hysteria" as unsuitable because it has a different meaning for patients and doctors. He favors the use of the simple word "nervousness" to designate all neurotic manifestations seen in war, and believes that such a term would appeal to the sense of discipline in armies and by promoting proper public opinion would be of prophylactic and therapeutic value. The diagnosis would be divided into "nervousness (sick)" and "nervousness (wounded)." In conclusion the author alludes to the physical changes, such as disturbed cardiac rhythm, dyspnea, and reduced alkalinity of the blood, which often accompany violent emotional disturbances.

Lieutenant Colonel Salmon, Medical Reserve Corps, United States Army, spoke of the importance of (1) a rational attitude toward these disorders on the part of the medical officers, line officers, enlisted men, and the general public; (2) careful selection of the human material brought across the Atlantic for the war; (3) determination that everything undertaken at this time shall aim not to prove or disprove a theory but to restore or conserve fighting men for the line. He recognizes the importance of having patients suffering from war neuroses reach the hands of experts in the earliest stages and the danger which attends the admission of such cases to the general wards of a hospital. When patients are ready to return to their

organizations or detained after cure through administrative reasons, it is undesirable to have them transferred to ordinary convalescent camps, as there is then a tendency to recrudescence of symptoms.

Major G. Rousey (professor in the Faculty of Medicine of Paris), speaking of the psychoneurological disturbances affecting the limbs during war, adverted to the reflex disturbances associated with secondary phenomena, which may be considered as phases of hysteria. They develop in subjects who give evidence of a special psychic condition which existed previously or else was acquired or accentuated by the actual circumstances under which they lived at the time of the disturbances. This psychic condition gives rise, on the occurrence of traumatism or some other slight commonplace factor, to the appearance of motor disturbance of a hysterical nature. Should such an influence be exerted on a limb whose circulation is normal or without incurable muscular lesions the motor trouble may be the only symptom, and it is pithiatic. If, on the contrary, it develops in a previously abnormal circulatory field acquired or accentuated by military life, it may give rise to secondary phenomena.

Lieutenant Colonel Gordon Holmes, R. A. M. C., speaking on the treatment and management of the psychoneuroses in armies, dwelt on the serious waste of man power liable to occur if steps are not taken (1) to check the development of neuroses; (2) to relieve with promptness the functional and nervous symptoms which appear. After showing the importance of this subject from the point of view of society, and the likelihood that many of the cases of war neuroses returning to civil life will become social parasites and lay a heavy moral and financial burden on the country, he quotes a statement made in the British Parliament to the effect that more than 20,000 men have been invalided from British armies with so-called "shell shock." A large proportion of these men were evacuated from the army before it was generally recognized that early and vigorous treatment under rigid military discipline is indispensable. The proportion of recoveries is smaller when active therapy is delayed. In 1916 neurological centers were established in army areas and as near the front as safety permitted to enable treatment to be given before the symptoms became fixed and organized. This permits of prompt return to fighting units. When patients pass through a series of hospitals and convalescent camps and come under the care of officers not fully acquainted with their previous conditions a recurrence or remission of symptoms is likely. Cases of slight concussion, though they may be abnormally emotional and present the symptoms common to concussion, usually require only a brief period of rest and light duty under the medical officer's direct supervision. If instead they are herded among men with severe neurotic manifestations they are liable

through subconscious minicry to imitate their associates and develop the symptoms suggested by them or their surroundings.

Prof. Pierre Marie inclined to a slightly different view from that propounded by the English and American speakers. He said that in the first year of the war French neurologists had inclined to consider war neurosis without concomitant mark or injury on some part of the body, especially the skull, as an indication of malingering or at least of the refusal on the part of the soldier to meet his full obligations. A wider range of view had led to the opinion that cases of commotion might be neither neuropaths nor malingerers. Marie believes that without any local lesions commotion may be caused by organic alterations of the nervous centers which can be observed by such clinical methods as lumbar puncture. The spinal fluid may or may not contain blood. The albumen content may be increased or the number of cells reduced. In a considerable number of cases there is a slight tendency to hyperglucosis. He believes in the existence of a diffuse micro-traumatism, that is a traumatism involving only the microscopic elements.

DE FURSAC, J. R. **Traumatic and emotional psychoses.** Am. Jour. Insan. July, 1918.

The following paragraphs are quoted from this valuable article:

"Traumatic psychoses" and "mental disorders supervening at the occasion of traumatism" are not the same.

It is proper * * * to exclude those post-traumatic mental disorders which, by reason of their clinical manifestations or a characteristic morbid anotomy, find their place in a definite pathological group, such as general paralysis, dementia precox, or a constitutional psychopathic state. In such cases we are dealing not with traumatic psychoses but with general paralysis, dementia precox, or a constitutional psychopathic state in the etiology of which the traumatism has played a part the importance of which is variable and for the most part merely contributory and indirect.

It has, however, also been customary to include among traumatic psychoses the many cases in which mental disorders have broken out after a traumatism which is in itself but slight, perhaps insignificant, but which is accompanied by an intense emotional shock. This is an abuse of language. The effectual cause here is the emotional shock. The physical trauma is nothing; the psychic trauma—to use an expression which is more than a mere figure of rhetoric—is everything. This is true to the extent that mental disorders observed in cases of this sort are identical in nature, in severity, and in their course with those known to be produced by a violent emotion acting alone, i. e., independently of any somatic injury. The term

"traumatic psychoses" in application to these cases is, therefore, inappropriate and should be replaced by the term "emotional psychoses."

Emotional war psychoses (so-called shell shock).—Explosions of projectiles or mines are capable of producing in subjects, showing outwardly no wounds or only insignificant wounds, neuropsychic symptoms more or less severe and lasting. The cases of this sort fall into three groups.

In the first group, the soldier is thrown by the explosion, with a resulting injury to the brain, either by fracture of the skull or by concussion, direct or indirect. The explosion has simply played the part of an agent of propulsion. The neuropsychic symptoms present no special character and vary according to the lesion which has been produced.

In the second group there is no external violence. The subject presents signs of a cerebral or spinal lesion, generally a paralysis (hemiplegia, monoplegia, paraplegia). Lumbar puncture reveals the presence of blood in the cerebro-spinal fluid. One deals here with a hemorrhage in the central nervous system, which must be considered a direct effect of the explosion, that is to say, of the changes of atmospheric pressure resulting from the enormous liberation of gases produced by the instantaneous combustion of the explosive substance.

It is not the same with cases in the third group, which is by far the largest. Here there is no external violence, no hemorrhage, no sign whatever of any organic lesion. The victim of the explosion, generally an excessively emotional subject, exhausted by the hardships of the campaign, perhaps just recovered from a more or less severe illness, loses consciousness. For two or three days he remains in a state of confusion, most often accompanied by dreams. Then he becomes lucid, but remains asthenic, emotional, living over again in his dreams his past terrors, and complaining of headaches and dizziness. This state may disappear in a few days, or it may persist for weeks or months, with or without complicating functional symptoms centering upon some organ, region, or function (deaf-mutism, paralyses, contractures).

These conditions, of which some have tried to make a sort of psychosis peculiar to war, were at first attributed to cerebral or cerebro-spinal concussion, hence the expression "shell shock," by which they have been designated. This interpretation is erroneous and the concept of concussion in relation to cases of this sort inappropriate.

The explosion has not only physical effects, but also a psychic one, which consists in an emotional shock. In certain cases this *emotional shock* dominates the situation to the point of being alone responsible for the neuropsychic symptoms which a hasty and super-

ficial consideration at first placed in relation to cerebral concussion; and it is because both give rise to an emotional shock that the explosion of a shell and a terrifying sight find expression in the same syndrome. The *war psychoses which have been called shell shock are nothing but emotional psychoses*, and they might best be studied under the name "emotional war psychoses."

The *etiology* of emotional war psychoses comprises, accordingly, all the factors capable of producing an emotional shock: Explosions of projectiles (shells, bombs, aerial torpedoes, hand grenades), mines, ammunition stores; terrifying sights (cadavers, conflagrations, etc.); imminence of danger; death of comrades; and injuries (wounds, contusions, sometimes concussion in the correct sense of the word), for the most part not of a serious nature.

These different factors, whether acting alone or in combination, show no efficacy except as they light upon a soil prepared in advance to undergo their action, a *predisposed soil.* The predisposition results most often from a constitutional defect consisting in emotional instability. "The individuals destined for shell shock are, before all, the emotionally unstable in whom the constitutional peculiarity has mostly manifested itself in their lives at occasions of painful emotion, and who react to events of the war as they have reacted to events of ordinary life, but in a manner infinitely more intense, because the excitants are infinitely more powerful."

In the mild cases the *symptomatology* of emotional war psychoses is reduced to a brief dazed period; the subject is for a moment stunned, dull, inert, speaking in monosyllables, his voice scarcely audible, articulation indistinct and hesitating. At the end of a few hours, sometimes one or two days, of rest he returns to his usual condition.

Where the disorder assumes a certain gravity one can distinguish, as in ordinary emotional psychoses, two phases: The first, acute (phase of confusion), the second, subacute (psychasthenic phase).

The natural *course* of emotional war psychoses, as of emotional psychoses in general, is toward recovery. It is necessary, however, to make some reservations.

I have seen, in four cases, chronic psychoses follow an explosion of a projectile or a mine: two general paretic syndromes, classical in their clinical manifestations, one dementia præcox, and one chronic hallucinatory psychosis. It is quite possible that in cases of this sort we are dealing with simple coincidences. An individual about to develop general paresis, dementia præcox, or a chronic hallucinatory psychoses may, like any other, become the victim of a shell explosion and show emotional phemonena. As the latter disappear, the signs of the chronic psychosis appear and develop. If

the explosion has played a part in the etiology, it is infinitely probable that the part is but a contributory one. It has but opened the way for a morbid process long prepared either by an infection (syphilis) or by a constitutional predisposition, or by any other pathogenic factor.

"* * * Nothing in all that we know of the etiology of mental diseases would justify the proposition that a purely emotional shock or an explosion could have for its consequence general paresis, dementia præcox, or a chronic hallucinatory psychosis. One might at most attribute to it the value of a contributing cause, but one could go no further than that.

It is conceivable that an emotional war psychosis, like an ordinary emotional psychosis, might develop into a delusional state centering about a prevailing fixed idea. In such a case the idea of damage sustained through an explosion or any other cause would become the fundamental fixed idea upon which the delusional state would develop. I have as yet not met with a case of this sort and I know of none published in the literature. But it would surprise me if such cases did not develop. It is probable that they will be seen springing up after the cessation of hostilities.

Finally, it should be recognized that there are patients in whom the syndrome characteristic of the second period lasts a year or longer. I know a case of emotional psychosis—by purely emotional shock—which has lasted over two years without any appreciable improvement or change. Is it, then, possible for the course of emotional war psychoses to be toward incurability? I should withhold an affirmative answer. I should even say that I do not believe it.

There exists at the present time a factor by which the prognosis of emotional war psychoses is radically biased; it is the war itself. The prospect of returning to the front constitutes, for many of the emotionally unstable, an obstacle to recovery of such power that it is impossible to say if it alone might not suffice to keep up the neuropsychic symptoms and to impart to the disease the appearance of chronicity which has been noted in some cases. The fate of these patients will not be settled until peace has been signed.

The *treatment* varies, naturally, according to whether the disease is in its first or second phase.

In the first phase, rest in bed, quiet, reconstructive medication. The treatment here suggests itself.

The indications are not so simple in the second phase, which we have designated the psychasthenic period.

At first these patients were treated like ordinary psychoneurasthenics; that is to say, medically, utilizing all the dietetic, medicinal, and physical therapeutic resources available to medical art. Now, it

has happened that in the medical organizations at the front, where the equipment is necessarily meager, the patients recovered rapidly and, in the majority of cases, were at the end of a few days well enough to rejoin their company; whereas in the hospital units in the rear, which are far more completely equipped, in spite of diets, douches, and electric currents of all forms and all strengths, the symptoms dragged on tediously, the patients remaining months in the hospital and often, after a cure obtained with difficulty, relapsing either in the course of convalescence or shortly after return to duty.

This experience has been constant and, though apparently paradoxical, is readily explained.

First of all, that which has been found in ordinary emotional (pseudo-traumatic) psychoses holds true for these victims of the war. A treatment which is too medical, if not followed by prompt and notable improvement, results in anchoring in the mind of the patient the notion of a grave pathological condition and in the development of hypochondriacal tendencies which are so often a part of the emotional syndrome, whether the latter be due to a common occurrence in ordinary life or to an event of the war. The idea of a grave pathological condition becomes quite naturally associated with the idea of damage sustained for the future as well as for the present; and just as a subject of an accident in times of peace can become obsessed with the preoccupation with indemnity to be turned over to him, so the subject of a war accident, exaggerating, like the first, his physical and mental damage, worries about the future, is often upheld in his hypochondriasis by ill-applied commiseration of those about him and the more or less interested pessimism of his relatives, and ends by hypnotizing himself with thoughts of retirement and pension; these then become obstacles to recovery, and in this way develops a *sinister* war case, in every way comparable with the sinister cases of ordinary accidents.

But aside from factors causing aggravation or preventing recovery, which are common to all sinister cases of whatever origin, we have to consider, in connection with emotional war psychoses, a factor peculiar to them alone. Recovery means more or less prompt return to the trenches. This prospect appears natural to the soldier who has remained at the front. It is otherwise with the one who has been evacuated to the interior. "By keeping the patient at the front one leaves him in the atmosphere of a combatant, in contact with the features which impart to this atmosphere its peculiar character—simplicity, and sometimes even restricted conditions of material existence, rigid discipline, close proximity of danger. He remains in the environment to which he has more or less fully become adapted. By evacuating him to the interior one breaks this contact and destroys the adaptation. When, upon recovery, he re-

turns to the trenches, he has to *readapt* himself. One can conceive how this readaptation, painful for many, may prove impossible for some. It will prove impossible, notably for the emotionally unstable, in whom a morbid imagination stirs up, amplifies immeasurably, and converts into obsession tragic spectacles of the war, causes him to live over again the fears once experienced, and projects into the future the terrors of the past. This is true of the graver cases of "shell shock" and explains the fact that recurrences occur almost always at the end of convalescence or shortly after returning to quarters, yet without one being thereby justified in speaking of simulation. The subject sees himself on the way back to the trenches, and, owing to an emotional and imaginative erethism, this perspective revives the elements of the shell shock syndrome."

Accordingly, subjects affected with emotional psychoses should be kept on psychiatric services at the front. The confused phase once passed, and the patient having become lucid and accessible to favorable suggestion, he must be convinced that he *is due* to get well, and that because he is due to get well he is not evacuated to the interior. This psychic therapy, associated where necessary with medication or such physical therapeutic means as may be available under the conditions (cacodylate in general weakness, electricity in deaf-mutism, paralysis, and all other pithiatic manifestations), will lead to a rapid recovery and an early return of the soldier to his company.

Nevertheless there will always remain a certain number of subjects who, by reason of a particularly marked emotional instability, will not get well quickly. The first indication in these cases is to segregate them from the others, on whom they can have but a deplorable influence, or if their isolation is not readily practicable, to evacuate them.

The hospitals in the interior will, consequently, continue to receive victims of emotional shock. They should be treated as patients, but as nervous patients, subject to military discipline, and not as insane and irresponsible for their acts.

In the interior, as at the front, the principal part in the treatment falls to psychotherapy. The patient must be convinced that the symptoms which he presents are curable, quickly curable; he must be made to note the progress he has made: and he should be granted the privileges he asks (visits, walks, participation in common amusements, etc.) only as rewards for further progress, and, as the crowning reward for complete recovery, a real convalescence. One should avoid, as the worst danger, giving him a glimpse of the possibility of retirement, especially retirement on a pension—this would but switch him on a sinister course.

The patient, as has been said, should remain a soldier, subject to discipline. He should keep his uniform and should maintain a correct bearing. He should remain in touch with superiors, toward whom he should observe the same deference as if he were normal. Finally, as was very properly recommended by Grasset, he will gradually be placed on the road back to a soldier's life by being made to take part in military drill in formation under command of noncommissioned officers. This military therapy—the association of these two words has nothing in it that is shocking—is essential. It is enough that the soldier has lost his adaptation to life at the front. It would be a grave error to let him lose also his adaptation to military life.

When the pathological condition has lasted many months, when the emotional balance remains gravely affected, and when hope of an early cure has to be given up, what course should be taken?

Retirement should not be considered. * * * the patient must * * * be kept in the Army. But he must also be eliminated from hospital wards, where his presence constitutes for the really sick a cause of discouragement and for the others encouragement in persisting. What, then, should be done? Certain subjects when sufficiently improved, can be transferred to the auxiliary troops. This solution commends itself particularly for the older retired men or men of the old auxiliary troops who have been—though to but a slight extent—brought into the service of the Army. For the others, for those who retain grave symptoms and must still be in institutions, it will be best to provide services for chronics, a sort of lazarettos, where they might be kept until a solution for their case might become available; that is to say, until the end of the war. However, it is probable that if not more than a minimum of the emotional psychoses are evacuated into the interior, and, if, in the hospitals which receive this small number, the authorities will proceed with firmness and prudence, this remnant of incurables or, more correctly, pseudo-incurable, will be quite limited.

PAYNE, C. R., and JELLIFFE, S. E. **War neuroses.** Jour. Nerv. and Ment. Dis., September, 1918.

The authors, in the course of an article on war neuroses and psychoneuroses, call attention to the fact that new types of wounds and casualties in war, due to new types of weapons and new methods of attack, have lead to new methods of treatment and new surgical procedures designed to cure, and they call upon specialists in diseases of the nervous system to rise in a similar way to the demands of the situation to-day and develop curative treatment for mental and nervous cases, since the time has passed when the community would

consent to the presence in its midst of cases of this type as though it were proper to pass them over untreated as mere anomalies, while men who had suffered loss of a limb or some mutilating wound were made the recipients of the most painstaking attention. They call attention to the fact that "in one sense the war has presented no new problems in this element."

"Though there are no new forms of psychic disturbances there are these causes of many varieties, which do not exist in times of peace, when often a latent psychoneurotic disposition is not brought to the test and the danger of such a breakdown has been quite obscured. These special and very trying situations produce sometimes marked psychoses but often of a curable nature, because they represent only inability to adjust to such extraordinary demands and conditions and to withstand their constant pressure. It is so also with the psychoneuroses many times. They, too, represent not a chronic nonadaptability and nonresistance, even a latent one, but rather failure only temporary and more easily readjustable to withstand in the face of cumulatively trying conditions."

They very pertinently suggest that "Perhaps something could be done in our training camps to establish a better psychic adaptability and an increased resistance power. Of course all the physical training tends to that, but reports prove that it has not always been well regulated to that end. It has sometimes tended in just the opposite direction."

Core, D. E. "Instinct Distortion" or "War Neurosis." Lancet, London. August 10, 1918.

The distinction is made between functional nervous disorders due to environment and those which are not. Hysteria and war neurosis belong to the former category. Neurasthenia or functional nervous disorder brought about by exposure of the nerve cells to prolonged poisoning by the products of microorganisms and certain reflex neuroses belong to the latter. Under the strain of modern warfare two emotions are called into frequent violent activity, the emotions of fear and disgust. These emotions are sudden and intense and insist upon being given free play, but are forbidden both by the idealistic conceptions acquired during childhood and early life and by the vigorous punishment they would receive from one's fellowmen. In modern warfare men constantly face hazards which render death almost a certainty. Normally constituted men then experience fear and under ideal conditions of such a position would run away. However, self-respect and military discipline prevent this normal end result and men proceed to fight in direct disobedience to their instinct. The emotion of savage anger against the adversay would be

helpful if it were felt with any intensity. Disgust at the unaccustomed sights and sounds of conflict is not allowed to manifest itself so that under its conditions the main powerful instinctive activities are distorted.

The author accepts MacDougall's classification of the seven primary instincts, but considers that they should not be separated by any hard and fast line. These instincts are:

1. The instinct to run away under the emotion of fear.
2. The instinct to fight under the emotion of anger.
3. The instinct of repulsion under the emotion of disgust.
4. The instinct of curiosity under the emotion of wonder.
5. The instinct of self-abasement under the emotion of subjection.
6. The instinct of self-assertion under the emotion of elation.
7. The parental instinct under the emotion of tenderness.

These seven primary instincts may be divided into two groups, the impressions of one group reinforcing each other and antagonizing those of the other group. In one of these groups may be placed the emotions of fear, disgust, and self-abasement with their associated impulses; in the other anger, self-assertion, wonder, and tenderness. The sense of inferiority, combined with disgust, strengthens fear and the emotion to run away. On the other hand, fear may be diminished by anger and the sense of superiority, and now the tendency of modern war is to give play to the emotions of the first group without developing those of the second and to produce emotional tone without the associated impulses.

It is harmful to the proper functioning of the nervous system and liable to produce functional disorders of this system to suppress the emotion which normally should follow its associated impulses.

The author makes the interesting observation that while normally the conative aspect of an instinct follows the emotional aspect, it is equally true that the performance of appropriate action tends to produce the associated emotion. The clenching of the hands and the setting of the teeth help to induce the feeling of anger. He asserts that patients suffering from war neuroses have always, at one time or another, experienced fear. In the early, untreated, and acute cases the fear may be obvious and openly expressed. As the patient improves, fear is present only during sleep and the terror dreams are an important factor in the case.

A relatively different type of case was observed in Mesopotamia and in India in 1916. It was characterized by complete indifference to surroundings and current events. The mental state was one of dullness and inertia. The sufferers from this form of neurosis were the victims of monotony and routine; of the deadness of country, camp, occupation, and food. Here the emotion of wonder in the instinct to curiosity had been in complete abeyance.

The author makes these distinctions between hysteria and war hysteria and war neurosis. Clinical manifestations of hysteria result from the improper suppression of a tendency inherent in every one and determined by our position in the scale of evolution; it is manifested as the result of an emotional activity which is normal as far as the emotion is concerned. War neuroses, on the other hand, follow the improper strain on the emotions themselves, causing the wrong emotional tone and disturbing the bodily mechanism which is associated with the conative aspect proper to the emotion concerned.

The diagnosis of instinct distortion or war neurosis is usually easy. It may be made in the case of any patient without organic disease who shows symptoms of nerve irritability and in whom also the element of fear is or has been present. Where distortions of nerve irritability exist and there are no signs of fear, either in the waking hours or in dreams, the war neurosis is in the late or habit stage and the terror dreams were present at the beginning of the illness. If no such history is obtainable the case is one of suggestion-hysteria.

The treatment of instinct-distortion neurosis is simpler and more successful than the treatment of hysteria because with the latter one treats symptoms, but the underlying hysterical conditions continue through the patient's lifetime. The harmony of the nervous system can usually be restored without much difficulty, provided the symptoms have been corrected before the distortion has amounted to the magnitude of habit. This point emphasizes the necessity of early treatment. When all ideas of war as an imminent factor have disappeared the more troublesome of these symptoms will be done away with and the patient will become a useful individual in his surroundings. The patient should be removed from the fighting area, and he must be impressed from the start by the assertion that his ultimate recovery is certain. When he has arrived at the ultimate base the patient should be put to bed in a quiet ward, preferably in company with two or three other patients while the active stage continues. The writer employs trional with or without aspirin to promote sleep. The medical attendant should see the patient frequently, and at each visit should reiterate the assurance of complete recovery. With the first signs of improvement convince the patient that he still has power in his legs by making him take a few steps every day. As insomnia passes and the dreams become less painful the patient should leave the ward each day and begin to mix with other patients. By this time special measures should be instituted to correct special defects, such as disorders of gait, tremors, disordered speech, and mental depression. These require carefully

regulated exercises and reeducation. For the mental depression "therapeutic conversations" are indicated. In the "therapeutic conversations" the atmosphere of "doctor and patient" should be in abeyance. Tact and ingenuity should be used. It is usually not hard to discover what the patient has on his mind. Many sources of worry are irremovable, but depression due to obtrusive symptoms can often be removed by occupation in experimental workshops. To convince the patient that he is not utterly disabled always lessens the depression. Graduated exercises offer the best hope in cases of rapid heart action and other affections of the sympathetic system.

SURGERY.

BALLEUIL, L. C., and JACK, W. D. **Fascial transplants in war surgery.** Ann. Surg. July, 1918.

The authors call attention to the use of fascial transplants for repair of deformities, the result of fibrous overgrowth following wounds attended with much tissue destruction, whether traumatic or from infection. They report 50 cases operated on successfully, including painful adherent scars of the extremities (with and without involvement of the muscle tissue and tendons), muscle hernias, and a hernia of the synovial membrane at the knee joint. The authors have also applied grafts to the dura, and they consider the method suited to all classes of plastic surgery. The operation is divided into four steps:

1. The resection of the scar.
2. The liberation of the muscles and the margins of its aponeurosis.
3. The cutting of the graft, its application and fixation.
4. The reconstruction of the subcutaneous tissues and skin.

The scar and all unsound tissue are completely excised; the muscle is freed from its fascia.

A graft of suitable size is obtained from the fascia lata, which is reached through an incision along the outer aspect of the thigh 28–30 cm. in length. This is placed in a sponge soaked with warm saline, while the fascia lata is united with mattress sutures of catgut, and the skin is sutured.

The graft is anchored in the fascial breach by sutures of 00 catgut at four points, after which it is united all around by a continuous suture of the same catgut, and the subcutaneous tissues and skin are united by ordinary methods. The part is immobilized in plaster for at least 10 days.

A number of cases are reported in detail, with illustrations of the different stages. (R. H. B.)

Chloralose as a general anesthetic.

Dr. W. F. Durand, scientific attaché of the American Embassy, Paris, reports that at a recent meeting of the French Academy of Sciences Dr. Charles Richert presented a paper detailing his experiences with chloralose as an anesthetic especially available for use in cases of traumatic shock or extreme weakness resulting from loss of blood.

In 1893, in conjunction with M. Henriot, Richert brought forward a new substance, which he designated chloralose, obtained by combining glucose with anhydrous chloral, and he established the fact that it possesses special hypnotic properties in doses much smaller than were needed to produce sleep with chloral, while its use by intravenous injection caused prolonged general anesthesia. This substance came into more or less general use for the production of anesthesia in animals used in laboratories, because it did not eliminate the reflexes, diminish the force of the heart, or lower arterial tension. In 1894 A. Pinard gave it to some of his patients to relieve the pains of labor without impairing the contractile power of the uterus. Absorption in the digestive tract is so slow and irregular that results were not very satisfactory when chloralose was given by the mouth. Recently Richert has employed chloralose in 50 cases to produce general anesthesia for surgical operations. The chloralose is given in saline solution with or without the addition of very minute quantities of chloral and sodium bromide.

The ordinary injection is made in a vein of arm or foot. The solution consists of 7.91 grams to the liter of common salt and 6 grams to the liter of chloralose. About 350 cubic centimeters, a total of 2.1 grams of chloralose, may safely be given. Doses of 2.5 and 2.75 grams of chloralose have been given, and 3 grams represent the maximum dose for safety. The injection is made in the usual manner through a sterile rubber tube, through which the liquid runs slowly, the container not being raised higher than 1 meter above the patient. The fluid enters the vein through a fine metallic needle. The injection should last about six minutes. It causes no pain, nor reaction, nor discomfort. The patient drops off to sleep without knowing it. At the end of the injection anesthesia is complete. Immobility is not concomitant with anesthesia. Rhythmic, automatic, choreiform movements are characteristic of the action of chloralose. Half an hour after the injection the movements cease, and it is then time to operate. Sometimes the rhythmic movements do not cease in half an hour, but anesthesia is complete, nevertheless.

Thus chloralose has an advantage over other anesthetics that it does not destroy medullar tonicity. It is an advantage to have the reflexes spared and at the same time violent movements may be

checked by the addition of 6 grams of chloral hydrate and 24 grams of anhydrous sodium bromide to each liter of chloralose solution.

The patient wakes only at the end of 5 to 8 hours after a profound sleep marked by heavy breathing. He awakes without nausea, headache, or any recollection of pain and showing a good appetite. There is often profuse perspiration.

Richert summarizes the advantages and disadvantages of the new anesthetic.

Chloralose is absolutely without toxic effect upon the heart and does not lower arterial pressure, in contradistinction to other anesthetics which weaken the cardiac systole and reduce arterial pressure. These facts make chloralose peculiarly appropriate for use in operations of great severity or where the patient's condition is alarming from excessive hemorrhage or many and serious wounds (naturally in such cases chloral and bromide of soda are not added). Richert considers the administration of chloralose without danger, though it may and often is attended with certain inconveniences. In the first place a certain variability in the results has to be admitted. Chloralose seems to be in a way an indicator of latent nervous troubles. Sometimes its administration causes extreme agitation and sometimes absolute calm results. Elderly patients do not stand it so well as young patients. Manifestly when the intravenous injection is complete there is no suspending the prodecure, as in the case of inhaled anesthetics.

In 10 to 15 per cent of the cases observed (particularly on patients 50 years of age or more) there is an exaggerated secretion in the nose, pharnyx, etc. There may be spasm of the glottis, labored, difficult breathing, while the tongue tends to fall back into the larynx and fill it up. Breathing is noisy, difficult, and convulsive; the patient inclines to become cyanotic. The large increase of bronchial secretions is an unfortunate feature of its use. However, from the point of view of safety no comparison can be made between an injury to the respiratory system and to the heart.

The writer recommends that chloralose, though he considers it harmless, be reserved for very severe cases.

MILITARY, LEGAL AND INDUSTRIAL.

AMANTEA, G. **A new treatment for lesions due to dichlorethyl sulphide.** Policlinico, Rome. September 22, 1918.

Following extensive study of the subject and experiments both on animals and upon himself with mustard gas, the author reports excellent results from the use of topical applications of silver nitrate. Without pretending to furnish the chemical formula of the reaction

that occurs when the two substances are brought together, he believes that the formation of a silver chloride demonstrates the decomposition of the yprite and consequent loss of toxic power. This is true whether the skin wet with dichlorethyl sulphide is treated immediately or only after a lapse of one to nine hours. Even after the skin is blanched the employment of a silver nitrate solution hinders vesication; if the blistering has begun the process is arrested.

Instead of using, as has been done in the past, ether, chloroform, or alcohol to remove the excess of dichlorethyl sulphide, Amantea prefers to mop the affected part with a cotton sponge soaked in the silver solution, working centripetally from the margins. When the excess of poison has been sponged off, the surface may be painted with silver or sponged with a fresh tuft of moistened cotton. No chlorine-containing substance should be employed.

For ordinary cutaneous surfaces a 3 to 5 per cent aqueous solution is indicated. For lesions of the eyes a solution of .0.25 per cent strength is used to flush them out, or a 1 per cent solution may be cautiously instilled. Open wounds are treated with these weaker solutions, and if they are very extensive and deep it may be proper to restrict the silver applications at the margins and introitus.

Research Society of the American Red Cross in France. **Conference on surgery in battle areas.** Session of September 6, 1918. Paris, France.

At the meeting of the Research Society of the American Red Cross in France, participated in by representative medical men from the military forces of France, Great Britain, and America, a number of questions were propounded to those in attendance regarding the various problems connected with the handling of the wounded and the answers appended to the questions given below report the consensus of opinion of the meeting, but many of those present disagreed with the findings.

I. PROBLEMS RELATING TO ORGANIZATION.

1. Personnel of a standard surgical team:
   (*a*) Surgeon.
   (*b*) Assistant physician.
   (*c*) Anesthetist (nurse or M. O.).
   (*d*) Two hospital corpsmen.
2. How many tables shall be allotted to each team?
Two.
3. What is the best arrangement of hours for a considerable pull?
Twelve-hour shift most practical.
4. What is the best means of transport teams?

Ambulance.

5. Shall teams furnish any instruments or apparatus?

No.

6. What shall be the proportion of X-ray operators?

One to three teams.

7. What shall be the proportion of general nurses in the operating room?

Two nurses to three or four teams.

8. Shall each surgeon be responsible for the aftercare of his cases?

Ideal, but impossible.

9. Shall there be a day and night chief of surgical service?

Yes.

10. Under whose direction shall the resuscitation team work?

Consulting surgeon.

11. Shall abundant reserves of teams be in readiness?

Yes.

12. What is the most available type of mobile unit for purely temporary emergency reinforcement?

Field Hospital (American).

Auto-chir (French).

Tent section of filed ambulance (British).

II. PROBLEMS RELATING TO WAR WOUNDS.

1. In cases suitable for primary closure it has heretofore been agreed that patients should remain under the care of the operating surgeon until there is sound healing. Are there any new facts suggesting a modification of this principle?

Yes; when possible; but for transportation every wound wide open.

2. If a suturable case must be evacuated and if there is opportunity for making surgical revision before evacuation shall the surgeon introduce stitches, leaving them untied or shall the wound be left wide open without stitches placed?

Wide open; without sutures, tied or untied.

3. Shall such wounds be protected by dry sterile gauze? Or shall an antiseptic dressing be applied? If so, what antiseptic?

Dry gauze.

No standard antiseptic treatment.

The French strongly advocate the gauze dressing.

4. Shall wounds be packed with gauze?

No; unless for hemmorrhage.

5. Shall splints be placed on limbs having wounds of the soft parts only?

Yes; wounds of nerves and tendons when sutured.

6. Is a bacteriologic examination of the wound required in making primary suture during the period of contamination, which usually lasts from 10 to 12 hours?

No.

7. If, owing to rush, no surgical treatment of a wound can be given before evacuation, shall the wound be covered with dry sterile gauze only? Shall any antiseptic be used? If the latter, what?

Dry sterile gauze only.

8. If there is a larger number of wounded than the surgeon can give a complete revision to, shall he give ideal treatment to as many as he can, leaving the remainder of the wounded unaided, or should he distribute his services among all, giving everyone a better chance for survival of life and limb but not a maximum of good result?

Complete in selected cases. Triage must be good—greatest good to greatest numbers.

9. In the latter case would the surgeon take the time to scrub and clean the field, or would he merely make provision against retention of wound secretion, make prophylactic incisions to provide against future tissue tension, deep infection, etc.?

No.

10. Shall there be evolved a "battle" technique as well as a "peace warfare" technique?

Yes.

11. In battle stress shall the surgeon with the ripest experience and the most matured judgment do operations, or shall he utilize his experience and judgment in making important decisions; in advancing less experienced operators; in directing treatment of critical cases; in deciding the schedule of operating—in short, acting as a surgical manager operating with his head, not his hands?

With his head and to superintend triage.

12. Shall the wounded receive morphia?

Yes.

13. If inexperienced anesthetists are used in emergency, what method of giving ether anesthesia is safest?

Ether-drop method on gauze.

III. PROBLEMS RELATING TO THE LIGHTLY WOUNDED.

1. Shall the lightly wounded be segregated and dealt with independently of the seriously wounded?

Yes; when push is on.

2. Shall they be kept in the forward area?

No; unless needed as donors for transfusion.

3. Suggest a Ford-factory plan of dealing with them.

Not discussed.

4. Shall they claim the attention of the best surgeons under the best conditions, or otherwise?

No; except for organization.

MAGNUSSON, L. **Laws regarding illegitimacy in Norway.** U. S. Department of Labor, Children's Bureau.

The Norwegian illegitimacy law of April 10, 1915, is a radical measure, and the principles laid down in it are in the nature of a return to those recognized in the early folk law of Norway, under which the illegitimate child had a qualified right of inheritance from the father and enjoyed substantially all the legal family rights of the legitimate child. These rights of the illegitimate child were, however, wiped out about the middle of the seventeenth century and were not fully restored and enlarged until the passage of the law of 1915.

The most radical change made by this new legislation consists in putting the burden of establishing paternity and fixing the obligation of maintenance upon the State instead of upon the mother as under the act of 1892. The mother of an illegitimate child is required by law to report the facts to the local authorities, and the court will then summon the alleged father to answer the charges.

For the first time an attempt is made to establish paternity as a biological fact, which when established carries with it all the obligations of legal paternity; failing in this, and merely establishing the fair presumption of paternity, the law puts upon the alleged father the obligation of maintenance or economic support of the mother and the child.

Further changes consist in (1) requiring the economic support to accord with the means of the better situated of the parents and not with their average means; (2) extending maintenance until the child has completed 16 years of age instead of 15, and in some cases even beyond that period; (3) equalizing the burden of contribution by requiring contributions from the mother if circumstances of wealth justify that; (4) requiring the contribution of benefits to the mother for three months before confinement and also during confinement; (5) payment of special nursing expenses for nine months after birth if the child is with the mother. The law fixes certain minimum and maximum amounts for these contributions to prevent abuses in local administration; (6) forced collection of contributions on the initiative of the State and not that of the mother as formerly.

Changes in the laws of succession give full rights of inheritance and transmission to an illegitimate child in the line of the father and the father's heirs next of kin, and a child of an illegal or void marriage is granted legitimacy.

88977—18——10

The property relations of husband and wife are changed to prevent any child which may be born out of wedlock from inheriting the property of either spouse which has been brought into the marriage by the other. A change similar in intent is made in the divorce law by which the innocent party may demand the division of the community property in such a manner that the illegitimate child of the other shall not inherit the property. The grounds for divorce are also enlarged to include the birth out of wedlock of a child whose paternity can be definitely established by law, but not if merely the presumption of paternity can be established, which latter carries with it the obligation of maintenance only.

The law on the rights of parents and children, July 6, 1892, is merely changed to conform to the changes made by the illegitimacy law in the corresponding rights of legitimate children. The amendment makes no change in the legal status of legitimate children.

The act on the care and maintenance of children, which applies both to legitimate and illegitimate children, provides for State care and supervision for destitute mothers and children whose fathers neglect to make the contributions for their maintenance. It is based on the assumption that there will be mothers who will get no contributions because the father has absconded or because he has no property. Such State contributions do not carry with them the stigma and loss of certain rights of citizenship attaching to poor relief, as there is no fault on the part of the mother or the child. These contributions, commonly termed maternity benefits, are payable by the local authorities from local taxation.

The general administration of this series of laws is by the department of social affairs, commerce, industries, and fisheries (departementet for sociale saker, handel, industri og fiskeri), which issues orders to supplement the law and acts as a central clearing house for the information of local police courts and other authorities which are directly concerned in enforcing the law. The immediate administration of the law is through the police authorities in the counties and in the lesser rural subdivisions whose activities are in turn supervised by the amtmand of the larger political divisions. The amtmand appoints the police authorities referred to.

Besides the department of social affairs, the department of justice is concerned in the administration of the act to the extent of court processes involved, the issue of citations or summonses, and punishing violations against certain provisions of the law, such as taking the child out of the country without leave, absconding, or failing to contribute.

The ecclesiastical department is concerned with the registration of births. The medical department provides the State physicians, who act as chairmen of the local boards of health, whose duty it is to su-

pervise all foster children and to oversee the activities of midwives and physicians and secure reports from them when attending births of illegitimates. Special advice on the medical and medicolegal aspects of problems connected with the adjudication of paternity may be sought from the State medicolegal commission. (W. A. B.)

FRENCH, W. J. **Prevention of blindness, Work of the State industrial accident commission.** California State Jour. Med. August, 1918.

The National Safety Council estimates that there is one worker killed every 15 minutes, day and night in the United States and one injured every 16 seconds, day and night. This gives us more than 30,000 killed and about 2,000,000 injured. It is estimated that out of this number there are 200,000 eye injuries. The National Committee for the Prevention of Blindness states there are 100,000 blind persons in the United States and that more than 50 per cent are needlesly blind.

There are, in round figures, 1,000,000 employees in the State of California. There are 300 industrial injuries each working day, including Sundays, in the State. We thus have approximately 100,000 industrial injuries each year in California. In 1914, 1915, and 1916 there were 23,451 eye injuries. Of this number 549 were permanent injuries and 22,902 temporary injuries. There were 11 cases of total blindness. The medical and compensation costs for these eye injuries will be about $788,000. It is impossible to give a definite amount at this time, because the 11 cases of total blindness call for life pensions, and we have simply computed the amounts that would be paid the injured men, based on the mortality tables used by the insurance companies. The time lost by the 22,902 temporary injuries was 234.2 years. This means that we found just what each man lost; one man might lose a day from work, another man a week, and another man six months, and so on. We added the total together and got the 234.2 years. We have in California 26 eye injuries each working-day and the number will grow larger as there is an increase in the total of employees, especially when we consider the large groups of men that are employed in the shipbuilding plants who are more likely to sustain eye injuries because of the continual chipping of steel and the use of emery wheels and machinery used in the construction of ships.

The Industrial Accident Commission advocates the wearing of goggles whenever workmen are liable to have their eyes injured. An individual pair of goggles for each man is advised because of the advantage of interesting him in what is practically his property and for the further good reason that men naturally object to wearing

goggles that have been promiscuously used. The use of masks is urged for welders and babbitters. These goggles and masks are so strongly constructed that they not only fit the eyes but have shields at the side of each lens to prevent flying chips from entering the eyes from the sides.

HARRINGTON, T. F. **Anilin poisoning.** Boston Med. and Surg. Jour. October 17, 1918.

The author describes poisoning by anilin occurring in the industrial plants of Massachusetts. The manufacture of anilin in this country is one of the direct results of the war, anilin and allied substances having previously been imported almost exclusively from Germany. There is a distinct danger of poison in connection with the manufacture of anilin and there has been a sufficient number of cases in Massachusetts to make it possible to speak definitely on the treatment and consequences of such an accident.

Anilin or anilin oil (amido-benzene, $C_6H_5NH_2$) is a colorless fluid turning dark on exposure to light and air. It has a slightly irritating aromatic odor, volatilizes at room temperature and boils at 182 C. Anilin is manufactured from coal tar, which is a mixture of benzene, toluene, xylene, etc., all volatile poisons. Benzene treated with nitric and sulphuric acid forms nitro-benzene, itself poisonous, and nitro-benzene is reduced to anilin by means of iron filings and hydrochloric acid. Important colors are made by the action of nitrous acid on anilin and allied aromatic amins.

Pure anilin does not cause poisoning but pure anilin is not employed in the industrial arts. What is usually known as anilin is a mixture of amido-benzene with meta-toluidin, paratoluidin, and ortho-toluidin and xylidin in varying proportions. Poisoning from anilin and its derivatives occurs in the manufacture of all dyes, drugs, photographic materials, rubber goods, etc. The poison may be absorbed through the unbroken skin by direct contact or through saturated clothing, by inhaling vapor and dust or by swallowing dust with food or saliva. Toxic symptoms may follow the inhaling of from 1 to 0.25 gram of anilin. The effect is greater in warm workrooms or during hot, sultry weather. Anilin produces a destruction of the red blood corpuscles. Pallor followed by a striking bluish color, especially in the lips, is the initial symptom. Next come lassitude, and a sense of fullness in the head.

Slight mental confusion, difficulty in swallowing, weakness and rapidity of the pulse, subnormal temperature, headache, dizziness, nausea, dyspnea, unconsciousness, convulsions, coma, and death. The

more chronic cases of poisoning by anilin are marked by anemia, headache, tinnitus, vertigo, disorder of digestion, and cramps in the muscles. Skin eruptions also occur.

The changes in the blood are characteristic. The spectroscope shows a band which comes close to that of metahemoglobin. There is a transient leucocytosis reaching from 30 to 40 thousand. Megaloblasts, nucleated reds, and basophilic granules appear in the circulating blood and in the bone marrow. Small repeated doses of anilin cause an increase in the number of red corpuscles, and a reduction of polymorphous leucocytes. Hemoglobin and color index are reduced. In the later stages hemoglobinuria is characteristic.

In acute cases the first step in treatment is the removal of the patient to the open air and keeping him awake. The heart should be stimulated by black coffee and camphorated oil and the inhalation of oxygen. The patient should also be stimulated by warm saline solutions injected under the skin or into a vein.

The prevention of poisoning is important. The factory or workshop should be well ventilated, all dust and fumes being thoroughly removed. Vacuum sweeping is better than dry sweeping and the workrooms should have ample washing facilities. The hands should be protected by long sleeves and gloves. Respirators should be worn and the workmen should be forbidden to eat in the workrooms or storerooms. All persons handling anilin should be taught the early signs of poisoning.

Immigration Statistics. Monthly Review, U. S. Bureau of Labor Statistics. March, 1918.

Immigrant aliens admitted into the United States in specified months, 1913 to 1917.

Month.	1913	1914	1915	1916	1917	
					Number.	Per cent increase over preceding month.
January	46,441	44,708	15,481	17,293	24,745	19.9
February	59,156	46,873	13,873	24,740	19,238	22.3
March	96,958	92,621	19,263	27,586	15,512	19.4
April	136,371	119,885	24,532	30,560	20,523	32.3
May	137,262	107,796	26,069	31,021	10,487	48.9
June	176,261	71,728	22,598	30,764	11,095	5.5
July	138,244	60,377	21,504	25,035	9,367	15.6
August	126,180	37,706	21,949	29,975	10,047	7.3
September	136,247	29,143	24,513	36,398	9,228	8.2
October	134,440	30,416	25,450	37,056	9,285	.6
November	104,671	26,298	24,545	34,437	6,446	30.6
December	95,387	20,944	18,901	30,902	.....	.....

Immigrant aliens admitted into and emigrant aliens departed from the United States, November, 1916 and 1917.

Race.	Admitted.		Departed.	
	November, 1916.	November, 1917.	November, 1916.	November, 1917.
African (black)	729	496	244	156
Armenian	159	30	.....	196
Bohemian and Moravian	43	3	3	68
Bulgarian, Serbian, Montenegrin	76	10	2	252
Chinese	153	112	101	125
Croatian and Slovenian	32	5	15	1
Cuban	154	31	297	125
Dalmatian, Bosnian, Herzegovinian	.....	.....	.....	2
Dutch and Flemish	866	168	46	38
East Indian	9	12	83	4
English	3,604	820	614	1,140
Finnish	942	258	178	77
French	4,642	580	218	412
German	1,342	144	51	39
Greek	2,009	105	131	526
Hebrew	1,908	344	13	33
Irish	2,046	345	219	231
Italian (north)	492	55	561	265
Italian (south)	5,531	130	1,327	2,476
Japanese	741	776	112	131
Korean	15	20	13	5
Lithuanian	72	19	.....	3
Magyar	72	5	12	1
Mexican	1,683	84	56	58
Pacific islander	.....	.....	.....	1
Polish	283	52	5	205
Portuguese	173	58	325	521
Roumanian	40	9	5	9
Russian	408	119	542	196
Ruthenian (Russniak)	94	5	.....	6
Scandinavian	2,576	736	503	140
Scotch	1,516	324	214	259
Slovak	33	2	1	38
Spanish	1,104	350	334	214
Spanish-American	160	127	50	90
Syrian	91	18	7	9
Turkish	102	.....	9	16
Welsh	98	11	20	11
West Indian (except Cuban)	110	71	23	47
Other peoples	329	12	26	10
Not specified	.....	.....	804	.....
Total	34,437	6,446	7,164	8,136

DURHAM, H. E. **Preservation of fruit.** Brit Med. Jour. June 22, 1918.

Fruits may be preserved for a more or less indefinite period by bottling or canning as jam, by making into paste, or by simple drying. Some fruits may be kept for months if properly stored. The author, who is the president of the Fruit Growers' Association of Herefordshire, suggests that as the making of jam in factories is now largely under Government control the manufacturers should be required to

make a declaration as to the substances other than the fruit named used in making the jam. Thus if the basis of jam is the pulp made from apples, plums, or vegetable marrow, the named fruit serving more as a flavoring agent, these facts should be declared. Jam is supposed to afford a ready means of adding vitamines and other available food substances to the diet in winter when fresh fruit is not available. Where fruits are pulped and kept and later recooked the vitamines may not be lost. The so-called "currant jam," supposed to be made solely from sound fruit and sugar, is often obtained simply by the use of pulp combined with apple or vegetable marrow with currant flavoring.

At this time when economy in sugar is vital the following notes have an unusual interest. When water without sugar is used in bottling, a diffusion takes place until an equilibrium is established. The individual fruits then become little more than tasteless bags, and can only be served at table when mashed into a purée. It is therefore necessary to make juice from some of the fruit and use it to fill up the bottles. The juice may be prepared by cooking some of the fruit in a small amount of water and squeezing the residue through a cloth by means of the fruit press.

The paste from fruit can be made into sauces for puddings, etc. To prepare an apple paste cut up the apples and cook with the least possible amount of water. When soft, after culling, pass through a fine cloth or sieve. Now continue the cooking with constant stirring until reduction is complete. Reduction is indicated when the wooden spoon used for stirring will stand alone in the pulp. If sugar is available, add from one-tenth to one-fifth of the weight of the pulp. Pour the pulp into well greased baking trays and place them to dry in a slow oven or in bright sunlight. Then the residue may be rolled or cut up into squares and stored in paper bags or cardboard boxes in a dry place.

Tomatoes are to be boiled without breaking the skin, the water drained away completely and seeds and skins are then to be removed. Add salt, cayenne, and allspice. The purée is then slowly reduced to a thick jam, poured into trays, dried, and rolled up. This paste keeps well.

The simple drying of fruit needs no elaborate outfit. The ordinary baking oven serves for drying fruit on a simple scale. When dried to hardness the fruit will keep perfectly in paper bags. Fruit to be dried should be of good size, free from defects, and ripe or nearly so. Fruit which is not perfectly ripe may be spread out on trays made of gauze or wood and kept over the range for a few days. For the first drying the temperature should not exceed 115° to 120 F. For the second or third heating the temperature should not exceed 150 F., and for the final a temperature of 160 F. is the maximum. If the

temperature is too high the skin of the fruit breaks, the sticky juice runs out, and a general mess results. At the end of each day's drying the oven may be allowed to cool for a little. The fruit should be left in over night. On the next day the fruit is taken out and cooled. It is well to leave the oven door ajar at night, and this must be done during the day when the fire is on.

It is essential to have intervals of cooling between the temperatures in the oven. Potatoes, young broad beans, and green beans dry rapidly and give a good product.

PARIS CHAMBER OF COMMERCE. **Economic and financial assistance given by the United States.** Bulletin of Information, Paris. September, 1918. No. 86.

In the course of a year—July 1, 1917, to July 1, 1918—10,000,000 tons of foodstuffs were exported to the allies, including 150,000,000 bushels of wheat. The cereals sent from America to France between May, 1917, and May, 1918, represented sufficient bread for 11,000,000 Frenchmen for a whole year, and the voluntary restrictions made throughout the country enabled the States to place 840,000,000 pounds of provisions at the disposal of the allies. The steel exports for the year ending June 30, 1918, amounted to a thousand million dollars, against $621,000,000 only in the preceding year. In May, 1918, copper exports figured at $29,065,347. In 12 months, thanks to the launching of special cistern boats, the exports in benzine, paraffin, and petroleum amounted to 650,000 tons.

The United States before the war had never loaned to any foreign States. The total of their advances to the allies now exceeds six thousand million dollars.

REPORTS.

SURGICAL EXPERIENCES AT THE FRONT.[1]

By G. G. Ross, Lieutenant, Medical Corps, United States Naval Reserve Force.

Under orders from Admiral Wilson, two operating teams from United States Navy base hospital No. 5 left for Paris on the morning of July 18. Upon our arrival in Paris at 8 p. m. we received verbal orders to report to United States Army base hospital No. 2, where we operated all night. The following morning we were ordered to field hospital No. 12 at Pierrefonds, arriving there by ambulances at 8 p. m. There were approximately 700 wounded lying on stretchers on the ground awaiting operations. All had been fed and tetanus antitoxin had been administered. The hospital was situated in a small hotel, the only available building in the town. The operating room was located in the dining room of the hotel and allowed space for three tables with barely room for the litters to pass between. The sterilization consisted of boiling instruments over a gasoline stove. The autoclaves were heated and the water boiled by the same method. They had a gasoline engine which supplied power for the electric light and the X-ray outfit. The speed of operating was hampered at night by the difficulty of selecting and transporting patients to and from the operating rooms, as lights were prohibited owing to the fact that the hospital was being bombed at regular intervals. The work continued for five days and nights, teams working on 12-hour shifts. On one occasion Drs. Curl and Ross operated for 18 consecutive hours. The wounds were massive and associated with more or less severe hemorrhage, loss of skin, muscle, and bone. The most hopeless cases were the wounds of the head and abdomen. In one shift, one table had occasion to do three intetinal resections and one anastomosis between the ileum and transverse colon, the cecum having been shot away. The through-and-through wounds of chest were not operated unless the wound was large and the pleura opened. Here the blood was allowed to escape, ragged ends of rib removed, packed with gauze, and the muscles and skin brought together by sutures. Every wound of the extremities, buttock, or loin spaces was treated by mechanical cleansing (débridement), and antisepticized by chemical means, iodine or Dakin solution being used. Foreign bodies,

[1] From report received from United States Navy Base Hospital No. 5.

shell fragments, bits of clothing, bullet (rifle, machine gun, and shrapnel) were removed when quickly located. Every wound received on the battle field is potentially or actually infected with the organisms of gas gangrene, and so every wound is allowed to remain wide open, the incision must be very large, and the débridement thorough. The last 36 hours at Pierrefonds were devoted to the care of Scottish troops who had been sent in to relieve the First and Second Divisions of our Army. The English authorities requested the hospital to remain, as their hospital equipment had not caught up with their rapidly moving troops.

We received 32 Scots, wounded at night by a bomb dropped on their column by a Boche aeroplane. The target was supplied by a Scot who struck a match to light his pipe. Eight of them were killed, and the balance, 32, we looked after. We also operated on a number of Hun prisoners after having cared for our boys and the Scots.

A German officer upon whom we operated, and who had been lying on the field for four days before he was found, told us that in Germany the general opinion was that France was in the war to secure Alsace-Loraine, and the Americans "for souvenirs."

About 3,500 men passed through this station in six days, about 300 of whom were operated on. The average operations per patient were not less than two, such as double amputations, multiple shell wounds, compound comminuted fractures of several extremities, or multiple of the same extremity, etc.

The function of a field hospital is to care for severe wounds and the nontransportables, but under the conditions we had to meet we were doing the work of an evacution or base hospital.

On July 30, 1918, United States Navy operating team No. 1 was ordered to evacuation hospital No. 6 at Chateau Thierry, and team No. 2 was ordered to evacuation hospital No. 7 at Coulommiers. As the Army had no means of transportation at hand we were sent out in automobiles supplied by Navy headquarters in Paris. We arrived at Chateau Thierry, but, as we were unable to locate No. 6, we were assigned to field hospital No. 116 for the night, and worked at the operating table until midnight. One of our nurses, Miss Hurst, continued on duty all night and handled instruments for three teams, and, on one occasion, three abdominal sections were going at the same time.

We found No. 6 the following morning and reported to the commanding officer, Colonel Baker. For 12 days we operated in 12-hour shifts, and during the last period were on duty for 24 hours.

Neither the cases brought to Chateau Thierry nor to Coulommiers were of so severe a nature as at Pierrefonds, the field hospitals between us and the line having cared for the nontransportables, such as abdominal cases and bad head injuries. There were comparatively

few amputations necessary. The most important work consisted of débridement and chemical sterilization of the wounds and placing the man by position or apparatus in condition for comfortable and safe transportation. For wounds of the extremities and especially of compound fractures of the femur and humerus, the Thomas splint is the best method for the field. It is easily applied and is very efficacious, but when improperly applied is very painful. Many cases came to us with the splint improperly placed, and the man thereby suffering unnecessary pain, especially at the instep and heel, the extension having been applied over the shoe. One must be charitable, however, because the work had been done under shell fire, a sufficient excuse for haste. We were surprised at the number of men whose large vessels had been shot away and who had not bled to death. We had occasion to ligate the femoral in Hunter's canal twice, to control by hemostats the internal pudic twice, the radial once, the brachial twice, the perineal once, the posterior tibial twice, the common femoral once, and the deep and superficial palmar arch twice. In all these cases a well-formed thrombus was present and hemorrhage had been checked, although most of these men had traveled from 15 to 20 miles in an ambulance. A very serious problem is the use of the tourniquet. It is usually applied on the field and it may be hours or even a day or two before the man can be brought to an operating unit. The day and hour of the application of the instrument should be noted on the man's field card and he should be transported to the rear with the greatest expedition, for after six hours' constant constriction it becomes a serious menace. One case we amputated had had a tourniquet on for 48 hours.

Most of the men had been given tetanus antitoxin on the field or at the advanced dressing station and the fact was noted on the field card, or by a "T" painted on the forehead. No case passed through the stations without having this matter checked up. The result is that tetanus is practically eliminated as a battle risk. Many of the wounds contained maggots, but while such a wound presents an unpleasant appearance, maggots are not detrimental to the wound, as they attack only the dead and devitalized tissue and bacteria.

The elimination of tetanus has been offset by the ever present anaerobic gas bacilli, as every wound involving muscle is potentially so infected and the surgery of the wound must be approached with this fact in mind. It is not a difficult diagnosis to make. The odor of the wound is very characteristic, as is its appearance. The odor is a peculiarly sweet sickening smell, and when associated with a wound having the appearance of grayish-yellow slough and muscle that is dark purplish red and lusterless, and which does not contract when touched, and which when cut gives the sensation of going

through soft mush, the diagnosis is established. Associated with the other symptoms there is an area around the wound which gives a crackling sensation to the finger, due to the presence of gas and this area shows discoloration varying from a curious gray dead look to that of subcutaneous ecchymosis.

Experience has taught that the circular-chop amputation is the most practical method and gives a higher percentage of recoveries. In the presence of the universal gas gangrene infection flap amputation is prohibited. The final results of chop amputations, if the Martin method of treating the stump is correctly carried out, is excellent and assures the patient the maximum use of an artificial limb.

In some cases of amputation of the thigh in the upper third in the presence of gas gangrene, it was necessary to make long lateral incisions with débridement. Penetrating wounds of the skull are very serious injuries as the fragments of the shell or bullets carry with them pieces of bone which are driven into the brain substance. Their removal requires great care and patience, as well as special skill and training. There is usually a great loss of brain substance. These cases should be drained and the scalp wound left wide open after débridement of the edges, and the final surgery belongs to specially equipped hospitals farther back from the line. To spend three hours in doing a finished brain operation in a front-line hospital, when scores of patients are waiting for the operating table, seems entirely out of place and is depriving men, who offer a much better prognosis, of an opportunity for recovery.

We saw several through-and-through wounds of the lower abdomen, in which the missile had traversed the bladder without opening the peritoneum. In one case the bullet had entered anteriorly and made its exit in the buttock near the crest of ilium. Through the tract, urine was escaping in a constant dribble, constituting perfect drainage. The patient was not operated upon, but evacuated to a base hospital.

One very unusual case came to Dr. Curl. A man was hit by a bullet which struck the cap of a shell in his bandolier, exploding it in his left lumbar region. The badly distorted shell case and bullet were removed from the loin space and back, the wound given débridement, and left open. The peritoneum was uninjured.

It is unnecessary to open and pare all through and through wounds caused by rifle or machine-gun bullets. The comparative size of the wound of entrance and exit will be the deciding factor. If the wound is caused by a bullet at the height of its flight when it has steadied down to a revolving motion, it will perforate soft tissue and bone with a minimum of destruction and the wound of exit will be but little larger than that of entrance. If, on the other hand, the bullet strikes the man at the beginning or toward the end of its

flight, it will be wobbling as well as rotating and will cause a tremendous destruction of tissue, causing severe comminution of bone and pulpification of muscle and fat and shredding of the connective tissue planes. Here the wound of exit is much larger than that of entrance and will give the appearance of an explosive force. This class of wound should be freely opened, pared, and cleaned by antiseptics, for it is the wound which presents the most favorable opportunity for the development of the gas gangrene bacilli.

All through-and-through wounds caused by shell fragments should be treated by free opening and débridement and left wide open with drainage.

Several cases of narrow escape from death or very severe wounds came to our notice. One case complained of severe pain in his neck. There was a slight wound on the side of the neck, and just below it, firmly bound by a bandage was a shell fragment 3 by 2 by 2 inches, causing pain by pressure. Another man, Lieut. S., had a shell fragment, roughly, 2 cubic inches in size, resting in a pocket of skin on the abductor side of the arm. The humerus was uninjured, the brachial artery was intact. Another man had a machine-gun bullet enter just below the right eye, fracturing the floor of the orbit, passing through the superior maxilla, around the side of the neck, and lodging in the muscles in the mid-line of the posterior surface of the neck.

DETAILS OF TRANSPORT SERVICE.[1]

By R. I. Longabaugh, Lieutenant Commander, Medical Corps, United States Navy.

It is probable that every medical officer on transport duty has been reporting details of his work as they arose, because the situations we are handling present so many new aspects. However, the assembling of many ideas and suggestions will in time make it possible for the authorities to lay down certain rules of conduct that will be of great assistance to any of our men assuming the duty for the first time.

With this in view I am inclosing two form letters which I had printed on board, one for the commanding officer of troops and his various commanding officers and the other for the medical officers of the Army. In addition, I have managed to hold a "get-together meeting" with each of these sets of officers when they came aboard, for the purpose of having them thoroughly understand in detail the ends for which we are working and realize the cordial relations which we desire to have exist.

[1] From Report of U. S. S. *America* of April 29, 1918. The marked disparity in the ships, both as to capacity and internal arrangements, has made it impossible to lay down hard and fast rules for the administration of the medical department of naval transports.

The senior medical officer has also submitted to me a list of the medical officers under him, together with any specialties they may have been following, and in this way we have been able to give all seriously sick special consideration through consultations. As an example of this, Drs. Stellwagen and Dorrance, both of whom are Philadelphia men well known to the service, consulted with me on several occasions on the way over.

Our sick list varies between, say, 20 and 100 persons, depending upon conditions. Among these sick are many men requiring liquid diets and special diets. In the past it has been the custom to make use of canned soups as part of this diet. We now carry some canned soups for emergencies, but we learned that, with the large number of troops aboard, the serving of soups to them as part of their ration was impracticable, and the bones were therefore a loss. We, in the sick bay, took advantage of this situation by having the paymaster make fine rich soups for the sick from the bones, thus we not only save our canned soup but, in addition, we get something much more palatable. However, the question of diets for the sick does not yet satisfy me. I believe that as a new departure the department should in some way secure cooks for the sole purpose of running the sick-bay diet kitchens and preparing such special dishes as from time to time may be ordered on board transports, especially on the return voyage. This much is certain, at no other place in the service would we attempt to care for a large number of sick without special provisions as to cooking for them.

Through the efforts of Captain C. N. Fiske, Medical Corps, United States Navy, we now have access to practically all of the good clinics in New York. I laid before the commanding officer the following plan to be followed in port and he immediately gave it his hearty approval: The officer of the day to be on duty during the entire 24 hours, the relief officer of the day on duty during working hours. The remaining two junior medical officers are to be excused from quarters and to attend the clinics. As a check they report to me the clinics attended and the number of hours spent therein. In order to show our appreciation of the efforts of Capt. Fiske I intend to submit to him each time upon departure a copy of this report. Speaking of the duties of the medical officers, another plan, which I have passed on to some other transport surgeons, is that at sea the officer of the day is on from 8 a. m. to 8 p. m. and the night is divided into three watches, which are stood at the sick bay. During each watch our medical officer accompanied by a medical officer of the Army makes an inspection of troop spaces to assure himself that men are sleeping under proper conditions. We have found that the presence of a medical officer at the sick bay at all times while troops

are aboard has not only created a very favorable impression, but has assured the sick prompt and complete attention.

In dealing with the soldiers it has been our plan as far as possible to avoid direct orders to them. On all inspections we are accompanied by an officer of the Army, who issues such orders as we may desire. We seem to feel that the soldier recognizes the uniform of an Army officer and obeys promptly, whereas he is unfamiliar with our uniform and it means nothing special to him. Then, too, it gives the Army officer a feeling that he is something more than a figurehead and stirs up a lively interest in his job.

From my viewpoint the Transport Service is at the present time the most important field for a naval surgeon. It therefore seems to me that he should be encouraged and helped to gather together and train a most efficient personnel and that once his system is established and getting results it should not be disturbed. For instance, during my first trip so many duties fell upon me personally that I found I lost what Dr. Fiske so aptly described as "the big point of view." On this trip, therefore, I began to train Lieutenant Dearing, Medical Corps, United States Navy, as sanitation officer. He has been performing the duties most satisfactorily, has been able to work out to completion many small details which originated with me, and has made many valuable suggestions himself. Between inspections of troop spaces with the Army officers, which take the entire morning, and inspection of crew spaces and the ship in general with the first lieutenant, taking up the afternoons, he has been kept very busy. In all this, however, his medical work has not been forgotten, for he is given an opportunity (which he is glad to have and seizes) to continue to work on the medical side of the ward.

As many hospital corpsmen as can be spared are ordered while in New York to attend the special courses provided by the commander of the cruiser force. In addition, while on board we have arranged for two classes daily on the return trips, when work is light, and have placed some of the reliable men as "heads of departments" on the surgical side, on ward management, paper work, dispensary work, etc., under the immediate supervision of the pharmacist. We expect to continue these trained men in their special jobs and have them train other men as fast as the men can absorb the work.

Naturally we have been endeavoring as far as possible to cooperate with the executive officer and assist in all matters relating to sanitation, for his duties are heavy. The inclosed bill of cleaning instructions is a sample of one which we got up for posting in every troop compartment to give the Army cleaning details a concise idea of what is expected of them and the extent of their work.

TROOP COMPARTMENT F–6.

The following allowance of cleaning gear and buckets is made to this compartment:

Three swabs for cleaning the deck.
Three scrubbing brushes for the deck.
Three brooms.
Three buckets for scrubbing and cleaning, blue.
Three buckets for sputum and vomitus, black and white.
One trash can.
Daily soap allowance of one-half bar of salt-water soap.
One spray pump.

All pumps, buckets, etc., are marked with the number of the compartment and shall not be used in any other except in authorized cases.

The daily allowance of soap, toilet paper, etc., shall be obtained from the issuing room, just aft of the troop's canteen, on D deck.

Brooms and scrubbing brushes shall be kept inverted in the wooden rack when not in use. Swabs must be kept hung up in the wooden locker and the buckets and hand scrubbing brushes stowed in this locker when not actually in use. The black and white spit buckets shall be distributed in the compartment as needed.

Under no condition shall cleaning buckets be used as spittoons or spit buckets be used for cleaning purposes.

Trash cans shall be emptied at the incinerator on the starboard side of D deck, aft, as soon as filled.

Pump for spraying the deck will be found hanging near the swab rack. This pump shall be brought to the ship's dispensary on B deck for filling and for instruction as to its use.

Officer in charge of this compartment shall be responsible for the cleanliness and sanitary condition of the following items:

Entire compartment.
Shower No. 5, with urinal.
Stairs leading to E deck—No. 20.
Scuttle-butt.

SANITARY INSTRUCTIONS.

Immediately after breakfast all the lower bunks shall be taken out or lashed up to the middle bunk to leave room for proper cleaning. All rifles, equipment, clothing, etc., shall be picked up off the deck and piled neatly on the bunks.

At 9.30 a. m. all men except the cleaning detail shall go on deck for exercise and remain there at least an hour. During this time the cleaning detail shall clean the compartment and ladders according to following instructions:

Thoroughly spray the decks with cresol solution.
Sweep thoroughly, being careful to include all nooks and corners.
Shave the soap into small chips and put into the water.
Scrub the deck and ladders thoroughly, using plenty of water and "elbow grease." This scrubbing shall include all ladders, corners, and spaces between the frames and shall extend up on the walls to a distance of at least 1 foot.
Swab up the deck with the swabs, getting it as dry as possible.
At 3 p. m. spray the deck again and sweep thoroughly.

The swabs shall be taken to the cleaning room just aft of No. 1 sick-call quarters on E deck, thoroughly boiled and cleaned once a day.

INSTRUCTIONS FOR CLEANING URINAL AND SCUTTLE-BUTT.

Urinal shall be cleaned every day. Wire gauze shall be taken out, laid on the deck, and thoroughly scrubbed with lye solution. The trough shall be scrubbed with soap and water on the inside and outside.

TO CLEAN SCUTTLE-BUTT.

Keep the drip pan free from tobacco, paper, and other refuse. The metal cones shall be removed (unscrewed) and thoroughly scrubbed and polished on both sides every day.

U. S. S. AMERICA.

INFORMATION FOR THE COMMANDING OFFICER OF TROOPS, COMMANDING OFFICERS OF DETACHMENTS, AND MEDICAL OFFICERS, RELATING TO SANITARY AND OTHER MATTERS.

The following information as to rules for sanitation on board this transport are the result of careful thought and consideration. A copy will be furnished the commanding officer of troops, the commanding officer of each detachment aboard, and each medical officer in order that all may immediately know and institute the sanitary measures which must be carried out.

GENERAL.

Prior to embarkation Army medical officers at the port of embarkation detailed there for that purpose carry on a very thorough examination of the men to weed out sick and start with only healthy men. Close attention in carrying out the following sanitary rules and early detection of disease must be observed if you expect full healthy units upon arrival at the port of debarkation:

1. Every man to take a shower daily.
2. Every man to change his underclothes at least once during the voyage.
3. All troops to spend at least an hour and a half daily on deck, each man bringing his blankets to be aired. Commanding officers to see that men receive 30 minutes of physical exercises during this period. In fact, oblige your men to stay in the open as much as the weather will permit.
4. The troop spaces to be sprayed, swabbed, and otherwise thoroughly cleaned by your cleaning details while the above (par. 3) is in progress. This in addition to the ordinary routine sweepings twice daily.
5. Inspection of all men and their effects twice weekly by your medical and commanding officers to weed out sick and be sure that men are keeping themselves clean and not harboring disease. During the airing on deck this can be carried on most successfully.
6. All men to sleep "heads and points" to prevent as far as possible spreading of infections by coughing.
7. See that your men sleep properly covered and that above all they are not allowed to sleep on the decks or anywhere else unless properly protected.
8. The eating of food in berthing spaces is strictly prohibited, and, in fact, food will not be served in rooms or other unauthorized places unless so ordered by the senior naval surgeon in cases of sickness.
9. See that your men do not close the ventilators or stuff their clothing into them to stop the flow of air.

10. Army regulations require the protective vaccination of all men prior to embarkation. Despite the preliminary examination there have been "last minute" requests for vaccinations, because although the men declared they had been protected, the records did not show it. The commanding officer of troops therefore will cause to be submitted to the Senior Naval Surgeon within five days of sailing either (*a*) a statement that all men have been protected or (*b*) a list of the men whom he desires vaccinated.

11. Upon arrival in foreign waters the following are required for all men who are to be sent to hospital: (1) Service record, (2) field equipment, neatly packed (and barrack bag when possible). If barrack bag is not available, commanding officers should arrange to have them secured when sorting out baggage at port of debarkation and sent to the hospital later, properly tagged. No rifle or pistol; no bayonet. I do not give a receipt for the man, his service record or his effects, for I simply turn them over to the hospital as I receive them. The general plan is that he is returned to you directly from hospital as soon as well.

CARE OF BERTHING SPACES, DRINKING FOUNTAINS, WASH ROOMS, LATRINES, URINALS, ETC.

1. Reliable guards to be stationed day and night at each drinking fountain, in each wash room, latrine, and urinal to see that they are kept clean and no nuisances committed.

2. The cleaning details for the troop spaces, the latrines, urinals, wash rooms, etc., to be permanent for the trip so that they will be able to cooperate more intelligently. Each detail to be in charge of a noncommissioned officer, who in turn will be held strictly accountable to the police officer and to any Army medical officer acting as sanitation officer for the proper carrying on of his work.

3. Troops spaces to be sprayed, swabbed, and thoroughly cleaned as previously described while troops are on deck.

4. Water-closet seats to be scrubbed with lye water (or 5 per cent formalin) daily. Seats are hinged or under side can be easily scrubbed.

5. Wash basins and troughs to be thoroughly scrubbed each morning with soap and water and troops instructed to clean basins after using.

6. All spitting on decks to be watched for and punished. (In this connection the drinking fountains seem to be favorite place for expectoration.)

7. Drinking fountains to be scrubbed thoroughly with hot 5 per cent formalin once daily.

NOTE.—Spray pumps for spraying compartments, soap for cleaning, brooms, swabs, toilet paper for latrines, etc., are under the care of the first lieutenant of the ship. See him and he will arrange for the issue of these things to you.

On the port side of the ship on E deck, just forward of the troop's galley and officer's scullery are two wash tubs with lots of hot lye water and a wringing machine for the cleaning of swabs. See that the cleaning details find this place and keep their swabs clean.

U. S. S. AMERICA.

MEMO FOR MEDICAL OFFICERS OF THE ARMY ON BOARD.

The regulations under which the naval medical staff is acting (and which also covers you) have been promulgated by the Surgeon General of the Navy after consultation with the Surgeon General of the Army. The regulations make the senior naval surgeon responsible for the sanitation of the ship, and also for the routine care of all men who are sick enough to require treatment other than first aid. These regulations also place at his disposal the services of any

or all of the medical officers of the Army on board, together with the hospital corps, sanitation corps, etc. I therefore desire that the senior Army surgeon on board keep in most intimate touch with me to advise and cooperate constantly so that the highest degree of medical efficiency may be maintained. With this end in view the following rules, which experience seems to indicate are good, have been laid down:

(*a*) The senior naval surgeon to be furnished within 24 hours after embarking a roster of all persons of the Army Medical Service on board.

(*b*) From these persons the senior Army surgeon will make suitable permanent details of enlisted men for work in the sick bay en route.

(*c*) He will have a commissioned officer report to the senior naval surgeon for duty as sanitation officer, supervise and report upon all Army sanitation, and carry out any special orders which may from time to time be given him.

(*d*) He will detail Army medical officers for duty as medical officers of the day and for night watches 8 to 12, 12 to 4, and 4 to 8, in company with the junior medical officers of the Navy; these night watches to be stood in the office of the medical officer of the day, adjoining the sick bay.

(*e*) He shall cause a venereal inspection to be made one week after sailing to discover such cases as may have appeared since embarking.

Sick call will be held daily at 8.30 a. m. and at 3.30 p. m. by such Army medical officers as the senior army surgeon may detail. A small black desk and locker (with red cross) is provided at the after end of each mess hall. The senior army surgeon will have a reliable hospital corpsman stationed at this place (sleeping there nights) to look out for sick, to find Army medical officer on duty, etc. This hospital corpsman to have the Army medical officer of the day see all sick before sending them to the sick bay.

The cabinet contains only the simplest articles, for it is to be desired that all really sick men be sent to the sick bay for treatment. All dressings (no matter how trivial) will be sent to the sick bay. The sick-call desk is provided with a Navy prescription pad and with blanks (copy attached). The Army medical

ADMISSION CARD, WHICH THE PATIENT TAKES TO SICK BAY.

Name in full_____Rank_____
Co_____Bat _____Reg _____
Age_____Nativity_____Service, yrs_____Reg. No_____
Tentative diagnosis_____
_____U. S. Army_____
(A) Admit to ward, date_____
Tentative diagnosis_____
Final diagnosis_____
Final disposition_____Date_____
(B) Treat and return to duty_____
Diagnosis _____
Per No_____Per No_____Per No_____
Other treatment_____
_____
_____
_____Surgeon, U. S. N.
Do not soil or bend this card.

officer holding sick call may prescribe things other than those in the locker and send his man to the dispensary for the medication. In this connection, however, attention is invited to the fact that special vigilance is demanded in order that

men may not be treated for "a slight headache" who have meningitis or for "mild sore throat" who have diphtheria. Endless trouble has resulted from careless filling out of the attached card form, particularly errors in spelling the patients' names. In all cases you send to the sick bay for possible admission, please fill in the top four lines carefully and sign your name and rank in the fifth line. In addition on the back of the card record the temperature, pulse, and respiration. Unless a case is particularly urgent it will not be received at the sick bay until seen by an Army medical officer and the form properly filled out.

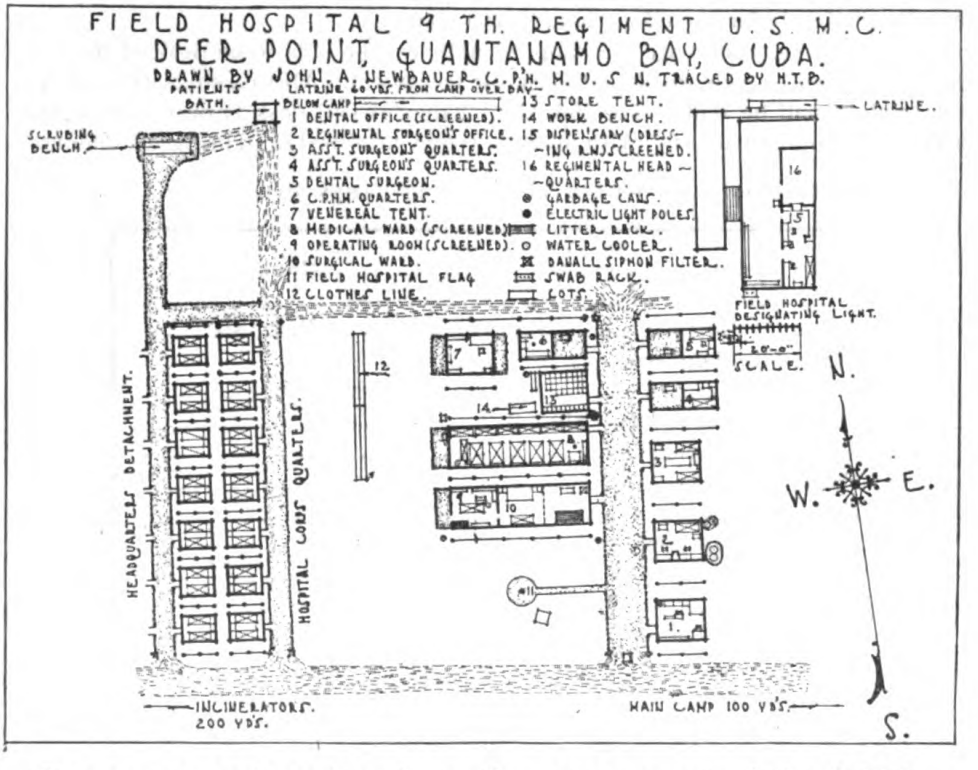
All the official papers (Form 52 and others connected with your men who are on the sick list are made out by us and forwarded to the Navy Department and by them to the War Department) so that the data you furnish must be correct.

It has been found to create endless confusion to have too many medical officers in the sick bay and in my office. Medical officers of the Army therefore must not enter the sick bay to work upon or examine patients or the office of the senior naval surgeon unless specifically requested to do so by him.

The foregoing plans were formulated after consultation with other Army medical officers on other trips with the idea of giving you something tangible to work upon immediately, so that the best possible sanitation and general medical cooperation would be had from the start, for after all the health of the troops must be our first consideration.

PLAN OF A REGIMENTAL FIELD HOSPITAL.

By C. B. Camerer, Lieutenant Commander, Medical Corps, United States Navy.



The accompanying plan shows the arrangement of the field hospital of the Ninth Regiment of United States Marines, at Deer Point, Guantanamo Bay, Cuba. The field hospital is 100 yards away

from the main camp on one side and 200 yards away from the incinerators on the other. The isolation ward consists of two hospital tents, erected on the point to leeward of the quarters for hospital corpsmen and does not appear on the plan. The latrines are 60 yards away from the camp, at the foot of the cliff and built over the waters of the bay.

The water supply is derived from the naval station and at present, owing to the prevalence of typhoid fever in the vicinity and the poor condition of the plumbing system at Guantanamo, the water is boiled before use.

REPORT ON THE PREPARATION OF BLOOD STAIN AT THE U. S. NAVAL MEDICAL SCHOOL.

By G. F. CLARK, Lieutenant Commander, Medical Corps, and Chief Pharmacist's Mate L. F. SHABEK, United States Navy.

For the past few months we have had considerable difficulty in the preparation of blood stains. American dyes were used and the polychroming was carried out by the use of silver oxide after the method of Balch or that of Wilson. So many batches of the stains proved unsatisfactory that we decided to try repolychroming them instead of throwing them away.

For this purpose we used sodium bicarbonate after the method of Wright, using 1.75 grams of the finished stain to 100 mils of ½ per cent sodium bicarbonate solution.

The stains that had been unsatisfactory were readily repolychromed despite the fact that eosin was present as well as methylene blue. In order to see what the action might be we tried mixing untreated methylene blue, bac. (1 gram) and untreated eosin y. w. s. (0.5 gram), then polychroming with solution of sodium bicarbonate 100 mils ½ per cent, container being placed in the Arnold sterilizer for one hour. Polychroming was readily brought about. After polychroming, the usual method of Wright was followed: Filtration, saving filtrate, and drying it. For use 0.3 gram are dissolved in 100 mils of methyl alcohol.

We are in hopes that the stain will have as satisfactory keeping qualities as when made with foreign dyes.

PREPARATION OF IDENTIFICATION TAGS.

By R. H. LANING, Lieutenant Commander, Medical Corps, United States Navy.

The supply of powdered asphaltum was exhausted but identification tags had not been made for all the officers and men of the U. S. S. *South Carolina* and as it was important to complete the work

we decided to experiment with other materials. Pharmacist McCallum (T.), United States Navy, went on a voyage of discovery in Norfolk, Va., and returned to the ship with some so-called "dragon's blood," printer's ink, and asphaltum varnish which he had gotten from a printer there. Pharmacist's Mates, third class, Osuch and Lyons experimented with these materials and perfected a method of making the imprints on the monel metal which is easier and cheaper than the regulation method. I understand that the powdered asphaltum is scarce and difficult to obtain at present and I would recommend the method with dragon's blood, asphaltum varnish and printer's ink as an alternative or substitute. I have not been able as yet to ascertain the composition of dragon's blood. The method worked out by Pharmacist McCallum and Pharmacist's Mates, third class, Lyons and Osuch is as follows:

1. To prepare the ink to make finger prints take 2 grams of powdered dragon's blood and add it gradually to 6 grams of printer's ink and stir thoroughly until there is an even mixture. To this mixture add gradually about 15 drops of asphaltum varnish and stir well.

2. To prepare the ink for the name prints take 10 grams of asphaltum varnish and add 2 grams of dragon's blood and mix thoroughly, then add to this mixture enough turpentine so that it will flow freely from the pen.

3. To prepare the acid mix the HCl and HNO_3 in the following proportions: One-quarter part HCl, one part HNO_3 and two parts H_2O. Use about 200 c. c. of this preparation to 50 tags.

To make the tag proceed as in the regulation way, inking the fingerprint with No. 1 preparation, printing name, rate, etc., with No. 2 preparation, dusting both sides with the dragon's blood, blowing off the excess, heating over flame until prints take a glossy appearance, then immersing in No. 3 to finish the etching. After coming out of etching acid the tags have a dirty appearance, and to polish them, immerse the tags for about 2 minutes in a solution of equal parts of HNO_3 and H_2O.

HISTORY AND AUTOPSY FINDINGS IN A CASE OF SALVARSAN ADMINISTRATION.

By R. C. CHRISTIANSEN, Lieutenant, Medical Corps, United States Navy.

Before discussing the case at hand it is considered advisable to briefly review the literature pertaining to the untoward effects and the cause of the same following the administration of salvarsan and neosalvarsan.

Very soon after the introduction of these compounds by Ehrlich clinicians realized that their use was attended by a certain factor of

danger, severe symptoms of shock, and even death occurring in a percentage of cases.

Wilcox and Webster have divided these symptoms into three classes as follows:

1. Slight; nausea and vomiting, rise in temperature of 1 to 2 degrees, headache, diarrhea, and occasionally albuminuria.

2. Severe; an exaggeration of the above symptoms with rigor, pain in the limbs, hemorrhages from the mucous membranes, dyspnea, weak, thready pulse, coma or delirium, and occasionally an urticarial rash.

3. Symptoms of acute arsenical poisoning; observed in cases receiving a second dose before the arsenic contained in the first has been excreted. In as much as arsenic is chiefly eliminated by the kidneys, individuals suffering from some form of nephritis are the type of patients concerned in this class.

An idea of the frequency of severe and fatal reactions may be obtained from the following reports, selected from the voluminous literature pertaining to this subject.

Ellis obtained severe reactions in 50 per cent of a large series, the exact number not given. One case developed severe nausea, which persisted for four days.

Ormsby and Mitchell report 28 severe reactions in 127 injections of neosalvarsan. Most of the patients complained of a taste and smell of ether as well as of gastrointestinal and nervous symptoms.

Moody reports a death following the injection of neosalvarsan. The patient was a woman in poor physical condition. Coma developed in 12 hours, and she died 4 days later. The autopsy was negative.

Kerl reports the death of a young male and attributes the fatality to a weakened condition of the circulatory system due to the abuse of alcohol.

Kahle reports a death following the use of neosalvarsan, the autopsy showing acute nephritis.

All of these observers are of the opinion that the present supply of both drugs is much more toxic than the original German preparation. This is emphasized by Fleet Surgeon Kilroy's report of 1913. Kilroy administered salvarsan to 1,000 patients, with no deaths and a very small number of severe reactions.

The causes of the reactions may be conveniently grouped under two headings, those relating to the patient and those having to do with the preparation used.

Certain individuals apparently have an idiosyncracy for arsenical compounds. Wechselman in 1910 pointed out that healthy young adults may succumb and at autopsy show slight or no pathological changes.

Patients suffering from organic heart disease or an impaired cardiovascular system due to alcohol or long standing lues are especially prone to develop severe reaction.

A number of instances of encephalitis following the injection of these drugs to cases of advanced cerebral syphilis are recorded.

By far the most important cause of profound shock or death is an impaired kidney function, due to an acute or chronic nephritis. Arsenic compounds act in two ways in such cases. As noted above, they may exhibit a cumulative action, due to delayed excretion. A uremia and intoxication may develop due to an acute nephritis caused by the action of the compounds on the kidneys if these organs are already impaired by an old process.

Brown and Pierce have proved that all arsenic compounds used therapeutically are capable of producing nephritis in animals when injected in doses considerably below the lethal.

Salvarsan and neo-salvarsan are both complex chemical compounds and unless carefully made by experienced chemists can contain very toxic substances. Both of the drugs as obtained on the market contain some amino-oxyphenol arsenoxid, usually less than 1 per cent. On exposure to the air or from improper preparation this oxidation product is rapidly formed. Amino-oxyphenol arsenoxid is some 20 times as toxic as the hydrochloride salt. It is for this reason that the drug can not be used after being dissolved for any length of time.

Early workers attributed many severe reactions to the use of impure water. Yakinoff points out that if the water used contains bacteria or their proteins, the addition of salvarsan renders these proteins toxic and the solution becomes 2 to 8 times as toxic as normally. This is essentially the " wasser fehler " theory of Wechselman.

Neisser and others believed that the symptoms were due to the action of the endotoxins contained in the bodies of the treponema and liberated when these organisms were destroyed. Numerous workers have proved that exactly the same syndrome may occur in nonluetics and can be produced in animals.

To summarize, severe reactions are due to an unusually toxic preparation. To quote Wechselman, " insufficiency of the kidney and not hypersensitiveness of the brain is the point of the entire question of salvarsan fatalities." Following is a report of an unusually interesting case of death after the second dose of salvarsan:

M. V. M., pharmacist's mate, third class; age 24; white. Enlisted from New York February, 1914, and was transferred to the naval hospital at Canacao, P. I.

History uneventful until October 23, 1914, on which date he contracted gonococcus infection of urethra, which ran an unusually severe course. On recovering he was transferred to the U. S. S. *Brooklyn*. Gives a history of repeated sprains of joints.

May 23, 1916, developed gonococcus arthritis of sacro-iliac and both ankle joints, and was transferred to the naval hospital at Yokohama, Japan. Bedridden until July 9. History at this time of excessive alcoholic indulgence.

On September 20, 1916, was discharged from hospital but still had slight trouble with ankle joints. Transferred to the receiving ship at San Francisco. While on this duty he had a reputation among his shipmates for habitual alcoholic and sexual excesses. On one occasion a corpsman saw his companion administer to him an infusion of digitalis while he, M., was partially intoxicated. He complained frequently to other corpsmen of being short of breath and of palpitation following any unusual exertion. On field days he was forced to rest frequently due to symptoms noted above. He withheld this history from the medical officer on being admitted to this hospital (Mare Island). Heart examination negative; urine was not examined.

December 28, 1917, admitted to this hospital with a relapse of old urethral infection.

December 27, 1917, following Christmas leave, he developed a chancre on glans. Wassermann at this time was negative.

On January 15, 1918, he complained of intense headaches, necessitating the administration of morphine. He was given mercury iodide pills gr. $\frac{1}{3}$ t. i. d. and mercury inunctions drachms $\frac{1}{2}$ once daily. Headaches cleared up under this treatment.

January 18, 1918, Wassermann double plus. Secondary rash well developed.

January 21, 1918, given 0.6 grams salvarsan. Has a moderate reaction with nausea and anorexia.

January 28, 1918, given 0.6 grams salvarsan, at 10 a. m. Twelve other patients received salvarsan from the same packages on this date. No other severe actions resulted. At 1 p. m. had a severe chill with sweating lasting 45 minutes followed by fever 102° and weak pulse. The same evening he complained of air hunger and was delirious at times.

January 29, 1918. Complained of feeling of suffocation and distress over entire chest. Considerable amount of dark bloody material coughed up. During the day he vomited bile and stained material, and complained of intense pains in knees, calves, and toes. At times he was delirious. During the afternoon 350 c. c. of urine were voided. At 9 p. m. he became convulsive and it was necessary to restrain him. Ten minutes later death occurred.

Autopsy report.—Subject is a well-developed, muscular, young adult. Lividity and rigor mortis present. A large chancre with indurated margin present on glans. Skin and membranes are otherwise negative. Usual median incision reveals a fair amount of sub-

cutaneous and omental fat. No excess of fluid in peritoneal or pleural cavities; a slightly excessive amount in the pericardial sac. The heart had stopped in diastole; the right auricle is moderately dilated. A milk plaque 5 cm. in diameter is present on the anterior aspect of left ventricle. The musculature of the heart appears lighter in color than normal and is rather flabby in consistency. The coronary arteries appear normal. Both cusps of the mitral valve are distinctly thickened, especially at the area of approximation; this thickening is well organized. No acute vegitations are present. The valve was apparently in a functioning condition. The remaining valves appear normal. The first portion of the aorta shows numerous small areas of very early atheromatous degeneration. These do not appear to be syphilitic in origin. Microscopically the musculature shows numerous small areas of fibrosis. There is no fatty degeneration present.

The lungs are voluminous and did not collapse when the chest was opened. No pleural adhesions. The surfaces are dark red in color; the entire lungs are firm, less crepitant than normal, and on palpation water-logged. On sectioning a considerable quantity of blood-tinged fluid escaped. No evidences of tuberculosis noted.

The liver appears slightly enlarged and is softer and lighter in color than normal. On section the surface is a light yellow, uniform throughout. The lobules are not discernible. Microscopically the nuclei of the cells around the central vein stain poorly and contain many fat droplets, denoting early central necrosis.

The spleen is normal in size, but distinctly softer than normal. The Malphigian bodies can not be seen. Microscopically this organ is negative.

The appendix is about 8 cm. long and presents an acute kink. It is firmly bound to caecum. No evidences of acute process are present. The remainder of the gastrointestinal tract is negative.

The kidneys are normal in size; the capsule strips easily; on section the capillaries of the cortex and medulla are very distinct. Microscopically the tubules appear normal. The capillaries of the Malphigian bodies and the tubule capillaries are intensely congested. There is a large number of red cells present in the intestinal tissue. The ureters are normal.

The bladder contains 100 c. c. of dark urine. No pathological changes. The prostate is enlarged; on section no abscess formation is noted. Microscopically it shows an excess of fibrous tissue; also small areas of scar formation. The tubules of the testes strip normally; microscopically negative.

Post-mortem diagnosis: Chronic myrocarditis. Chronic productive endocarditis, affecting mitral valve. Edema of lungs. Early

central necrosis of liver. Acute hemorrhagic interstitial nephritis. Chronic prostatitis. Chronic appendicitis.

The cause of death in this case was doubtless the toxic action of the arsenic on a heart weakened by the valvular condition and the myocarditis. Both of these conditions are easily explained by the history of gonococcic bacteraemia. It is probable that a cumulative action occurred, as the nephritis and central necrosis of liver point to this. Had the individual had an idiocyncracy to the drug, the first dose should have been followed by more severe symptoms. The preparation of salvarsan injected may have been slightly more toxic than usual, but the fact that no very severe reactions occurred in the other 12 patients tends to invalidate such an assumption.

SANITARY REPORT ON THE ISLAND OF CORFU.

By. H. SHAW, Lieutenant Commander, Medical Corps, United States Navy.

According to official figures obtained at the mayor's office the present population of the city is 30,000. No epidemic diseases are prevalent at this time. It is estimated that 15,000 Serbians died here from cholera and typhus two years ago. Malaria is endemic.

There is much poverty in Corfu, and the price of food is exceedingly high, which may in part explain the immorality and many degenerate practices so common here.

According to the observations made at the meteorological bureau of Corfu the maximum temperature for 1917 was during the month of August 35.2 C. and the minimum temperature was in December ber —1.1 C. During eight months of the year the prevailing winds are south-southwest.

In the city of Corfu the anopheles mosquitoes are rare, but in the country and in marshy districts they are very numerous. Both flies and fleas abound and are the source of much annoyance. Cockroaches, bedbugs, and lice are present in large numbers. The city is practically without sewerage but has good natural drainage. There is a varying elevation above sea level of 50 to 100 feet.

There are numerous good camping sites in the country, but in the city itself the only vacant space is the esplande, which has an extent of about 15 acres.

No definite information is available in regard to the quantity of the water supply but His Britannic Majesty's consul reports that it is ample for the present population. The quality of the water is excellent. It is collected from uncontaminated sources in the hills and brought to the city by a system constructed by the English during their occupation of the island. Purification of the water does not seem necessary.

The quality of the food is very poor and it is very expensive. Bread is made principally from maize. Meat can only be procured in small quantities, mutton being the commonest variety and retailing at about 70 cents a pound. At this writing coffee can not be bought in the open market. Sugar sells at several francs per pound. Tea costs 8 francs per pound. Beef when obtainable costs $1.40 per pound. Eggs cost 10 cents apiece. Fortunately fruit is abundant and of good quality, and cheap.

Medicines can be obtained in small quantities from the numerous drug stores in the city. There are two large buildings suitable for use as emergency hospitals. One of them is the former residence of Prince Andrea, of Greece, known as Mon Repos, and located in the suburbs. The other is the governor's palace which stands in the heart of the city. The quarantine regulations which obtained under the Greek Government are no longer in force since the English and French assumed the jurisdiction of the place. There are no provisions for cremation, and bodies can not be disinterred until three years after sepulture, police permission being necessary. The English have a small cemetery just beyond the city limits.

The languages commonly spoken in Corfu are Greek, French, and Italian.

THE MARCH AND THE SHOE.[1]

By W. L. Mann, Lieutenant Commander, Medical Corps, United States Navy.

It appears to be almost impossible to give too much attention to the care of the feet. There has been some work done on this subject at this station, and it is our desire to devote more time to this important subject. The post surgeon has kept in touch with the orthopedic department of the United States Army and has utilized to some extent the results of their studies of this question.

At present the entire command are having their feet measured and the measurements are being recorded in the enlistment record for future reference in drawing new shoes. The process is as follows: (*a*) The size of the shoe the man is now wearing in heavy marching order is recorded; (*b*) the foot is measured by an automatic measuring device, which gives the length and width; (*c*) then the inch stick measurement is used as a check; and (*d*) finally the results of the above are verified by the actual fit of the shoe by an experienced shoe fitter. The data obtained from the last three sources correspond very closely.

The size of shoe now being worn by some of the men was found to be one-half to two sizes shorter than the actual foot measurements.

[1] Extract from monthly sanitary report, June, 1918, Marine Training Camp, Quantico, Va.

The results of this series of foot measurements strongly indicate that the company commanders have failed to personally supervise the fitting of shoes, as is required by Marine Corps regulations.

A comparison of the foot measurements of the hospital corps with the marines showed that the hospital corps averaged a half size smaller and almost one width narrower. This was presumably due to the fact that the marines have done more marching and have developed the military foot to a certain degree.

The hike of the artillery regiments to Fredricksburg and return furnished some interesting data for observing the effects of misfitting shoes and improper footwear. It is interesting to note that these 1,000 men on the fifth day of the hike made the entire trip from Fredricksburg to Quantico in one day, a distance of 31 miles, carrying the heavy pack and rifle, a total weight of about 40 pounds, nearly the entire distance. This was rendered possible by the stamina and morale of the men in withstanding a large degree of foot injuries without incapacitation. About 90 per cent of the men presented some form of foot trouble. In many cases the cause was the lining of the shoe wrinkling or becoming torn and worn, creating roughened places which causes friction.

In about 40 per cent of the men, injuries were noted about the tendo Achillis. The chief source of this trouble seemed to be the leggings, either due to a misfit about the ankle or caused by the leggings becoming wetted with perspiration and "wilting," forming wrinkles which rubbed the back of the leg.

In about 25 per cent of the cases, blisters were present on the great toe. This was possibly due to the pattern of the Marine Corps shoe. It seems to be universally accepted that the Munson last gives the most desirable results. This type of shoe permits the great toe, the ball of the foot, and the heel to act in a straight line ("Gibson" line). In the Marine Corps style of shoe the great toe is bent slightly outward, and this often results in injuries to the inner side of the toe. It also acts to some extent in preventing the maximum leverage action of the big toe.

It is proposed to have one of the medical officers of each of the regiments which are to be formed at this station designated as "regimental orthopedic surgeon," who will formulate the necessary rules and regulations for the care of the feet.

THE INTRACUTANEOUS TUBERCULIN TEST IN YOUNG ADULTS.

By E. Moody and C. F. Carter, Lieutenants, Medical Corps, United States Naval Reserve Force.

A great deal of work has been done within the past few years to prove the relative efficacy of the various skin tests for tuberculosis

with the result that a vast amount of literature on the subject has been published.

Veeder and Johnston (1) working with children in St. Louis found that the skin tests were of undoubted value and drew the conclusion that the intradermal test was of somewhat greater value than the ordinary von Pirquet test. Bass (2) has recently verified their conclusions on a large series of children in a New York City orphan asylum and states emphatically that the intradermal test is of much the greater value of the two. He also went to a great deal pains to prove that the positive intradermal reaction was not the result of a particular skin sensitiveness other than the actual reaction to tuberculin.

Wittich (3) does not believe that there is specific value in the skin tests in adults for differentiating between infection and disease, while Ryan (4), reporting on the modified Detre test, feels that a great deal can be expected from skin tests in the adult in both diagnosis and prognosis.

Our series is reported, not because we think that any special conclusions can be drawn from our observations, but because we feel that such material as was used for this test—that is, young men between the ages of 18 and 25 who have passed at least two rigid physical examinations before their admission to this hospital and who have been under careful observation since their transfer here—should prove valuable for such work in establishing normal standards and in the hope that it may be of value to others carrying out similar work.

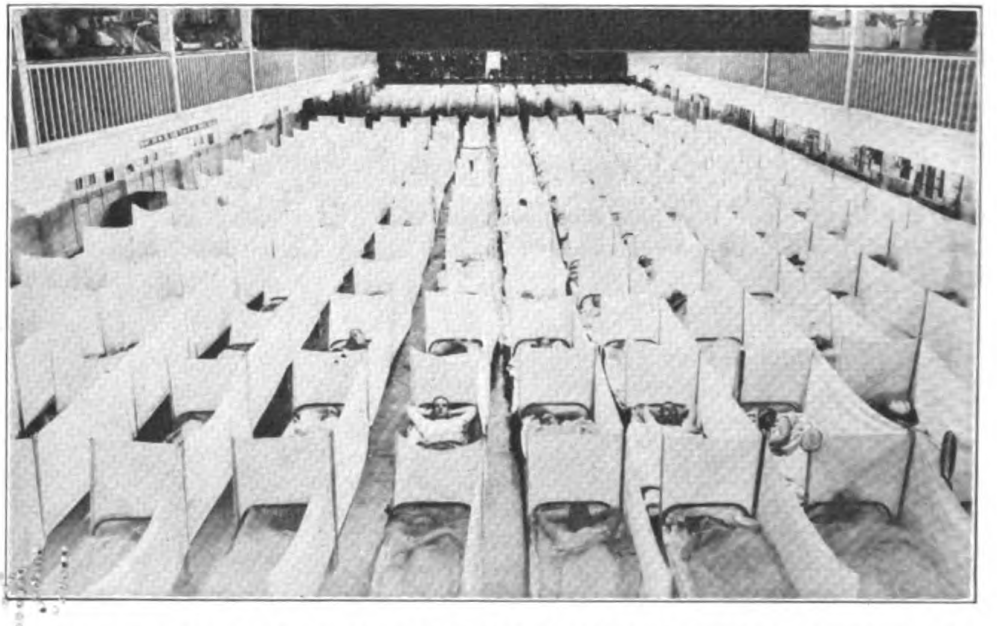
We have used as a standard test the intradermal injection of $\frac{1}{1000}$ mg. of old tuberculin given in $\frac{1}{10}$ c. c. of normal salt solution.

Observations were made at the end of 8, 24, and 48 hours, and only those cases where the reaction appeared within the first 24 hours and reached a maximum redness in 48 hours were considered positive. The positive reactions were verified by a second test, and by a positive von Pirquet. The results in all cases are shown in Table No. 1 and the results classified according to disease in Table No. 2.

Table No. 1.

Total number of cases	187
Positive clinically (tuberculosis)	8
Positive intradermal	10
Positive von Pirquet	12
Positive intradermal and von Pirquet	7
Positive intradermal, von Pirquet, and clinically	6
Positive von Pirquet, negative intradermal	4
Positive von Pirquet, negative intradermal, positive clinically	1

MAIN DRILL HALL AS A DORMITORY, TRAINING STATION, SAN FRANCISCO, CAL.



DRILL HALL WITH SCREENS ON EACH COT TO PREVENT SPREAD OF DISEASE BY SNEEZING AND COUGHING.

167–1

Table No. 2.

Diagnosi	Number of cases.	Positive intradermal.	Positive von Pirquet.	Positive intradermal and von Pirquet.
Chr. pulm. tuberc	8	7	8	7
Pneumonia	7	.....	.....	.....
Bronchitis	38	.....	.....	.....
Malaria	60	1	1	.....
Skin disease (scabies, ringworm)	12	.....	.....	.....
Tonsillitis	11	.....	.....	.....
Surgical cases, except abdominal	32	.....	1	.....
Gastro-intestinal	6	.....	1	.....
Syphilis	13	2	1	.....
Total	187	10	12	7

It is interesting to note that the cases clinically positive gave positive reactions to both tests. Cases considered clinically positive were diagnosed either on fairly positive chest findings borne out by the X-ray, temperature reactions, etc., or by the finding of the tubercle bacilli in the sputum.

Thirty-three cases reacting negatively to both tests were given $\frac{1}{1000}$ and $\frac{1}{100}$ mg. of old tuberculin subcutaneously and the temperature recorded carefully for 48 hours while the patients were in bed. None of the 38 gave positive reactions.

REFERENCES.

(1) Veeder and Johnston: The Frequency of Infection with the Tubercle Bacillus in Childhood. Am. Jour. Dis. Child., ix, p. 478.

(2) Bass: Cutaneous and Intracutaneous Tuberculin Tests. Am. Jour. Dis. Child., xv, p. 313.

(3) Wittich: Comparison between Skin Tuberculin Tests. Am. Rev. of Tuberculosis, i, No. 11, Jan., 1918.

(4) Ryan: Tuberculin as a Diagnostic Test of Tuberculosis in Man. Jour. Am. Med. Assn., lxx, p. 982.

BED SCREENS IN BARRACKS.[1]

By P. S. Rossiter, Commander, Medical Corps, United States Navy.

The accompanying illustrations show what has been found to be a very satisfactory sneeze screen for use at this station.

One of the pictures illustrates the method of berthing in the main drill hall prior to use of the sneeze screens. In this method men are berthed head and feet on 5-foot bunk centers. With a sneeze screen heads are all in the same direction.

[1] Extract from Report to Surgeon General. Oct. 19, 1918.

The screen is cheap and simple in construction, easily erected, and very efficacious.

It consists of unbleached muslin, 1 yard wide, tacked to three 1-inch uprights 4 feet long. During the day these are rolled up and stowed or aired on the air-bedding racks. At night the screen is unrolled and fastened by clothes stops to the legs of each bunk. When pitched in rows as shown in the photograph, it has been found that stopping the outboard head upright of one to the outboard foot upright of the next bunk tautens and strengthens the line.

INFLUENZA ON A NAVAL TRANSPORT.

By W. F. McANALLY, Lieutenant, Medical Corps, United States Navy.

During the past six months we have treated over 100 cases of influenza and pseudo-influenza. These occurred in the proportion of about 30 per cent of the former and about 60 per cent of the latter. At no time did the disease tend to assume an epidemic form, which fact is possibly due to the thorough prophylaxis which is insisted upon. A typical case of influenza occurs after an incubation period of one to three days. The attack is generally marked by a chill of greater or less severity, followed by fever ranging from 101° to 104° or higher. The patient complains of aching pains in the trunk and extremities, headache, and general malaise. He looks and feels sick. Upon examination, in practically every case of our series, there has been found a more or less severe inflammation of the nasal mucous membrane and tonsillar rings; in some few cases there has been a distinct streptococcic tonsillitis, which was generally very obstinate to treatment and persisted even after the original influenza had cleared up entirely. These symptoms generally appeared on the third or fourth day of the disease.

The treatment has been generally very satisfactory and was practically the same in all of our cases, i. e., rest in bed, free catharsis, Dobell's solution or a 1 per cent solution of chlorazene as a gargle every two hours, aspirin grs. x and sodium bicarbonate grs. xx t. i. d., together with the subcutaneous injection of influenza bacterin mixed (Mulford), a primary dose of 1/2 c. c. being given upon admission and followed at four-day intervals by two or three secondary doses of 1 c. c. each.

Following one, or in some cases two, injections of influenza bacterin and the general treatment as outlined, most of the typical cases were generally discharged to duty in three or four days. Injections of 1/2 c. c. of the bacterin upon admission, followed at four-day intervals by injections of 1 c. c. has been productive almost invariably of exceedingly good results. From one to six hours after the primary

injection there is a more or less severe exacerbation of the symptoms, but we have yet to see a case in which a serious reaction occurred.

In the second type of cases, which we have called pseudoinfluenzal for want of a better name, our treatment has not given such good results, although they were seemingly the result of a much milder infection. The following case illustrates this type:

C— Frank, admitted to the sick bay July 15, 1918, complaining of sore throat, slight headache, and muscular pains; temperature, 100.4°; there was a slight inflammation of the nasal and pharyngeal mucous membranes; heart and respiration normal.

Treatment: Bed; magnesium sulphate, oz. 1½, aspirin, grs. x, sodium bicarbonate, grs. xx t. i. d.; Dobell's gargle; silver nitrate (10 per cent) locally to throat t. i. d. Influenza bacterin 1/2 c. c. was given subcutaneously upon admission. There was apparently no reaction after the bacterin injection.

July 16, 1918: There is very little change; temperature, 99.8°; patient still feels badly, with aching pains in legs and headache.

July 19, 1918: Improving slowly; temperature ranging from 99.8° to 100.2°; tonsillar rings and tonsils inflamed; influenza bacterin 1 c. c. injected s. c.; no reaction; no muscular pains nor headache.

July 23, 1918: Discharged to duty. No symptoms other than a slight redness of the tonsillar rings; slight variations in temperature from normal to 99.3°. Treatment continued.

This case was mild throughout; there were never any severe muscular pains nor headache; fever was low, and the respiratory symptoms were not marked. It and all the cases of this type resembled influenza very closely, except in the severity of the symptoms; furthermore, all these cases of pseudoinfluenza give very little or no reaction to the influenza bacterin, and the course of the disease has not been influenced by it.

In our series of over 100 cases careful records were kept in only about 25 instances. While this number is entirely too small to be a basis for any definite statements, and while the cases were not worked out bacteriologically in the laboratory, it seems that we are justified in the following conclusions:

1. There are two varieties of infection giving practically the same train of symptoms, the only difference being in the severity of the process, one of these being influenza, with the classical symptoms and due to a specific infection. The other, pseudoinfluenza, seems to occupy a position midway between a "cold in the head" and influenza and is not due to the same infectious agent.

2. That for the treatment of influenza we have a specific bacterin, which in our hands and when given in a primary dose of 1/2 c. c. subcutaneously, followed by one to three secondary doses of 1 c. c. each, has given very satisfactory results, patients rarely remaining

in the sick bay over three to five days. Also, that this specific bacterin has no appreciable effect upon cases of the pseudoinfluenzal type.

The above results would have been more satisfactory had we been able to follow up our cases bacteriologically, and it is hoped that some one will report a series of similar cases in which this data will be available.

THE TREATMENT OF CHANCROIDS AND THE PREVENTION OF BUBOES.

By G. W. Millett, Lieutenant, Medical Corps, United States Navy.

The object to be gained in the treatment of chancroidal infection is twofold. First, to heal the ulcer; second, to prevent the formation of a bubo. The time spent in hospitals from chancroidal infections is largely due to infections of the inguinal lymph glands, and not due primarily to the lesions on the penis.

When an ulcer is cauterized with heat or a strong reagent there is much necrosis of the surrounding tissue. In a short time this cauterized dead tissue affords a splendid medium for the growth of the organisms which are present in the vicinity. This secondary infection in many cases is as bad or worse than the first one, due to the fact that the tissues have lost their power of resistance. As a result the infection spreads to the lymph channels and is carried to the inguinal glands, and a bubo is formed.

The majority of buboes contain sterile pus, or pus containing a mixed infection mainly of staphilococci or streptococci. In the examination of 24 consecutive cases of bubo, 20 contained staphilococci as the prevailing organism, and 13 contained only staphilococci or staphilococci and streptococci. Many observers have failed to find the Ducrey bacillus in the bubo, while some observers have withdrawn the pus and inoculated it and failed to produce the characteristic soft sore. All these facts tend to point toward the theory that buboes are usually formed by secondary infection of the ulcers.

During the months of April, May, and June, the cauterization treatment was used on all cases of chancroid infection entering the United States Naval Hospital, Canacao, P. I. The number of sick days due to buboes during this quarter were 540. The total number of sick days for this quarter was only 4,150; therefore over 13 per cent of all the sick days were due to buboes. During the month of July cauterizing was not done, but after thorough cleansing of the chancroids with hydrogen peroxide or bichloride of mercury, they were treated with a 10 per cent solution of copper sulphate, and after 5 or 10 minutes a dusting powder, preferably aristol, was applied or they were dressed with a wet antiseptic dressing. The sore should be dressed in this manner night and morning, or oftener. During this month we had only 51 sick days due to buboes, while

practically the same ratio of chanchroid cases entered the hospital. Of course, cases entered with buboes, but the ratio of these were the same for each of the months.

The object of this treatment is to keep the ulcer clean and not allow secondary infection to progress. Copper sulphate will kill the chancroid infection and by the use of wet dressings or an absorbent powder the secondary infection is not allowed to progress. Where the patient has been circumcised or where an ulcer is on the outer surface of the foreskin I apply a shield made with wire screen and adhesive tape.

With a shield of this nature no dressing need touch the ulcer and it can drain freely or be kept clean and dry with a little dusting powder, without removing the shield. Anyone can make a shield of wire screen and adhesive tape to keep the patient's clothing and dressings away from the ulcer. It can be held in place by a piece of adhesive tape attaching it to the penis or by a bandage passed around the abdomen and around the hips just below the gluteal muscles.

This treatment not only helps in the prevention of buboes but also hastens the cure of chancroids.

RECORD OF THE NAVY RECRUITING STATION, PITTSBURGH, PA.

By C. C. AMMERMAN, Lieutenant, Medical Corps, United States Naval Reserve Force.

Summary of recruiting statistics at Navy recruiting station, Pittsburgh, Pa., for 5 year ending June 30, 1918.

Week ending—	Examinations.				Enrollments.		
	United States Navy.	United States Naval Reserve Force.	Reexamination and special.	Total.	United States Navy.	United States Naval Reserve Force.	Total.
Apr. 6	65	45	2	112	23	18	41
13	31	123	12	166	22	70	92
20	29	155	16	200	17	79	96
27	24	199	14	237	11	117	128
May 4	31	174	21	226	20	87	107
11	36	220	8	264	23	129	152
18	66	195	10	271	27	101	128
25	63	227	20	310	34	109	143
June 1	51	404	13	468	32	225	257
8	109	525	.....	634	61	236	297
15	68	173	19	260	22	68	90
22	38	185	11	234	16	77	93
30	81	185	14	280	49	82	131
Total...	692	2,810	160	3,662	357	1,398	1,755
Previous examinations..	10,715	1,927	2,780	15,422	3,343	922	4,265
Total...	11,407	4,737	2,940	19,084	3,700	2,320	6,020

Number of applicants for United States Navy		11,407
Number of applicants for United States Naval Reserve Force		4,737
Total applicants examined		16,144
Number of special and reexaminations		2,940
Total number of examinations made		19,084
Total applicants accepted		6,936
Total applicants rejected		8,436
Waivers requested, approved	515	
Waivers requested, disapproved	257	
		772
		16,144
Grand total applicants accepted		7,451
Grand total applicants rejected		8,693
		16,144
Accepted applicants enrolled		6,020
Accepted applicants failed to enroll		1,431
		7,451
Per cent of applicants accepted, excluding waivers		43
Per cent of applicants accepted, including waivers		46
Per cent of examined applicants enrolled		37
Per cent of accepted applicants enrolled		80
Smallest number of examinations in a day, C. C. Ammerman		None.
Largest number of examinations in a day, C. C. Ammerman, (June 4, 1918)		182
Largest previous number examinations in a day, C. C. Ammerman, (December 14, 1917)		139
Largest number of examinations in station 1 day (June 4, 1918) 2 medical officers		274
Smallest quarter, number applicants examined (September 30, 1916)		210
Largest quarter, number applicants examined (June 30, 1918)		3,501
Lowest per cent applicants accepted for quarter (December 31, 1914)		26
Highest per cent applicants accepted for quarter (March 31, 1917)		60
Cost of medical officer's examination per applicant		$0.69
Cost of medical officer's examination per enlistment		$2.20

STRENGTH OF THE NAVY.

The following figures give the actual strength of the Navy as calculated on October 22, 1918:

	Officers.	Men.
Regular Navy	9,962	218,251
Naval Reserve	21,072	282,000
Coast Guards:		
Commissioned officers	227	5,953
Warrant officers	435	.....
Lighthouse	244	888
Midshipmen (Naval Academy)	2,115	.....
Public Health Service:		
With Sanitation Division, United States Navy	13	.....
On Coast Guard vessels, United States Navy	2	.....
Nurse Corps:		
Regular	260	.....
Reserve	523	.....
United States Naval Reserve Force	546	.....
Coast and Geodetic Survey	42	79

	Officers.	Men.
Marine Corps:		
Regulars	1,708	60,272
Reserve	329	6,670
Warrant officers	284	.....
Judge Advocate General: Prisoners, officers and men	.....	2,836
Total	37,762	576,949
Grand total	614,711	

BOOK NOTICES.

TEXTBOOK OF PRACTICAL THERAPEUTICS, by *H. A. Hare, M. D., B. Sc.* Seventeenth Edition. Lea & Febiger, Philadelphia, Pa., 1918.

To those familiar with previous editions of this work it is needless to detail its merits. Suffice it to say that the new issue is thoroughly up to date and covers the latest advances in therapeutics. The Carrel-Dakin treatment, ambrine, antitetanic serum, antipneumococcic serum, the treatment of hay fever, etc., are fully discussed.

SURGICAL TREATMENT, by *J. P. Warbasse, M. D.* W. B. Saunders Co., Philadelphia, Pa., 1918.

The second volume of this work has appeared and amply fulfills the promise of the first. This is a full and comprehensive presentation of modern surgical diagnosis and treatment, the technical steps of operative procedures being given more in outline. An unusually good book.

THE SURGERY OF ORAL DISEASES AND MALFORMATIONS, by *G. Van I. Brown, D. D. S., M. D., C. M., F. A. C. S.* Third Edition. Lea & Febiger, Philadelphia, Pa., 1918.

TEXTBOOK OF GENERAL BACTERIOLOGY, by *E. O. Jordan, Ph. D.* Sixth Edition. W. B. Saunders & Co., Philadelphia, Pa., 1918.

UROLOGY, by *E. L. Keyes, jr., M. D., Ph. D.* D. Appleton & Co., New York, 1917.

This excellent and handy volume merits a place in every medical library. It is full without being diffuse, the author having the happy faculty of making his meaning clear in a few well chosen words.

EQUILIBRIUM AND VERTIGO, by *L. Fisher, M. D.* J. B. Lippincott Co., Philadelphia, Pa., 1918.

MEDICAL AND SURGICAL THERAPY. Edited by *Sir Alfred Keogh, K. C. B., C. B., LL. D., M. D.*, etc. D. Appleton & Co., New York, 1918.

This book will be of real service in every general hospital. Each of the five volumes is devoted to a special subject—infectious dis-

eases, neuroses, wounds, fractures, bones and joints—the list of the authors of the text containing such well-known names as Ombredanne, Broca, Vincent, Abrami, Leriche, Babinsky, Roussey, and others equally famous. The work is a translation of the major part of a series of French manuals and thus presents the views and details the experience of a number, though by no means all, of the brilliant workers who have done so much to restore to France that leadership in surgery held at the beginning of the nineteenth century.

NOTICE TO SERVICE CONTRIBUTORS.

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

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

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

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

Only the names of actual reviewers for a current number appear.

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

VOL. XIII NO. 2

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
CAPTAIN J. S. TAYLOR, MEDICAL CORPS, U. S. NAVY
IN CHARGE

APRIL, 1919

(QUARTERLY)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

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.

NOTE.

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

Volume VII, No. 2, April, 1913.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
Volume XII, No. 3, July, 1918.

SUBSCRIPTION PRICE OF THE BULLETIN.

Subscriptions should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C.

Yearly subscription, beginning January 1, $1; for foreign subscription add 25 cents for postage.

Single numbers, domestic, 25 cents; foreign, 31 cents, which includes foreign postage.

Exchange of publications will be extended to medical and scientific organizations, societies, laboratories, and journals. Communications on this subject should be addressed to the Surgeon General, United States Navy, Washington, D. C.

TABLE OF CONTENTS.

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, 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 parts 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.

U. S. NAVAL MEDICAL BULLETIN

VOL. XIII. APRIL, 1919. No. 2.

SPECIAL ARTICLES.

THE PATHOLOGY OF PNEUMONIA ACCOMPANYING INFLUENZA.

By E. W. GOODPASTURE and F. L. BURNETT, Lieutenants (J. G.), Medical Corps, United States Naval Reserve Force.

During the present epidemic of influenza, as in similar epidemics of the past, the most frequent and grave complication of the infection has been pneumonia. It is estimated that the mortality in this form of the disease among patients treated at the United States Naval Hospital, Chelsea, Mass., since last August, will be between 25 and 30 per cent; while in the similar epidemic of 1889–90 the mortality in cases of influenza pneumonia in Boston, as recorded by Mason, varied for different ages between 29 and 45 per cent.

The relation of influenza to the inflammation in the lungs, so frequently accompanying it, was a problem of particular interest to pathologists and bacteriologists in the last great pandemic of 1889–90, and the observations at that time gave rise to opposing views as to the nature and cause of the pneumonia. The differences of opinion were occasioned by the variety of inflammatory changes found in the lungs at autopsy and from the lack of uniformity in the results of bacteriologic studies. Cultures from the lungs demonstrated in numerous cases the presence of well known microorganisms, particularly pneumococci and streptococci; and each of these organisms was proposed by a group of observers as the cause of the pulmonary inflammation. Weichselbaum, and with him probably the majority of investigators at the time, attributed the pneumonia to the pneumococcus, while Finkler and Ribbert, finding streptococci in the lungs of several cases, considered the broncho-pneumonia which they observed identical in form with the lesions present in pulmonary erysipelas, due, as they thought, to the same microorganism. Corresponding to these two views the character of the inflammatory exudate was described as "croupous" when associated with pneumococci and "catarrhal" with streptococci.

In fact the idea that influenza pneumonia was exclusively due to a mixed or secondary infection became so firmly established, accord-

ing to Leichtenstern, that the opposing hypothesis of a primary influenza pneumonia advocated by him in 1889, was criticized by many bacteriologists as groundless. From clinical and anatomical evidences he, at that time, stated "there is a primary influenza pneumonia that is an inflammation of the lungs produced by the poison of influenza." Four years later, primary influenza pneumonia was described by Pfeiffer in his publication announcing the discovery of the influenza bacillus. Inasmuch as the lesions, recorded by him as the type of pulmonary inflammation caused by this organism, differ in certain respects from those observed by certain other investigators and from the disease as it is manifesting itself in the present epidemic, his description will be presented in some detail.

With the naked eye he found the lungs studded with a great number of lobular areas, in the centers of which were pinhead to pea-sized yellow spots elevated above the surrounding dark red tissue. These lobular areas were separated by air-containing tissue or coalesced forming a secondary, apparently lobar consolidation, but still on close examination showing the characteristic structure of lobular pneumonia. The lesion was easily distinguishable from uniform lobar consolidation. With a little pressure greenish yellow droplets of thick, tenacious pus could be squeezed from the cut bronchi. In smears and in stained sections of lung tissue, great numbers of influenza bacilli were found within the leucocytic exudate in the centers of the pneumonic areas and on the bronchial walls, while in larger bronchi, various organisms, including streptococci and pneumococci, were present. Microscopically the centers of consolidated areas were found full of pus cells which filled the alveoli and septa, so that the architecture of the lung was obscured. The alveoli about the periphery of the consolidated areas contained large round, often pigmented cells. In the central portion fibrin was completely absent, and at the periphery occurred at most only in small strands. The absence of fibrin he considered the typical difference between "croupous" and influenza pneumonia. The bronchial walls were infiltrated with wandering cells.

In explanation of the lobular distribution of the pneumonic areas, Pfeiffer conceived the inflammation to extend directly into the alveoli from a diseased bronchus, consequently influenza pneumonia, as he found it, was a typical lobular pneumonia with a "catarrhal" exudate in which were numbers of influenza bacilli.

As to the complete distinction of pure "croupous" and influenza pneumonia, since the discovery of the influenza bacillus, there is little or no confusion either from a clinical or pathological standpoint. The anatomical features of difference are presented by Ribbert as follows: "The cut surface of the consolidated lung with influenza pneumonia is smooth, not granular, the exudate soft, very

abundant and poor in fibrin; even with lobar consolidation the cut surface has a lobular configuration and the individual lobules are not altered in the same degree." Croupous pneumonia, however, superimposed upon and accompanying influenza, is often confusing; and there are considerable variations in the descriptions of the character of inflammatory exudate in true influenza pneumonia. Thus, while Pfeiffer, Beck, and Wassermann describe an exudate consisting of pus cells and little or no fibrin as typical, Weichselbaum found, in the neighborhood of purulent broncho-pneumonic areas alveoli in which fibrinous, serous, or hemorrhagic exudate predominated. And Leichtenstein, while admitting that the influenza bacillus can produce a fibrinous as well as a catarrhal inflammation, considers the numerous instances of croupous pneumonia accompanying influenza due to a secondary invasion by pneumococci.

Thus it appears to have been admitted that the influenza bacillus of itself is capable of producing a pneumonia which, though typically lobular in distribution, may at times become lobar by coalescence of focal areas of inflammation while still maintaining a lobular structure; that the pulmonary exudate which its injury calls forth may be simply catarrhal—that is, composed of leucocytes with little or no fibrin—or may be predominantly fibrinous, hemorrhagic, or serous in certain areas. It is well established that in a high percentage of cases the anatomy of the lungs is more complicated by reason of a secondary infection with pneumococci, streptococci, and less frequently other pathogenic microorganisms. Among these complications are described croupous pneumonia, abscess formation, gangrene, and occasionally caseation, where a latent tuberculosis is incited to increased activity by the disease.

Since the present epidemic of influenza made its appearance in the first naval district in August many deaths have resulted from the disease, and in all of 30 cases autopsied at this naval hospital extensive pneumonia was present in both lungs. In 83⅓ per cent of these influenza bacilli were isolated from the lungs either in pure culture or associated with pneumococci, Types I, II, III, or IV, streptococci, staphylococci, or micrococcus catarrhalis, as reported by Lieutenant J. J. Keegan, Medical Corps, United States Navy, in September. Since this report Lieutenant Keegan has increased the number of cases from which influenza bacilli have been obtained from the lungs, and with his permission the complete list, with bacteriologic data, is presented here.

Cultures from the lungs.

Number of cases.	Influenza bacillus.	Pneumococcus.	Streptococcus viridans.	Streptococcus hemolyticus.	Micrococcus catarrhalis.	Staphylococcus aureus.	Duration of pneumonia, in days.	Blood culture.
1....	+	−	−	−	−	−	4	
2....	+	−	−	−	−	−	4	
3....	+	−	−	−	−	−	4	
4....	+	−	−	−	−	−	2	
5....	+	−	−	−	−	−	15	
6....	+	−	−	−	−	−	16	
7....	+	+ (II)	−	−	−	−	10	Pneumococcus.
8....	+	+ (II)	−	−	−	−	7	
9....	+	+ (IV)	−	−	−	−	9	
10....	+	+ (II)	−	−	−	−	.....	
11....	+	+ (II)	−	−	−	+	4	
12....	+	+ (II)	−	−	−	+	12	Do.
13....	+	+ (II)	−	−	−	−	6	Do.
14....	+	+ (IV)	−	−	−	+	.....	Micrococcus catarrhalis.
15....	+	+ (III)	−	−	−	−	.....	Pneumococcus.
16....	+	+ (IV)	−	−	−	−	.....	
17....	−	+	−	−	−	−	.....	
18....	+	+ (II)	−	−	−	−	.....	
19....	+	+ (I)	−	−	−	−	.....	Do.
20....	+	+ (IV)	−	+	−	−	.....	
21....	+	−	−	−	−	+	.....	
22....	+	−	−	−	−	+	.....	
23....	+	−	−	−	−	+	.....	
24....	+	−	−	−	−	+	.....	
25....	+	−	−	−	−	+	.....	Influenza bacillus, staphylococcus.
26....	−	−	−	+	−	−	4	Streptococcus.
27....	−	−	−	+	−	−	5	Do.
28....	+	−	−	+	−	−	.....	
29....	+	−	−	+	+	+	.....	Do.
30....	+	−	−	−	+	+	.....	
31....	−	−	−	+	−	−	3	
32....	+	+ (IV)	−	+	−	−	3	
33....	−	−	−	+	+	−	5	
34....	+	−	−	−	−	−	4	
35....	+	−	−	−	−	−	2	
36....	+	+ (IV)	−	−	−	−	.....	
37....	+	+ (III–IV)	−	−	−	−	6	
38....	+	+ (IV)	−	−	−	−	.....	
39....	+	+ (III)	−	−	+	−	.....	
40....	+	−	−	+	−	−	.....	
41....	+	+ (IV)	−	−	−	−	.....	
42....	+	−	−	−	+	−	.....	
43....	−	−	−	+	−	−	.....	
44....	+	−	−	+	−	+	.....	
45....	+	−	−	−	−	+	.....	
46....	+	+ (IV)	+	−	+	−	.....	
47....	+	−	−	+	−	−	.....	
48....	+	−	−	+	+	+	.....	
49....	+	−	−	+	−	−	.....	
50....	+	+ (IV)	−	+	−	−	.....	
51....	+	−	−	+	−	−	.....	
52....	+	−	−	−	−	+	.....	
53....	−	+ (IV)	−	−	+	−	.....	
54....	−	+ (IV)	−	−	+	−	.....	
55....	+	−	−	+	−	−	.....	
56....	+	+	−	−	−	−	.....	

Cultures from the lungs—Continued.

Number of cases.	Influenza bacillus.	Pneumococcus.	Streptococcus viridans.	Streptococcus hemolyticus.	Micrococcus catarrhalis.	Staphylococcus aureus.	Duration of pneumonia in days.	Blood culture.
57....	+	+ (IV)	−	−	−	−	.....	
58....	+	−	−	−	−	−	.....	
59....	−	+ (III)	−	−	−	−	.....	
60....	+	−	−	−	−	−	.....	
61....	+	+ (IV)	−	+	−	+	.....	
62....	+	+ (IV)	−	−	+	+	.....	
63....	+	−	−	−	−	−	.....	
64....	−	−	−	−	−	+	.....	

Autopsies were performed upon the first 30 cases in the above chart; and this study is based upon observations of the pathological anatomy of influenza, especially the pulmonary lesions, as presented by these individuals post mortem. They were all young men of strong physique betwen the ages of 18 and 30. The autopsies were performed from 2 to 10 hours post mortem, usually within 6 hours.

UNCOMPLICATED INFLUENZA PNEUMONIA.

A reference to the foregoing chart shows that the lungs in six cases, or 20 per cent of the 30 autopsied, yielded pure cultures of the influenza bacillus, while 15, or 50 per cent, were associated with pneumococci; 4, or 13⅓ per cent, with streptococci, and the remainder with other micro-organisms. These cultural results do not indicate accurately the accompanying pathologic changes, for in the four cases from which staphylococci appeared in cultures, the condition of the lung in gross and microscopically indicates that these organisms were probably contaminants, and the lesions associated with the influenza bacillus alone. However, by correlating the cultural results with the pathologic changes and the micro-organisms demonstrated in sections, it is possible to describe the pulmonary lesions in two groups, separating the inflammatory changes associated with the influenza bacillus alone, from those in which secondary organisms modified the pathology.

The first group, in which the influenza bacillus was alone or predominantly present, includes cases varying in the duration of clinical evidences of pneumonia from 2 to 16 days. The appearances of the lungs and the pathologic processes at work in them are very different in the two extremes. It is consequently necessary to describe them more or less separately, at the same time correlating them and following the consecutive stages.

In each instance the pneumonia has been bilateral, and the lobes of both lungs involved to a greater or lesser degree. The inflammation

in the upper and middle lobes was always less extensive than in the lower, and the anterior portions less than the posterior. The middle lobe is spared to a greater extent than any other, though it, too, may be extensively infiltrated.

The lungs of the early stages of pneumonia associated with pure cultures of the influenza bacillus are quite similar in the type of injury and reaction present, though there is great variety in the preponderance of inflammatory elements in various portions of a single lung or lobe.

There is commonly a moderate serous effusion in one or both pleural cavities amounting to 50 or 250 cubic centimeters. The fluid is clear and has the color of blood-stained serum. The pleural surfaces are smooth, shiny and wet, though occasionally a thin, granular fibrinous exudate may be seen by reflected light over limited areas. Often numerous small, red, discrete, or confluent pleural hemorrhages are present over consolidated portions, especially posteriorly on the surface of the lower lobes. One or both lower lobes in most instances appear completely consolidated, and the posterior and inferior regions of the upper lobes have a similar appearance. The consolidation in these lobes and in the middle lobe are characteristically patchy in distribution. Patches of consolidation measuring 2 to 5 centimeters can be seen and felt in the anterior and lateral portions. The consolidated regions of all lobes appear externally grayish purple to dark reddish purple, the lower and posterior regions being darker than the upper and anterior. The intervening air-containing tissue is emphysematous, more expanded than the consolidated areas, edematous, more or less, and pinkish or yellowish purple in color. The emphysema is quite striking, the individual air vesicles being readily discernible.

The lungs are heavy and cut surfaces drip freely a blood-stained fluid, with which they are in large measure saturated. In consolidated areas purple fluid runs from the bronchi when slight pressure is applied and exudes from the surface generally. This markedly edematous condition is constant in the early stages and is present in a great part of the otherwise unconsolidated emphysematous tissue.

The cut surface of a consolidated lobe is smooth and glistening, slightly translucent in certain parts where the exudate is most fluid. It has a dark reddish or grayish purple, fairly uniform color, but always some portions, more often centrally located, are darker purple, more firm, and less fluid in content. Hemorrhagic areas involving one or more lobules are found here and there. Toward the periphery the lung may appear grayer, and the structure of the open alveoli and bronchioles is very evident when the surface is blotted. Such areas are semitranslucent and have the appearance of a saturated sponge of delicate architecture. Excepting that such variations in the char-

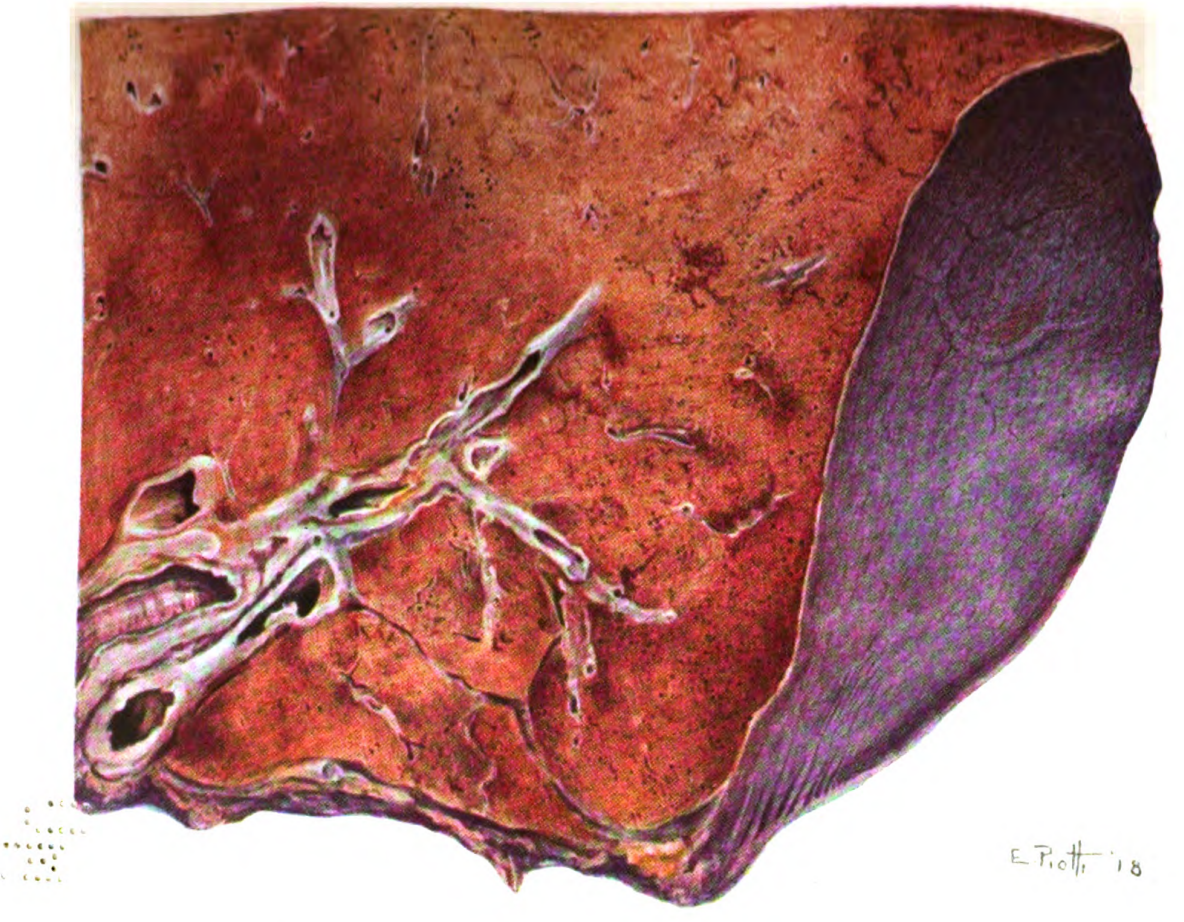


PLATE I.- INFLUENZA PNEUMONIA OF 4 DAYS DURATION. LOWER LOBE COMPLETELY CONSOLIDATED; AREAS OF HEMORRHAGE AND FLUID EXUDATE.

acter of exudate are obvious, no especial relation of the inflammation to bronchi is evident in the acute lobar inflammation. Gross sections, through partially consolidated lobes and through isolated areas of consolidation, may and usually do show evident relation of the inflammation to bronchi. One finds small, discrete, grayish-purple areas (up to 1 cm.) of consolidation grouped about a bronchus and slightly elevated above the surrounding tissue, or there may be a more diffuse consolidation occupying and extending from the region of a bronchus. These vary in color; some are gray and grayish purple, others hemorrhagic. Such areas represent older lesions than the more extensive lobar inflammation, as indicated by the protocol given below. The mucous membranes of the larger bronchi are dark reddish purple in color, while those of smaller branches may appear pale and smooth. Their content is serous, and no pus is anywhere evident.

The following protocol is appended because the progress of the pneumonia as recorded clinically may explain in part certain differences in the anatomical appearance of the lesions in various areas.

In this case the first evidences of pneumonia were detected clinically four days before death. The lungs are extremely wet and boggy. Both are voluminous and extensively consolidated. Notwithstanding the extensive consolidation, it is remarkable that there is so little evidence of pleural involvement. Clinically the pneumonic process began in the upper portion of the upper right lobe, yet the pleural surface here is as smooth, moist, and devoid of visible exudate as the remainder of the lung. Both lower lobes are especially consolidated posteriorly; also most of the upper left and right lobes, the middle lobe being almost free.

The only evidences of pleural inflammation are found over the widespread consolidated regions. These consist of subpleural hemorrhages varing in appearance from minute innumerable purplish-red dots, over which the pleura appears smooth and shiny, to fairly extensive irregular red areas (2 to 3 cms.) over which the pleural surface by reflected light is faintly granular. The extensive edema of the lung generally is indicated by the wet, shiny, boggy appearance of the surfaces. Between the lobes of the lung the edema is very apparent as a watery effusion in the loose subpleural connective tissue. Cut section through the consolidated areas in the right upper lobe where the pneumonia began presents a very wet surface and there are fairly well circumscribed patches of consolidation along individual bronchi parallel with their course. Although these patches are fairly distinct, they fuse to a certain extent. They average one-half cm., and are slightly elevated above the surface and when the excess of fluid is scraped off they are finely granular, irregularly round and grayish purple in color. The thin-walled bronchi do not appear to be dilated; their walls are collapsed and pale gray. The larger

bronchi are extremely congested. The alveolar tissue between the elevated patches is filled with fluid, has a solidified appearance and when pressed exudes a bloodstained serum. The unconsolidated portions are quite emphysematous. The lower right lobe, where pneumonia next became evident clinically, is almost completely consolidated, extremely wet and boggy. The inflammation seems to have spread more rapidly than in the upper lobe. The consolidation appears to be bronchial in distribution. The larger branches of the bronchi are surrounded by a wide zone, dark purple in color and granular on the surface. Between these areas the tissue is slightly depressed, paler purple and smoother. More fluid can be expressed from the intervening tissues than from the firmer areas, but no air is present. The cut surface of the lower left lobe, where the inflammation last appeared and consequently not more than two days old, shows an even more uniform and diffuse type of solidification. The tissue is elastic and very wet, and one can not discern a definite bronchial distribution, though certain groups of lobules are darker purple and firmer than others.

One is led to infer from such a case that in the areas of earliest extension from bronchi into alveoli there is more resistance to the injury of the infection than later in the disease. This is indicated by the circumscribed broncho-pneumonic patches representing the first lesions. Later the process spreads more rapidly and diffusely elsewhere, the exudate becoming less cellular. A still more rapid progress may result in a fulminating inflammation of an entire lobe, the exudate being largely serous, fibrinous, and hemorrhagic, the content of the various inflammatory elements varying somewhat in different areas.

In sections studied microscopically from this early stage of pneumonia it is more evident than in gross that a general bronchitis, and especially bronchiolitis, precedes the infiltration of alveoli. One finds in unconsolidated areas bronchioles filled with an exudate composed of polymorphonuclear and mononuclear leucocytes, with varying amounts of fibrin and amorphous hyaline material. The mucosa may be intact or desquamated and ulcerated. The infundibula and air vesicles subtended by the bronchiole may contain an exudate of leucocytes with little or not fibrin, forming a small focus of broncho-pneumonia. More characteristic of this stage of inflammation is a lesion of the walls of certain infundibula and air vesicles in the neighborhood of and within the latest areas of consolidation. A hyaline membrane partially or completely covers the walls of these air spaces. The membrane is irregular in thickness, sometimes stratified with occasional cells within narrow clefts. It tends to be thickest over the angles of the wall, though it may be so abundant as to fill an alveolus. There is no epithelial lining be-

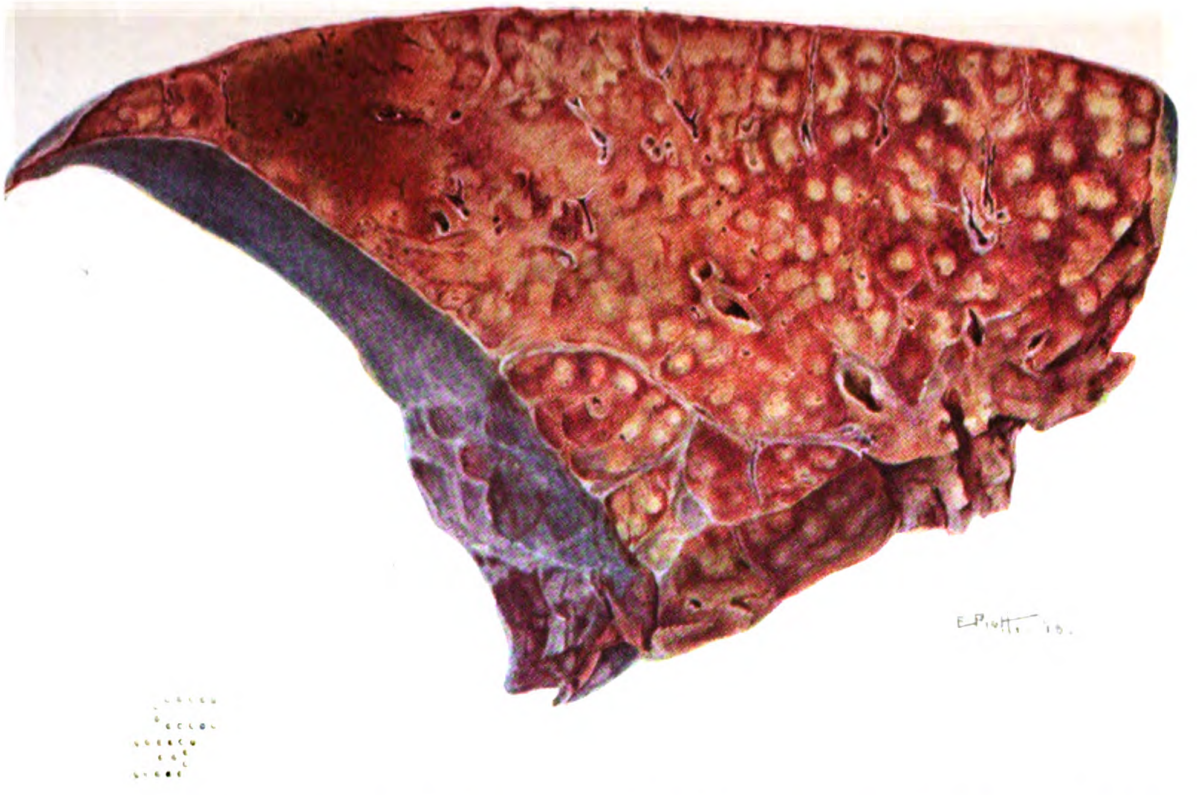


PLATE II.—INFLUENZA PNEUMONIA OF 16 DAYS DURATION. NOTE FOCALIZATION OF INFECTION ABOUT BRONCHI.

neath; and it may be continuous with strands of fibrin. Its appearance gives the impression that it is composed essentially of fused threads of fibrin. This lesion is not uniformly distributed throughout the lung and is most prominent in the neighborhood of recent areas of consolidation, disappearing or becoming obscured with the advance of the inflammation.

In the larger areas of lobular pneumonia and in the diffusely consolidated lobes there is a severe and widely destructive injury which has spread rapidly through the lung, destroying the epithelial lining of alveoli, rupturing capillaries, and often in large foci completely destroying alveolar walls, rendering the pulmonary structure unrecognizable. The air spaces are filled with coagulable fluid, fibrin is deposited in membranous fashion along alveolar and infundibular walls or in a delicate or dense network within the lumina, the interstices of which contain serum, erythrocytes, and leucocytes in varying proportion. Where the injury is most severe a large area is filled with erythrocytes, fibrin, scattered epithelial cells, and remnants of alveolar walls. Elsewhere the capillaries are engorged with blood and erythrocytes are escaping in great numbers by diapedesis and vascular rupture.

The proportion of leucocytes varies, but at this stage they do not constitute a conspicuous part of the picture. The majority are polymorphonuclear, though there is a relatively large number of mononuclear cells of various kinds, some of them desquamated epithelium and wandering phagocytes, others lymphocytes. In older foci of pneumonia, leucocytes are the predominant inflammatory element, with small amounts of blood and fibrin, but in the diffusely consolidated patches or lobes of short duration, serum, fibrin, and red blood cells are most conspicuous. Especially prominent are the large areas of hemorrhage from capillary rupture. Large mononuclear phagocytes containing blood pigment are frequently observed within these patches. Where the alveolar walls are more intact, leucocytes and erythrocytes lie beside the capillary channels from which they have escaped. In certain areas numerous focal necroses of alveolar walls, with fibrinous thrombi plugging the capillaries and fragmentation of nuclei, are observed. The smaller bronchi present older lesions than those within the alveoli. They contain plugs of leucocytes, fibrin, and hyaline material, and their epithelial lining is partially or completely ulcerated and covered by a fibrino-purulent membrane. One of the most impressive features of the section is the dilated, empty condition of many infundibula which stand widely open in the midst of alveoli filled with exudate. At times they are filled with coagulable fluid.

In sections from such acutely inflamed lungs there may be no demonstrable organisms either within the exudate of smaller bronchi

or alveoli, although pure cultures of influenza bacilli were isolated from them. In somewhat later stages with similar injury and exudate, these organisms have been demonstrated in great numbers both intra- and extra-cellularly. They are ingested both by polymorphonuclear and mononuclear phagocytes. Within the latter they may be aggregated in minute spherical groups. Within the alveoli they stimulate an immigration of leucocytes.

The nature of the above-described lesions and their presence in three very early cases in which micro-organisms were not demonstrable in sections, and in one case with sterile cultures, indicate that the extensive injury may be brought about by an extremely toxic substance elaborated within and disseminated through the larger air passages to the more delicate structures of the lung. This hypothetical toxic agent has little chemiotactic action toward leucocytes, but rapidly attacks the alveolar walls and their capillary bed, injuring them to the point of rupture, and stimulating a fluid exudate in great quantity. The product of this preliminary reaction forms a favorable medium for whatever pathogenic organisms are at hand. Influenza bacilli enter through the bronchi, alone or together with pneumococci, streptococci, or staphylococci. These secondary invaders, multiplying with great rapidity, give rise to further injury and inflammatory reaction more or less characteristic for the type of organism concerned.

The recognition that there is a primary diffuse and extremely severe toxic type of injury to the lung in influenza affords a rational basis of explanation for the varied bacteriological and pathological results which have been so confusing, and at the same time establishes a pathological process which may be considered peculiar to this form of the disease.

Following this initial injury the influenza bacillus may invade the alveoli over wide areas. Here they stimulate an immigration of polymorphonuclear leucocytes which rapidly ingest them. They are also actively phagocyted by large mononuclear cells. We have seen two cases in which these organisms were demonstrated in sections within the alveoli in large areas of consolidation. The exudate in these is predominantly cellular, with some serum and erythrocytes and little fibrin. But there is usually only a local invasion by these organisms within a group of alveoli about terminal bronchi. The localization of the infection begins four or five days after the initial injury. This is first evident in gross in the firmer, usually centrally situated areas of consolidation, which represent the earliest regions of involvement. A thin gray or yellowish gray zone appears about the bronchioles and infundibula, the width of each focus measuring 1 mm. or less, three or four of which are present in each lobule.

The intervening tissue is still purple, hemorrhagic, smooth, and firm. Later similar foci appear farther out toward the surface and within lobules which are not so firm, more edematous and less hemorrhagic.

In contrast to the diffuse serous, hemorrhagic, fibrinous, and cellular exudate, these secondary foci are composed almost entirely of cells, polymorphonuclear and mononuclear, which fill the bronchioles and several adjacent alveoli. If fibrin previously was present it is dissolved by the leucocytes. Influenza bacilli have been demonstrated in such areas in great numbers within both bronchi and alveoli. As the foci increase in size, fluid exudate is absorbed and organization begins in the alveoli between them and within the exudate of bronchi where micro-organisms are less numerous. At the end of two weeks the most prominent feature of the fresh section of lung is the presence of numbers of these now yellow or grayish-yellow foci measuring 3 or more millimeters in diameter. In many of them a yellow opaque center with peripheral gray semitranslucent zone can be detected, representing organization about small abscess cavities. The fluid of the initial edema is absorbed so that at this time the surface is fairly dry. The surrounding alveolar tissue has a bright red color, from the reestablishment of circulation and the formation of new capillary channels within organizing exudate. One may find also bright red hemorrhages where blood has escaped into healing alveoli. In areas where the injury has been more severe an entire lobule or groups of lobules may appear yellow or grayish yellow, smooth, and firm. The yellow color is partially due to large mononuclear cells within healing alveoli, the cytoplasm of which is filled with fat droplets.

Two cases with pneumonia of 15 and 16 days' duration, the lungs of which yielded pure cultures of the influenza bacillus, have been observed in this series. The pathology in the lungs of each was essentially the same. The following protocol is illustrative of this stage.

Duration of pneumonia, 16 days. No excess of fluid in left pleural cavity; about 50 c. c. in right. Lungs are voluminous and pale pink anteriorly; emphysematous between patches of consolidation. Interlobular veins injected bright red.

Left lung.—There is a thin fibrino-purulent exudate over anterior and lateral surfaces and between the lobes. Posterior half of lower lobe almost completely consolidated, light purple in color. Subpleural hemorrhages posteriorly over upper lobe. There is no edema. Section through posterior portion of lower lobe shows diffuse broncho-pneumonia, characterized by the presence of multiple, elevated, grayish and yellow foci of consolidation about terminal

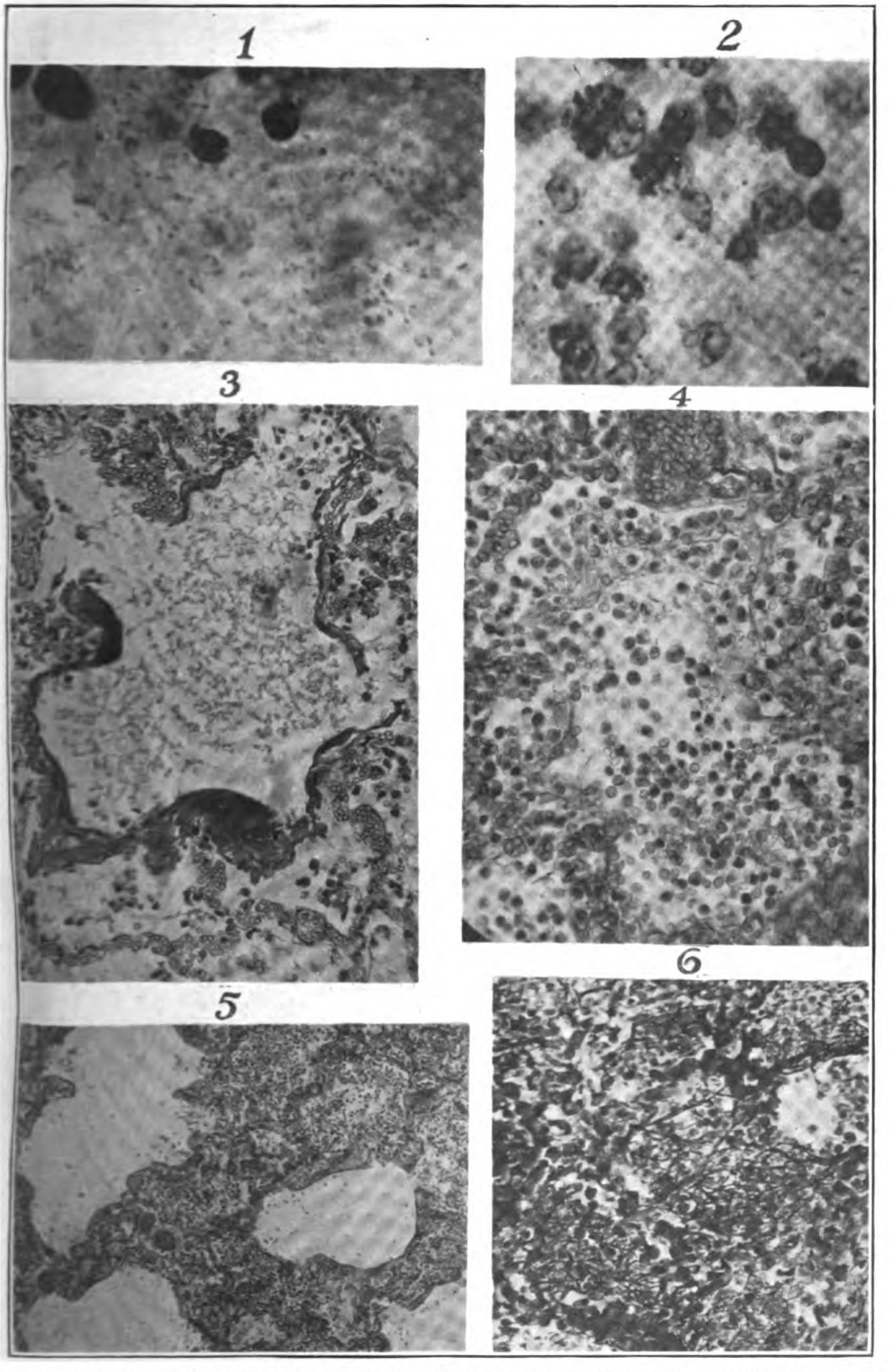
bronchi, measuring 2 to 5 mm. The bronchi are moderately dilated, and their mucosa appears edematous and thickened. Thick yellow pus can be expressed from them. Intervening alveolar tissue is red or purple in color with a fine grayish or yellow stippling partially outlining alveoli. This tissue is elastic, moist, semitranslucent, and is devoid of air. There is no evident pleural inflammation over these areas. The surface is smooth, glistening, mottled purple and pink, corresponding to consolidated and air-containing tissue. Mucosa of larger bronchi only slightly injected.

Anteriorly in the lower lobe are patches of consolidation, bronchial in distribution, measuring 2 by 3 cm.; some of these are quite hemorrhagic in appearance, that is to say, the alveolar tissue between yellow foci has a dark purple color. Over this region is a thin fibrino-purulent pleuritis. In the anterior half of the upper lobe the lung tissue on cut surface is very pale and grayish yellow in color. Here there are innumerable firm, yellow peribronchial areas of consolidation, which are larger and more diffuse than in lower lobe. Near the hilum is a patch of uniform, smooth, moist, gray consolidation.

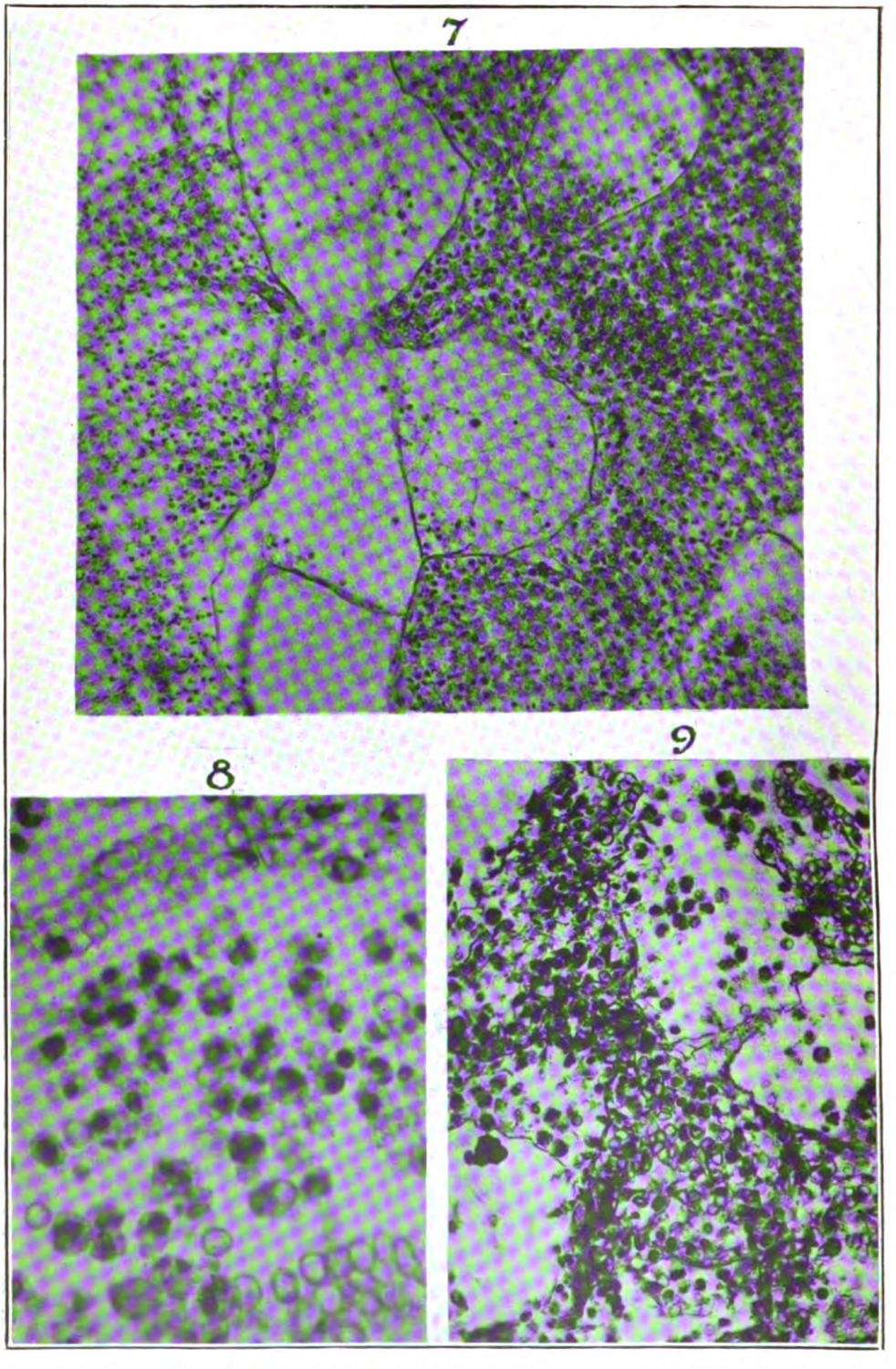
Right lung.—Lower lobe completely and firmly consolidated; posterior halves of middle and upper lobes completely consolidated but nodular. Anterior halves of these lobes almost entirely consolidated, but mottled with groups of lobules which are pink, emphysematous and air-containing. The cut surface of these lobes presents changes which are quite similar to those on the left side. The lungs in general resemble those of an extensive tuberculous broncho-pneumonia.

Corresponding to the widespread injury and destruction noted in the early stages of the disease, one finds in these two cases of longer duration extensive organization and fibrosis of the lung. The fibrinous exudate in alveoli has been invaded and absorbed by fibroblasts and capillaries from adjacent alveolar walls. In many places the architecture of the lung is completely obliterated, and there remains only a young vascularized fibrous tissue including particles of incompletely absorbed fibrin. Small areas of hemorrhage are present, and occasional contracted alveoli lined by vacuolated cuboidal epithelium. Polymorphonuclear leucocytes are relatively few, but numbers of lymphocytes and plasma cells have appeared. They are numerous within the organizing tissue, about blood vessels and within bronchial walls. Organization is proceeding also within the exudate of certain bronchioles and infundibula forming branching plugs of young fibrous tissue completely occluding these passages and extending out into neighboring alveoli.

Alveoli about many terminal bronchi are filled with polymorphonuclear and mononuclear leucocytes containing numbers of in-



1, Influenza bacilli in bronchial exudate; 2, influenza bacilli within large mononuclear cells of alveolus, arranged in dense groups; 3, hyaline membrane partially covering infundibular walls; 4, acute alveolar exudate with extravasation of red blood cells; 5, acute inflammation of lung, with dilated open infundibula; 6, acute fibrino-hemorrhagic inflammation of lung.



7, Acute inflammation of lung—varied exudate; 8, catarrhal exudate in alveolus from broncho-pneumonic patch showing numerous influenza bacilli; 9, necrosis of alveolar walls.

fluenza bacilli. The yellow opaque foci noted in gross represent small abscesses or dilated bronchi filled with purulent exudate containing influenza bacilli.

Many dilated bronchi are surrounded by a zone of alveoli which are plugged with masses of fibrin. About others these masses of fibrin have been organized and absorbed by fibroblasts or replaced by fused epithelial cells. This reaction about dilated bronchi will be described more fully in considering bronchiectasis.

These two cases present clearly the progress toward healing of an influenza pneumonia unaccompanied by other organisms, and they demonstrate in an illuminating manner the fact that the pulmonary injury in the initial stages is of utmost severity, and the process of healing and repair one of organization of large areas which could never be of more than very limited functional value. Resolution as it usually occurs in croupous pneumonia is not observed.

Although the most extensive injury takes place during the early stages, the inflammation is progressive, and there is continuous destruction of tissue locally about many bronchi with the resulting formation of more or less chronic abscesses and bronchiectatic cavities which harbor masses of influenza bacilli. This fact is of especial interest in view of the observations of Boggs and of Lord on chronic bronchiectacis associated with this organism, and is evidence for the assertion that many cases in this epidemic pursued a similar chronic course with intermittent recurrences.

A mechanical lesion of interest which appears to be distinct from the immediate inflammatory process, is rupture of alveoli and interstitial emphysema in unconsolidated emphysematous pulmonary tissue. Three cases with this condition were found in this series, all of them early. In one of these there was subcutaneous emphysema extending from the superior mediastinum into the neck. The neck anteriorly and laterally from the angles of the jaw on each side to the second intercostal space over the clavicles, was greatly distended with air, crepitating and pitting on pressure. In other instances seen clinically, the subcutaneous tissue over a considerable portion of the trunk has been similarly affected. On removing the sternum of the above case the mediastinal fatty and connective tissue was found distended with air. Following rupture of alveoli, air escapes into the interlobular tissues and eventually finds it way to the hilum whence it enters the mediastinum. Sections of the lung show large air blebs especially numerous in the interlobular and subpleural tissue, though large cavities up to 1 cm. may be present within the lobule, the surrounding alveoli being atelectatic. Hemorrhages are associated with these lesions.

INFLUENZA PNEUMONIA COMPLICATED BY SECONDARY INVADERS WHICH MODIFY THE PATHOLOGY.

Given the primary acute toxic injury to the lung substance which appears to be the essential lesion in the early stage of influenza pneumonia of the present epidemic, any pathogenic micro-organism harbored by the air passages has a fertile field upon which to become implanted, and to multiply, producing injury and reaction more or less characteristic for the organism concerned. Since an acute inflammation of the air passages always precedes the extension into the alveolar tissue, there are in most cases pathogenic organisms, other than the influenza bacillus, present in the injured bronchi ready for invasion. Consequently, in a majority of instances mixed infection is present in the lungs, and the older the pneumonia the greater the probability of secondary invasion. Most common of these invaders in order of frequency have been the various types of pneumococci, streptococci, staphylococci, and micrococcus catarrhalis.

Pneumococci have been cultivated from the lungs together with influenza bacilli in 14 cases, and once alone. In three instances the secondary infection was apparently of such short duration that they had not modified appreciably the gross or microscopic appearances of the lungs.

The pleurae were smooth, the lungs edematous, hemorrhagic, and partially or completely consolidated with acute exudate. In one case numerous pneumococci were found within the alveolar exudate, and in the other two in a narrow zone beneath and within the pleura, but not more deeply within the inflamed lung. In 11 cases the secondary infection had been of sufficient duration and extent to bring about a more or less characteristic reaction to their presence. The pathology in these is exceedingly complex; for the lungs of a single individual show in different parts various stages and degrees of injury and intensity of secondary infection.

In each of these 11 cases there was a fibrinous or fibrino-purulent membrane over the affected pleura, often with a sero-fibrinous effusion on the side most involved, amounting at times to 500 to 1,000 cubic centimeters. Grossly, the lungs presented in a portion of one or more lobes the typical dry, gray, granular surface characteristic of croupous exudate. These areas contrast sharply with the accompanying lesions of influenza pneumonia which are always recognizable in the same or other lobes. The areas of croupous pneumonia are more voluminous, dry, granular, and friable. Their color is more uniformly gray and opaque. The surface of adjacent areas of influenza pneumonia is smooth, moist, elastic, with a variety in colors and irregularity in density.

Smaller foci of broncho-pneumonia in which pneumococci predominate are not distinguishable from similar patches in which influenza bacilli only are present. Such focal areas are not infrequent in these cases, the initial bronchitis and alveolar injury seeming to predispose to a broncho-pneumonic type of inflammation whatever organism may be invading.

Microscopically, croupous pneumonia is quite as distinctive as in gross. The alveoli, distended uniformly with dense plugs of leucocytes and fibrin, contrast with those of influenza pneumonia, in which there is such an irregular distribution of the various inflammatory elements. One notices, however, a greater degree of injury to alveolar walls, in the form of thrombosis of capillaries and focal necrosis, than is usual with simple croupous inflammation.

In two cases there was a healing influenza pneumonia in the lung on one side and an outspoken croupous pneumonia on the other. In the healing lung no organisms were found. Early organization and fibrosis were present, and numbers of plasma cells and lymphocytes. Another lung presented large regions of croupous exudate in the left lower lobe, while in the right lower multiple small abscesses and dilated bronchi were abundant.

INFLUENZA PNEUMONIA COMPLICATED BY STREPTOCOCCUS INFECTION.

In five cases hemolytic streptococci were cultured from the lungs. In three of these multiple abscesses were present, measuring up to 2 centimeters. Streptococci and influenza bacilli were associated in the other two cases in the production of widespread bronchiectatic abscesses and bronchitis with ulceration.

In the lungs of the first three cases there were large and small masses of lobular pneumonia, in the centers of which were yellow, opaque, soft areas of necrosis or excavation. Microscopically, the alveoli contain leucocytes and fibrin, with extensive necrosis in places of both exudate and alveolar walls. Here streptococci in short chains are present in enormous numbers. A fibrino-purulent exudate containing streptococci was present over the lungs, and in one case there was a left sero-purulent effusion of 2,500 cubic centimeters.

ACUTE BRONCHIECTASIS.

Even in the earliest stages of influenza pneumonia, that is from two to four days' duration, one of the most striking appearances is the gaping, dilated condition of infundibula and the general emphysema in unconsolidated portions. In three cases rupture of alveoli had taken place with subsequent interstitial emphysema. This tendency to dilatation of the air passages has manifested itself as actual

bronchiectasis in four cases. Two of these were associated with pure cultures of influenza bacilli and have been described with the other cases showing this organism alone. In the other two bronchiectasis was extensive, with abscesses and ulceration of many bronchi. The bronchiectasis in one instance was confined to the right side, the site of the older pneumonic process, the left lower lobe being firmly and almost completely consolidated in a state of gray hepatization with pneumococcus infection. In the remaining case bronchiectasis was extensive in each lobe on both sides. Cultures from this and the previous case demonstrated both influenza bacilli and hemolytic streptococci.

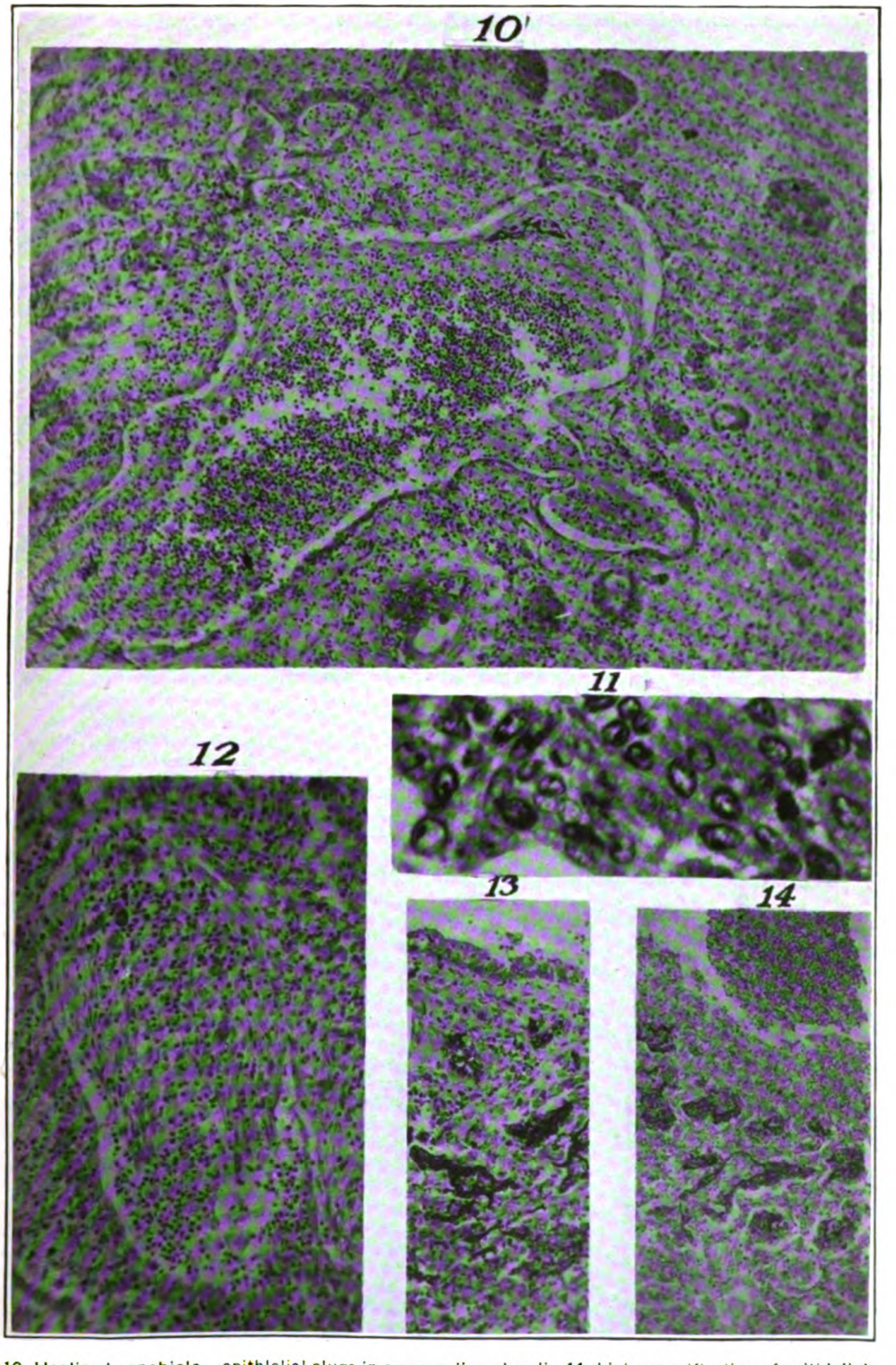
The association of influenza bacilli with chronic bronchiectatic changes in the lung is well known, especially through the publications of Boggs and of Lord. It is of exceptional interest that dilatation of bronchi and the permanent changes incident to ulceration and abscess formation can proceed so rapidly as is evident in our cases.

The following protocol describes the gross appearances of the lungs in the case which presented the most advanced lesions and in both lungs. The clinical evidences of pneumonia were of 10 days' duration.

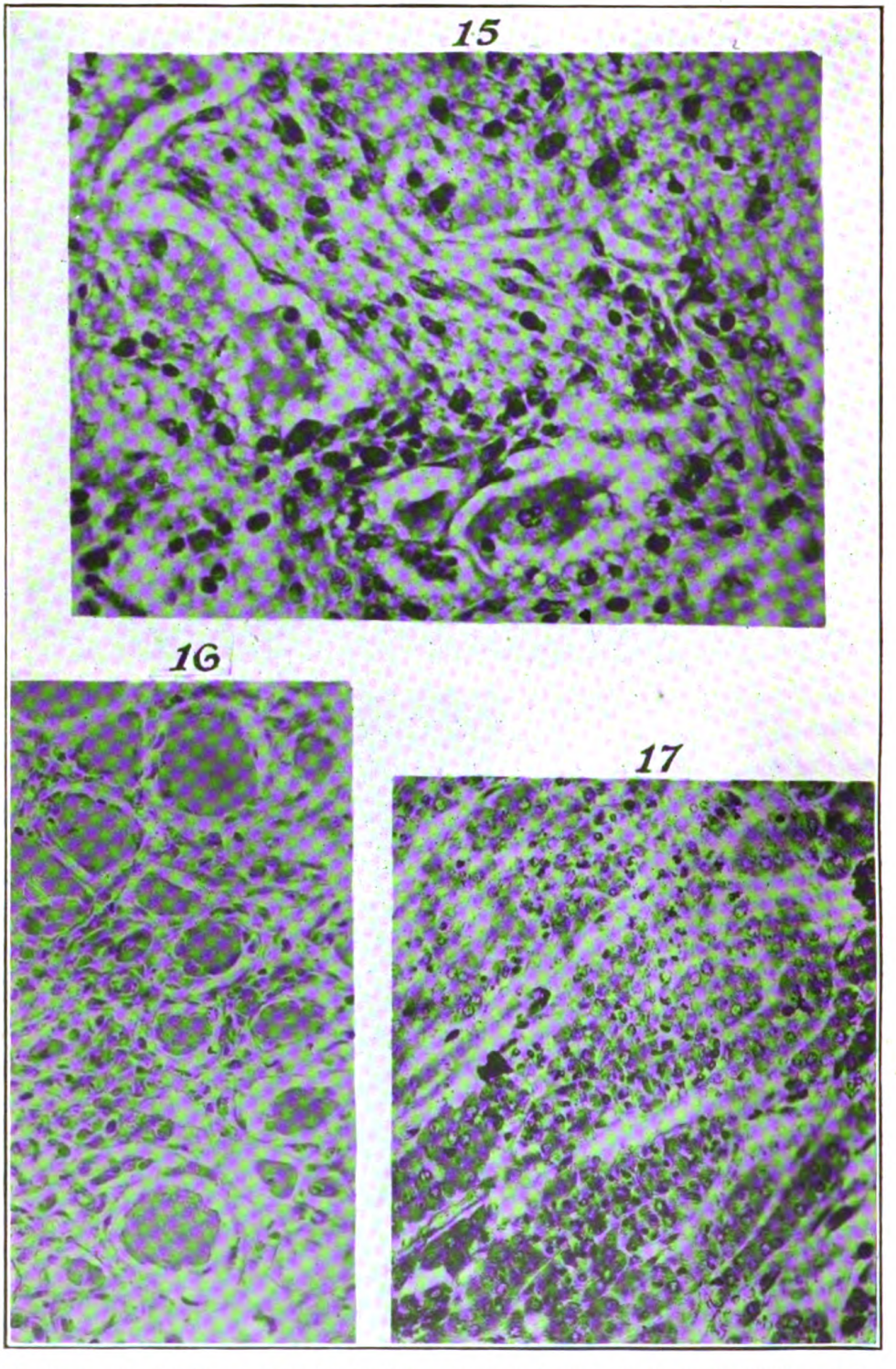
No excess of fluid in either pleural cavity, only a few cubic centimeters of thick yellow pus.

Left lung.—There is an injection of the pleural vessels, especially between the lobules, so that they appear bright red and prominent. A thin slightly sticky exudate is over the pleural surfaces, and the lobes are adherent by a fairly firm fibrino-purulent exudate, scant in amount. Both lobes are almost completely consolidated by numerous small areas of consolidation which give the surface of the lung a coarse nodular feel. On cut section the larger and smaller bronchi are found to be very widely dilated giving to the surface a worm-eaten appearance. There are numerous fairly uniformly distributed nodular grayish-yellow areas of consolidation associated with the bronchi which are elevated above the surface. The intervening alveolar tissue is grayish-purple in color containing some air and fluid which can be expressed easily. The bronchi are filled with a thick semifluid yellow pus. In the upper lobe there is a patch measuring 1½ cm. in diameter in which is a widely dilated terminal bronchus surrounded by a rosette of gray elevated areas of consolidation. The dilated bronchus measures 3 mm. when opened; the areas of consolidation 4 to 5 mm.

Right lung.—Presents a similar appearance to the left on the surface. It is heavier and the consolidation is more extensive and diffuse. The cut surface on this side presents a similar but more advanced degree of the same changes noted on the left. The terminal bronchi measure 2 to 3 mm. in diameter in cross sections. The



10, Healing bronchiole—epithlelial plugs in surrounding alveoli; 11, high magnification of epithlelial cells within alveolus from 10; 12, organizing bronchiole causing obliteration of lumen; 13, wall of dilated bronchus, showing surrounding alveoli, collapsed or filled with dense fibrin; 14, wall of small abscess in bronchiole. Surrounding alveoli filled with fibrin.



15, Organizing alveolar exudate; 16, hyaline necrosis and repair of rectus abdominis muscle; 17, focal necrosis of adrenal cortex with some polymorphonuclear exudate.

middle lobe shows early stages of bronchiectasis and broncho-pneumonia. With little consolidation there is noticeable dilatation of larger and small bronchi surrounded by a zone of dark purple, slightly elevated tissue. The mucosa of smaller bronchi is pale; of larger ones it is hemorrhagic.

Microscopically the pneumonia in most places is evidently peribronchial and lobular in distribution. Bronchioles and adjacent alveoli are filled with a leucocytic exudate and practically no fibrin. Peripheral alveoli contain increasing numbers of mononuclear leucocytes. Both polymorphs. and mononuclears contain numerous influenza bacilli. The smaller bronchi are dilated to 3 mm. The mucosa is totally or in part ulcerated and covered with a fibrino-purulent membrane. A wide zone of alveoli surrounding bronchi are filled with dense plugs of fibrin in which are a few mononuclear cells. Others of these alveoli are partially or completely collapsed. There is a beginning immigration of mononuclear wandering cells, which are more numerous about blood vessels and within bronchial walls. Many of them appear to be plasma cells.

Within the exudate in the lumens of ulcerated bronchi and in the fibrino-purulent membrane are found many streptococci in short chains. Whereas within the alveolar exudate the prevailing organism is the influenza bacillus.

In larger areas of consolidation there are in the exudate, in addition to leucocytes containing influenza bacilli, a good deal of fibrin and red blood cells and considerable destruction of alveolar walls.

The presence of fibrinous plugs within alveoli adjacent to the bronchus seems to be a constant accompaniment of excessive dilatation. Just how this is brought about is not clear, though it seems likely that intermittent lateral pressure mechanically further injures the already weakened alveolar tissues. It does not appear to be due to direct injury from the absorption of toxic substances from the lumina, for it may be seen around fairly large bronchi whose epithelial walls are intact and in which no organisms or cellular exudate are demonstrable. The presence of the fibrin tends to make the air tube more rigid and assists mechanically in limiting the infection in terminal portions where the bronchial walls may be partially or completely necrosed. The process of healing probably renders the dilatation permanent, if it does not actually accentuate it, for the fibrin about larger bronchi becomes organized and eventually converted into dense fibrous tissue, while about smaller bronchi it is replaced by masses of closely approximated or fused epithelial cells, which are surrounded by thickened fibrous walls. The more or less extensive organization and subsequent contraction of intervening alveolar tissue will also dispose to fix the dilated state.

The importance of a secondary streptococcus infection in producing extensive ulceration and bronchiectatic cavities in the acute stages is to be emphasized. These organisms especially produce local necrosis, and in this way extend the margins of infection. The influenza bacillus probably persisting much longer, may perpetuate the inflammation in a chronic state.

CHANGES IN OTHER ORGANS.

In the cases dying within four or five days after the onset of pneumonia, congestion and edema of the liver, kidneys, and adrenal glands are quite evident. The adrenals in a majority of instances contain focal hyaline necroses, usually quite small and situated either in the glomerular zone or the adjacent part of the fascicular zone. Rarely there is a narrow strip of necrosis extending parallel to the surface through many columns of cells. Occasionally a few polymorphonuclear leucocytes infiltrate the necrotic foci. In one instance in which the pneumonia was of longer duration and complicated by streptococcus infection, the focal necroses were accompanied by hemorrhage and fibrinous exudate, and a few streptococci were found within the lesions.

The spleen in uncomplicated cases is not appreciably enlarged, though often congested. Where secondary infection with pyogenic organisms is present there is enlargement, with the usual swollen, gray appearance and soft consistency of acute splenic tumor.

In one case an influenza pneumonia was coincident with a purulent cerebro-spinal meningitis, due to micrococcus catarrhalis.

Five cases, only one of which was associated with a pure culture of influenza bacillus in the lungs, showed extensive hyaline degeneration, necrosis, rupture, and hemorrhage in one or both abdominal rectus muscles. In its inception this lesion is probably a result of extreme intoxication, but later the degenerative necrotic areas may be invaded by secondary micro-organisms. In one case pneumococci were found within the lesions, in another streptococci, but in neither were they in considerable numbers and there is practically no cellular reaction. Acute arteritis and phlebitis were seen within the injured areas. Repair by fibrosis is rapid.

RÉSUMÉ.

The difficulties of analyzing the pulmonary lesions in any group of influenza pneumonias, as they have appeared in this epidemic, are very apparent to anyone who has had an opportunity to observe the bacteriology and pathology of this accompaniment of the disease. The uncertainty as to the nature of the infection, the varied character of the primary injury and reaction, the multiplicity of

complicating micro-organisms, and the modifications presented at different stages of the lesions preclude a clear-cut picture of all the interrelated and consecutive changes. We have attempted, however, to present as clearly as they have appeared to us certain distinctive features of the disease, and to separate from them coincident changes obviously of a secondary nature. Careful bacteriological data have been essential because of the high frequency of these secondary micro-organisms.

The very fact that so many complicating infections and their resultant pathological changes occur in influenza pneumonia is a distinctive feature in itself; for, probably in no other acute pulmonary disease are they so varied and frequent. In explanation of this it must be remembered that for several days before the onset of pneumonia there is a severe acute respiratory inflammation and general intoxication, lowering resistance and paving the way for the entrance into the lung of pathogenic organisms harbored there. Suddenly there comes an injury to the lung tissue in one or more areas, bronchial in distribution. The nature of this injury is such that there is an acute outflow of the fluid elements of the blood especially, and of hemorrhage. The alveoli in lobular areas, not infrequently in an entire lobe, become filled with this exudate, which, apparently, constitutes under these circumstances an excellent medium for the growth of pathogenic micro-organisms.

The pulmonary injury and reaction being so acute and often widespread, and the fact that in certain very early cases demonstrable bacteria of any kind are scarce or not found at all, make us feel, notwithstanding the demonstration of influenza bacilli in pure culture in the lung in all but one instance, that at this stage organisms are comparatively few within alveoli, and the primary injury is due to a very potent toxic agent elaborated in and disseminated through larger air passages. That there is such a toxic substance in influenza is evident from the sudden, severe general reaction from the beginning.

Primary toxic injury to the pulmonary tissue is a constant feature in the early stages of the pneumonia, and presents a fairly characteristic picture. Alveolar walls are injured, capillaries ruptured and in places necrosed; there is an exudation of all the elements of the blood, and larger or smaller areas of hemorrhage. Leucocytes are not especially prominent at this time, and many of them are of the large mononuclear variety. This primary lesion may rapidly increase in extent until an entire lobe is affected, or may remain in larger or smaller patches within several lobes. Apparently, such a focus may rapidly begin to heal by organization before any organisms in demonstrable numbers gain entrance, but as a rule, after the acute condition has persisted three or four days, we begin to find micro-organisms of various kinds in different cases, even in the same case, within the

pulmonary exudate. Influenza bacilli appear alone in certain cases. They are rapidly ingested and their further injurious effects upon the tissue is local about bronchial terminations. Small abscesses may form, in which these organisms are demonstrable in great numbers. When they are most numerous the exudate in neighboring alveoli is composed of leucocytes, with little or no fibrin.

In larger areas of inflammation, lobular or lobar in extent, the infection gradually focalizes about smaller bronchi where the bacilli persist longest. At the same time absorption of fluid, organization, and repair proceed in the intervening tissue. Associated with the localization of infection are bronchiectasis and abscess formation. In some cases bronchiectasis is extensive. An exudate of fibrin appears within alveoli in a zone about the dilated tubes, and the subsequent organization of it tends to make the change a permanent one. Healing in all the different forms of inflammation associated with the influenza bacillus alone is by organization of the exudate and fibrous induration of injured structures.

Influenza pneumonia as described by Pfeiffer corresponds fairly well to the stage of the process as we have seen it after a duration of two weeks, excepting that the injury of alveolar tissue was apparently much more extensive in our cases.

In addition to the cases from which pure cultures of the influenza bacillus were recovered, there is a large percentage in which is present an additional infection with one or more organisms, particularly pneumococci or streptococci. Multiple areas of bronchial and lobular pneumonia in which one of these types of organisms predominate are to be found. In cases complicated by a secondary pneumococcus infection one usually finds extensive areas or an entire lobe consolidated by a typical fibrino-purulent or "croupous" exudate, characteristic of the reaction to these organisms. In mixed infections with streptococci a purulent exudate with large areas of necrosis and abscess formation is the usual result.

There are also numerous lesions due to various combinations of organisms, such as multiple focal areas of broncho-pneumonia with abscesses and bronchiectasis due to a mixed infection with influenza bacilli and hemolytic streptococci.

In conclusion, influenza pneumonia as we have seen it, in cases from which only pure cultures of influenza bacilli were obtained from the lungs, consists primarily in a severe toxic injury to the lungs in areas which are peribronchial, lobular, or lobar in distribution.

In later stages, or from the beginning if the injury be slight, the infection focalizes about bronchi and their terminations, so that the bronchial and lobular distribution becomes very conspicuous. Miliary abscess and bronchiectasis are the usual accompaniment of this

phase. Finally healing and repair take place by organization and induration with extensive permanent distortions and impairment of the pulmonary tissues.

TECHNIQUE.

For microscopic study pieces of organs were fixed in Zenker's fluid and paraffin sections stained by the eosinmethlyene blue method. This stain was found fairly satisfactory for demonstrating the influenza bacillus and especially other organisms in the tissues. Much more sharply defined staining of the influenza bacilli was obtained, however, by the use of the following method which was devised for this purpose:

1. Tissues fixed thoroughly in Zenker's fluid.
2. Steam thin paraffin sections for five minutes in a few drops of the following solution poured over the section fixed to the slide:

Basic fuchsin	0.5 gram.
Carbolic acid (crystalized)	1.0 cc.
Anilin oil	0.5 cc.
Alcohol, 30 per cent	100.0 cc.

Dissolve fuchsin in the dilute alcohol and add the other reagents.

3. Wash off excess of stain rapidly in tap water.
4. Differentiate and decolorize with 40 per cent formalin, poured over section a few drops at a time until no more color is discharged.
5. Rinse in water and counterstain for one minute in a saturated aqueous solution of picric acid.
6. Dehydrate quickly in 95 per cent and absolute alcohol; xylol; balsam.

This staining method is easily applied and has in our hands given in most instances satisfactory results. In properly stained preparations the influenza baccilli are stained sharply a dark purple, almost black color, with a lemon-yellow clear background. The details of their morphology are quite distinctly brought out.[1]

REFERENCES.

Keegan, J. J. Jour. Am. Med. Assn. Sept. 28, 1918, vol. 71, p. 1051.
Mason: Influenza in Boston. Boston Med. Jour. Feb. 1890, p. 145.
Weichselbaum: Wiener klin. Wchnschr. 1892, 32.
Ribbert: Deutsche med. Wchnschr. No. 4, 1890.
Finkler: Deutsche med. Wchnschr. No. 5.
Leichtenstern: Specialle Path. w. Ther. Nothnagel, IV. Bd. I p. 83.
Pfeiffer: Leitsch. f. Hygiene w. Infections krankheitens, Bd. XIII, 3, 1893.
Beck: Handbuch d. path. mikroorganismen. Kolle w. Wassermann. 1903, p. 382.
Boggs: Bull. Johns Hopkins Hosp. 1905, 16, p. 288.
Lord: Boston Med. and Surg. Jour. 1905, cl. 11, 537.

[1] We wish to express our indebtedness for the privilege and opportunity of making this study to Captain J. N. Blackwood, Medical Corps, U. S. N.; Commander J. M. Brister, Medical Corps, U. S. N.; and Lieutenant Commander M. J. Rosenau, Medical Corps, U. S. N. R. F., director of the laboratory; and to Lieutenant J. J. Keegan, Medical Corps, U. S. N. R. F., for his bacteriological data.

A ROUTINE METHOD OF MENTAL EXAMINATIONS FOR NAVAL RECRUITS.

By L. E. Bisch, Lieutenant, Medical Corps, United States Naval Reserve Force.

The system of psychiatric examinations which forms the subject matter of this paper is that which has been devised and applied at the Naval Operating Base, Hampton Roads, Va. Considerable experimental work had to be carried on and numerous tests and schemes were devised, later rearranged or discarded, until the present plan was perfected. It is not claimed that any of the methods or procedures are infallible, but it is believed that since they have proved themselves to be a strongly suggestive and fairly dependable method at one station that possibly some of the methods at least may prove of value at other training centers.

This paper is to deal primarily with the problem of testing the raw naval recruit as to his fitness for service from mental and neurological points of view. For purposes of completeness, however, a cursory summary of the other activities of the Psychiatric Division are touched upon.

GENERAL SCHEME OF EXAMINATIONS.

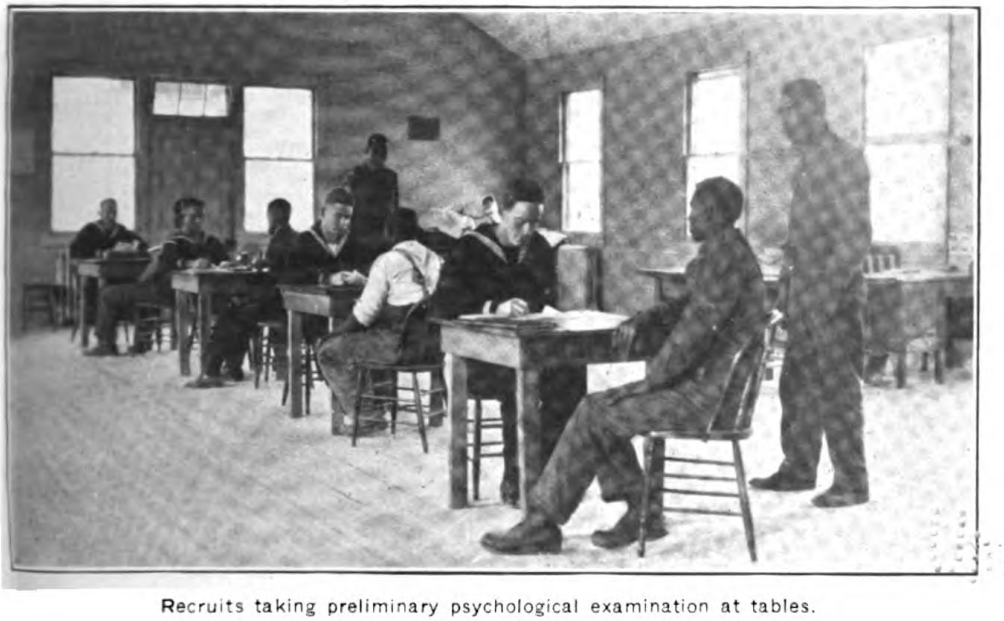
The "schema of examinations," which appears in diagrammatic form gives a general idea of the sources of supply of cases, the methods used in classifying them, and their final disposition.

The cases with which the division is concerned are classified according to sources of supply, as follows: (I) Recruits, (II) training station, (III) air station, (IV) base hospital.

On the schema referred to, these are the sources of supply for the intensive examination which is indicated by the large square marked "Intensive psychiatric examination." This examination is the major examination given by the division, and, in addition to a complete medical history, includes all detailed psychiatric and psychological procedures.

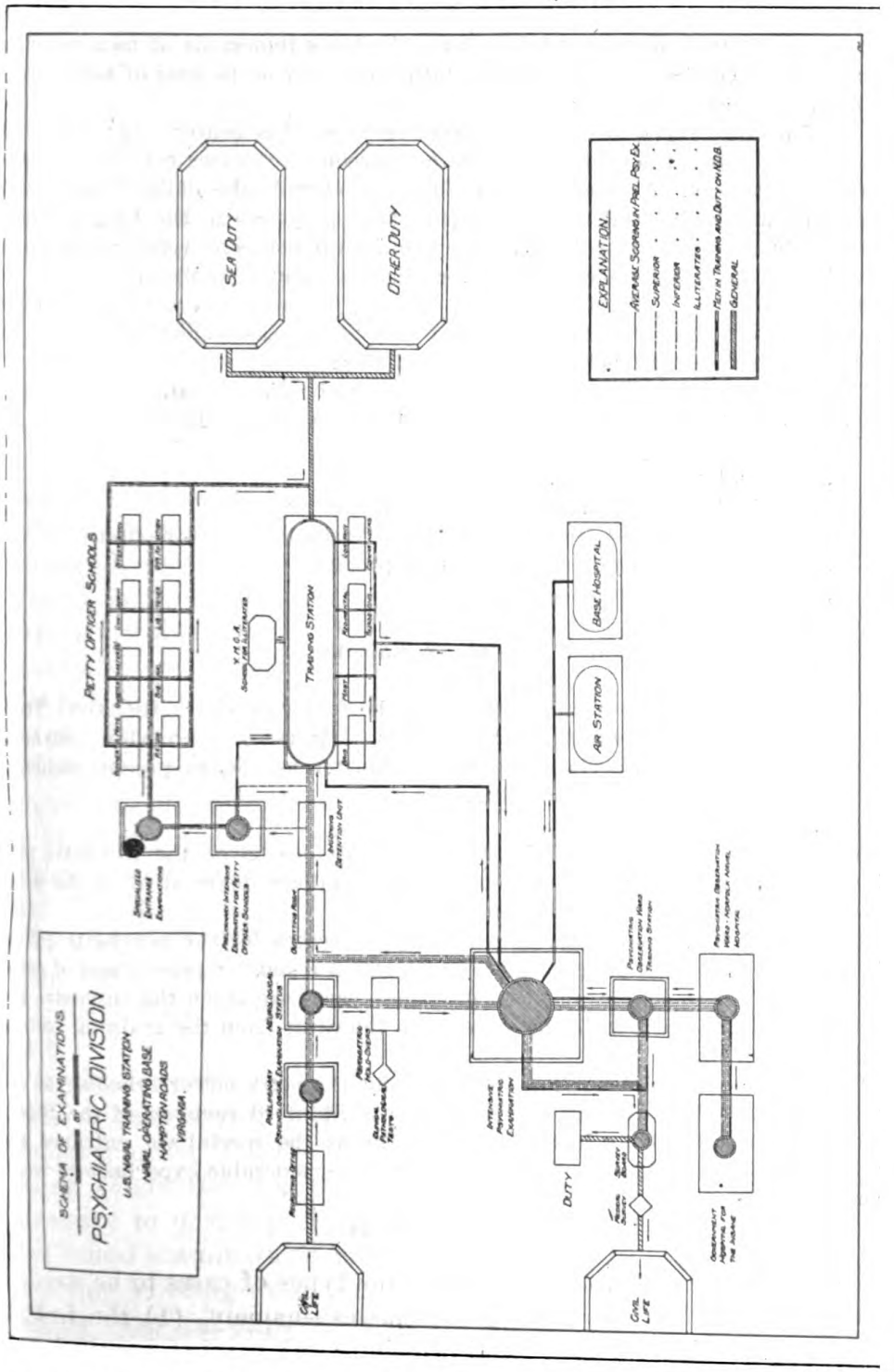
(I) The recruits with which the division is concerned at Hampton Roads may be classified into "superiors," "average," "inferiors," and "illiterates." They are classified in the detention unit at the time of their entrance into the service by the preliminary psychological examination, as is indicated on the chart. They receive in addition an examination to determine their neurological status. Then, if they are "superiors," they are regarded as petty officer material, and candidates for the specialized entrance examination to the petty officer schools; if "average" they proceed in the regular manner through the detention period into the training station; if "inferior" they are held over in the detention unit before being outfitted and are candidates for the intensive psychiatric examination mentioned above; if "illiterates" but mentally competent they are candidates for the Y. M. C. A. school for illiterates at the end of their detention period. On the chart these types of cases and procedures are indicated by characteristic dotted lines.

Strictly speaking, the division is concerned only with two types of cases—the "superior" and the "inferior." The former proceed through their detention period and are candidates for the preliminary intensive examination for the petty officer schools, as well as for the specialized entrance examination



Recruits taking preliminary psychological examination at tables.

given candidates for each school. Failure in either of these examinations re turns the man to the training station. The "inferiors" are held over as can didates for the intensive psychiatric examination in order to finally and accu



rately determine their status, and, in addition, where it is necessary, they ar given clinical pathological tests, consisting of serological and parasitical ex aminations, urinalysis, etc.

The intensive examination may result in (1) the man being returned to the detention unit to be outfitted and to proceed into the training station, (2) retention in the psychiatric observation ward for further observation and disposition, (3) medical survey.

(II) The training station furnishes another large and important supply of cases. In addition to recruits, the station includes thousands of men en route to and from the fleet who are on the station for varying periods of time—from a day to three months.

The following types of cases are received from this source: (*a*) Brig and "mast," (*b*) cases referred by regimental surgeons, (*c*) cases referred by company commanders. A member of the division attends the daily "mast," and the division examines all general court-martial prisoners in the brig to determine their mental responsibility. The regimental surgeons refer all cases to the division involving mental status for diagnosis and disposition.

A printed sheet is distributed to all company commanders with instructions that they are to report to the psychiatric division all cases showing any one or more of the following behavior characteristics:

1. Resentfulness to discipline or inability to be disciplined.
2. Unusual stupidity or awkwardness in drills or exercises.
3. Inability to transmit orders correctly.
4. Personal uncleanliness.
5. Criminal tendencies.
6. Abnormal sex practices and tendencies, including masturbation.
7. Filthy language and defacement of property.
8. Distinct feminine types.
9. "Bed wetters."
10. Subjects of continual teasing or ridicule.
11. Queer, peculiar behavior.
12. All recruits who persistently show the following characteristics: Tearfulness, irritability, seclusiveness, sulkiness, depression, shyness, timidity, antisocial attitude, overboisterousness, suspicion, dullness, sleeplessness, sleepwalking.
13. Chronic homesickness.

All cases referred from training station sources are given the intensive psychiatric examination as indicated on the chart and are disposed of in the same manner as cases in the detention unit.

(III) (IV) The two last sources of supply of cases for the psychiatric division, the air station, and the base hospital furnish a smaller percentage of cases than the other two sources mentioned. These cases are given the intensive examination and disposition is the same as in the cases from the training station and detention unit.

(As a preliminary intensive examination for the petty officer schools, the so-called 16-year-old or average adult test of the Stanford revision of the Binet-Simon test is tentatively being used. So far as the specialized entrance examinations for the various schools is concerned, considerable experimental work is underway.)

THE PROBLEM.

Roughly speaking, one may divide the types of cases to be weeded out of the service into three great classes—namely, (1) the feeble-minded, including constitutional inferiors; (2) psychoses, actual and potential; (3) functional and organic nervous diseases. In other words, the cases to be looked for comprise not only defective intel-

lectual processes existing from birth or from an early age, but also cases of disordered thinking coexistent with the mature intellect, such as the insanities and the functional types, as well as cases of organic lesions of the central nervous system.

Obviously, the matter of weeding out such unfit subjects can not be left to methods of casual observation and personal judgment. Naturally, a frank case of insanity, for example, would not require specialized methods to detect it. But the cases which present themselves at a training station are, as a rule, border-line types of all kinds and only careful and detailed examinations will bring their defects to light.

Perhaps the greatest difficulty lies in discovering the higher types of feeblemindedness, such as morons and high-grade imbeciles. These can not be identified by inspection. Many of them have a fluent command of language and possess a passable fund of general information. They talk to the examiner readily and plausibly, and tend to make a good impression. Yet, it is precisely such cases that present the greatest menace to the service.

So far as neurological and purely psychiatrical examinations were concerned, recognized and unfailing methods were already at hand. When it came to the question of testing for mental inferiority, however, the problem at once became exceedingly complex because of the multitudinous number of psychological tests already in use, the fact that but few were standardized and therefore not of proved value, and the fact that none of them by themselves seemed to constitute a satisfactory method so far as the problem of the naval recruit was concerned. It was therefore necessary either to devise new tests or to modify already existing standards. As noted above, both methods were tried and finally a system was adopted which is described further on.

In adopting the tests which were to compose the preliminary examination two factors were considered of prime importance: (1) Reliability of the tests selected; (2) time consumed in giving the tests.

It was deemed essential that recruits be examined before they had received their naval uniforms and while they were still in civilian clothes in order that the Government might be saved the cost of outfitting candidates for prospective medical survey. Hence it was necessary to devise preliminary tests whereby the routine physical and dental examinations, etc., incident to arrival of the recruit at the receiving building would not be unduly delayed by the psychological testing. On the other hand, the tests selected had to be of such a nature as to accurately identify for further examination the group with which the division was concerned.

GROUP VS. INDIVIDUAL METHODS.

The group method is the one usually employed in giving mental tests to large numbers of men. Because of lack of time it is often impossible to examine each man individually. An alternative has seemed to be that of addressing the tests to a group of men who could make the responses in writing. To this end various so-called "mass tests" have been devised and used. In this way groups of from 10 to 200 men may be treated at once. The method, however, is open to some criticism. (1) Test scores depend exclusively on the time element. We have no psychological grounds for believing that a mental process should occupy a given amount of time. (2) The group method leaves no opportunity for the adaptation by the examiner to the individualities of the subject. (3) Failure in performance of tests given by the group method, in the absence of the individual observation of that performance on the part of the examiner, is not reliable evidence that a failure was due to low mentality. (4) The group tests are of necessity dependent upon written responses, and the act of writing adds a complication which it is difficult to evaluate and separate from pure intelligence factors in scoring.

Hence it was felt that some modification of the individual method of giving tests to meet the necessity of limiting the amount of time consumed should be the method finally adopted for naval recruits.

TESTS AND METHODS ADOPTED.

The selection of tests to compose the preliminary psychological examination was governed, so far as possible, by the principle that they should not be tests dependent largely upon school knowledge, but that they should be tests involving manipulation; in other words, "performance" tests. In such tests the emphasis is placed upon manual performance rather than upon language ability. Various "form-board" tests, picture-puzzle tests, and puzzle-box tests come under this head.

In these tests an objective situation is presented to the subject by means of physical apparatus or objects in as few words as possible, and his reactions are not dependent upon language but upon performance. In such tests the mental processes of the subject are more apparent, inasmuch as his mental reactions may be observed during his performance of the tests and the examiner is not dependent upon a verbal response alone.

To this end the numerous performance tests were reviewed and selections made. Many of the tests had to be rejected because of the fact that a greater amount of time was consumed by them than could

be allowed in the detention situation. Finally the following tests were adopted:

1. Knox cube.[1]
2. Digits backwards.[2]
3. Healy "A" form board.[3]
4. Comprehensive tests (four degrees).[4]

It was necessary in every case to modify the author's method of giving the above tests. In some cases the method of scoring was not suitable to our needs, and in other cases it was necessary to change the instructions accompanying the tests. In succeeding sections a detailed discussion of the tests will be given. Acknowledgments are hereby made to the various authors for the use of their tests.

It is not likely that the four tests that have been adopted adequately or completely analyze all the mental processes, or that they present a complete view of the individual's intelligence. It is believed, however, that the essential processes are examined and that a satisfactory percentage of the imbeciles and morons are identified before they proceed into general naval service.

METHOD OF GIVING TESTS.

As has been previously stated the individual method of giving the tests was considered superior to the so-called "group" methods. The only criticism of the former method lay in the fact that a large amount of time was necessary in presentation of the tests. At first it seemed that this difficulty could not be overcome, but later the following method was devised which overcame this difficulty.

A yeoman assistant was assigned for each of the four tests to be given. These four assistants, who were called "psychological testers," were installed at separate tables. A fifth assistant who sat at the first table took the recruit's name and rate on the "Preliminary psychological examination" sheet (Form II) and also made out a card (Form I) which contained a brief history of the recruit's education, occupation, diseases, and institutional history. The recruit then carried the preliminary test sheet and card in his hands and progressed from table to table, receiving one of the tests at each table. Each tester scored the performance of his particular test and the last tester totaled the individual scores and from the total score determined whether or not the man should be held over for an inten-

[1] Knox, Howard: A Scale for Estimating Mental Defect. Jour. Am. Med. Assn., March 9, 1914, p. 741; Journal of Heredity, March, 1914, p. 122.

[2] Terman, Lewis M.: The Measurement of Intelligence, p. 207, ff.

[3] Healy, William A., and Fernald, Grace M.: Tests for Practical Mental Classification. Psychological Monograph No. 54, March, 1911. Psychological Review Publishing Co., Princeton University.

[4] Terman, Lewis M.: The Measurement of Intelligence, pp. 157, 181, 216, 268.

sive examination. (A discussion of the scores and the method of arriving at them will be taken up in a later section.)

FORM I.

No._____
Name _____Rate _____Date _____
Birthplace _____Race _____Married _____Children, m____ f____
Education: No. yrs___ City_____ Country_____ Grade___ Prep.____ Col.___
Occupation _____Avg. weekly wage_____
Disease history_____ Venereal_____
Institution record_____Alc. and Dr._____
Physical defects_____Stigmata _____
Neurological defects_____Amentia _____
Inferiority _____Crass ignorance_____Illiteracy_____
Psychopathy _____Psychiatry _____
Family history _____
_____ _____
Summary _____
Disposition _____

FORM I.

(Reverse side.)

Special abilities_____
Date of birth_____ Chronological age_____

SCORE	TEST	DATE	EXR.	SUMMARY	
				Years	Months
	Preliminary test			3	
				4	
MA IQ	Stanford revision			5	
				6	
MA MC	Binet-Simon			7	
				8	
				9	
Special tests:				10	
				12	
				14	
				16	
Reactions during examination:				18	
				Total:	

Comments:

On the back of the "Preliminary test sheet" (Form II, reverse side) which the recruit carried with him are listed a number of "character descriptives." Each tester checked one or more of these characteristics, basing his judgment on the recruit's performance of the particular test. The tests were so timed that the instruction for and the performance of any test did not take more than three minutes. It was thus possible to complete the testing of a recruit every three minutes, and at the same time give each recruit an individual test.

FORM II.

PSYCHIATRIC DIVISION.

No. .....

Preliminary examination.

Detention Unit.

Inf.....
Sup.....

Name..... Rate..... Date.....

1. Knox cube:

(a) 1234..... (e) 13243.....
(b) 1324..... (g) 13124.....
(d) 1423..... (h) 143124.....

Comment.....

.....

Score:

2. Numbers (backwards):

(3)	(5)	9182736453
(3)	(5)	7353281964
(4)	(6)	3915846273
(4)	(6)	4691823574
		3546372819

Score:

Comment.....

3. Healey "A":

	Time.	No. of moves.	No of false moves reported.
First trial:			
Second trial:			

Planfulness.....

Learning capacity.....

Score:

4. Comprehension:

First degree (sleepy).....
Second degree (fire).....
Third degree (unintentional injury).....
Fourth degree (actions v. words).....

Score:

Held over.....
Binet.....
Disposition.....

Total score:

FORM II.

(Reverse side.)

REACTIONS DURING PRELIMINARY EXAMINATIONS.

+	−		+	−		+		+	
		Composed			Childish		Irritable		Restive
		Willing			Oafish		Resentful		Nervous
		Cooperative			Stolid		Resistive		Variable
		Interested			Timid		Defiant		Suggestable
		Attentive			Bashful		Sulky		Distracted
		Cheerful			Sensitive		Shut-in		Anxious
		Stable			Reserved		Moody		Afraid
		Careful			Modest		Depressed		Fearful
		Deliberate			Frank		Despondent		Tearful
		Assured			Jovial		Effeminate		Nostalgia
		Apt			Suspicious				
		Energetic			Forward		Untidy		Uncleanly
		Rapid			Overconfident		Self-conscious		
		Systematic			Conceited		Self-depreciative		
		Thorough			Scornful		Sympathy-seeking		
		Efficient			Boastful		Abnormalities		
		Intelligent			Boisterous				
		Profound			Euphoric				
		Confidence gained quickly					Plea of unfamiliarity		

Special comments .....

.....

.....

FORM III.

PSYCHIATRIC DIVISION.

Detention Unit.

Neurological status.

Name _____Rate_____Age_____
Examiner_____Date_____, 191__

Syphilis_____ Chancroids_____
Gonorrhea_____ Enuresis, D–N_____
Alocohol_____ Drug addition_____
Convulsions_____ Fainting or dizziness_____
Sensory disturbances_____ Subjective symptoms_____
Institution history_____
Neurotic history_____
Test words: Slurring_____, Ataxia_____, Transposition_____, Elision_____
Speech defect: Stuttering_____, Lisping_____, Faulty articulation_____
Paralysis_____, Atrophy_____, Asymmetry_____, Spasms_____
Pupils: Right__, Left__; Irregular__, Unequal__, Reaction to light sluggish__
Absent_____,
Nystagmus_____ Strabismus_____
Hyperthyroidism: Enlarged thyroid___ Persistent tachycardia_____
Exophthalmos_____ General nervousness_____
Tremor: Coarse_____, Fine_____, Face_____, Tongue_____
Hands_____, Muscles_____, Intention_____
Patellar reflexes: Right_____, Left_____, Normal_____, Absent_____
Diminished_____, Exaggerated_____
Babinski_____ Clonus_____
Romberg_____ Gait_____
"Stigmata of degeneracy"_____
_____
Wassermann: (1st) Date_____, Result_____(2d) Date_____, Result_____
Disposition_____
_____

The advantages of this method are: (1) Each recruit received an individual examination from each of the four men; (2) the total score represents the judgment of four different examiners and is likely to be free from individual bias; (3) while each recruit receives a personal examination, lasting some 15 minutes, it is possible to complete an examination every three minutes; (4) the fact that the recruit moves from table to table and is compelled to face a new situation each time is in itself a test of intelligence; (5) the scoring is complete at the end of the examination, and it is not necessary to score large numbers of examination sheets, as would be the case if the "group" methods of giving the tests were used.

NEUROLOGICAL STATUS.

After the recruit has taken the preliminary psychological tests, he passes into another room, where a neurologist examines him for any neurological signs or symptoms of organic disease. These are noted down on Form III.

It may be noted that in case the patient showed signs of syphilis of the nervous system, which was later verified by positive Wassermann findings, the man was immediately brought before a board of medical survey without any further procedures being carried out in his case. Where the man gave a history of venereal infection his name was sent to the genito-urinary department, where laboratory tests were performed and the man later given treatment if necessary.

DESCRIPTION OF TESTS.

(I) THE KNOX CUBE TEST.

Apparatus.—The apparatus[1] for this test consists of a strip of wood, about 22 inches long by 1¾ inches wide, divided into four equal sections. The sections are painted red, blue, green, and yellow, respectively. In the center of each section is placed a cube about three-quarters of an inch square of the corresponding color. In addition there is a detached cube about one-half inch square painted black.

Object of test.—The colored cubes are tapped in certain sequences by the detached black cube in view of the subject, and it is the purpose of the test to have the subject tap them in exactly the same order. No language is involved other than brief preliminary instructions. The test involves the psychological capacities of attention, ability to carry out instructions, and visual memory. The sequences are arranged in ascending grades of difficulty. The following sequences were used: 1—2—3—4, 1—3—2—4, 1—4—2—3, 1—3—2—4—3, 1—3—1—2—4, 1—4—3—1—2—4.

Instructions to subject.—The cubes are placed before the subject and are tapped in the order given, beginning with the red section. The only instructions given the subject are as follows: "I am going to tap these cubes in a certain order with this block I have in my hand. Watch me carefully, and when I get through I want you to tap the blocks in exactly the same order in which I do."

The numbers on the preliminary test sheet represent the successive colored sections of the wooden strip, No. 1 being red, No. 2 being blue, No. 3 being green, No. 4 being yellow. The blocks were only

[1] The material for this test and the other tests described in this paper may be obtained from the C. H. Stoelting Co., 3037–3047 Carroll Ave., Chicago, Ill.

tapped once by the examiner for each trial. If the subject did not seem to understand he was cautioned as follows: "Now watch me carefully and tap them just as I do." The blocks were tapped in exactly even intervals of time, i. e., there was absolutely no rhythm. The blocks were tapped at the rate of one per second.

(II) DIGITS BACKWARD.

No apparatus is necessary for this test other than the block of numbers printed on the preliminary examination sheet. These numbers are printed for the purpose of serving as a guide for the examiner in order that he may thus avoid using the same set of numbers twice.

Object of test.—The digits are pronounced to the subject, and he is required to say them to the examiner in the reverse order. Two sets of three digits each, two sets of four digits each, two sets of five digits each, and two sets of six digits each are read. Any group of digits may be given provided there are no sequences either in descending or ascending order. It is essential that the examiner read the digits with absolutely no rhythm and at the rate of about one per second. This test involves: (1) Ability to carry out instructions, (2) auditory memory, (3) manipulation of imagery, (4) attention.

The heaviest demand is made upon the capacity of attention. The digits must be retained in consciousness by means of mental imagery. Terman[1] emphasizes the dependence of the test on the manipulation of imagery. In the Stanford revision of the Binet-Simon tests Terman places the digits-backward test as follows: Three digits reversed as an alternative test in year VII, four digits reversed in year IX, five digits reversed in year XII, six digits reversed in year XVI (average adult), seven digits reversed in year XVIII (superior adult). The criterion of success in the Stanford revision is the correct performance of one group of digits out of three for each mental level.

Instructions to subject.—The following instructions are given the subject for this test: "I am going to say some numbers, and when I get through I want you to say them backward; that is, I want you to say them in the opposite order to which I give them. For instance, if I should say 8—1, I would want you to say 1—8. Do you understand? Now listen carefully and say them *backward*."

It is permissible, in case the subject does not understand, to repeat the instructions, emphasizing that the numbers are to be given *backward*. Not more than one repetition is allowed.

[1] Cf. Terman, pp. 208–209.

(III) HEALY "A" FORM BOARD.

Apparatus.—This test was standardized by Healy,[1] and the apparatus consists of a square wooden frame, in which are fitted evenly five wooden blocks.

Object of test.—The empty frame and blocks are placed before the subject and he is instructed to put them into the frame evenly in the shortest possible time. This is the only test of the four in which the time element is important. If the blocks are not fitted in correctly at the end of one minute, they are correctly placed by the examiner in full view of the subject, removed from the frame by the examiner, and the subject is required to replace them correctly within 20 seconds. In case the blocks are placed correctly the first time before the end of one minute, the time is taken by stop-watch and noted on the preliminary test sheet. In all cases a second trial is given in which the maximum time allowed is 20 seconds. The method outlined here is a modification of the method used by Healy. The test was devised by Prof. Freeman, and adapted and standardized by Healy and Fernald, Kuhlmann, and Miss Gertrude Hall. Terman[2] places it as an alternative test in year X in the Stanford revision of the Binet-Simon intelligence test.

The method used by the subject in the performance of the test is important and should be noted by the examiner on the preliminary test sheet. The examiner should look for the repetition of absurd mistakes, and note whether the subject profits by experience. The test is especially valuable, inasmuch as language ability is not essential. Psychologically, the test involves ability to profit by error and mechanical ingenuity.

Instructions to subject.—When the empty frame and blocks are placed before the subject, the following instructions are given: "These blocks fit into this frame without any space left over—they fit in evenly. I want you to fit them into the frame just as quickly as you can. Go ahead."

It is permissible to repeat the instructions once. The stop-watch is started at the signal "Go ahead." At the end of 1 minute, if the blocks are not correctly placed, the examiner should place them correctly and expose the completed board to the subject. The examiner should then empty the frame and say: "Now, try it again." On the second trial the blocks should be placed within 20 seconds.

(IV) COMPREHENSION.

No apparatus is necessary for this test. The following "degrees" were selected from the comprehension tests used by Terman in the Stanford revision of the Binet-Simon tests: First degree (Stanford

[1] Cf. footnote, p. 203. [2] Cf. Terman, p. 280

revision, year IV), "What must you do when you are sleepy?" Second degree (Stanford revision, year VI), "What's the thing to do when you find that your house is on fire?" Third degree (Stanford revision, year VIII), "What's the thing to do if a man hits you without meaning to do it?" Fourth degree (Stanford revision, year X), "Why should we judge a person more by his actions than by his words?"[1]

Object of test.—Any normal reaction to the situation described in the questions is scored plus. Bizarre and irrelevant responses should be noted, and are scored minus. Responses to the first question should embody the idea of going to sleep, going to bed, etc. Responses to the second question should suggest measures of extinguishing a fire or escaping from it. Responses to the third question should suggest the idea of overlooking the unintentional injury. If in responding to this question the subject indicates a desire to retaliate or demand an apology, the response is scored minus. Responses to the fourth question are satisfactory if it is indicated that deeds are more reliable than words, i. e., a man may conceal his true intent by words.

At best, these questions only feebly reproduce true situations, and it is possible if the situation described were actual, that the subject might react normally. In connection with these tests, Terman[2] points out that it is likely that it requires a higher degree of intelligence to tell what one would do in a given situation than to act in an actual situation.

Instructions to subject.—No other instructions than the questions themselves as indicated above are given. In case the subject does not understand the instructions, it is permissible to repeat them once.

SCORING AND NORMS.

Necessity for scores.—A detailed description of four tests and the method of using them has been outlined. To make effective use of these tests it was necessary to adopt some system of scoring. The tests were in the hands of examiners with but a small amount of phychological training, who, on a basis of mere success or failure in a given test, could not with accuracy determine whether a recruit was a candidate for the intensive examination. The adoption of a method of numerically weighing the various tests composing the preliminary psychological examination makes it possible to arrive at a total score, also a numerical value, which has a defienite statistical meaning. On the basis of experimental norms, this total score may come to be the basis of a rough preliminary estimate of the

[1] Cf. Terman, pp. 157 ff, 181 ff, 215 ff, 268 ff. [2] Cf. Terman, p. 159.

recruit's mental fitness for the service, and hence the basis for determining whether or not the recruit is a candidate for the intensive examination, the latter to establish exactly his mental status. Such a score also would be a part of the "clinical picture" if the recruit were retained for further examination or a part of his psychiatric record for the purpose of future reference. This is exactly the purpose of our preliminary psychological examination. The scores adopted were, to a certain extent, arbitrary, and the total score comes to have meaning as an increasing amount of data is accumulated. To finally establish such a total score it would be necessary to correlate it with other intelligence scales, school grades, etc. Certain of these procedures have already been followed out, and it will be the purpose of the following sections to describe them. It is desirable, however, that further data be obtained in order to conclusively establish the scores, and later on more complete data may make a revision necessary. The exigencies of the situation in the detention unit at Hampton Roads demanded a system of scoring for immediate use. It is the purpose of this paper to describe this system.

SCORES EXPERIMENTALLY ADOPTED.

The first step in the adoption of scores was an inspection of a record of the successes and failures on each of the four tests. These were merely records of raw performance to which no numerical weight had been given.

(I) The Knox cube test. In this test there are seven possibilities of performance: (1) Complete failure in all sequences, (2) successful performance in one sequence, (3) successful performance of two sequences, (4) of three, (5) of four, (6) of five, (7) of six sequences. The following table summarizes the performance by sequences in a thousand cases:[1]

TABLE 1 (*a*).—*Performance of Knox cube test, tabulated with reference to success by sequence.*

Successful performances ending with—						
Complete failure.	First sequence.	Second sequence.	Third sequence.	Fourth sequence.	Fifth sequence.	Sixth sequence.
4	38	152	325	298	160	23

The above table indicates that the first three sequences were performed successfully by more than 50 per cent of the entire number

[1] The thousand cases from which the data for this table and the following tables was obtained are unselected, i. e., beginning at a certain date all cases were used in the order of the appearance at the detention unit of recruits until a thousand had been obtained.

of cases. Only 38 cases out of a thousand were unable to progress further than the first sequence, 152 failed after the second sequence, and only 23 were unable to perform all six sequences.

TABLE 1 (*b*).—*Performance of Knox cube test, tabulated with reference to total successes.*

Total successes by sequences.					
First sequence.	Second sequence.	Third sequence.	Fourth sequence.	Fifth sequence.	Sixth sequence.
996	958	806	481	183	23

Table 1 (*b*) states positively what the previous table stated negatively. It will be noted that the greatest discrepancy occurs between the third and fourth sequences. Reference to the description of the Knox cube test will indicate the reason for this. The first three sequences, while of increasing complexity, only involve four blocks. The fourth sequence involves five blocks.

A score of four was experimentally adopted for each of the six sequences. If the subject performed the first sequence, he was given a score of 4; if he performed the first two sequences, he was given a score of 8; a successful performance of all six sequences scored the subject 24 for the test. Inasmuch as more than 50 per cent of the cases were able to successfully perform the first three sequences, we may call the successful performance of the first three sequences an average performance. On this basis, then, we may say a score of 12 should be expected from the average in our group.

(II) Digits backwards: In this test there are eight possibilities of performance: (1) Two sets of three digits each, (2) two sets of four digits each, (3) two sets of five digits each, (4) two sets of six digits each.

The following table summarizes the performance by group of digits in 580 unselected cases. (Owing to the fact that the method of giving this test was slightly altered for experimental purposes, only 580 cases could be used under the method described in the present paper.)

TABLE 2 (*a*).—*Performance of the digits-backwards test tabulated with reference to success by digit groups.*

Successful performances ending with—								
Complete failure.	Three digits.	Three digits.	Four digits.	Four digits.	Five digits.	Five digits.	Six digits.	Six digits.
4	24	108	113	153	95	47	25	11

It will be noted that a performance through and including the second group of four digits includes more than 50 per cent of our cases. The following table will emphasize this fact:

TABLE 2 (*b*).—*Performance of digits-backwards test tabulated with reference to total successes.*

Total successes by digit groups.							
Three digits.	Three digits.	Four digits.	Four digits.	Five digits.	Five digits.	Six digits.	Six digits.
576	552	444	331	178	83	36	11

It would seem that the successful performance for each *pair* would be approximately the same—that is, the same group of individuals should be able to do the second group of three digits backward as were able to do the first group of three digits backward. This, however, is not the case, and is very likely due to various factors, such as inattention, failure to hear the digits as pronounced by the examiner, fatigue, etc. From the above table we may say that the average individual of our group should be able to give four digits backward twice in succession. A score of three from each group of digits correctly given backward was experimentally adopted for this test. If all the groups were successfully given backward the perfect score for this test would be 24.

(III) Healy "A" form board: According to our method of giving the test these are six possibilities of performance which are outlined in the following table:

TABLE 3 (*a*).—*Healy "A" performance possibilities.*

Possibilities.	First trial.	Second trial.
1	35 seconds or less	20 seconds or less.
2	Between 35 seconds and 1 minute	Do.
3	Shown after 1 minute	Do.
4	35 seconds or less	Over 20 seconds.
5	Between 35 seconds and 1 minute	Do.
6	Shown after 1 minute	Do.

According to our standard for this test as given in the description of it on page 210, possibility 1 would be a complete success and possibility 6 would be a complete failure. Failures on the first trial are indicated in possibilities 3 and 6; possibilities 4, 5, and 6 indicate failures on second trial. On the basis of other experimental data it was found that out of 1,000 cases only 225 were unable to place the blocks correctly before the end of one minute at the first trial. This, then, may be considered a normal performance of the test on

the first trial. The following weights were given the various possibilities of this test:

TABLE 3 (*b*).—*Healy "A" score possibilities.*

Possibilities.	First trial.	Second trial.	Total score.
1.....	35 seconds or less (score 15)....	20 seconds or less (score +5)...	20
2.....	Between 35 seconds and 1 minute (score 10).	20 seconds or less (score +5)...	15
3.....	Shown after 1 minute (score 0).	20 seconds or less (score +5)...	5
4.....	35 seconds or less (score 15)....	Over 20 seconds (score −5)....	10
5.....	Between 35 seconds and 1 minute (score 10).	Over 20 seconds (score −5)....	5
6.....	Shown after 1 minute (score 0).	Over 20 seconds (score 0).....	0

It will be noted from the above table that the subject is penalized five points for failure to perform the test within 20 seconds or less on the second trial. It is possible that this scoring may be criticized because of the fact that more weight is not given to the failure or success of the second performance. The two factors in the test, the ability to profit by experience, which is shown by the failure or success of the second trial, and the factor of ingenuity and planfulness, as shown by the performance on the first trial, have unequal weight in our scoring. It was felt that the performance of the first trial should have the greater weight, inasmuch as the essential reactions are found in it.

The distribution of the 1,000 cases, according to the above method of scoring, is as follows:

TABLE 3 (*c*).—*Scores of 1,000 cases of Healy "A" form board.*

Scores.				
Zero.	Five.	Ten.	Fifteen.	Twenty.
64	191	55	140	550

(IV) Comprehension test: The standards of success and failure in the responses to the questions in this test have been outlined in the section in which the test was described. The following tabulates the raw performances on the test:

TABLE 4 (*a*).—*Performance on comprehension test tabulated with reference to successes by "degrees."*

Performances ending with—				
Complete failure.	First degree.	Second degree.	Third degree.	Fourth degree.
1	4	71	635	289

It will be noted from the above table that complete failure on this test is an exceedingly rare performance. The greater number are able to give correct responses up to and including the third question, when there is a sharp decline and only 289 were able to complete the four questions entirely. These facts are more clearly shown by the following table compiled from the same data as the preceding table:

TABLE 4 (*b*).—*Number of successes.*

First degree.	Second degree.	Third degree.	Fourth degree.
999	995	924	289

Because of the language involved and because of its rather artificial nature this test was given the least weight of the four tests. A score of 4 was given for a correct response to each of the four questions—that is, the subject was scored 4 if the first response was correct, 8 if the first and second were correct, 12 if the first, second, and third were correct, and 16 for the correct response to all four of the questions.

(V) Summary: Summarizing the total score for each of the four tests we have the following:

TABLE 5 (*a*).—*Test scores.*

Test:	Total score.
Knox cube	24
Digits backwards	24
Healy "A"	20
Comprehension	16
Perfect score	84

The perfect score of 84 to have meaning must be evaluated on the basis of the distribution by scores of a large group of cases. It will be the purpose of the following section to discuss such distributions.

(VI) Total scores: One thousand unselected cases[1] scored by the method just outlined distribute themselves as follows:

[1] The cases composing this thousand and the cases composing the thousand in Table 6 (*b*) are from the detention unit and are the total scores of 2,000 recruits taken in the order of their appearance during the months August, September, and October, 1918.

TABLE 6 (*a*).—*Distribution of the first thousand cases by scores.*

Number of men.	Score.	Number of men.	Score.	Number of men.	Score.
1	8	12	40	6	57
1	12	38	41	10	58
6	20	14	42	19	59
1	22	9	43	113	60
9	24	40	44	3	61
3	25	19	45	7	62
12	28	10	46	4	63
12	29	25	47	73	64
1	30	43	48	5	66
1	31	14	49	3	67
23	32	13	50	46	68
22	33	19	51	5	70
5	34	98	52	2	71
3	35	12	53	15	72
17	36	5	54	1	75
31	37	24	55	10	76
11	38	115	56	3	80
6	39				

Mean=51.41.[1]

A second thousand cases from the same source distribute themselves as follows:

TABLE 6 (*b*).—*Distribution of the second thousand cases by scores.*

Number of men.	Score.	Number of men.	Score.	Number of men.	Score.
1	16	15	41	13	61
1	18	10	42	11	62
1	20	13	43	32	63
1	21	21	44	67	64
2	23	31	45	12	65
5	24	26	46	12	66
1	26	23	47	17	67
2	28	33	48	40	68
7	29	44	49	7	69
12	30	23	50	8	70
7	31	25	51	6	71
10	32	44	52	18	72
15	33	26	53	9	73
5	34	19	54	6	74
12	35	18	55	1	75
13	36	60	56	12	76
19	37	32	57	1	77
16	38	20	58	12	80
6	39	27	59	3	84
8	40	63	60		

Mean=53.137.

[1] Whipple, G. M.: Manual of Mental and Physical Tests, Warwick & York, 1914, Part 1, p. 21 ff.

The above distribution is represented graphically in charts "A," "F," "G." An inspection of the tables and charts reveals the fact that the upper limits of the curve are somewhat heavier than the lower limits, indicating that the greater number of cases fall above the mean. In general the distribution is a typical curve of error. The mode and the mean very nearly coincide.

Charts "C," "E" indicate that our lower limit of normality lies between 30 and 40 and the upper limit between 50 and 60. Our exact limits of normality, i. e., the limits within which lie more than 50 per cent of all the cases, are between 34 and 68. These are broad limits. The more exact limits may be placed at a score of 51 and 68. Between scores 34 and 51 undoubtedly are included some low-grade cases, but they do not present a sufficient degree of defectiveness to be held over for an intensive examination.

LOWER LIMIT OF NORMALITY.

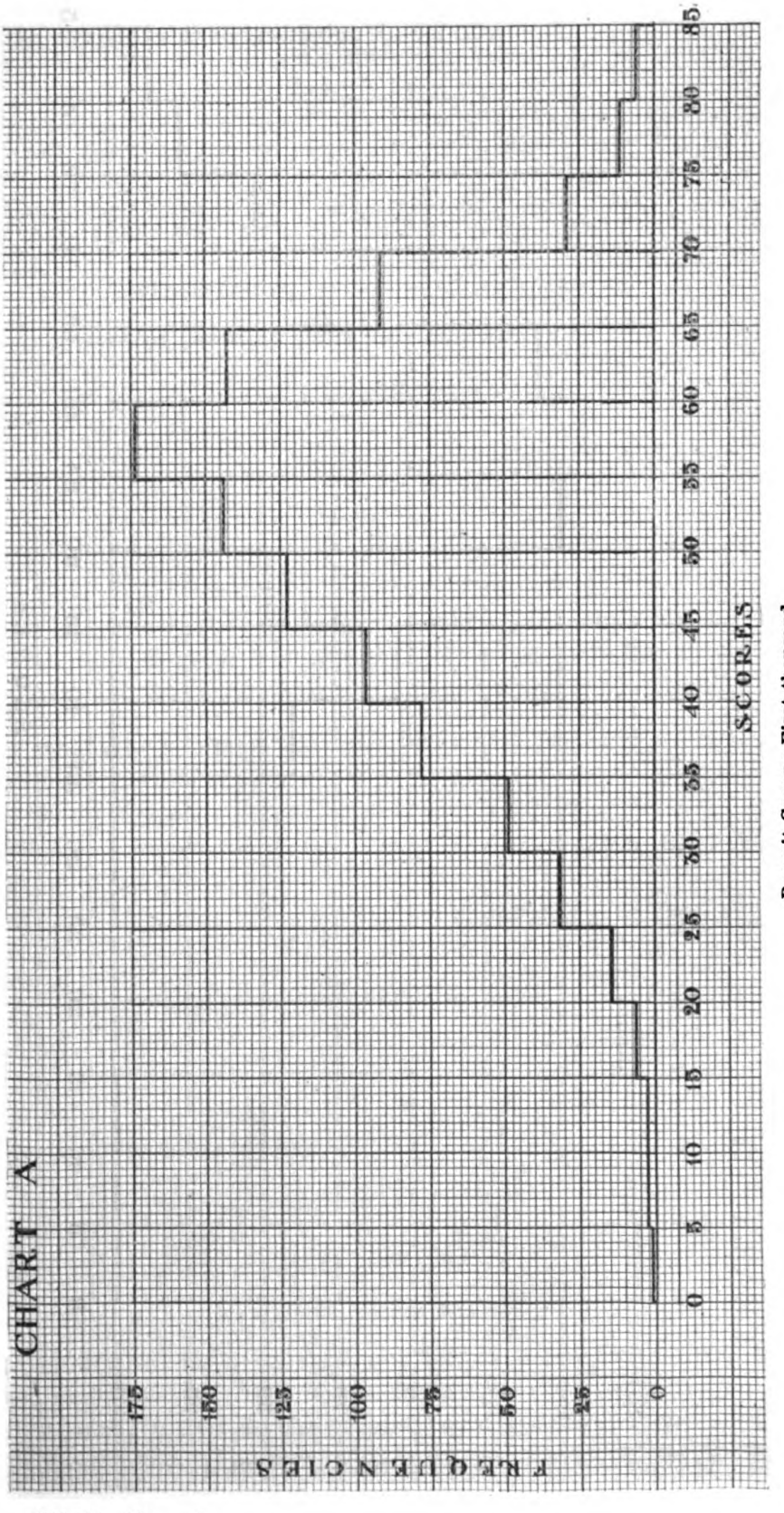
It was necessary to find the score in our scale below which a recruit could not fall without being retained for the intensive examination. This point is, of course, an arbitrary one. The limit which it defined must be placed high enough to include all cases of suspected mentality, but not so high as to include too large a number of men. The men which it was the purpose of the examinations to eliminate from the service were only those that deviate to a marked degree below normal. A score of 30 or below was adopted as the score below which a recruit could not fall without being held over for further examination.

This limit has proved satisfactory. The thousand cases represented in the distribution in Table 6 (*b*) indicate that 21 cases received a score of below 30.

These cases were intensively examined with the following results:

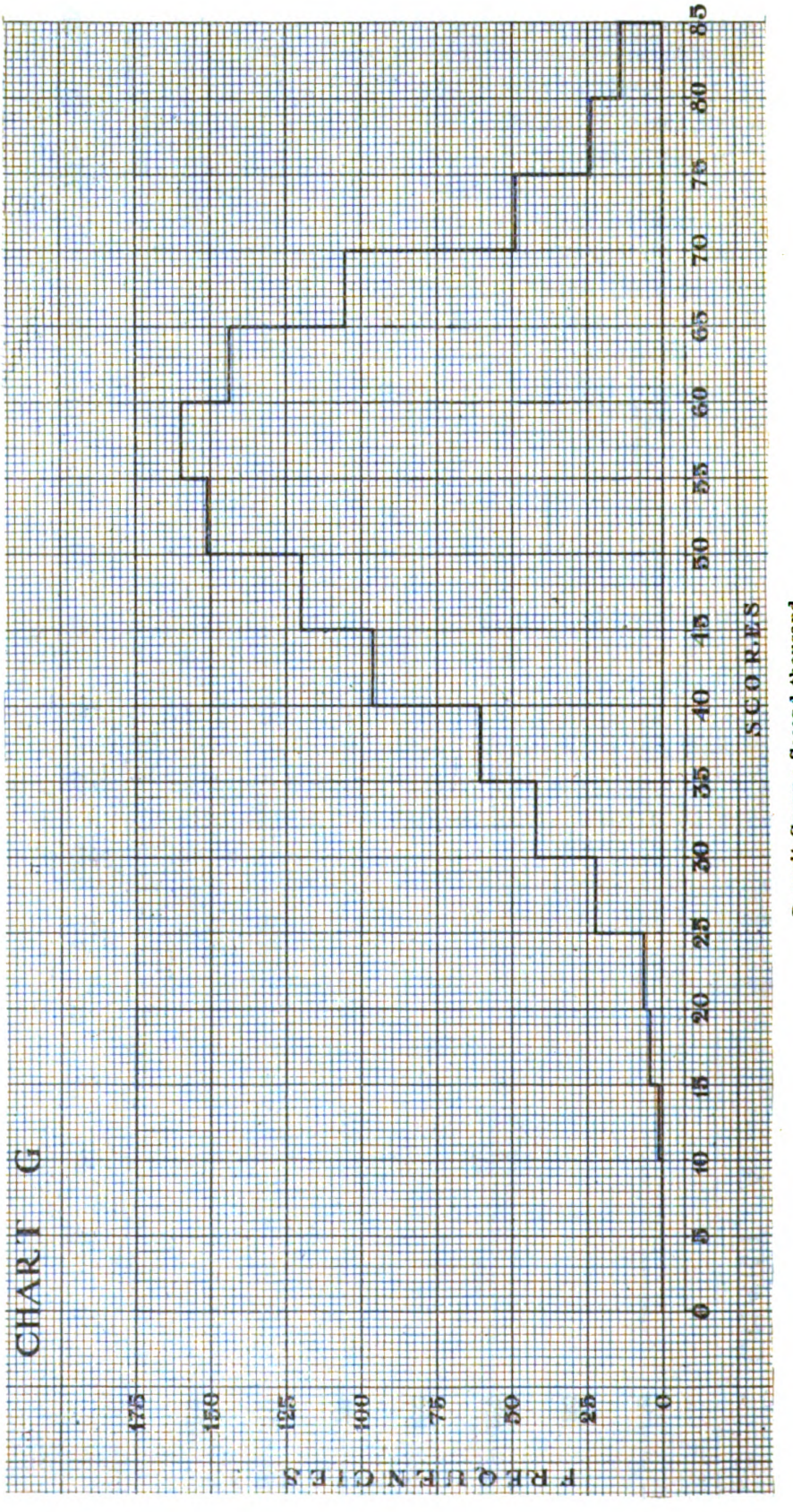
TABLE 7 (*a*).—*Cases surveyed in first thousand cases.*

Number surveyed from service.	Number returned to duty.	Number given Stanford revision of the Binet-Simon test.
9	12	11



Recruit Group: First thousand.

103396—19——4



The intelligence quotient and mental age values in the 11 cases given the Stanford revision range as follows:

TABLE 7 (*b*).

	Case 1.	Case 2.	Case 3.	Case 4.	Case 5.	Case 6.	Case 7.	Case 8.	Case 9.	Case 10.	Case 11.
I. Q.[1]..	42	55	53	56	48	51	59	57	81.5	58	52
M. A.[2].	6–9	8–10	8–6	7–9	7–9	8–2	9–5	9–1	13–10.5	9–7	8–4

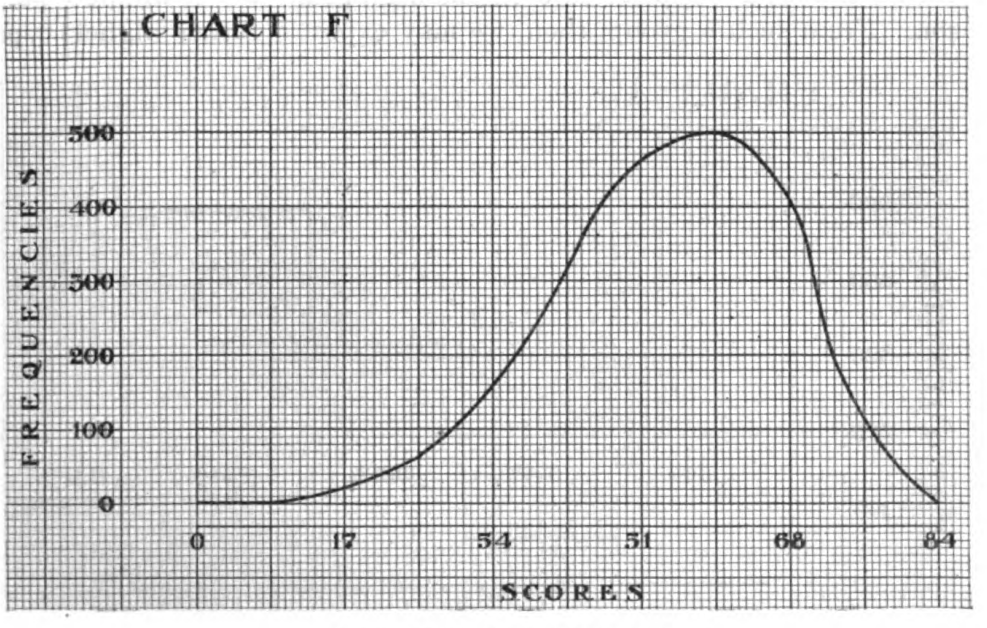
[1] Intelligence quotient. [2] Mental age.

The diagnoses of the nine surveyed cases are:

TABLE 7 (*c*).—*Diagnoses.*

Imbecility.	Constitutional inferiority.	Constitutional psychopathic state.
5	3	1

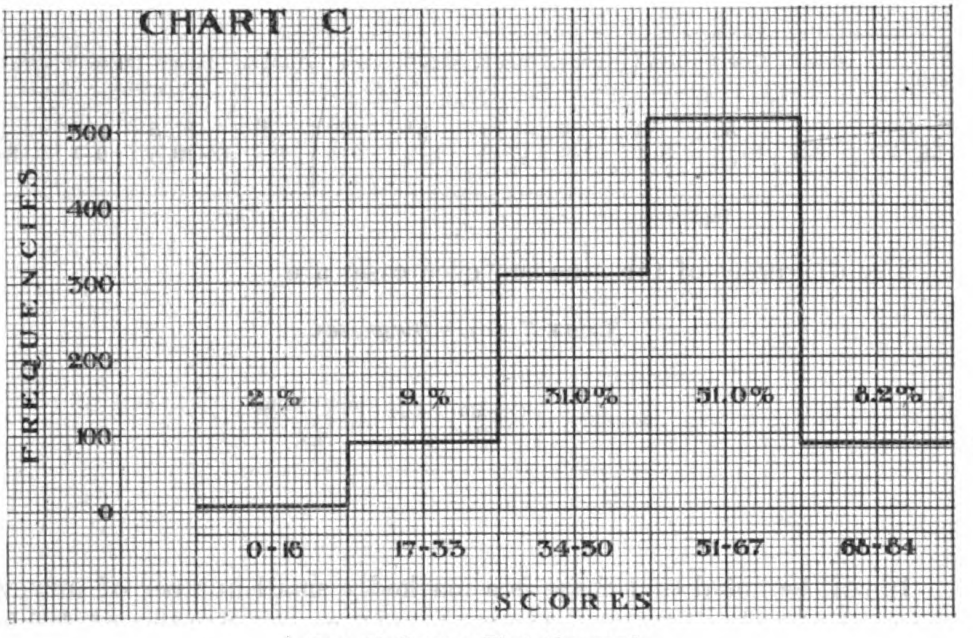
It will be noted that there is a markedly small number of surveys because of imbecility in a group of 1,000 cases. Studies of feeble-mindedness that have been made from time to time by psychiatrists



Recruit Group: Second thousand.

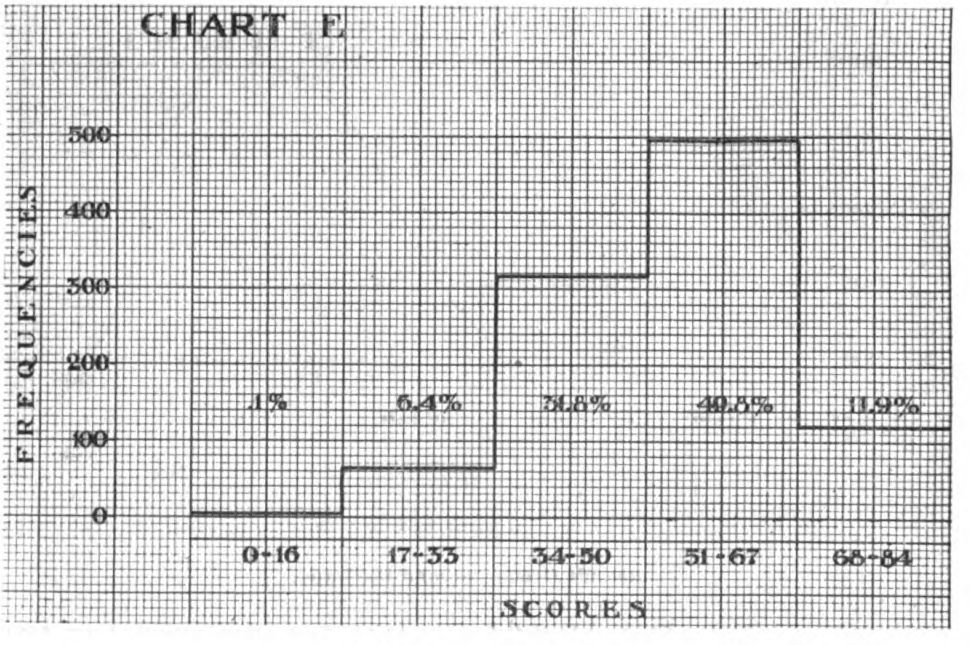
and psychologists have brought out larger percentages than were obtained in our study. This is due, in part, to the type that compose our group, and, in part, to the peculiar service situation under which surveys were made. The men who volunteer for naval service have

indicated a higher mental status by the fact that they have taken the initiative themselves. The act of volunteering has indicated an inherent planfulness, an interest in their own affairs and in the



Recruit Group: First thousand.

future that is not typical of even the high-grade feeble-minded person. From such a group, then, we may expect a rather higher type



Recruit Group: Second thousand.

of individual than is usually found in unselected groups of this size. Again, the small percentage of feeble-minded in our group may be

explained because of the service conditions under which surveys had to be made. At the time the scores were made on the group described the war situation was such that it was necessary to conserve the man-power to the greatest extent possible consistent with an efficient fighting force in the Navy. Some very high-grade cases were therefore retained and given a type of duty commensurate with their intelligence.

THE ARMED GUARD GROUP.

At the St. Helena Training Station, where the tests were given to the armed guard, a thousand unselected cases were tabulated. We should expect in this group a rather higher intelligence level than in the recruit group. These men had already stood the test of service adjustments. The mentally unfit had been weeded out by the stress and strain of naval life. In addition, they were a specially selected group for a special service.

Our scores from this group bear out these facts. The following table will indicate that the greater number of performances fall on the higher scores.

TABLE 8 (*a*).—*One thousand cases, armed-guard group.*

Number of men.	Score.	Number of men.	Score.	Number of men.	Score.
1	17	15	45	12	63
1	20	4	46	102	64
2	24	9	47	1	65
1	25	22	48	1	66
1	28	28	49	11	67
2	30	10	50	110	68
4	32	15	51	2	70
6	33	62	52	7	71
7	34	18	53	74	72
9	36	7	54	2	74
16	37	19	55	1	75
4	38	96	56	45	76
5	39	13	57	1	77
17	40	2	58	2	78
17	41	22	59	21	80
8	42	107	60	11	84
8	43	8	61		
22	44	8	62		

Mean=58.71.

The mean in this group is markedly higher than in the previous groups. The general tendency of the scores to overweight the upper end of the scale may be due in part to the peculiar conditions under which the tests were given. The men in this group were examined by companies and the examinations extended over a period of weeks. This made it possible for coaching to be a factor in the scores. A man would have the opportunity to tell his mates about the tests and there is no doubt but what they were much discussed by the men of this group during the time the tests were being given. With our recruit group this is not possible, as the men are brought in from

civil life and have no opportunity of discussing any of the examinations previous to the time they take the tests.

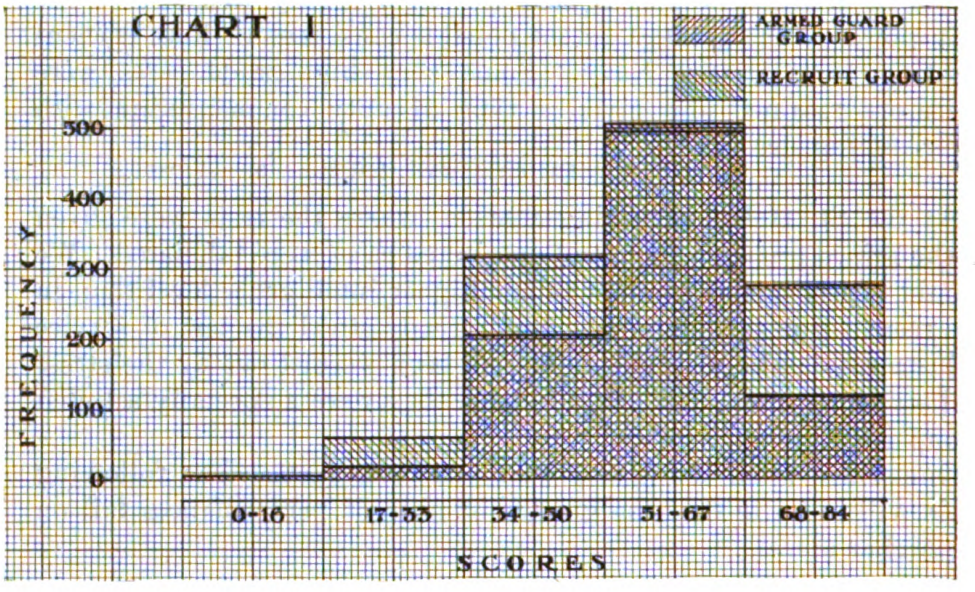
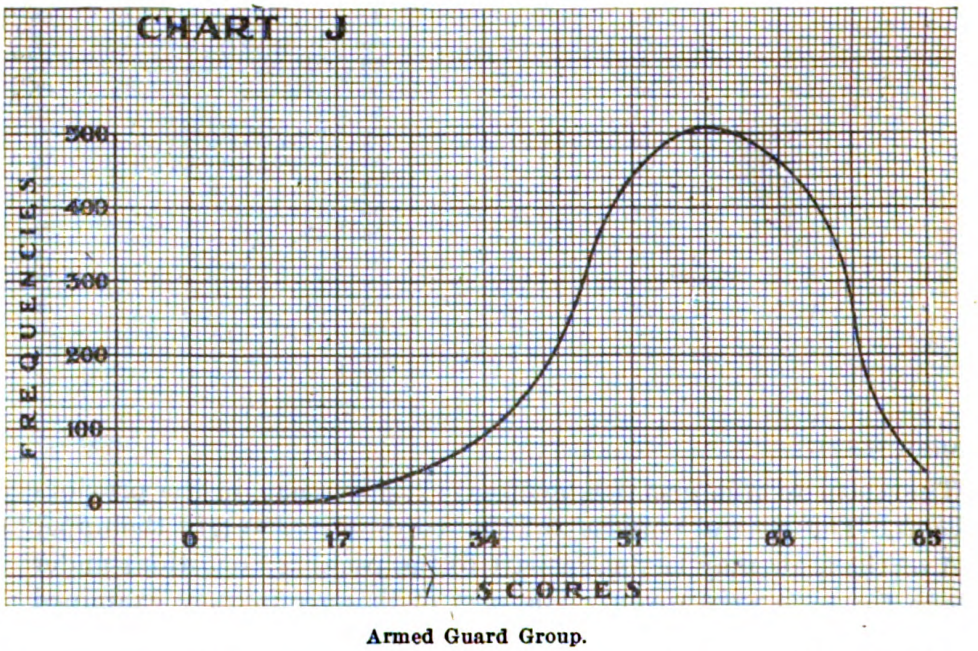


Chart "I" represents the relation of the armed-guard group to the recruit group; characteristic shading indicating the relatively higher scores received by the former group. Chart "J" shows the



Armed Guard Group.

distribution of the thousand cases of the armed guard. Due to the source of error just mentioned, too much reliance can not be attached to these scores.

CORRELATIONS.

Data was collected on a thousand cases[1] for the purpose of making a correlation between school grade and scores received in the preliminary psychological tests. The educational data was obtained from the card made out for each recruit at the time of his entrance in the detention unit by the psychiatric division. On the appended chart (Table 9) will be found a table showing the distribution of school grades by scores received in the preliminary psychological examinations. A visual inspection of this table reveals a marked degree of correlation. It will be noted that but few of the higher school years are indicated as belonging to men receiving low scores. On the other hand it will be noted that few of the cases in the lower school grades received high scores in the preliminary examinations. The index of correlations was precisely computed by the "Product-Moments" method of Pearson.[2] This proved to be +0.35.

TABLE 9.—*Education-score distribution.*

Scores.	School year.																Frequencies.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
16	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0
18	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0
20	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1
21	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0
23	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2
24	...	1	...	...	...	...	...	2	1	1	...	...	...	...	...	...	5
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0
26	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0
28	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
29	...	1	...	1	...	2	...	1	1	...	...	...	...	...	1	...	7
30	...	1	...	2	3	1	2	2	...	...	1	...	...	...	...	...	12
31	...	...	...	...	1	2	...	2	1	1	...	...	...	...	...	...	7
32	...	...	...	1	...	3	3	1	...	2	...	...	...	...	...	...	10
33	...	...	...	...	1	3	1	4	2	1	1	1	1	...	...	...	15
34	...	...	...	...	...	...	...	...	2	...	1	1	...	1	...	...	5
35	...	...	...	...	1	1	2	3	1	2	1	1	...	...	...	...	12
36	...	...	...	...	1	...	2	4	3	...	...	2	1	...	...	...	13
37	...	1	...	...	1	4	2	1	4	2	1	1	...	...	...	2	19
38	...	2	...	1	...	...	3	3	3	...	2	1	1	...	...	...	16
39	...	1	...	...	...	...	2	1	1	...	...	1	...	...	...	...	6
40	...	...	...	...	1	1	1	...	1	2	...	2	...	...	...	...	8
41	...	...	...	...	2	...	...	3	...	5	1	3	...	1	...	...	15
42	...	2	...	...	1	...	2	2	...	1	1	...	...	1	...	...	10
43	...	...	...	...	...	3	2	2	5	...	1	...	...	...	...	...	13
44	...	1	...	3	2	2	3	3	...	2	3	1	1	...	...	...	21
45	...	1	...	2	2	3	6	5	4	4	2	2	...	...	...	...	31
46	...	1	...	2	6	5	5	3	1	...	2	1	...	...	...	...	26

[1] The thousand cases discussed in this section from which correlations were made are the same thousand on which scores were tabulated in Table 6 (*b*).

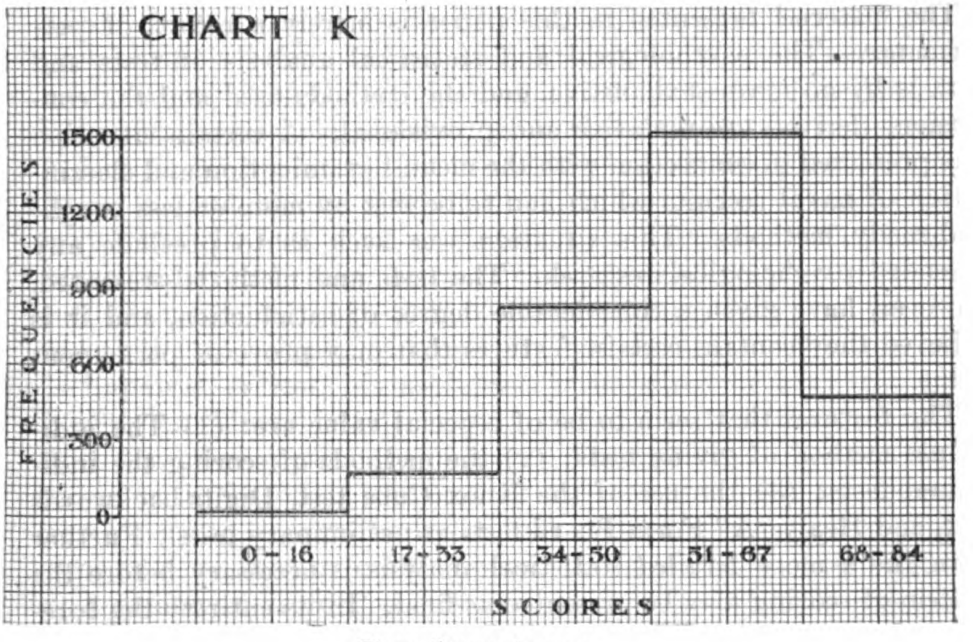
[2] Cf. Whipple, p. 38 ff., and Davenport, C. B.: Statistical Methods, John Wiley & Sons (Inc.), New York, 1914, p. 14 ff.

TABLE 9.—*Education-score distribution*—Continued.

Score.	School year.																Frequencies.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
47	...	2	...	1	1	...	5	5	3	2	2	....	...	2	...	....	23
48	...	2	...	...	4	1	7	7	7	1	3	....	...	...	...	1	33
49	...	2	...	3	4	4	8	3	10	4	2	1	1	2	...	....	44
50	...	2	...	...	1	1	3	3	6	3	1	2	...	...	1	....	23
51	...	...	...	3	...	3	4	4	3	4	2	1	1	...	...	....	25
52	...	1	...	3	4	4	7	8	4	5	2	3	1	2	...	....	44
53	...	1	...	3	1	1	2	1	3	4	3	7	...	...	...	....	26
54	...	...	...	...	2	...	2	5	3	1	1	2	3	...	...	....	19
55	...	...	...	...	2	...	....	4	3	4	2	....	1	1	...	1	18
56	...	...	...	4	2	1	9	6	10	10	5	7	1	5	...	....	60
57	...	...	...	3	...	3	3	4	4	3	2	5	3	2	...	....	32
58	...	...	...	...	...	2	3	10	1	2	1	....	...	...	...	1	20
59	...	...	...	1	...	2	5	3	3	4	4	3	1	1	...	....	27
60	...	...	...	1	3	4	5	10	8	5	7	11	5	1	2	1	63
61	...	...	...	...	...	...	1	4	1	1	1	3	2	...	...	....	13
62	...	...	...	...	...	1	....	....	2	1	3	3	...	...	...	1	11
63	...	...	...	1	1	1	3	5	6	4	3	6	1	...	...	1	32
64	...	...	...	4	3	5	4	7	9	6	4	13	5	6	1	....	67
65	...	...	...	...	1	1	....	....	2	2	2	2	...	1	...	1	12
66	...	...	...	...	1	1	1	....	1	3	1	2	1	...	...	1	12
67	...	...	...	...	...	1	2	....	5	3	1	4	...	...	...	1	17
68	...	...	...	...	2	2	3	5	3	4	5	3	8	3	2	....	40
69	...	...	...	...	...	...	1	2	2	....	1	1	...	...	...	....	7
70	...	...	...	...	...	...	1	....	1	2	1	2	1	...	...	....	8
71	...	...	...	...	...	...	....	1	1	....	2	2	...	...	...	....	6
72	...	...	...	...	...	...	1	4	2	4	3	1	2	...	1	....	18
73	...	...	...	...	1	...	....	....	1	1	...	1	...	1	...	....	5
74	...	...	...	...	...	...	....	....	....	2	2	1	...	1	...	....	6
75	...	...	...	...	...	...	....	....	....	1	...	....	...	...	...	....	1
76	...	...	...	...	...	...	1	2	....	1	2	4	...	1	...	1	12
77	...	...	...	...	...	...	....	1	....	....	...	....	...	...	...	....	0
78	...	...	...	...	...	...	....	....	....	....	...	....	...	...	...	....	1
79	...	...	...	...	...	...	....	....	....	....	...	....	...	...	...	....	0
80	...	...	...	...	...	...	....	1	3	2	1	3	...	1	...	1	12
81	...	...	...	...	...	...	....	....	....	....	...	....	...	...	...	....	0
82	...	...	...	...	...	...	....	....	....	....	...	....	...	...	...	....	0
83	...	...	...	...	...	...	....	....	....	....	...	....	...	...	...	....	0
84	...	...	...	...	...	...	....	....	....	1	...	1	...	1	...	....	3
Total.	0	25	0	41	56	68	119	148	137	113	86	111	41	34	8	13	1,000

It would seem that a correlation of +0.35 is not as large as we should expect from our data. The educational data, however, is not entirely reliable. The data was taken from the recruit without possibility of verification, and it is possible that the school grades which the recruit gave do not represent his educational status. Among the older men it is possible that the question regarding education could not be accurately answered because of poor memory. Again, the idea is not entirely reliable, due to a misunderstanding of the instruction as to how the questions regarding educational status were to be put. In some cases the question was: "How many years of schooling have you had?" In other cases the question

was put as follows: "What grade did you reach in school?" The most important source of error lies in the various systems of school classification represented in the answers to either of these questions. The recruits are very largely from the Southern States. In these States the system of grading varies; some of the school systems are ungraded; in some of them the term "high school" applies to the last four years of grammar school. This lack of standardization was a source of discrepancy which it was impossible to eliminate from our data.



Three thousand cases.

INTENSIVE EXAMINATION.

The intensive psychiatric examination which always followed the preliminary psychological examinations and "neurological status" in the case of hold-overs, consisted of the performance of such standards as the Stanford revision of the Binet-Simon intelligence test in the case of suspected aments, or the giving of a complete mental examination such as that used by the New York State Hospitals for the Insane.

In addition, in each such case, a complete record was made and kept on file, which included the following:

1. Chief complaint.
2. Referred by whom.
3. Family history.
4. Personal history.
5. Present condition.
6. Physical and neurological examinations.
7. Verbatim report of conversation with patient, aimed to elicit mental abnormalities.
8. Report of psychological tests.

9. Summary of findings.
10. Diagnosis.
11. Prognosis.
12. Recommendations.
13. Copies of report of recommendations made to commanding officer or senior medical officer referring the case, if any.
14. Final disposition.

The reverse side of Form I was used as a summary of the various examinations given.

CONCLUSION.

The material presented in this paper is merely a record of performance. The psychological and statistical analysis of tests and data is by no means exhaustive, and the methods used and the conclusions derived are tentative and provisional. A certain situation was presented in connection with the mental examination and classification of naval recruits which had to be met by more or less rough-and-ready methods. This situation was such as to preclude any extended psychological research. The tests and methods presented, however, have given a considerable degree of satisfaction, and it is believed they contain certain features that may prove of permanent value.

The features that seem to be of especial value are: (1) The individual method of giving tests; (2) the methods of scoring the individual tests; (3) the use of the Knox Cube test, Digits-backwards test, and Healy "A" Form Board tests as preliminary tests. Further data and a more detailed statistical analysis is necessary before the system of scoring may be presented as final. In its entirety the foregoing results are derived from 3,000 analyzed cases.

The use of the foregoing psychological methods by persons without any scientific training along these lines is to be deprecated. No subject should be diagnosed on tests alone, and for all cases a neurological status, a physical examination, and a complete medical history should be included. Tests which do not depend upon school knowledge or training should be stressed as much as possible. Great care should be exercised to avoid confusing ignorance with feeble-mindedness. The nervous factors involved in examining a man in a new and unusual environment for him, frequently after a long and tedious journey from home, should always be given consideration.

The psychological tests presented in this paper are only intended to be a means of rapidly classifying the recruits upon their induction into the service for the purposes of further examinations and classification.

(Sincere indebtedness is hereby expressed to Chief Yeoman F. S. Fearing, who, in the capacity of a trained psychologist, has rendered most valuable assistance in the compilation of the statistical analyses presented herewith.)

THE TREATMENT OF MILITARY OFFENDERS.

By A. L. JACOBY, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

The trend of modern medicine, both in and out of the military services, is, primarily, toward the prevention of the loss of useful function, and, secondarily, toward the restoration of that function, if it is lost. Formerly, the physician concerned himself only with treating derangements of a given organ or group of organs. A little later he began giving attention to preventing these same derangements from occurring in healthy individuals, and now the idea of prevention is being carried still further in what is called social medicine, which deals with prevention of the loss of function of the individual as a whole, and not this or that organ of the individual.

Just as we are in the habit of studying disease processes in the living patient by the symptoms which the patient presents, so we may study the individual as a whole by his behavior. The behavior of an individual, then, becomes the symptom-complex of what we call his mind, the part of him which "thinks, feels, and acts." If his ability to "think, feel, and act" in harmony with other minds is impaired or lost, his usefulness is impaired or lost, just as the heart's usefulness is impaired if it fails to function in harmony with the other organs of the body. The failure to function in harmony with the other members of society often makes it necessary for society to remove the individual, and he is placed in an institution of some sort or other, where his functioning is done for him to a greater or less degree. Sometimes it is the prison to which he is sent, other times the insane hospital or institution for the feeble-minded, or it may be the poorhouse. To which of these places he may go is often a matter of the purest accident, depending only upon how attention may have been called to him, and it frequently happens that the same individual is sent to one place upon one occasion and to an entirely different sort of institution on another exactly similar occasion. The fact that very little attention is paid to the kind of man under consideration before it is decided to which institution he shall go, or how long he shall stay there, leads often to a great and unnecessary loss of human function, and very often induces great harm to the individual himself and to the society to which he will have to return sooner or later.

At the U. S. Naval Prison, Portsmouth, N. H., there are now over 2,000 general court-martial prisoners. Each man is in the prison because he failed to adjust himself to his environment, the Navy, and the Navy has determined that he must not be allowed to function in society for a given period of time. The duration of this depriva-

tion of function is, in every case, largely determined by the seriousness of the specific act of conduct which is accepted as evidence that he was not fit for the Navy. The "Naval Courts and Boards, 1917," contains instructions, in the form of a table of sentences to be administered for each of numerous offenses, and it even subdivides a single offense according to the degree of damage done by the offender, with gradations of punishment accordingly. For example, the theft of less than $50 is to be punished by confinement for two years, and dishonorable discharge; if the amount stolen is between $50 and $100, the confinement shall be three years; and for the theft of over $200, confinement for four years is suggested. It is as if we were taught to administer 2 grains of phenacetin for all fevers under 100; 3 grains for fevers ranging from 100 to 102; and 4 grains for every fever above 102. We know that the fever is merely a symptom of a disorder of function in the organism, and that the degree of fever does not necessarily indicate the severity of the disorder. Just as we make an attempt to find and correct the disorder causing the fever, so we should study the offender against society, with a view to determining what is wrong with him and correct it, if possible. The duration of the deprivation of his liberty should not depend alone upon the offense any more than medication depends upon the amount of fever, but it should depend upon the kind of man he is.

It is very commonly observed that men of the worst type, so far as usefulness is concerned, are sent to the Naval Prison for relatively minor offenses, as absence over leave, with short sentences, and are eligible for return to duty in the Navy. At the same time youths of great potential possibilities of usefulness in the Navy are sent to the prison for desertion with longer sentences and are not eligible for return to duty. It is true that desertion in war time is much more serious than absence over leave, just as a fever of 104 is more serious than a fever of 102, but it does not follow that the man who commits absence over leave should receive less treatment than the deserter, any more than that the patient whose fever is 102 necessarily receives less treatment than one whose temperature is 104. In the cases with fever other symptoms are sought and considered before treatment is instituted. In the same way other symptoms should be sought and considered before treatment is administered to offenders.

A careful study has been made by examination and observation in 566 general court-martial prisoners and the conditions enumerated in table I have been noted.

TABLE I.

	Number.	Per cent.
Subnormal	142	23.3
Hysteria	57	10.0
Dementia precox	23	4.0
Manic depressive insanity	8	1.4
Anxiety neurosis	14	2.2
Epilepsy	16	2.8
Paranoid state	1	.1
Depression (undifferentiated)	1	.1
Drug addiction	3	.5
Chronic alcoholism	34	6.0
Traumatic neurosis	1	.1
Organic brain disease (undifferentiated)	4	.7
Symptomatic mental state	1	.1
Cerebro-spinal syphilis	13	2.3
Psychopathic personality	43	7.6
Constitutional inferiority	44	7.7
Cerebral arteriosclerosis	1	.1
Congenital syphilis	1	.1
Unclassified mental disorders	11	1.9
Neurological conditions:		
Sydenham's chorea	1	.1
Toxic neuritis	2	.3
Trifacial neuralgia	1	.1
Hyperthyroidism	2	.3
Multiple sclerosis	1	.1
Tabes dorsalis	2	.3
Nerve injury	1	.1
Migraine	1	.1
Foreign body in the cranial cavity	1	.1
Fracture of spine with resulting nerve pressure	1	.1
Examination negative	134	23.6

It is not my intention to attempt to prove in each case enumerated above, that the offense is a symptom of the existing disorder at the central nervous system level, although that is often the case. More frequently, however, the offense for which the man is in prison, bears no direct relation to his nervous or mental disorder. Even a casual glance at the above table, however, will show that the majority of the disorders enumerated are of such a nature that they must have existed before the man was admitted to the prison, and even before he enlisted. When those 566 cases are classified with reference to the length of their service, that is, the time elapsed between the date of enlistment and the date of arrival at the prison, which is very often several months after the commitment of the offense, it is found that 122 of them served less than six months; 241 between six months and a year; and 203 served more than a year. In nearly two-thirds of them, then, or to be exact 64.1 per cent, less than a year had elapsed from the time of their enlistment until they were actually in the prison. Certainly such conditions as a subnormality, constitutional inferiority, and the constitutional psychopathic states may logically be said to have existed when the patient was enlisted. Such defects

can not be said to have been acquired as a result of service conditions. It is very often the case, however, that the Navy environment imposes requirements of adjustment upon certain defective individuals which are more difficult than have ever been required of them before, with the direct result that these individuals "break" under the added requirements, and find their way to prison.

If we study the previous histories of this series of 566 prisoners, it is found that 236 of them have a record of at least one residence in a penal institution or in a hospital for the insane before enlistment, and there are 11 instances in which the individual had been committed to both penal and insane institutions before enlistment. This data is shown in Table II.

TABLE II.

	Number.
Commitments to penal institutions:	
Times committed—	
1	102
2	31
3	16
4	10
5	6
More than 5	55
Total	220
Commitments to insane institutions:	
Times committed—	
1	10
2	2
3	2
More than 3	2
Total	16
No previous residence in penal or insane institutions	113
No record or record unconfirmed	228

It will be seen from this table that in those cases in which accurate data was obtainable about two-thirds of them had experienced life in a penal or insane institution before they enlisted. It is along the lines suggested by these data that the greatest possibility lies for the exclusion of the misfits in the recruiting office. The failure of a man to adjust himself to his environment should always be a matter for consideration by the medical officer, whether that failure to adjust arises through an attack of pneumonia or through delinquency. In either case the individual is lost as a useful member of society. The medical officer on recruiting duty should have impressed upon him just as great responsibility in regard to the enlistment of repeated offenders as he has in enlisting blind or deaf men. In either case the man enlisted is almost sure to become an expense to the Navy rather than a useful member. It is hardly within reason to suppose that a man

who has been committed to penal institutions in civil life over and over again for drunkenness, disorderly conduct, or what not, is going to be a profitable addition to the Navy. In spite of this we not infrequenty see repeated offenders "sentenced" to an enlistment in the Navy by civil authorities.

The importance of taking a short previous history of the applicant for enlistment has been well set forth by Stearns.[1] In Volume XII, No. 4, of the UNITED STATES NAVAL MEDICAL BULLETIN, October, 1918, there appears an editorial, "Where the Psychiatrist Fails," in which the writer asks for a brief, comprehensive method of procedure, capable of being used by every medical officer for detecting defectives, and he refers to the need of a proper routine method of testing. A routine set of questions now exists on the application form for enlistment and it was apparently intended, from the nature of these questions, that they should exclude undesirable types. These questions make inquiry as to the habits of the individual, his previous commitments to penal institutions, etc. They are excellent questions, and, if they were answered truthfully by the applicant for enlistment, would serve to exclude, very satisfactorily, a large majority of delinquents, but it is not to be expected that the applicant will answer these questions truthfully, when they are put to him in so perfunctory a manner. If these same questions were removed from the application form and put to the applicant orally by the medical officer himself, and in private, they would be of vastly greater value. I have been told over and over by general court-martial prisoners that a "doctor never saw me when I shipped," and some men of the most undesirable types have described to me the testing of their vision by an enlisted man as the only physical examination received by them for enlistment. This condition, we may say, is, in a measure, excusable in the stress of war-time recruiting, but all will agree that it should not be.

It is impossible for the medical officer on recruiting duty to be highly specialized in all branches of medical science, but he is usually well enough versed in each of them for practical purposes if he uses the training which he has had. There is no more important duty that the medical officer is called upon to perform than that of recruiting, and if he is made to feel the same responsibility for enlisting habitual delinquents as he feels about enlisting a man blind in one eye, a great step in advance will be made. Some psychiatrists have attempted with elaborate and more or less mysterious tests to accomplish the elimination of the mentally unfit from our service, with the result that they have often overstepped, as it were. They remind

[1]Stearns, A. W.: "The History as a Means of Detecting Undesirable Candidates for Enlistment with Special Reference to Military Delinquents," Naval Medical Bulletin, Volume XII, No. 3, July, 1918.

one of the celebrated internist who was examining an applicant for the position of intern. He produced a very difficult case and told the applicant to "give the diagnosis of that case." The applicant immediately asked the patient what the matter was with him, and when the patient replied that he had syphilis, the would-be intern turned in that diagnosis, which was the correct one, without examining the patient. There is nothing weird or mysterious about practical psychiatry. In fact, it has been defined as applied common sense. If the medical officer on recruiting duty will have a private interview with each applicant, directing his questions toward finding out what schooling the applicant has had, his occupations, the maximum wage he has earned, why he wants to enlist—in short, what he has done with his life—he will form an excellent idea of the applicant's fitness or unfitness. This interview must not take on the character of a perfunctory state meeting, but it must be done in such a way that the applicant feels that the doctor has a real personal interest in him. A very few minutes, probably not more than five in most cases, is all the time which needs to be consumed in this way. It is to be expected that some men will lie, but the medical officer will find that he is able to detect nearly all the liars, if he is face to face with the applicants. A procedure such as outlined above will serve not only to keep out of the service most of the recidivist type but it will stimulate the medical officer to meet the responsibility which the corps as a whole should bear to the problem of discipline.

At the training stations the psychiatric problems should be and are in the hands of men with special training, and at this point in the recruit's career his service record and health record should be a matter of careful consideration, as well as physical and psychiatric examination, before he is permitted to go into the service proper. The way a recruit adjusts himself to his environment is of far greater importance to the service than they way he may perform psychological tests of one kind or another. It is expected that at the training stations neuroses and the milder degrees of constitutional defect will be detected. The various psychological tests are valuable aids to be used in reaching our conclusions, particularly at the training station, but they are of limited value if used alone, just as the Wassermann is of limited value in determining a man's general state of health. The Wasserman does not give evidence of flat feet, for example, and the intelligence tests will not give evidence of bed wetting. At the training station as well as throughout the service the relationship between the medical corps and the line can not be too close in reference to the problem of discipline.

The exclusion at the recruiting office or the elimination at the training station of undesirables by the medical officer is only a small portion of his function in this matter of discipline. Aboard ship,

every time a court-martial is ordered the doctor should feel that here rests an opportunity for usefulness. The general court-martial, with its double function—first, the determination of the guilt or innocence of the accused, and, secondly, the determination of what shall be done with him if found guilty—frequently errs in its second function, particularly because it has insufficient information upon which to draw its conclusions. The medical corps should be the means of furnishing to the general court-martial information of immense value to help it determine the best course in a given case. As a result of the court's lack of information about the accused, particularly if he happens to plead guilty, there is an enormous loss to the service of useful men, not to mention the financial loss and the actual harm done to men by confinement, which is not necessary, and the harm done society or the Navy in particular by releasing men from confinement prematurely.

Punishment can no longer be considered as the last word in any case, and it should only be considered as a means toward a definite end, the end being the accomplishment of a harmonious adjustment of the individual to society. If it does not do that, it fails as a method of treatment. If sentences were only imposed after the consideration of all the available data concerning the accused, such as his family history, his previous medical and social history, mental and physical examinations, and a period of observation by medical officers especially trained, together with line officers versed in matters of discipline, as well as the consideration of the facts directly related to the offense, a minimum loss of function would occur. It is impossible for the general court-martial to obtain all this information with the time and means at its disposal. Therefore it is believed that the general court-martial, as now constituted, should limit its function to the determination of the guilt or innocence of the accused, and give no consideration to the character or amount of punishment to be administered. If the accused is found to have committed the offense charged, he should then be deprived of his liberty for a period of from two to three months, during which time he should be placed under observation at the Naval Prison or other suitable place.

At this place of detention for observation there should be officers with special training in the matters of human conduct. A copy of the proceedings of the trial of the accused should accompany him to this observation hospital, and here all examinations should be conducted and complete data concerning his family and personal history should be obtained by correspondence or otherwise. At the expiration of this period of observation, of from two to three months, the offender should come before a second court or board, together with all the information concerning him and his offense, for recom-

mendation as to disposition. This board might recommend restoration to duty, discharge from the service, transfer to a hospital, confinement at hard labor, or such other disposition of the case as may be deemed necessary to best meet the needs of the service for useful men, and of the particular man under consideration. This board should be very carefully selected, and it should contain men capable of interpreting and correlating data received from the great variety of sources that its information would necessarily come. In addition, its members should be men thoroughly acquainted with Navy life in all its phases. This second court or board would also serve the function of a court of appeals, and would consider any new evidence relating to the offense which may have come to light since the trial.

Such procedure, it is true, would be a great departure from established precedent, but the period of history through which we are now passing is characterized by the breaking of precedents. In an article of this length no attempt can be made at the full consideration of the detailed application of such a system, and it is only intended to offer a suggestion of a plan designed to prevent, so far as is possible, in our present state of knowledge, the loss of useful men to the service and the elimination as early as possible in their careers of men who are never going to be useful in the service.

CONCLUSIONS.

1. The problem of military delinquency is essentially one for the consideration of the medical corps.

2. The use of a few minutes by the recruiting medical officer in a man-to-man conversation with the applicant for enlistment will serve much better than the psychological tests for the exclusion of delinquents and psychotics.

3. The observation by trained men at the training station, with consideration of the recruit's method of meeting and adjusting himself to his new environment, will serve to eliminate very largely the neuroses and the milder degrees of constitutional defect.

4. The general court-martial as now constituted should determine only the guilt or innocence of the accused.

5. If found guilty the accused should then be placed under observation for from two to three months, and all possible information obtained about him and the stock from which he comes.

6. A second court or board should determine the disposition of each case which will best meet the needs of the service and of the accused after the consideration of all the data collected during the observation period and any new evidence in connection with the offense.

EXTRACTION OF METALLIC FOREIGN BODIES WITH FORCEPS UNDER DIRECT X-RAY CONTROL.

By E. ROBIN, Médecin de 1 ère Classe, Chef du Service Chirurgicale, Hôpital de la Marine, Brest.

Dr. le Coniac, during the first three years of the war, and for the past year Dr. Corolleur, have been in charge of the department of skiagraphy at the Hôpital Principal de la Marine, of Brest. Both of these radiographers, being familiar with the localization of foreign bodies, have developed while working in intimate collaboration with surgeons, a method of extracting foreign bodies with forceps under the direct control of the fluroscopic screen. This method, in the hands of one with a little training, is most rapid, accurate, and harmless.

The surgeon after a time may become so trained in radiosurgery that he is able to localize and extract foreign bodies without the direction of the radiographist, but until he has acquired what may be called "the radioscopic eye" he should be guided by a skillful radiographer.

The method which forms the subject of this paper is so simple as to be applicable to most cases. The following principles, however, should be kept in mind:

1. All the wounded passing through a hospital, whether their lesions be recent or old, should be examined from head to foot by radioscopy in order to determine the presence or absence of foreign bodies. It often happens that men keep silent about foreign bodies, especially if their papers state that the missile has been extracted.

2. Any foreign body of the soft parts, no matter how small, should be removed for two reasons: (*a*) It may be the seat of latent infection or the source of acute developments in the future. (*b*) Even if the foreign body be well tolerated, the patient may make it a pretext for exemption from work or duty, or even for pension or passage to an auxiliary service. Every foreign body, then, even if it be no larger than a pinhead, should be removed.

Localization.—Such systematic extraction would be impossible were the radiographer obliged to make plates, measurements, and calculations for each patient, as is the case when one uses a localizing apparatus. Thousands of foreign bodies have been removed in the radio-operating room at Brest without the use of localizing instruments.

The only practical localization is anatomical localization. The application of compasses takes a long time and does not give, for instance, the exact relation of a piece of shell to the different parts of the body around it. It is not of first importance for the surgeon to know that a foreign body is 8 or 10 centimeters deep in the gluteal region; but it is important for him to know its relationship to the iliac bone or the sciatic nerve or other anatomic structure; information that the compasses can not give.

Both radiographer and surgeon must know their anatomical topography. The anatomical localization is obtained by studying the respective displacements of the foreign body on the one part and of the organs of the neighborhood, chiefly bones, on the other part, while the body is being rotated from one side to the other.

The shadow of a foreign body situated in front of the general axis of rotation will displace in the same direction as the part of the body which is *next to the screen* and in an inverse direction than the part of the body *nearer the screen*. If the foreign body is behind the axis, the contrary will take place. Besides, it is evident that the displacement of the shadow is more rapid when the foreign body is more distant from the axis of rotation.

During the rotation the shadows of the skeleton move also. The relative displacement of the shadow of a bone and the image of the foreign body is considerable when they are widely separated; if during the rotation, bone and foreign bodies keep at the same distance and move in the same direction, one may say that they are near each other. The displacements of the foreign body during spontaneous, induced, or psysiologic movements give very useful information. As an example, we may suppose the piece of a shell in the fleshy part of the limb; if the radiologist moves it through the skin, these movements may be seen on the screen, and the propulsion will reach its maximum when the finger is as near as possible to the foreign body.

The shadow of a bullet in the scapular region will displace on the ribs during the raising up of the arm, and this simple test will show that it is not intra thoracic. A lot of information may be obtained by comparing the displacements of the foreign body with the physiologic movements of the thorax. Everybody knows that during inspiration the diaphragm goes down and the ribs go up. Hence if an intrathoracic foreign body follows exactly the movements of the diaphragm, but at a distance from it, one can be sure that it is intrapulmonary. If, on the contrary, it goes up and down with the ribs, it is depending on the ribs. Then we use the method of rotation to find out if it is extra or intrathoracic; in the latter case, it is either pleural or cortico-pleural with pleural adhesions.

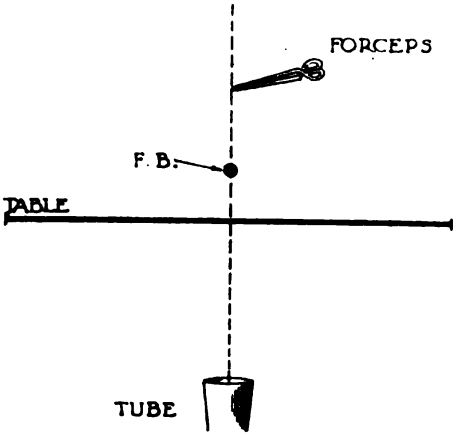
Foreign bodies near the mediastinum are not very mobile, but by rotation we can see at once what their position is inside the thorax. Foreign bodies near the heart are the seat of transmitted beatings from the heart; rotation will allow us to see if they are near, on, or in the pericardium.

On the whole, the method of rotation associated with ordinary methods of common sense enables the radiologist and the surgeon to localize the exact position of the foreign body, and the surgeon has anatomical and clinical means of selecting his avenue of approach to it.—Thèse de Gourion, Bordeaux, 1917.

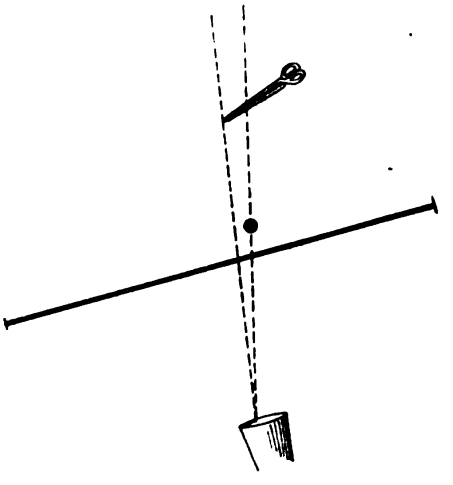
SURGICAL INDICATIONS FOR THE EXTRACTION OF FOREIGN BODIES WITH FORCEPS UNDER DIRECT CONTROL OF RADIOSCOPY.

(*a*) In the ambulances, "auto-chirs," or hospitals at the front, the extraction of foreign bodies is only a part of the general treatment of war wounds (large incisions, extraction of foreign bodies and pieces of clothing with primary suture, if possible). Under these conditions, if the foreign body is rather deep in the muscles, the X-ray is most useful in reaching it.

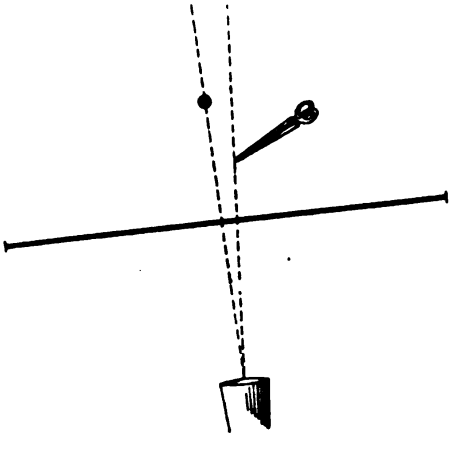
(*b*) In very many cases, owing to overcrowding, the wounded are evacuated from the front to the hospitals at the rear with foreign bodies still *in situ*. These foreign bodies may develop infection and abscess around them, but, on the other hand, are often well tolerated and become surrounded more or less rapidly by an envelope of fibrous tissue. Should these cases come to the knowledge of the radiographer



TUBE, SHADOW OF F.B. AND TIP OF FORCEPS ON SAME VERTICAL LINE



FORCEPS MORE SUPERFICIAL RAPIDLY PASSES OVER THE SHADOW OF F.B.



F.B. MORE SUPERFICIAL SEPARATES FROM THE TIP OF FORCEPS

or the surgeon, they should be operated on for the reasons indicated above.

The systematic extraction of foreign bodies would not be possible, if each one had to be reached by a large incision which opened widely plane after plane of fascia and muscle. Even with an experienced surgeon, possessing full knowledge of the anatomical planes,

the inconvenience resulting from such an open method of interference, as far as small and deeply situated foreign bodies are concerned, outweighs the disadvantages of leaving these missiles in place. Extraction under the direct control of the X-ray, with forceps passed through a small button hole in the skin, is most rapid, practical, and safe. The criticism that it is a blind method does not hold good and is only raised by those who do not know this method, or have failed in its application.

Eight or ten foreign bodies of the extremities at different depths can be removed in a half hour; this time including sterilization of the skin in different areas. Usually 5 cubic centimeters of ethyl-chloride will provide sufficient anesthesia for the removal of a foreign body from a thigh or from a leg at any depth.

This method is undoubtedly safe; I have removed more than 1,000 foreign bodies and I have never damaged a nerve or a blood vessel of importance.

The surgeon must choose his route of access so as not to endanger important structures, such as blood vessels or nerves and to avoid obstacles such as bones and thick tendons. For instance, a foreign body in the thigh, in front of the obturator foramen, should not be attacked through Scarpa's triangle; but the introduction of a long forceps into the inner aspect of the thigh through the adductor muscles will be perfectly safe.

When the surgeon appreciates that a foreign body is in the immediate vicinity of a dangerous organ he will modify his technique accordingly. In certain cases he will operate through an open wound in order to secure direct vision, using the rays to direct the incision and thus save time.

The principles on which this method of extraction is based are: (*a*) Penetration through the tissues by an aseptic blunt instrument (for instance, an ordinary artery forceps with closed blades) is perfectly harmless. It breaks nothing, it only displaces the cellular tissue or the muscular fibers through which it is introduced; and these tissues resume their place after the instrument has been removed, leaving but a simple puncture. (*b*) At all times the radiographer must be able to tell the surgeon whether or not his forceps is moving in the direction of the foreign body, guiding him until he touches it. This information is obtained by observing the displacement of the shadows, using the method of rotation described above.

OUTFIT NECESSARY FOR THIS METHOD OF EXTRACTION.

Room and lights.—A radio-operating room with red light or feeble white light; alternating with full light, artificial or natural.

Instruments.—Knife and artery forceps or foreign-body forceps of different sizes.

Radio-operating table.—We use the table of le Coniac which consists essentially of a plane revolving around its long axis. The patient is firmly fastened to the rotatory table, so that he may be turned from right to left and inversely around its axis without falling off. Our radiographers use Piloris tubes; a Coolidge tube would be better. The tube can be moved in an horizontal plane beneath the rotatory table. Diaphragming is rapid and easy.

STEPS IN THE OPERATION.

1. The position of the foreign body is ascertained.

2. The patient is placed on the movable table in the best possible position for the operation.

3. The inhalation of ethyl chloride will furnish sufficient anesthesia for a short, easy extraction. If the operation is liable to be long, if there are several missiles to be removed from the same patient, or if complete immobility is necessary, chloroform or ether may follow. It has been our practice to use chloroform with the Richard apparatus. In radio-surgery the Richard apparatus has two advantages: (*a*) Its long connecting tube makes it easier for the anesthetist to work while the table is being rotated; (*b*) the noise of its valves during inspiration and expiration enables one to hear the respiration of the patient. Let me state here that anesthesia is always begun when the lights are on and should never be administered in the dark except by a skilled anesthetist. I have never seen any fatal accidents due to it.

4. The skin is antisepticized with tincture of iodine and sterile towels are put in place.

5. The surgeon, when his eyes have become accommodated to the dark, asks for the rays. The radiographer centers the tube and the diaphragms. Both look through the screen. The surgeon, placing the point of his knife on the shadow of the foreign body, asks for red light or feeble white light. Then, using his anatomical knowledge, he chooses his avenue of approach, and, as a rule, makes his puncture a trifle to the right of the foreign bodies, that he may use his right hand to better advantage in manipulating the forceps.

6. The puncture is made. This is a small, buttonhole incision, not more than half a centimeter in length, and divides skin, subcutaneous tissue, and fascia. The forceps is now introduced through the puncture in the direction of the foreign body. As a rule, an artery forceps is used. Kocher's forceps may be used in some cases, but the teeth are liable to catch in the tissues. Some deep foreign bodies require long bullet forceps.

7. The surgeon asks for the rays as soon as the forceps is in the incision, and through the screen he watches it as it penetrates the tissues and he advances it gently but firmly. When the tip of the

forceps reaches the shadow of the foreign body, if the surgeon does not feel or does not see the contact with it, a localizing test must be made to learn whether the tip of the instrument is too deep or too superficial.

8. The surgeon immobilizes his hand on the skin and his forceps in the patient's tissues so that each displacement of the table will be transmitted completely to everything lying over it. The radiographer now indicates the direction in which the surgeon is to move, while both of them watch the respective displacements of the shadows. When the tip of the forceps and the foreign body are on the same vertical line, if the table be made to rotate, that shadow which moves more rapidly in the direction of the rotation is the more superficial. (See figures.) By one or two rotary movements the surgeon ascertains whether his forceps is too superficial (between the foreign body and the skin) or too deep (between the foreign body and the table).

9. When once the surgeon's forceps has reached the foreign body he will use it as a grooved stylet with which to separate the foreign body from the surrounding tissues. After months have elapsed a foreign body is included in a mass of fibrous tissue. As a rule, this decortication is easily made.

10. When the surgeon has achieved the "metallic contact" and the foreign body is free, he fixes it by pressing it against sound tissue, and, opening the blades of his forceps, he catches it.

11. As a rule, the foreign body is withdrawn with ease, but occasionally a slight twist is necessary in order to break its last connections with the surrounding tissues.

12. No suture is used, merely a dry dressing, which is removed in three days.

This method of extraction is simple and very rapid when the surgeon has acquired a little experience. In the soft parts it may be undertaken with safety by any surgeon knowing anatomy. Slight modification of technique permits the surgeon to remove foreign bodies from bones (with curettes after trephining the bone); from the brain (after craniotomy and opening of the meninges).

EXTRACTION OF FOREIGN BODIES FROM THE LUNGS.

Since the first extraction from the lungs made by Petit de la Villeon, with Dr. le Coniac as radiographer, in 1915, more than 200 foreign bodies have been removed at Brest. The method of extraction from the lungs is the same as for all foreign bodies, with some modifications in technique; it is only a special application of the general method.

Without entering into the details we may say that—

1. A very accurate localization must be made (*vide supra*).

2. Skin and intercostal space are cut by an incision not longer than a small buttonhole.

3. A long forceps (ordinary bullet forceps or, better, forceps with crocodile jaws) is introduced and, under the control of the X-ray, passes through the two leaves of the pleura without causing pneumothorax, and enters lung tissue. The penetration of a blunt instrument through lung tissue does not cause hemorrhage.

4. By rotary movements of the table the progression of the forceps to the foreign body is made in one-half inch steps. The radiographer and surgeon are able to appreciate the direction by the displacement of the shadows as described above.

5. The foreign body is caught and taken out slowly to avoid cutting the lung by the sharp edges of the fragment.

6. The passage through the skin, if the foreign body be big, necessitates at times enlargement of the incision.

7. A silk-worm suture closes the small wound. Usually we give a little morphia. With very few exceptions there is no hemoptysis or hemothorax. In some cases, when the operation has been done rapidly, we may notice a little bloody sputum for two or three days after the extraction. There is, however, no rise in temperature, and, as a rule, the patient is out of his bed in less than a week. After a careful radioscopic examination of his chest, to make sure that lungs and pleura have resumed their normal condition, the patient goes back to his work.

This method of extraction of foreign bodies from the lungs must appeal to every surgeon because it is simple, rapid, and safe. Médecin General Duval, directeur du service de santé de Brest, has given his support to this method which was originated in Brest, and we have had the opportunity of operating upon many cases before American and French surgeons. All agreed with us that it is the method of election, infinitely preferable to extractions after pleurotomies with or without rib resection.

It is to be borne in mind (*a*) that the region of the hilus should not be operated on by this method; but all other parts of the lungs are accessible; (*b*) that before operating upon a lung the surgeon must be trained to remove foreign bodies from the soft parts of limbs. I have personally extracted 50 foreign bodies from the thorax with perfect results and no deaths.

An objection may be made that the hands and face of the surgeon may suffer from exposure to the rays. In answer to this it may be stated (*a*) The eyes are protected by lead glasses; and besides there is no necessity for the eyes to be directly over the screen. (*b*) As for the hands, the radiographer uses the diaphragm as much as possible

and, as a rule, the forceps only is in the rays. Besides, we wear heavy, thick rubber gloves (Chaput's gloves). The operator may use Manclair's gloves with lead in them. We may add that after two years of intensive radio-surgery the skin of the author's hands is perfectly normal.

NEW WAR METHODS IN AMPUTATIONS, STUMPS, AND PROSTHESIS OF THE LOWER LIMBS.

By R. G. LECONTE, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

One of the cruel results of the present war is the enormous number of mutilated men it has produced. The treatment of the amputated has changed but little in a century, except for the perfecting of mechanical devices by ingenious mechanics who lack surgical knowledge and education. The comfort and usefulness of a man without a leg was left to the artificial-limb maker, for the surgeon's interest ceased often before the wound was fully healed, and the orthopedist's interest was not awakened or limited to the recommendation of a maker of limbs. By the time the unfortunate's wound was healed practically all scientific surgical supervision of him ceased. To Dr. F. Martin, of La Panne, Belgium, was given the inspiration to study the results obtained by such a system of treatment, and after more than a year of intensive work he has written a new chapter in prosthesis, placing this long-neglected subject on as firm a scientific surgical basis as the correction of refractive errors of the eye. I use this simile advisedly, for our treatment of the amputated has been about as logical and scientific as the giving of the address of an optician to a patient requiring glasses.

Dr. Martin starts with the proposition that all legs differ in shape as much as the features of the face; that a man's walk is as characteristic of an individual as his voice; and that this character is largely due to the shape of his legs. Therefore to reproduce stability and comfort in walking, the exact counterpart of the limb lost must be reproduced in the artificial member.

The treatment of the stump, which eventually will actuate the artificial limb, is as important as the limb itself.

The development of the muscles that control the joint above must be constant from the moment the wound is healed. This development is best attained by making the patient walk with a temporary apparatus.

Crutches will speedily develop a lateral curvature of the spine in a uniped. Martin has therefore discarded them. This lateral curve is an effort of nature to produce stability while standing on one leg. The lumbar spine bows toward the sound side. The curvature is

quite apparent in two months and steadily increases with the use of crutches. For the correction of lateral curvature in childhood and youth, exercises with crutches walking on one leg are strongly recommended.

The immediate treatment of the psychic condition, always present in the mutilated, is of primary importance to the patient's future social value.

For the patient then the best ultimate result will be obtained only through a close liaison of the surgeon amputating and the orthopedist, for to the latter is delegated the treatment of the stump, its development, its temporary walking apparatus, its final fitting with the artificial limb, and above all the treatment of the psychic condition and professional reeducation of the patient. When such a correlation is brought about, the beggary of maimed men following a war will cease.

AMPUTATIONS.

Amputations in war surgery are desirable when the loss of the limb is certain, or the attempted preservation would result in death. These two indications are due to traumatism (mortality 6 per cent) and infections (mortality 28 per cent). Before this war the technique of an amputation was taught empirically, and three fundamental ideas govern this classical procedure:

1. The amputation must be done in healthy tissue.
2. The shape of the flaps is prescribed (circular, oval, or of unequal length).
3. The stump must be well padded with soft tissues.

These classical ideas must now be forgotten, for they no longer exist in war surgery.

Amputation of the lower limb in healthy tissue is practically never done except when the entire foot has to be sacrificed. There is an optimum length of stump for the leg; otherwise, every bit of bone that can be saved is left. The infected soft tissues are cut on a level with the bone (chop amputation) without any attempt at flap formation unless the wound lends itself to short flaps. The position of the wound and the seat of fracture will determine the point of amputation, and not the splintering of the bone above the fracture. The disinfection of the wound is at once started, and it is left wide open until the infection is controlled, when the wound may be closed by a late primary or secondary suture, the tension on the flaps being relieved by traction on the skin by adhesive tapes. When revision of an amputation is necessary it will be done when disinfection is complete and the soft parts have been given all the elongation possible. The usefulness of the stump depends on the length of the bony lever and the muscular attachments which control the joint above. Disar-

ticulation of the hip and knee should not be done unless the joint is invaded and infected, and then an amputation at the lower third of the thigh is preferable to the knee joint for the fitting of an artificial limb. One inch of femur, if it contains the muscular attachments to the trochanters, is invaluable to an artificial limb, and the same is true of the tibia if the extensor and hamstring attachments can be retained. Should one or the other of these be stripped from the bone, their reattachment should be made when possible. The relation of the length of the stump to the prosthetic apparatus may be stated as follows: The length of the stump increases by arithmetical progression, while its action on the artificial limb increases by geometrical progression. As none of the body weight is borne by the end of the stump, the padding of this with soft tissues is no longer considered.

The surgeon's considerations in amputations are, therefore, first, to save life; second, to save all tissue that will aid in actuating the artificial limb; and, third, healing of the wound in the shortest possible time. The rapid healing of the wound is important for the exercising of the joint above and the muscles controlling it. To preserve the functions of this joint, passive motion should be made at each dressing and the joint kept in extension and not propped with pillows in a semiflexed position. If the stump needs support, pillows may be placed laterally, but not underneath. The muscles that actuate the joint should be exercised and massaged to keep them in their most efficient state. When adhesive tapes are employed to draw down the flaps, the muscles may be exercised against the weights making this extension. The length of the stump is determined by the operation, but its power and mobility depend largely on the treatment. The wound should be healed in two weeks or not more than four weeks and the patient turned over to the care of the orthopedist.

The orthopedist's first duty will be to fit a temporary apparatus and have his patient out of bed and walking on two legs. To walk with one leg and crutches ruins the static equilibrium of the amputated, for the center of gravity of the body must pass through the supporting foot. The body in attempting to compensate for this will develop a scoliosis of the lumbar spine, and as these war victims are young this will be apparent in a few weeks. It is therefore preferable to confine a patient to bed or a chair rather than allow walking with one leg. The provisional apparatus permits of immediate walking; it replaces the mechanical or manual mobilization of the stump and massage of the muscles by natural and agreeable exercise; it has a profound influence on the mental attitude of the patient to his mutilation; it improves his general health; it permits of an early reeducation; and it exerts on the stump the necessary and beneficial action of supporting weight, hastening its shrinkage,

and thereby shortening the time for the fitting of the artificial limb. For these reasons the temporary apparatus is an indispensable element in the treatment and should not be considered as a makeshift of no special importance.

PROVISIONAL APPARATUS.

The provisional apparatus applied to an always sensitive, often painful, stump must be carefully molded to properly support the weight of the body. There must be no pressure on the lower portion and end of the stump, no friction and no pull on the skin that would tend to reopen the wound. It must permit of free movement of the articulation above. It must be applicable to double amputations as well as to single ones. It must be readily changeable to conform to the constantly changing stump. It should be light in weight, inexpensive, and easily and rapidly made. The following description is for a midthigh amputation, and is given as an illustration of what can be done cheaply and quickly. The apparatus costs probably less than a dollar; its weight is about 2 pounds; it will last five or six months, but, owing to the shrinkage in the stump, it will require two or three renewals of the plaster mold.

The materials needed are plaster of Paris bandages, plaster cream, two pieces of wire netting the size of the palm of the hand, an iron hook fastened to a short piece of strap iron, and two pieces of wood similar to the lateral supports of a crutch. These pieces of wood are beveled at their upper portion and longitudinally grooved, the better to incorporate them in the plaster. The patient is placed on the table, lying on the sound side, with the limb straight and the stump following this alignment. The stump, buttocks, and lower abdomen are covered with a thin coating of vaseline. The stump is encircled with plaster bandages and the plaster is carried well up on the buttocks and over the crest of the illium and made particularly strong in the region of the ischium. The wire netting is incorporated in the plaster over the great trochanter and on the inner side of the thigh just below the ischium. The inner stick is placed about an inch below the ischium and incorporated in the plaster. The outer stick rises to the level of the great trochanter, and just in front of it on a level with the trochanter the iron hook is placed. While the cast is drying the lower end of the stump is freed from all pressure by cutting away the plaster, and the upper level of the cast is outlined with a pencil. This should follow the fold between the buttocks to the crest of the illium, pass a shade below Poupart's ligament and a little below the perineum. The cast is then removed and allowed to dry for 12 or 15 hours. The upper portion of the cast is pared to the pencil line, and the cut

edges are made smooth with molded plaster or adhesive tape. In this way an open cone is produced in which the two supporting sticks are incorporated.

The apparatus is completed by joining the two crutch pieces of wood with a cross bar 3 or 4 inches below the end of the stump, and fitting the ends with a cylinder of wood to walk upon. The length of the apparatus should correspond to the length of the other leg without its shoe. When the stump is thick the internal wooden support should be placed a little anterior to the mid line, and the outer support a little posterior to the mid line, so that the bulk of the apparatus will not rub the inner side of the other leg.

For high amputations of the thigh, the apparatus must be stiffened with iron. To the hook which holds the waist band a curved iron strap is attached, which will partially encircle the stump. On the anterior inner end of this strap a metal support or flange is riveted, which will rise to within an inch of the perineum. This is incorporated in the plaster, and if still more rigidity is required it can be riveted to the lateral wooden supports.

For a disarticulation of the hip the apparatus is still further strengthened by riveting metal flanges to the upper end of the two lateral wooden supports before they are incorporated in the plaster.

The apparatus is applied as follows: A stockinet cover is drawn over the stump with the end toward the foot left long. The stump is fitted into the plaster mold and the long end of stockinet drawn down and fastened to the crossbar. This downward traction on the skin relieves the wound and the end of the stump from all pressure. A suspender passes under the crossbar and over the opposite shoulder and a belt under the hook and across the crest of the illium on the other side. This fixes the stump in its mold. The patient is assisted in his first attempts at walking until he acquires a static position; then he walks with two canes, and very soon he will discard the use of even a single cane. In a couple of weeks he should be able to walk a mile or two without a stop.

As the stump shrinks in size a new plaster mold is made. This change will be needed two or three times before the form of the stump is sufficiently permanent for the artificial leg.

The two things which will do more to bring the patient out of the slough of despond that always follows mutilation are walking and work. The orthopedic treatment of the stump is helpful, for it shows the patient that you are personally occupied with his welfare. The object lesson of seeing other mutilated people happy and at work will give him the moral support needed to overcome this psychic depression—a feeling that life in the future will be vegetative instead of animal. Too much stress can not be laid on the

treatment directed toward the patient's regaining his moral tone, for on this depends the necessary stimulant to keep him from beggary.

ARTIFICIAL LEG.

The value of an artificial leg is confined to its static and dynamic functions, and it is good or bad, depending upon whether these functions are good or bad. Every individual has his personal characteristics in these two functions, depending upon the length and angle of the thigh, the length and curve of the leg, the relation of the axes of the knee and ankle, etc., and in no two individuals are all these measurements and angles the same. It follows, therefore, that if the artificial limb is to reproduce the functions of the lost limb, it must copy exactly the lines and measurements of the lost leg. Therefore any artificial limb which is designed for all men and adapted to the individual's use will fit no one. If the comfort of a man walking and working is to be compared with a man wearing glasses, the same precise surgical and mathematical skill must be displayed in obtaining a perfect result. In either instance it is not a province that should be relegated to a skilled but ignorant workman, and belongs solely to the orthopedist and eye surgeon, respectively.

Up to the time that Dr. Martin made his intensive studies of the mutilated, the so-called American artificial leg was considered the best in Europe. It was designed on the following principles:

1. The axis of the knee and the axis of the ankle are superinposable in all points, since they are on the same frontal plane.

2. The axis of the knee and the axis of the ankle are parallel to each other and to the ground.

3. The longitudinal axis of the foot passing between the first and second toes passes through the middle of the axis of the ankle and, therefore, the knee.

4. The longitudinal axis of the whole limb passes through the middle of the thigh, the axis of the knee, and the axis of the ankle.

5. The plane of the longitudinal axis of the foot and of the limb forms with the midplane of the body an angle of 18½ degrees, directed forward and outward.

6. The anterior border of the great trochanter, the external condyle, and the external malleolus are all on the same vertical plane.

These are contrary, almost in their entirety, to the anatomic principles of the lower limb. They produce a straight leg devoid of normal angles, a foot externally rotated 18.5 degrees beyond the midline of the body, which necessitates the mounting of the foot on the leg at an angle of 110 degrees instead of at a right angle, making a pes equinus (figs. 1, 2, 3, 4). The stump, on being applied to a straight leg, must be vertical, therefore in a position of abduction and external rotation, as the abductors are also external rotators.

This faulty position at once vitiates the normal walking movement of the stump. It therefore requires a reeducation of these muscles, changing their normal walking movement to abnormal ones, with the consequent rapid exhaustion of the muscles. The patient, unconscious of the anatomic defects, blames the weight of the artificial limb for his exhaustion, and consequently seeks a lighter apparatus, which again fails. There are few cases of mid-thigh amputation that do not prefer to walk with a peg leg, or, discarding all prosthetic support, use crutches. Practically none of these artificial limbs will stand alone, while an anatomically correct apparatus stands erect, as firm on the ground as a riding boot with its tree.

DR. MARTIN'S PRINCIPLES.

His principles are to reproduce in the artificial limb all the lines, curves, angles of deflection and joint axes of the individual limb lost, and he models the new limb on the measurements and projections of the leg remaining, reversing the projections to produce its counterpart. The stump enters his apparatus in its normal obliquity, downward and forward, and the muscles which control the movement of the stump will conform to their normal movements of walking in actuating the artificial leg.

The scope of this article is only to call attention to the monumental and epoch-making studies of Dr. Martin, and is not a translation of his 107-page monograph (La Prothèse du Membre Inferieur, Masson et Cie., 120 Boulevard Saint-Germain, Paris, 1918) or his 44-page article which has not yet appeared in print. For a detailed description of his methods the reader is referred to these two articles, as an outline only follows:

The Belgian artificial limb is made on a plaster mold of the leg, with thin ribbons of beachwood, overlaid in various directions, and cemented together with water-proof glue. It is about 7 mm. ($\frac{7}{25}$ths of an inch) thick. To make this mold the leg must be modeled in clay with its circumferences reduced to conform to the thickness of the artificial limb. Art and precision are required for this, and only an outline of the technique can be sketched here. A cast is made of the stump on which the position of the ischium, the anterior border of the great trochanter, and the oblique axis of the stump are marked. When these points are noted on the patient with an aniline pencil, the color will be transmitted to the mold and in turn to the cast. A frontal and lateral projection of the sound limb is made and reduced in its dimensions by three-fifths of an inch. The projections are reversed and mounted on an easel. The following measurements are taken with the patient standing on a specially devised stand, which assures a normal upright, erect position (fig. 5): (1) Perineum to the

ground; (2) end of stump to the ground; (3) the most prominent point of the internal condyle to the ground; (4) summit of the internal malleolus to the ground; (5) length of the stump from the perineum. The measurements 2 and 5 when added must be the same as No. 1 (fig. 6). From the measurements taken from the sound limb, a knee and ankle are carved from a block of wood, and, as these are destined to take their place in the artificial limb, they are made with a slightly decreased circumference. The knee block is made hemispherical at its base to articulate with the leg piece. These two blocks of wood later contain the mechanism to control their respective joints.

The cast of the stump is suspended from a gallows on the easel in front of and touching the frontal projection so that its outline follows the outline of the projection and its axis the axis of the limb. (Fig. 7.) The position of the knee joint and ankle joint are carefully noted, and the wooden knee and ankle are fastened to each other and to the stump by a wooden prop or brace in their correct situation. (Fig. 8.) All measurements and axes are carefully verified. Modeling clay is used to complete the leg. (Fig. 9.) A thin coating of the clay is applied to the lower surface of the cast of the stump, to avoid all pressure from the artificial leg on this sensitive region. If the stump has other sensitive points a little clay on the cast will relieve them from pressure. From this model a plaster cast is made and divided into a thigh and leg piece. On these the ribbons of beechwood are molded, with a hot copper roller and waterproof glue. The surface is smoothed and varnished and the leg is completed by articulating the foot, leg, and thigh pieces together. (Fig. 10.)

The Belgian artificial leg is the only one that reproduces the natural static qualities of the lower limb, and in accomplishing this it reproduces the esthetic qualities also. It is waterproof and therefore easily cleaned. It can be made without seeing the patient, if the proper measurements and projections are taken, and a cast of the sound limb and stump accompany them. Its mode of construction, the materials used, and the articulations are all new and founded on scientific principles derived from a study of the anatomy and physiology of the leg. Few skilled workmen are required to make the apparatus, as a major part of the labor at La Panne is furnished by the mutilated themselves, and all of it was unskilled at the start. The cost of the limb at La Panne is well below the price of the American-made leg. The life of the apparatus is at present unknown, but there is every reason to believe that it will last for many years.

To Dr. Martin belongs the credit of being the first to place the rehabilitation of the mutilated on a sound scientific basis. He feels

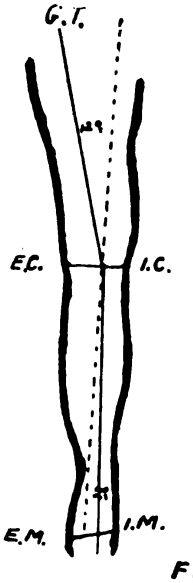
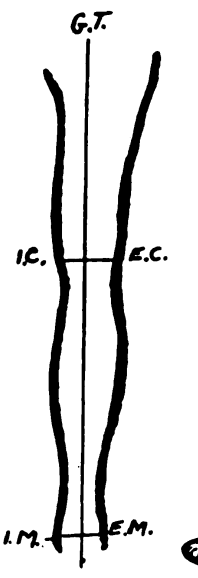
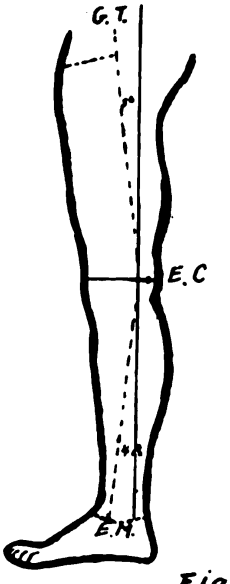


Fig. 1.





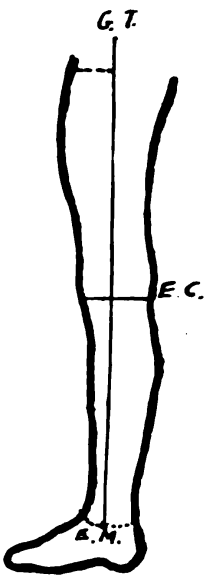
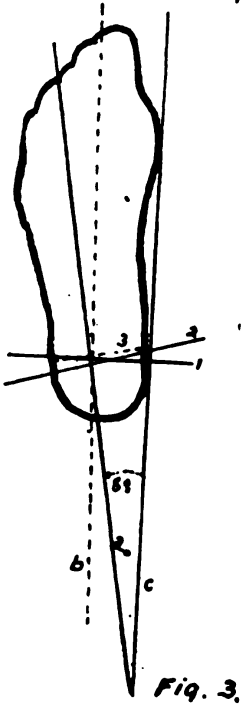


Fig. 2.



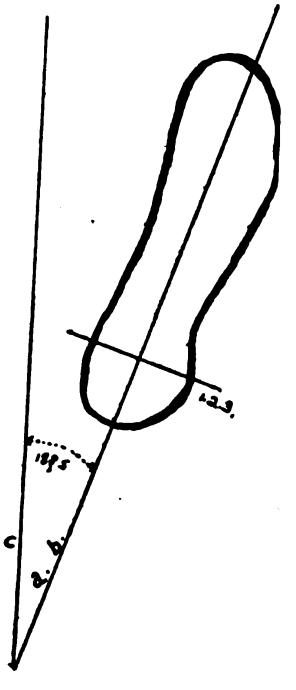


Fig. 3.

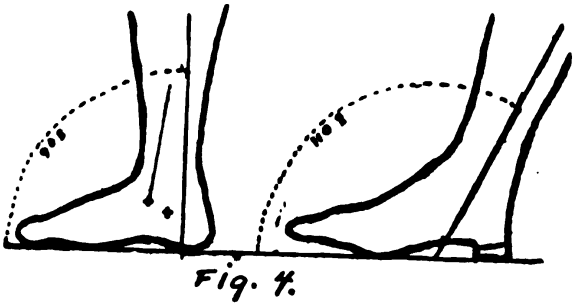


Fig. 4.

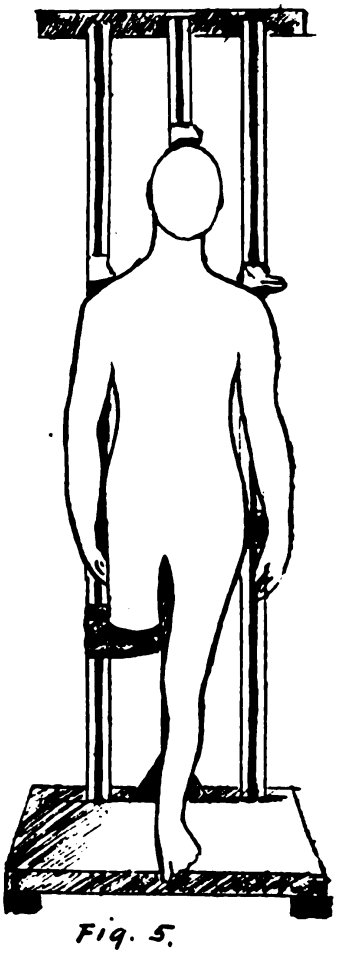


Fig. 5.

FIG. 1.—Frontal projection of normal and American artificial leg. Angle of femur 12°, leg 2°. Vertical line near external malleolus.

FIG. 2.—Lateral projection of normal and American artificial leg. Genu recurvatum 5° above joint, 4° below joint.

FIG. 3.—Horizontal projection of normal and American-made foot. 1. Axis of the knee. 2. Axis of the ankle. 3. Axis rotation of foot. *a*. Longitudinal axis of foot. *b*. Longitudinal axis of leg. *c*. Midline of body.

FIG. 4.—Normal foot: American-made foot.

FIG. 5.—Stand for taking measurements.

FIG. 6.—Scheme of measurements. α=angle of external deviation of foot.
FIG. 7.—Frontal projection and cast of stump.
FIG. 8.—Mounting of knee and ankle.
FIG. 9.—Clay modeling of limb.
FIG. 10.—Belgian artificial limb.

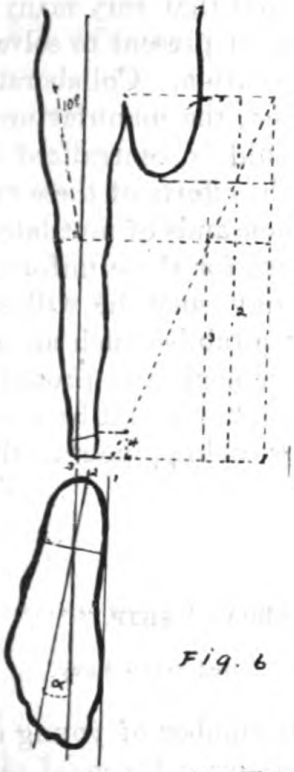


Fig. 6

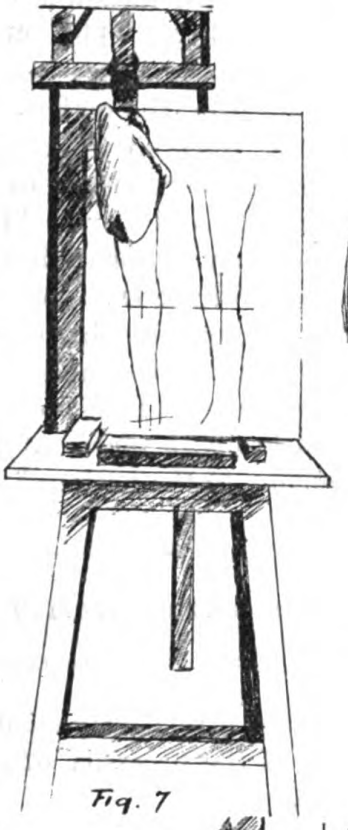


Fig. 7

Fig. 10.

Fig. 8

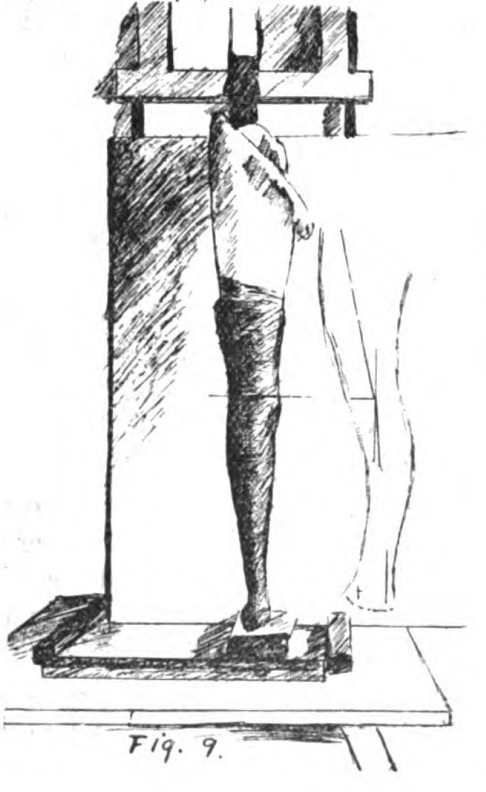


Fig. 9.

that he has only just touched the subject, and that very many problems are still to be worked out. The effort at present to solve these problems is not sufficient and lacks coordination. Collaboration is needed between the surgeon, the orthopedist, the manufacturer and the technician, and the research work should be centralized in one institution for the proper coordination of the efforts of these experts. This war has already produced scores of thousands of mutilated, and makes imperative our duty of rehabilitation for these unfortunates. Dr. Martin expresses the hope that some day, soon, he will see one of the great countries injured by this war, establish such an institution of prosthesis, which will rise under the aegis and protection of an enlightened philanthropy. To quote him, "it would be a work of true and sane philanthropy, a source of great happiness to the amputated, and of economy to the nations."

EDUCATION AND SANITATION ABOARD SHIP.

By W. S. Pugh, Commander, Medical Corps, United States Navy.

Few enlisted men and a relatively small number of young officers have any conception of the necessity of preserving a good sanitary condition of the ship.

The correction of erroneous ideas in this matter is to my mind one of the most important duties of the naval medical officer. He must also be able to demonstrate the necessity for new appliances, and the results to be obtained by them must be made quite clear. The seagoing man does not welcome innovations, particularly those which require the expenditure of a little effort. As an example we will cite the following: A new system of heating and ventilation, combined with a humidity control, was placed in operation on this ship. The response from everyone concerned was not, "Well, we will try and see how it works," but "That thing won't work; it might as well be taken out." When a fair trial was insisted on, and carried out, it worked very well indeed.

In order to overcome the opposition of ignorance the medical officers of this vessel decided on a campaign of education. In the first place a chart of the ship, showing all the decks and billets, was prepared from a blue print and kept in the medical officer's office. Beside each billet number there was a hole for a pin and the following colored pins were used:

Common colds	Black	Scarlet fever	Scarlet
Tonsilitis	White	Influenza	Violet
Measles	Pink	Meningitis	Green
Pneumonia	Yellow		

Of course, the most usual condition was that of common colds. These will invariably appear in groups, and when this occurs it is customary to call in the division officer and the petty officer of the compartment. The medical officer then informs them that the case has been investigated and certain things have been found wrong. When these have been corrected those concerned are shown that their pins have disappeared. Splendid results have been achieved in this respect not only with common colds, but with several other forms of transmissible disease.

THE SCUTTLE BUTT.

This appliance is one of the most important elements in the preservation of health when properly used and one of the greatest factors of evil when incorrectly used. Conditions such as tonsillitis, pharyngitis, bronchitis, and other affections of the respiratory tract are at times directly traceable to the scuttle butt. To prevent these conditions the appliance must be kept thoroughly clean, and the following or similar regulations posted on it in a glass-covered frame:

1. Don't press lips to scuttle-butt terminals.
2. Don't spit in scuttle butt.
3. Attendant will flame terminals twice daily with blow torch.

The second sketch on page 259 is attached to the above. If necessary a sentry should be placed on scuttle butts.

INFLUENZA.

Just before the epidemic of influenza struck the fleet the following sanitary bulletin was isued for the information of officers and men:

U. S. S. "MISSISSIPPI," *15 September, 1918.*

Subject: (*a*) Sanitary Bulletin No. 6.
(*b*) Influenza.

1. Influenza or "grippe" is more contagious than measles. Though it is common enough at all times, there have been several epidemics. In 1889–90 there was a world-wide epidemic in which three-fourths of our city populations were affected. It is caused by a germ—the bacillus of influenza. The infection is introduced through the nose and throat. It spreads most rapidly where people are crowded, as on a ship, because the air becomes filled with germs from the coughing and sneezing of those who have the disease. It is like a "common cold," but is of greater severity.

2. Symptoms: It may begin within a few hours after infection, or may not appear for several days. It begins suddenly with fever, headache, pains in back and shoulders, and feeling of weakness. Coughing and sneezing appear early in the attack. The cough is at first dry and hacking, and may be accompanied by the sensation of suffocation. There are many complications which occur. Pneumonia appears to be common in this epidemic. After recovery a feeling of depression is liable to last a long time.

HERE'S THE DOPE DO YOUR BIT

USE A HANKY

KEEP OUT OF CROWDS

GET LOTS OF FRESH AIR

USE YOUR OWN TOILET ARTICLES

SWING HAMMOCKS HEAD TO FOOT

REPORT AT SICK BAY IF SICK

HAVE YOU MADE YOUR PLEDGE ???

LET'S MAKE THE ~~MISS~~ A HOME. HELP KEEP HER CLEAN.

EXPOSURE !!!

That is one way of getting colds

DRESS WARM AND AVOID COLDS.

The ....
PROPER WAY WHEN DRINKING AT THE SCUTTLEBUT

KEEP YOUR LIPS OFF THE METAL PARTS.

3. Prevention: It is a dangerous disease and will, if we should have many cases, make it difficult to "play the game." We have not a single case aboard. Help us to keep clear of it.

When coughing or sneezing place a handkerchief in front of your face.
Swing your hammock head to foot.
Keep out of crowds.
Don't use anyone else's towel, handkerchief, or cup.
Get lots of fresh air.
Report at "sick call" if you have a "cold."
If you rate a "48," paste this in your hat:

Avoid the hug,
Avoid the lip,
Escape the bug
That gives the "grippe."

Approved for publication.

(Signed) B. F. HUTCHISON,
Captain, U. S. Navy, Commanding.

The object of these bulletins, which are issued to officers and men, is to acquaint them with the facts so that they will be encouraged to report to the medical officers in the early stages of the disease, thus aiding us in obtaining early recoveries without complications.

In the sanitary lectures given to officers much stress is placed upon communicable disease and its relation to sanitation. Officers are given instruction as to how this information may be imparted to the men without causing undue excitement.

During the presence of the disease on board the moving-picture projection was utilized and between the reels points bearing on the situation were thrown on the screen. These were in the nature of advice and where possible were combined with cartoons. The language used was that of the men—"real old United States"—so that there could never be any doubt as to its meaning.

These or similar sketches were thrown on the screen every night and soon became a very interesting part of the show. A little later the following bulletin was issued:

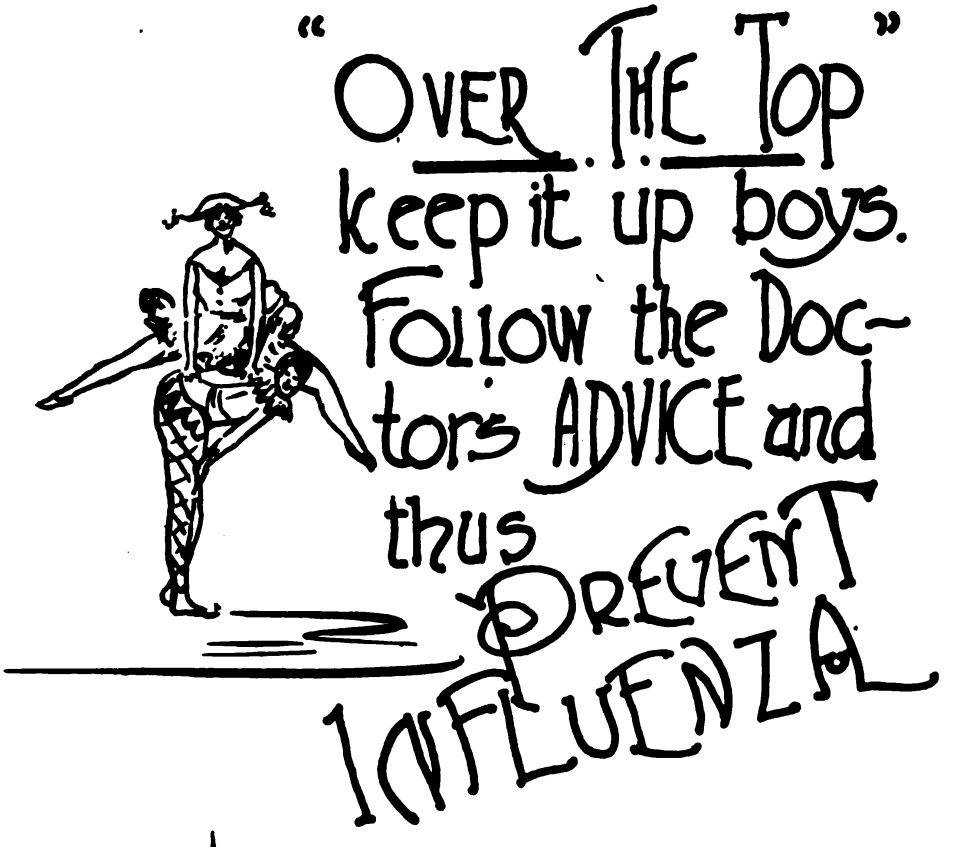
U. S. S. "MISSISSIPPI," *8 October, 1918.*

Subject: (*a*) Sanitary Bulletin No. 7.
(*b*) Present Status of Influenza.

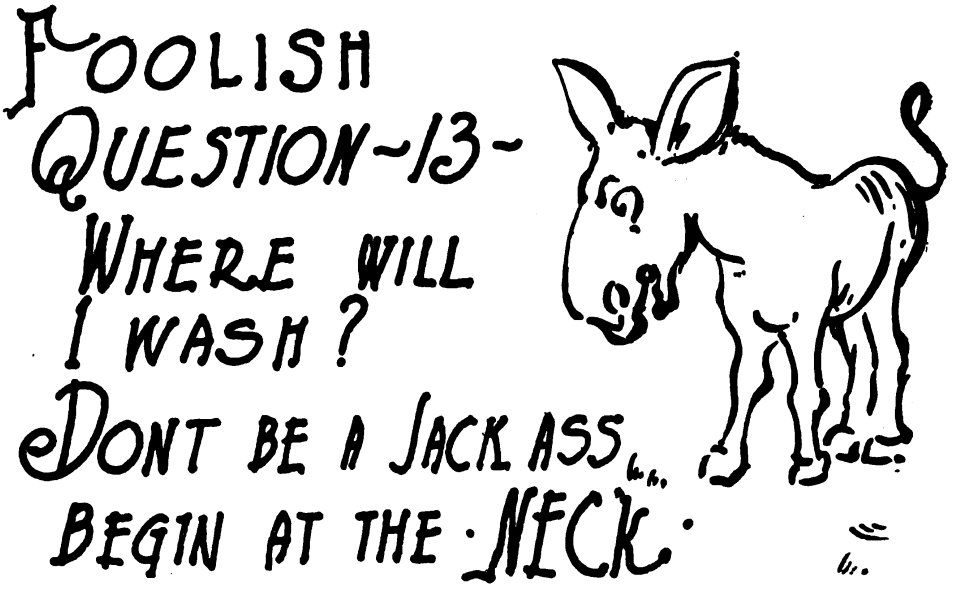
1. Influenza is with us, but it is mild. We have had very few cases, and the majority of these have not been severe. We have fared better than the other ships in the fleet. A number of deaths have been reported from other ships. We have not had a single death. Only three of our patients have been sick enough to necessitate transferring them to the hospital ship, and these are now on the road to recovery. We now have 15 cases, and 8 have been returned to duty. These fine results are not a matter of luck; they are due to the splendid cooperation of the officers and men of the *Mississippi*. Keep up the good work.

2. When coughing or sneezing place a handkerchief in front of your face.

3. Swing your hammock head to foot.



· THE WRONG WAY · THE CORRECT WAY



4. Keep out of crowds.
5. Don't use anyone else's towel, handkerchief, or cup.
6. Get lots of fresh air.
7. Report at sick call if you have a "cold."
8. A clean ship is a healthy ship. CLEAN 'EM UP, "MISSISSIPPI."

Approved:

(Signed) B. F. HUTCHISON,
Captain, United States Navy, Commanding.

The anti-influenza campaign along the above lines was highly successful. Petty officers would bring in their men and other members of the crew would report in and make the medical officer cognizant of things that otherwise would have escaped his notice.

CAMPAIGN AGAINST BOILS.

My coworkers and I are strong believers in the dirt theory for the etiology of boils, so that on the appearance of a number of cases of boils the following sanitary bulletin was issued:

U. S. S. "MISSISSIPPI," *21 October, 1918.*

Subject: (*a*) Sanitary Bulletin No. 8.
(*b*) Boils.

1. Boils, in ordinary terms, signify poisoning of a part of the body. The poison is an easily recognized germ which enters around the skin pores.

2. How do these germs get there? They are planted by the dust and dirt that gathers on your body and is rubbed in thoroughly by your clothes.

3. Who are the most susceptible? (1) Those who are dirty and wear dirty clothes. (2) Mess cooks and those who work in offices or who have charge of compartments and never, or seldom, get into the fresh air.

4. Why are these people attacked? Because they shun the fresh air and sunshine, nature's greatest aids in the preservation of health, thereby lowering their resistance. Boils are very great factors tending toward inefficiency, and a person affected with them is as a rule totally or partly incapacitated for his duty. In times like the present, when all must be fit to fight, boils should be regarded as first aids to the Kaiser and the Clown Prince.

5. The pus is highly infectious and readily transmitted to other persons. Do your duty—take a bath frequently and scrub thoroughly. Wear clean clothes. Get as much fresh air and sunshine as possible. CLEAN 'EM UP, "MISSISSIPPI."

Approved:

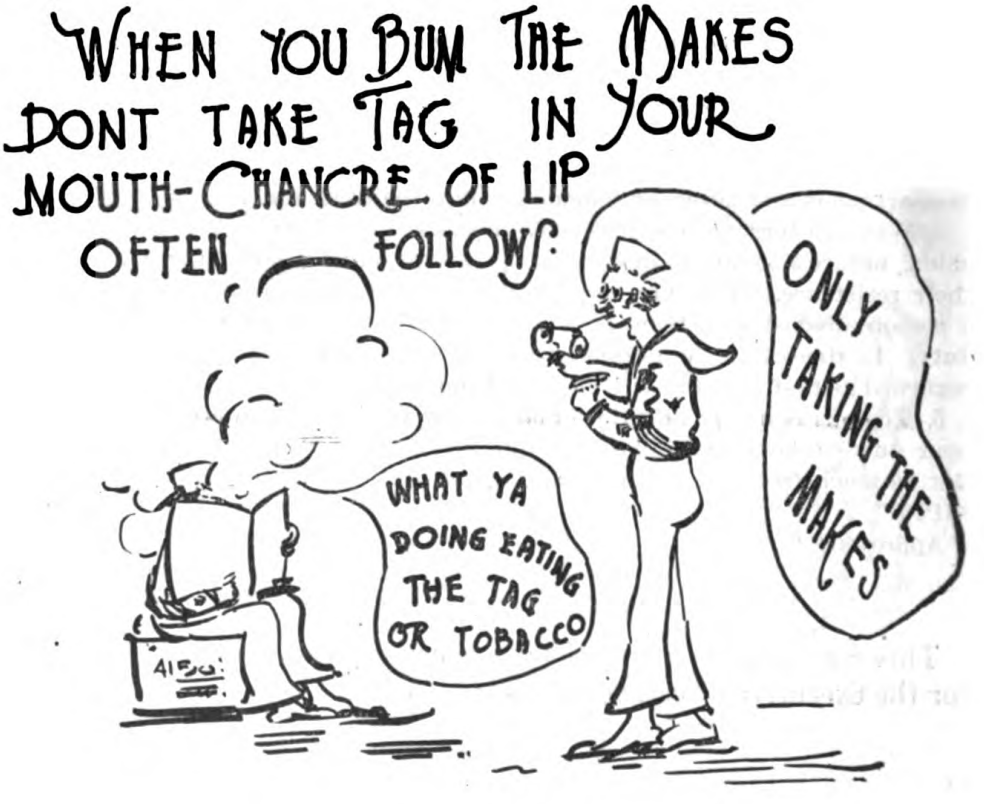
B. F. HUTCHISON.
Captain, United States Navy, Commanding.

This was shortly followed by a routine order, which we prepared for the executive officer, as follows:

U. S. S. "MISSISSIPPI."

Routine Order No. 7.

Attention of all officers is invited to the fact that filth is the most important factor in the propagation of disease, and that cleanliness is the best weapon with which to combat it.



A marked relaxation in the matter of personal bodily cleanliness has been noted among the members of the crew, which, along with the tendency toward use of filthy underwear, undoubtedly accounts for the many cases of boils and abscesses among the crew.

Officers will impress upon their men the great necessity for a general bodily bath at least twice a week, with a change of underwear at the same time.

(Signed) O. C. DOWLING,
Commander, United States Navy, Executive Officer.

In connection with the above, the accompanying representative cartoons were used on the projectograph.

ANTIVENEREAL CAMPAIGN.

Our venereal propaganda has been conducted along three lines:

1. *Moral.*—In this the services of Chaplain Frank Lash, a very active worker, were enlisted, as it seemed to me that this was distinctly within the scope of the duties of his office; hearty cooperation was obtained, and I think considerable good accomplished.

2. *Educational.*—The stereomotorgraph was secured and the series of films worked up by the camp community committee were used in connection with a lecture to small groups until every man in the ship's company had heard the lecture and seen the pictures. Moving pictures were brought into play and Brieux's famous story, "Damaged Goods," was secured. This is a very effective picture. The soldiers' film, "Fit to Fight," was also produced, and was found very good. It is most surprising how many men will report and request an examination following an exhibition of these pictures.

The accompanying representative cartoons were then made and shown on the screen by means of the projector.

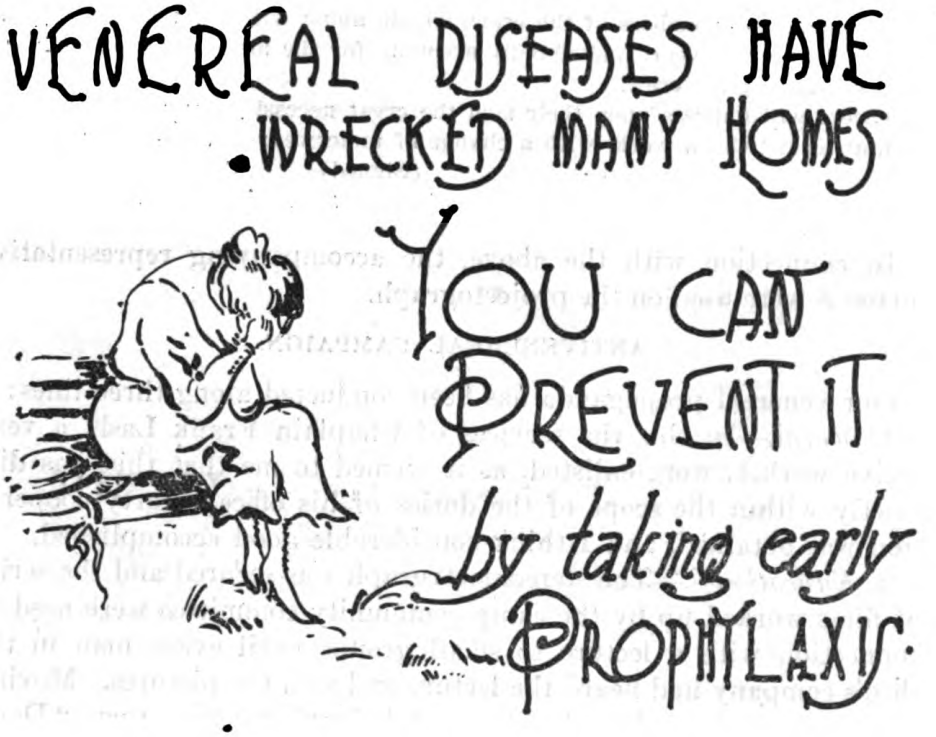
3. *Venereal prophylaxis.*—Every effort was made to have the men report for prophylaxis immediately on return from liberty or, if possible, at the Army station while on leave, the regulations of the department being shown for their benefit. The results of the campaign were more than satisfactory. Following our propaganda there has been a very marked lowering of the sick rate coincident with a marked improvement in the cleanliness of the ship. The cartoon No. 13 appeared after a campaign and illustrates the success of our educational campaigns.

INSTRUCTION FOR LINE OFFICERS.

In addition to the foregoing the following sets of lectures and practical demonstrations are given for the instruction of line officers.

First-aid lectures will be given by the surgical officer and will cover the following:

1. Wounds by firearms and cold arms, particular attention being given to the application of shell-wound dressings and first-aid packets.



THE MISSISSIPPI HAS THE LOWEST SICK LIST IN THE BIG FLEET

WATCH THE SANITARY BULLETINS AND FOLLOW THE DOCTORS ADVICE

BOILS INDICATE A DIRTY SHIP'S CREW

BOILS CRIPPLE GUN CREWS

PREVENT THEM BY HAVING CLEAN BODIES AND CLEAN CLOTHES.

CLEAN-EM-UP.

MISSISSIPPI

START NOW.

103396—19——7

2. Hemorrhage, including the application of the tourniquet, particular emphasis being placed on the adjustment of this appliance, its proper use as well as its dangers.
3. Emergency treatment of fractures and dislocations.
4. Drowing cases.
5. Effects of heat and cold.
6. Common poisons.
7. Transportation of injured.

Sanitation.—Lectures on this subject will be given by the sanitary officer. This course is given with the idea that many officers will be ordered to ships or small camps where the services of a medical officer are not available. It will also assist the medical officer in obtaining the cooperation of his brother officers of the line. Without this union of effort on a ship, be it large or small, the health of the crew will suffer. This course will be given by an officer particularly conversant with this line of work. It will largely consist of general principles of health and hygiene that anyone will be able to grasp.

1. Air aboard ship, heating and ventilation.
2. Berthing of the crew and its relation to disease transmission.
3. Water supply and its care—scuttle butts, lavatories, wash rooms, etc.
4. Toilets and their care; their relation to disease transmission.
5. Clothing and bedding of the crew.
6. Dangerous occupations.
7. Sanitary police.
8. Landing parties and camp sites.
9. Sanitary policing of camps.
10. Water supply. The disposal of refuse, garbage, etc.
11. Diseases of camp and their prevention.

HISTORICAL.

JEAN DOMINIQUE LARREY, 1766—1842.

Jean Dominique Larrey was born in the village of Baudéan in the department of Hautes-Pyrénées on July 8, 1766, and at the age of 13 went to Toulouse to complete his preliminary education and later take up the study of medicine in the professional schools where his father's brother was in high repute as a teacher.

At 21 Larrey went to Paris where he came to the notice of the eminent Louis.[1] After due competitive examination Larrey was appointed a surgeon in the royal navy of France and went for a cruise in North American waters on the *Vigilante*. The voyage over, the young doctor resigned his commission, went to Paris and resumed his professional studies at the Hôtel Dieu and the Invalides. Three years later we find him in the Army of the Rhine serving under Kellerman and winning favorable comment from his military superiors just as he had from his commanding officers in the navy. After the action of July 22 he was mentioned in despatches by Beauharnais and officially commended in the "Moniteur."

It was during the campaign of 1793 that Larrey, painfully impressed by the utter lack of system in caring for the wounded, conceived the idea of *organized effort on military lines* to give immediate and adequate succor to the victims of battle. Usually, the wounded remained where they fell until the fighting was over, rarely receiving the surgeon's attentions until 24 hours had passed. In case of defeat they were abandoned. The mortality in the field was tremendous. Larrey decided that the surgeon ought to go to the wounded and that aid must be a matter of routine, administered with the same system and on the same status as any other military measure, deeming the hospital provisions three miles in the rear, called for by army regulations, wholly inadequate.

The nearest approach to first-aid treatment in our modern sense was furnished by the "wurz" of Percy[2] "a sort of long, narrow caisson containing instruments and dressings with a top, round as à pudding, astride of which perched the surgeons who could jump

[1] Pierre Charles Alexandre Louis, who named typhoid fever and insisted on the importance of carefully prepared statistics in estimating the value of a given therapeutic measure.

[2] Pierre Francois Percy, 1754–1825.

down and as quickly resume their places. Each 'wurz' was drawn by six horses and manned by eight surgeons and eight attendants, the latter seated on the chests at the front and rear or riding the horses that drew the vehicle. The whole affair carried the necessary supplies for 1,200 wounded. Under the driver's box were stretchers to carry from the field such patients as could not walk. The 'wurz' could maneuver with the speed of field artillery and went on the firing line."[1]

Larrey modified the Percy idea as to the transportation of the wounded, but went far beyond him in arranging for a systematized service of ambulances and movable hospitals or dressing stations as an integral part of the organization of the army as a whole. His flying hospital legion was placed under the control of the chief surgeon of the army. It consisted of various *medical* divisions, the division being a unit designed to meet the needs of a *military* division. These units could be multiplied as required if divisions were combined to form army corps or subdivided to accompany brigades and smaller formations. In any event medical personnel and matériel was always available at short notice.

The administrative work of a division was handled in two sections. One was composed of a commissary and various subordinates, 12 mounted and 25 unmounted sick attendants, all soldiers, and a drummer. The other section consisted of 12 light carriages and 4 heavy vehicles, each with a man in charge, and a driver, a horseshoer, and a bugler. The personnel of the medical division numbered 113 persons. The division was formed of a number of subdivisions each with a directing surgeon and 15 subordinate surgeons of various ranks. The light vehicles drawn by one horse, or two if the terrain was difficult, were on springs, "easy running, furnished with mattresses, padded sides and pockets for supplies." They collected the wounded and evacuated them to the heavy wagons which bore them to the principal dressing station or hospital beyond the battle area. The serious cases were attended to where they fell, and emergency surgery was done under fire. Larrey's scheme was put to the test for the first time during the operations before Metz in 1793 and gave such general satisfaction that he was ordered to assemble the necessary ambulance units for 14 armies of the Republic.

Larrey was now designated chief surgeon of the expedition organized to wrest Corsica from the British. The British blockade of Nice, where the force assembled, interfered with the execution of the program, and Larrey profited by the delay to hurry to Paris for his marriage with a daughter of Laville-Leroux, a former minister of finance under Louis XVI.

[1] J. Ambert: Le Baron Larrey; Cosse et J. Dumaine, Paris, 1863.

At Toulon, Larrey acted as instructor in surgery and anatomy in a school gotten up for the benefit of the younger medical officers of the land and sea forces until his labors were interrupted by orders to occupy a chair in the newly created military medical school at the Val-de-Grâce. Scarcely had he assumed his new functions when he was summoned by Napoleon beyond the Alps to superintend the operations of the "flying ambulance" for the Army of Italy. Bernadotte wanted him, besides, to take measures against the epidemic which was killing off the cattle of Friuli. Napoleon witnessed in person the evolutions of Bernadotte's "ambulance volante" and at their conclusion said to Larrey: "Your work is one of the happiest conceptions of our time."

Returning from Italy, Larrey went to work again at the Val-de-Grâce, but he was not left undisturbed for long. The campaign in Egypt was about to begin and his presence with it was now considered indispensable to the army. Some of the incidents of his adventurous and varied life at this period are worth recalling. After the battle of Aboukir Bay, Larrey had to amputate the right arm of Gen. Figuière, who declared that he would never be able to draw his sword again and therefore presented the magnificent damascened blade to Napoleon who had attended him during the ordeal of operation. The latter accepted the gift and presented it on the spot to Larry with the remark: "He saves your life."

Larrey established military hospitals in Cairo and a school of medicine and surgery for the medical officers of the army. During the stay in Egypt he made a painstaking study of Egyptian ophthalmia (trachoma) which threatened to become epidemic among French troops. On the expedition into Syria Larrey realized that his ambulance carriages would be insufficient and had constructed a hundred long, open paniers, for a single patient each, to be carried as stretchers or drawn by mules. Napoleon has been reproached for his desertion of Kléber, but we may remember in his favor how, when means of transportation failed for the 10,000 wounded that complicated the evacuation of Palestine and a march of 180 miles across the desert, he assigned all the horses belonging to the staff to the use of the medical department and set an example of generosity by himself leading the way on foot.[1]

An example of Larrey's sense of duty to his patients is furnished by the following episode, unpretentiously set forth in his "Mémoires de Chirurgie militaire et Campagnes." "I had barely time to load the wounded man[2] on my shoulders and bear him back toward our army, which was beginning to retreat. A series of holes or capertree trenches that I had to traverse saved me, for the cavalry could

[1] J. Ambert: Loc. cit. [2] Gen. Silly, whose leg had been crushed by a cannon ball.

not follow a route so cut up, and I reached our rear guard ahead of the enemy's dragoons. At last I got to Alexandria with my worthy patient on my back and there succeeded in curing him."

After the campaign in Egypt, Larrey was appointed surgeon to the consular guard, and later made inspector general of the health department of the French armies. Meanwhile he had been selected for membership in the recently organized Legion of Honor, receiving the decoration at the hands of Napoleon himself, who remarked: "A well-deserved honor."

When the Emperor collected a vast array of stores and assembled a huge army at Boulogne for the invasion of England, Larrey was at hand with a fully prepared medical service. "You came near being ready before I was," said Napoleon drily, as he remarked his chief surgeon's ceaseless activity.

Larrey participated in all the principal campaigns after the rupture of the treaty of Amiens. He was present at Austerlitz, Jena, Eylau, Friedland, and Wagram. On the field of Eylau, Napoleon made him commander of the Legion of Honor. At Friedland, as everywhere, Larrey lavished his professional attentions on friend and foe alike. A wounded Russian officer has described how he had been left for dead on the battlefield and robbed by marauders of his very clothing, and when he was finally found and carried to the dressing station the great French surgeon not only dressed his wounds, but supplied his deficiency of attire from his own wardrobe.

The medical school of Jena conferred on Larrey the degree of Doctor of Medicine in recognition of his high attainments and nobility of character. During the peninsular campaign Larrey contracted typhus fever and narrowly escaped death. On convalescing he rejoined Napoleon in Austria in time to be present at the battle of Essling. It was on the island of Lobau that Larrey concocted his famous broth for the sick and wounded. There was a dearth of all supplies, but he ordered his own chargers killed to supply the meat. There were no cooking utensils so the helmets of the cuirassiers were requisitioned. Gunpowder was substituted for salt as a condiment. Gen. Masséna drank the first bowl of this concoction without suspecting the nature of its ingredients. While Larrey was teaching and practicing his art during the French occupation of Vienna Napoleon made him a baron of the empire, with an annuity of $1,000.

The great heart, the intrepid soul, the redoubtable energy of Larrey never showed to greater advantage than during the ill-fated campaign of 1812. His generosity, patience, tender devotion, and self-sacrifice were seconded by his ingenuity and resourcefulness. At Smolensk no lint was to be had for surgical dressings. A sort of tow made from the shred of the birch was used instead. Paper dressings replaced those of linen, the source of supply being the

archives of the city. At Moskowa Larrey remained behind for 72 hours and worked day and night to relieve the sufferings of the thousands of wounded French and Russian soldiers. Thiers says that on this occasion he was "the benefactor of all sufferers." Speaking of the retreat from Moscow Thiers, in his "History of the Consulate and Empire," recalls that the momentous decision to attempt it was opposed by Larrey, "one of the best informed witnesses of the situation who believed that there were in the city ample provisions for a six months' sojourn." "Unfortunately, no attention was paid to his opinion," says Ambert.[1]

"Surgeon Larrey," says Thiers, "through his inexhaustible kindness, had gone ahead to help the wounded at Kolotskoi as far as the brief stop there permitted. He arranged for the removal of those able to travel and lavished on the others the highest resources of his art. When he discovered there certain Russian officers who owed their lives to his services and were profuse in their acknowledgements, he required them to pledge their word of honor that from the approaching moment of their liberation, when they would become masters of the fate of those whose plight they had recently shared, they would repay to them the good they had received at the hands of the head surgeon of the French."

In the memorable retreat from Russia Larrey marched on foot, surrounded by his assistants, in the center of the long column of starving, shivering soldiers, setting an example of fortitude and cheerfulness to all. He put his own canteen to the lips of the dying and shared his meager ration with the hungry; he encouraged the weary by every means in his power; as the men fell to the ground he picked them up and revived them. He was everywhere sustaining, helping, cheering; urging on the stragglers; changing the dressings of the wounded, inspiring the disheartened with fresh hope. At night he wandered about among the wounded seeking to relieve their pain, and to those who were past all hope from surgery he addressed words of spiritual consolation.

The passage of the Beresina was in the nature of a stampede under the decimating fire of the Russians. Larrey got across with the remnants of the imperial guard, but had scarcely reached the farther bank when he discovered that the boxes containing certain important surgical instruments had been left behind. In spite of the urgent appeals of his companions Larrey retraced his steps and forced his way to the other side. When he finally sought to rejoin the main body his retreat was cut off by the dense mass of soldiery fighting for a foothold on the shattered bridge which the sappers and miners had finally been able to make passable. He would have been trampled to death by the maddened host of fugitives if some of the common

[1] Loc. cit.

soldiers had not recognized him and taking him in their arms forced a passage for themselves and their precious burden.

In the campaigns that closed Napoleon's meteoric career his armies were made up to a large extent of raw young conscripts. Many of these were found after an engagement with mutilated hands. It was represented that these wounds were self-inflicted, and the Emperor was first overwhelmed with mortification and then fired with wrath. He proposed to make severe examples of the guilty. Terror invaded the ranks and the report was current that 1 man in every 20 would be executed. Larrey, who had carefully examined many of these wounds, stoutly maintained that they were not self-inflicted. He went before the Emperor and demanded an official inquiry into the subject before punitive measures were instituted. Napoleon grudgingly consented, and some 2,000 youths, all suffering from wounds of the hands, were lined up in the precincts of the customhouse just beyond Bautzen. A painstaking examination was conducted by five army surgeons, a high ranking officer of the line, and a captain of the gendarmerie chosen by the provost marshal. For each man a carefully prepared report was drawn up after Larrey himself had inspected their hands and satisfied himself that the wounds were due either to the fire of inexperienced comrades in arms drawn up behind them or to the enemy's fire when the conscripts attacked up an incline carrying their pieces high in front of them, covering face and chest, instead of at the hip.

Larry went in person to report the results of the investigation. "Well, sir," said Napoleon in a tone of irritation, "do you still persist in your opinion?" "I do more than that," said the intrepid doctor, "I come to prove it to your majesty." He detailed the minute inspection to which the cases had been subjected and assured the Emperor that brave and worthy men had been grossly misrepresented. "Very well, sir," said Napoleon testily, "I will attend to the matter myself." When Napoleon had satisfied himself of the soundness of Larrey's judgment he appeared before him in a state of profound emotion and paced the floor for some time, his arms crossed, his head sunk on his chest. Suddenly he halted before the surgeon exclaiming, "Good bye, Mr. Larrey. A monarch is fortunate indeed who has near him a man such as you are. You will receive my orders later—wait." The Emperor seized Larrey's hands in his, then threw his arms around him in a warm embrace. The next moment he hurried from the apartment. An hour later Larrey was informed that he had been pensioned by the State and presented by Napoleon with a miniature likeness of himself set in diamonds.

When Napoleon was banished to Elba Larrey wanted to accompany him but the great leader bade him remain, declaring that he belonged to the soldiers of France. No sooner had Napoleon effected

his escape than he summoned Larry to the Tuileries and publicly expressed regret at not having done more to reward his meritorious services.

In the retreat from Waterloo Larrey's horse was shot under him by pursuing Prussians and he himself received two saber wounds. Later he was taken prisoner and at first mistaken for the Corsican, as he was wearing at the time a gray cloak exactly like Napoleon's. When his captors discovered their error they remembered that he had fired on them in attempting to escape and in their irritation promptly stood him up before a firing squad. Fortunately the Prussian surgeon who advanced, handkerchief in hand, to bandage his eyes recognized Larrey from having been one of his pupils in Berlin. By threats and prayers he secured a stay of execution—or murder—and had the prisoner taken before Gen. Bulow, who in turn referred the case to Blücher himself. During the Austrian campaign Larrey had been instrumental in saving the Prussian marshall's life and the debt was now discharged. Larrey was set at liberty and escorted to safety by one of Blücher's own aids.

After a brief period of oblivion following Napoleon's fall Larrey was restored to favor under the reinstated Bourbon government. A unanimous vote of the chamber of deputies renewed his pension. Louis XVIII appointed him surgeon of the royal guard. Under the government of Louis Philippe, Larrey was appointed senior surgeon to the Hôtel des Invalides. About this time he worked out the details for the organization of the medical corps of the Belgian Army. In 1834 he went to Italy for the express purpose of seeing Napoleon's mother and other members of the Bonaparte family whom he loved for the sake of the fallen leader.

When in 1840 Napoleon's remains were brought from St. Helena for interment in the splendid mausoleum prepared for them on the banks of the Seine, Larrey, now 74 years old, followed the procession, bareheaded and on foot, all the way from the Arc de Triomphe, though it was bitterly cold, the coldest day of the year. He was dressed in the uniform he had worn at Wagram. Tears streamed from his eyes.

At 76 Larrey, who for some years had been forgotten and ignored by the public in spite of all he had accomplished for his country (he never uttered a word of complaint), was sent on a tour of inspection of the military hospitals in Algeria. He died in Lyons within a few days of landing in France after completing the duty assigned. While his son was ministering to his last needs on earth a letter from Paris announced the death of Madame Larrey. In 1850 a statue was set up to the memory of Baron Larrey in the grand courtyard of the Val-de-Grâce. This ceremony was an occasion of national importance, and eulogies of the great surgeon and

good man were pronounced by many eminent in science or high in army and Government circles. Among the speakers was Roux,[1] representing the Academy of Sciences. His estimate of Larrey is interesting. He calls him the hero of humanity, the idol of the French soldier, and in quoting the famous words of Napoleon's will—"Larrey is the most virtuous, the most upright man that I have ever known"—recalls the fact that Marcus Aurelius used almost identical language in regard to Galen, and Louis XIV in regard to Lamoignon when urging him to accept the presidency of the parliament of Paris. On the professional side he credits Larrey with great ability as a military medical officer, as an organizer, as a pioneer in the adequate and systematic relief of the wounded. He calls attention to Larrey's use of *débridement* (a word heard often to-day) in gunshot wounds, to his fine work in the treatment of fractures by immobilization, his belief in the prompt amputation of limbs where the destruction of tissue has been excessive, his studies of frostbite, his method of disarticulation at hip and shoulder, but condemns Larrey's disinclination for the primary suture of wounds. The favorable and unfavorable comment are alike a panegyric of a surgeon who had neither aseptic nor antiseptic methods, much less an ancillary bacteriological laboratory at his command, but whose patients got well.

Larrey left an imperishable name. Other men have devised operations, worked cures, contributed to the progress of science, but their names are known only to the student who disturbs the dust on the worm-eaten records of medical history. Larrey's fame is a living inspiration, because back of his native talent and the skill acquired through laborious effort there shines a character made beautiful by purity, unselfishness, and unassailable integrity.

A single sentence from Napoleon's testimony to Larrey's virtue has been quoted a thousand times. The rest of what he said is not so well known. The omitted sentences are practical and specific. They contain a wonderful rebuke to the military surgeon who can always be found at headquarters, to the Navy doctor who attempts to administer the sick bay from the wardroom and wins a favorable report by playing a good hand of bridge in the cabin.

"In the most inclement weather and at all times of the night or day Larrey was to be found among the wounded. He scarcely allowed a moment's repose to his assistants and kept them eternally at their posts. He tormented the generals and disturbed them out of their beds at night whenever he wanted accommodations or assistance for the wounded or sick. They were all afraid of him, as they knew he would instantly come and make a complaint to me. He paid court to none of them."

[1] Philibert-Joseph Roux, who succeeded Dupuytren at the Hôtel Dieu of Paris and was a pioneer in operative gynecology.

EXTRACT FROM A SURGICAL MEMOIR READ BY BARON LARREY BEFORE THE ROYAL ACADEMY OF PARIS, FEBRUARY 19, 1819.[1]

Translated by G. A. LUNG, Captain, Medical Corps, United States Navy.

The merit in this translation is its value as an incident in medical history. The operations described were performed by one of, if not the most famous of military surgeons known. They are conspicuous in that they were undertaken at a time when few surgeons had the hardihood to undertake such tasks. Anesthetics were unknown. Hemorrhage during operation, suppuration, and secondary hemorrhage were always likely complications that deterred many surgeons from entering into fields where now they safely venture.

At the time that Larrey performed these operations the armamentarium of the surgeon, except for certain elegancies and refinements, was much as it is to-day. Suppuration was regarded as inevitable and accepted as a matter of course. Where it did not occur in abundance and for a protracted period it evoked some surprise and a profound sense of satisfaction in the surgeon. Such a happy condition, when it happened, was probably due to some fortuitous act in the ordinary effort at cleanliness, or some fortunate action of the various substances that were applied in the dressings. Of course, too, it is to be observed that certain patients in combination with other favoring circumstances may have been spared infection through their own natural powers of resistance. Larrey's success in this respect may have been largely due to his use, for a period prior to operation, of tonics to build up the health of the patient and thus increase his resistance to suppuration and shock. It is also possible that his practice of using mercury locally for a period prior to operating may have had something to do with the rapid recovery from the immediate effects of the operation.

The case of Nicholas Moret is interesting because the detail and exactness of the description of his case by Larrey makes it resemble the record of a hospital patient of yesterday.

He calls the affection a tumor, but implies that it was a cancer that had not yet undergone "cancerous degeneration."

From his very careful description of its appearance, location, size, structure, and duration, it was in all probability a lympho-sarcoma.

The points conspicuous in Moret's case are: The surgeon's great anxiety to control the hemorrhage; that the wound was cleaned and a styrax ointment was applied covering the entire area of the operation; that the patient bore the operation with great courage, and that he suffered a period of what is now termed surgical shock; that the operation was accomplished in 50 minites; that the wound healed in 31 days.

In the volume from which this translation was made there appears a wood cut depicting the appearance of the tumor before operation.

The case of Madame de L. is even more interesting. Judging from the description of its appearance it must have been a carcinoma. Larrey's method of extirpation of the cancer was essentially the same as the accepted one of this day and described in text books as the Halstead operation.

It is amazing to think of one undertaking these operations without an anesthetic, and equally so to read how promptly the patient recovered.

The case of Madame de L. was one of several Larrey operated on successfully. In the record of the Moret case he states that he had removed the breasts of 15 or more women afflicted with cancer, and that no recurrence manifested itself in periods of from 3 to 10 years following.

[1] From "Traité de la Maladie Scrophuleuse," by C. C. Heufeland, Paris, 1821.

In this translation the writer makes no claim to being proficient in the French language. It was literally dug out with the use of the dictionary and, on occasions, with other help. It is offered as a small contribution to the study of medical history.

I am not aware that it has been translated.

DESCRIPTION OF AN UNUSUAL OPERATION, TOGETHER WITH SOME OBSERVATIONS ON THE NATURE OF THE DISEASE NECESSITATING THIS OPERATION.

If the nations have experienced deep afflictions as the result of the last war, which extended its theater of operation throughout all of Europe and over a part of the New and Old Worlds, humanity has found in French surgery a real source of consolation. And during this memorable war this art has made such great progress, it has, perhaps, attained its highest degree of perfection.

The numerous and bloody conflicts which our armies endured in all countries have supplied military surgeons, guided by leaders full of years of devotion, with numerous opportunities for experiments, whose happy results have served to simplify many surgical problems hitherto considered insoluble. But in order to reach this much-desired goal, military medical officers have had to unite genius and intelligence to a firm and indomitable courage, by which they have braved dangers, surmounting all obstacles and opposed by prejudice and routine.

If we may presume to mention ourselves among those gentlemen who have distinguished themselves in these matters, we shall remind the Academy of Science of those memoirs on the principal points of our art which we have had the honor to communicate to it at various times. May it permit us, however, to refer again to the subject of some of the most striking of these memoirs.

Some had undergone, according to a method of our own, amputation of the arm at the shoulder, others that of the thigh at its upper joint, others, again, opening of the chest with resection of a rib for the extraction of missiles lost in that cavity.

In short, many others, not less remarkable, have specially attracted the attention of the commissaires receiving these memoirs.

The skill we have acquired in the practice of these large and difficult operations has made us undertake, against the advice of several famous surgeons at this capital, the one that is the subject we are about to report, and the observations which accompany it.

Nicholas Moret, aged 40, farmer, born and living in the country about Louviers, of a robust constitution but with scrofulous idiosyncrasy, presented on the left side of the neck a tumor, lobular, slightly mobile, indolent, and without any change of color of the skin. It stretched from the mastoid process, along the jaw, filling

all the deep hollow of the neck to the larynx, forming in front of the maxillary bone a projection about the size of two fists. This tumor had developed 10 years before. The patient, after submitting in vain to several treatments, went to Paris during July, 1818, to consult the best doctors. Their opinions, heard separately, were very different. Some advised extirpation of the tumor without manifesting any desire to operate. Others regarded an operation as highly dangerous. Others again were undecided as to what to do.

His hopes dashed, Moret left Paris and returned to his home in Normandy deeply distressed at his condition. However, he fell in, by chance, with one of our own soldiers whose arm had been amputated at the shoulder, and who strongly advised him to return to Paris to see the surgeon who had operated on him. And Moret came to seek us toward the middle of November of the same year.

After having examined the tumor with great care it was easy to determine its character and to foresee the serious consequences it would entail if not promptly removed. This indication seemed positive and what made its execution more urgent was the fact that the disease had arrived at the stage where cancerous degeneration usually sets in. We had already seen three different patients die from the same malady and in which its spread had been so rapid that the surgeons consulted, not daring to operate, remained simply spectators of the sufferings and the process of strangulation which soon ended the days of these three unfortunates.

On the other hand we might well have been deterred by the tragic accidents that had happened to several of those who had removed tumors similar to this of our patient. But we overcame this obstacle by the certainty of controlling the hemorrhage by means of ligatures and compression.

We were not deterred by the fear of meeting the criticism of those who were probably less skilled in the exercise of their art.

Having thus carefully considered the possibilities of the operation and its results, the patient being perfectly in accord, we decided to operate as promptly as possible. To this end we consulted with those two enlightened physicians, Messrs. Chaussier and Ribes, who coincided with us in the urgent necessity for removal of this huge tumor already producing mechanical pressure on the principal vessels of the head, the larynx, the tracheal arteries, putting the patient in the greatest danger.

All being arranged we proceeded to operate November 16, 1918, assisted by one of the consultants, by M. de Lacaze, surgeon major of the 2d Regiment of the Swiss Guard, and Messrs. Grinelles and Desrulles, major assistant surgeons to the Hospital of the Royal Guard.

The patient being laid on a specially made bed, we traced in our minds the plan of the operation such as we shall describe, anticipating above all to take every precaution necessary to prevent hemorrhage of the many arteries to be cut, the only dangerous accident to be feared. However, the intelligence and skill of the assisting surgeons reassured us as to this danger, and moreover we said with Celsus, "Melius est anceps experiri remedium quam nullum."[1]

By means of an incision paralleling the edge of the jaw we first cut the skin covering the surface of the tumor. Three other incisions crossed it at right angles, one followed the anterior edge of the sternomastoid muscle to the clavicle, the second, the center of the tumor, and the third smaller one followed the immediate line of the larynx. The strips resulting from these incisions were promptly detached from the exposed surface of the hardened mass.

Several arteries cut in these incisions were successively tied and we continued the dissection until the tumor was isolated for about three-fourths of its circumference. Deep cellular furrows divided it into several lobes of different sizes. These were like so many paths by which we arrived at the roots of the tumor. Carefully following the layers of these furrows, we detached these glandular bodies, the tissues being easily cut by means of a button bistoury.

The largest and most prominent part was thus soon shelled out. Its pedicle being two large vessels we passed a ligature about it before cutting them. Removal of this glandular body involved the jaw, which we found necrosed to a depth of several lines, disclosed the other tumors, and facilitated the rest of the operation. One of the glands was embedded in the interval of the transverse apophysis of the second and third cervicle vertebrae and was removed with the same precautions.

The second one, of an egg shape, and the size of an almond, was involved in the sheath of the common carotid artery. Nevertheless, it had to be removed like the others or else the malady would have reproduced itself. After having firmly compressed this artery below the gland, we cautiously cut its sheath. We detached it by means of the button bistoury. Its removal completely bared this main vessel, but everything was prepared for its ligation in case of accident.

The third gland, composed of several lobules, adhered to the left side of the larynx, the genio-glossal muscle, and the hyoid bone. Its extraction, though difficult, was equally successful.

We can even feel sure that not a single glandular fragment remained within the seat of the infection. We can venture to guarantee that there will never be the least recurrence of trouble in all this region of the neck and head.

[1] It is better to try a hazardous remedy than none.

More than 15 arterial vessels were tied. Among them we may mention the external maxillary or common labial, the submaxillary, the occipital and superior thyroid, and a number of others of some size developed by the malady.

Several nerve fibers of the facial, vagus, lingual, and Willis's accessory on its way across the sterno-mastoid muscle were cut.

The incision washed and cleansed, we approximated the edges, fastened it with a score of sutures, adhesive plaster, and fenestrated linen, covering with a styrax ointment which covered all the region upon which we had operated. We were careful to fasten the ligatures at the open angles of the incision. Lint and an appropriate bandage completed the dressing.

The patient had borne the operation with the greatest courage, although it lasted 50 minutes in all, but some moments afterwards he was seized with a marked syncope followed by a chill of a febrile nervous character, a transitory but unavoidable accident. Perfect calm succeeded this storm, and for the first time for a long while this farmer enjoyed the benefit of peaceful sleep.

The happy outcome of this extensive operation made us forecast favorable results, and, as it was, the patient grew better and better, and the first three days passed without the least drawback, except a slight temporary fever the night of the third day following the operation. The first dressing was lifted on the fourth day. It was saturated with purulent matter and without one drop of blood, all the stitches taken in the wound being already reunited, and, with the exception of the opening we had left in which to place the ligatures and favor the draining of the fluids, all the incisions were almost entirely healed. The ligatures fell between the ninth and tenth days, and shortly afterwards the edges of the wound corresponding to the passage of the ligatures were themselves joined, so that the patient was cured on the thirty-first day from the operation and left for home on the forty-first with every sign of perfect health.

We examined the glandular tumors with great care. All were enveloped in membranous tunics of a dense tissue, red in color. The deepest layer of these was furnished inside with very thin partitions like those observed in the lemon. The substance interposed between these gray and white layers can not be better compared in appearance and density than to the pulp of that fruit. It was firm, elastic, like half-cooked albumen, so that in cutting one of the glands across the fleshy tissues of each of them, it swelled and exuded by a sort of erectility. It was hard to tear the tissue. These membranous envelopes evidently received nerves and vessels, and they also appeared to be endowed with vital properties in varying degrees, so that irritability of the blood vessels and lymphatics had been increased in our farmer, which were produced in the glands of the

neck by some predisposing local cause unknown to us; first inflammation, then stagnation of the lymph occurred in the interior of this glandulous system, whence there resulted permanent engorgement and tumefaction.

During the first period this was slow and gradual; later the progress was more marked. In other respects this disease presented the same phenomena in all subjects attacked by it, with the exception of some variations depending on age, sex, and temperament.

In general this morbid condition, without being accompanied by local pains, attacks the integrity of the neutritive functions and one of its principal effects which has not been noticed by writers is the unnatural and asthenic dilatation of the arteries, especially those near the tumors.

* * * * * * *

Mme. de L., of Rouen, 62 years old, went to Paris early in the spring of 1816 to consult the best doctors about an enormous cancer of the right breast that she had had for several years. The celebrated Laumonier, chief surgeon of the Hôtel Dieu, at Rouen, twice operated upon this case, amputating first the scirrhous breast and then the tumor associated with it which this lady developed after the first operation, the latter reproducing itself just as the first was healed.

When we saw this lady for the first time the cancerous tumor was about the size of a child's head. It was depressed in the center, caused by its adherence about the cicatrix, which had contracted at this point, while its circumference presented a series of vesicular tubercles of bluish color and of different sizes, separated one from another by fissures from which oozed a yellowish ichorous humor of an extremely fetid odor. The skin covering this tumor was mottled with numerous and very large varicose veins. The glands on the same side were engorged and one of them formed part of the tumor. The arm on the affected side was engorged and almost immovable, and the patient suffered lancinating pains, depriving her of sleep and keeping her in a state of constant anxiety.

The majority of physicians consulted had judged a third operation impracticable and useless. Madame deL., in despair, was on the point of returning to Rouen when, by the advice of one of the ladies upon whom we had operated several years previously, she came to consult us. In spite of the gravity of the disease, of which we have described the principal symptoms, we entertained a hope for the success of a third operation if preceded by the treatment before mentioned. The patient accepted our proposition with joy, and that very same day submitted to this treatment, which was continued for six weeks. It resulted in marked diminution of the

lancinating pains and the resolution of the axillary glands, except those forming part of the tumor, which remained about the same size.

After these preparations we called in consultation the physicians who had aided us by their knowledge in the Moret case, Messrs. Chaussier and Ribes. They approved the operation that we suggested, and, although its success was very uncertain and its execution difficult and dangerous, they agreed that it was necessary and preferable to the caustics that some doctors advise. In short, we performed the operation in the presence of the doctors consulted, assisted by one of our pupils, M. Desruelles.

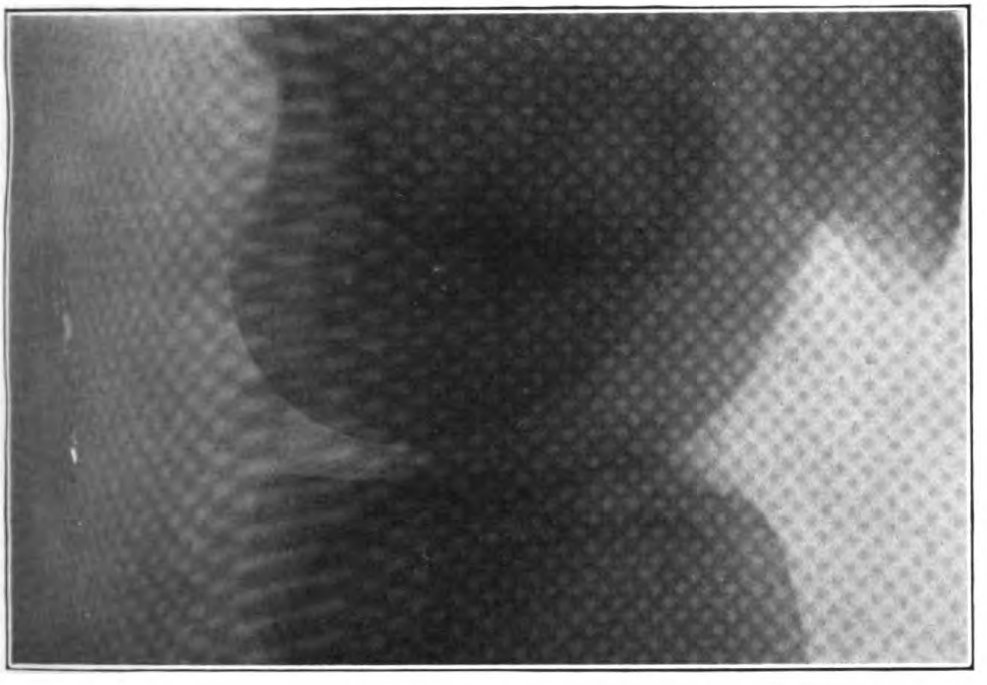
In amputating the tumor we preserved as many of its inclosing integuments as possible, but we had to remove a layer of the large pectoral muscle, to which the cancer adhered. We then prolonged the incision toward the armpit to extract the glands tainted with the cancer. After having extirpated the roots we proceeded to tie the vessels and draw together the edges of the wound, which had a truly frightful appearance.

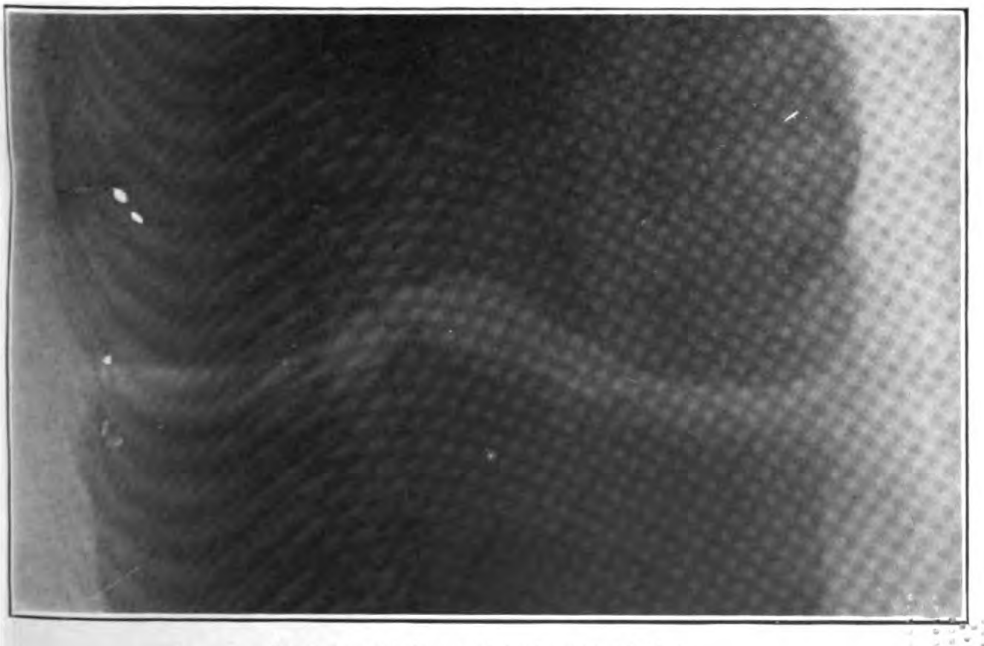
The cancerous mass we removed weighed 2 pounds 3 ounces. It was composed of ovoid fungous bodies of different sizes, scattered inside with cells filled with a blackish and oleaginous fluid. These cells were separated by fibrous membranes, thick and opalescent. In short, this cancerous mass presented a peculiar aspect not ordinarily observed in cancer of the breast.

The wound ran its course without any accident and reached complete cicatrization before the sixtieth day. We doubtless prevented any recurrence by the care taken in operating not to leave a particle of scirrhous tissue and by the treatment with which we followed it during the first years succeeding operation. This lady, who recently came to see us in Paris, enjoys perfect health. The scar is white, firm, and painless, although adherent to the ribs.

We presume to think that these facts and the observations that accompany them may suffice to encourage young practitioners and prove to the public that there are very few diseases, at least those not in their last stages, that may not be attacked with advantage, provided, of course, that treatment be administered with discernment.

108396—19——8





Fracture of inter-condyloid spine of tibia.

the block, being used to hoist the anchor, was under heavy tension and flew about 10 feet. After striking the patient, who was thrown 8 feet in the air, the block glanced off and struck a large galvanized-iron bucket filled with sand. The impact was so great as to flatten this bucket. The patient was wearing a pair of high hip boots folded down in such a manner that the part of the leg struck was covered by about four thicknesses of rubber. For a moment, the patient was unconscious. Then, there was a severe pain in the leg—pain increased by motion. There was marked swelling, ecchymosis and a large hematoma of both thigh and leg. Hot applications gave no relief. The following morning the patient was removed to the French hospital at L——. The leg was extended and placed in a wire splint. On the third day the hematoma was evacuated by a large trochar, a pint or so of thick, bloody fluid being withdrawn. An attempt to walk failed and he spent two weeks in bed. After hobbling about for another two weeks without improvement patient was conveyed to this hospital. On admission, the knee was found to be somewhat swollen and slightly flexed and there were varicosities of the superficial veins on the posterior surface of the leg. X-ray examination showed a transverse fracture of the intercondylar spine of the left tibia in good position and with some excess of callus.

Persistency in passive and active motion has resulted in complete restoration of flexion and almost complete extension of the leg on the thigh, although there is still a sense of grating in the joint on motion.

A CASE OF FRACTURE OF PELVIS.

By G. G. Ross, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

E. E. W., boatswain's mate second class, age 28, was admitted to United States Naval Base Hospital No. 5 on April 4, 1918. We were indebted to the medical officer of the U. S. S. *Panther* for the following history of the accident.

At 4.30 p. m., April 4, patient was in a motor boat alongside the U. S. S. *Panther*. He was helping to transfer heavy sheet steel. Three sheets (6 by 9 feet) weighing about 3,000 pounds, were lowered by tackle and pulley from ship's deck to motor boat. Upon reaching the bow of the motor boat one end of the sheet-steel pieces (which were slung together) struck the boat, jarring all three pieces, then fell about 15 feet and struck the patient, with their entire weight, on his left hip. The patient was thrown against his left hip and the side of the boat against his right hip. The motor boat yielded to the impact and thereby lessened the severity of the injury. The patient did not become unconscious and was carried to sick bay

immediately. He had difficulty in voiding urine which was somewhat bloody. The medical officer was able to elicit crepitus in the left hip joint on straightening out the leg. There was no shock.

The patient was admitted to the hospital two hours after the accident. He was catheterized and no evidence of rupture of bladder or urethra was found. The urine was bloody, but the blood was not clotted and it was well mixed with urine. This blood might easily have come from the kidney or from the contused bladder. Urinalysis was negative except for blood.

On examination the man complained of pain all over the pelvic region, most marked over the left hip, in the right groin, and in the small of the back. The application of inward pressure simultaneously to both hips brought on extreme pain. He was especially tender in the right groin and also over the sacro-iliac regions.

X-ray examination showed the following, April 5, 1918. Fracture of descending ramus of pubis on both sides. Dislocation of left sacro-iliac junction; partial dislocation of right. Whole left side of pelvis is pushed upward and backward about 2 inches. Stellate fracture at bottom of right acetabulum. Head of femur driven into acetabulum making a central luxation of first degree.

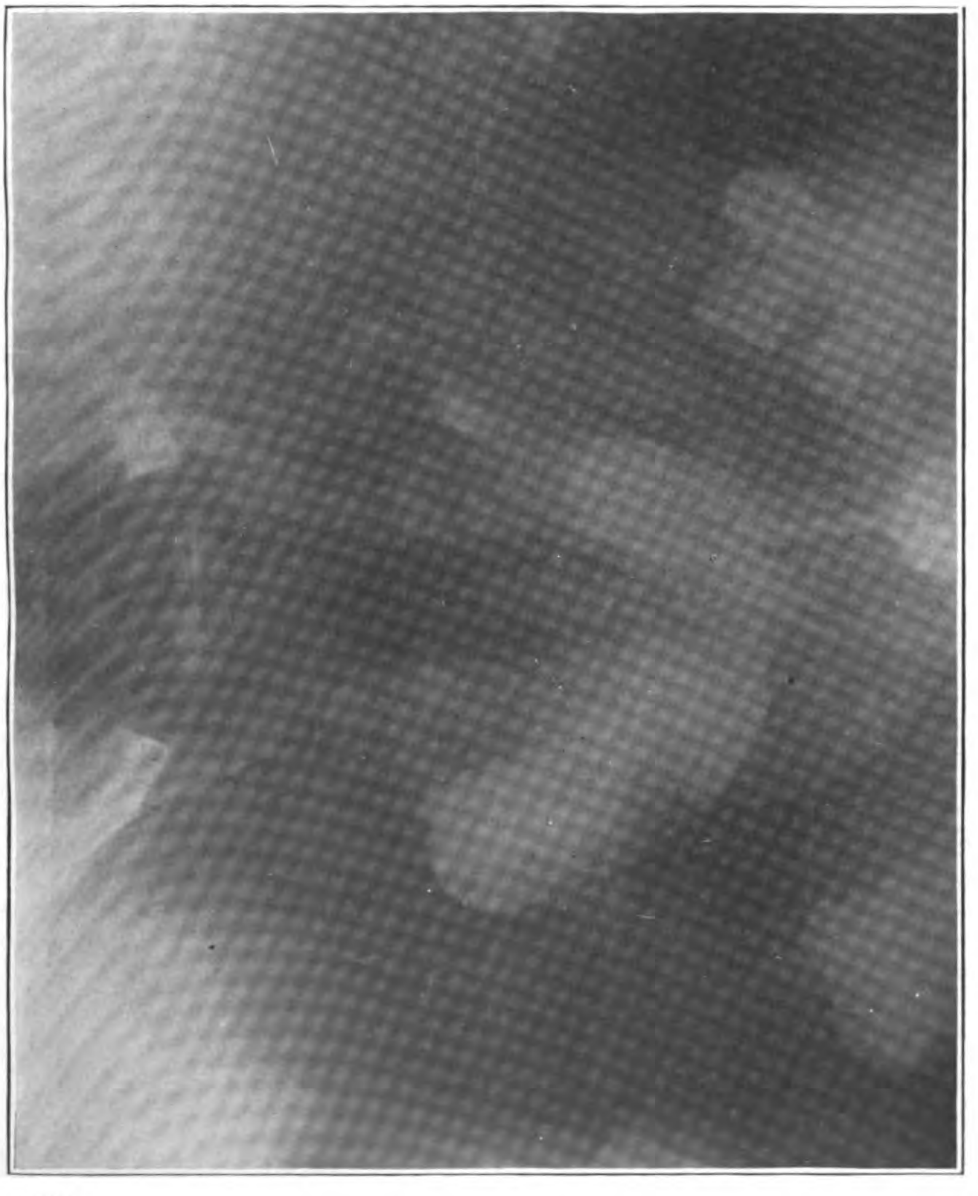
He was placed on Bradford frame and the pelvis incased in an adhesive plaster belt, extending from above the crests of the ilii to below the great trochanter and completely encircling the body. At the end of a week an abdominal pelvic appliance, made of canvas and laced in front, was substituted for the adhesive plaster. Great care was exercised in moving the patient, as a false move could have resulted in puncturing the bladder or in cutting the urethra. Four men on the same side of the bed, all lifting at the same time, were able to raise him in a perfectly horizontal plane, and without discomfort. At the end of two weeks he was able to sit up in bed and to flex both thighs on the abdomen.

CHRONIC ARTICULAR RHEUMATISM CURED BY REMOVAL OF DISEASED APPENDIX.

By R. H. Michels, Lieutenant, Medical Corps, United States Naval Reserve Force.

This case is interesting on account of the sudden and complete relief from prolonged and intense suffering due to chronic articular rheumatism afforded by an appendectomy.

Sergt. L.—— R.———, United States Marine Corps, while on duty at Guam, was admitted to the sick list during March, 1918, with a diagnosis of chronic articular rheumatism. The knees, ankles, phalangeal joints, and right shoulder were the principal parts affected. March 30, 1918, he was transferred to the United States



296–1

Fracture of ischiopubic ramus. Luxation of l. sacro-iliac synchondrosis.

Fracture of pelvis.

296–2

Naval Hospital, Mare Island, Cal. He obtained sick leave during May, and while visiting his relatives in Chicago I was called and treated him for a severe recurrence of rheumatism, and later he was transferred to the United States Naval Hospital, Great Lakes, Ill. July 27, 1918, he was discharged to duty and was attached to this recruiting district. He worked in the office on light duty, but with frequent recurrences of rheumatism, until November 4, 1918, when his disability required transfer to the United States Naval Hospital, Great Lakes. I recommended an exploratory operation on account of a constant tender area in the region of McBurney's point. All other points of possible focal infection being negative, it appeared probable that his frequent recurrences of rheumatism were due to some infective focus in the region of the appendix. Appendectomy was performed on December 6, 1918, at the United States Naval Hospital, Great Lakes, Ill., and I was informed that the appendix contained three concretions and was in bad condition. January 2, 1919, he was discharged to duty, well.

From the beginning of the chronic articular rheumatism, which really began about three months before his first admission, until December 6, 1918, he had never been entirely free from pain for a day. The patient informs me that he went on the operating table with rheumatic pains and stiffness, especially in the shoulder joints, and that was the end of it. Since January 2 his duty at this recruiting station has required him to be outdoors in all sorts of bad weather, without even a reminder of his former trouble. I believe he is permanently cured.

A CASE OF MYELOID LEUKEMIA.

By E. R. Ryan, Lieutenant, Medical Corps, United States Navy.

L. R. G., seaman, age 21, married, came to sick bay on board the U. S. S. *Arkansas* on October 8, 1918, complaining of "stomach trouble" and constipation.

Family history.—Father, age 49, living and well. Mother, age 47, living and well. One sister, the oldest child, was stillborn. He has five brothers, all living and in good health. No family history of epilepsy, insanity, or tuberculosis.

Past history.—Had whooping cough at age of 4, mumps at age of 8, measles at age of 9, and diphtheria at age of 11. All these diseases were uncomplicated and patient had complete recovery. Had malarial fever at the age of 13, and another attack at the age of 19.

Nervous system.—Has had occasional headaches for past four or five years. No dizziness or tremors. No history of epilepsy. Hearing and eyesight have always been good.

106396—19——9

Respiratory system.—Has had frequent attacks of influenza. No history of cough or expectoration. No night sweats. Has lost some weight, approximately 10 pounds, during the last year.

Circulatory system.—Has dyspnea on slight exertion. No palpitation, edema, or swelling of feet.

Gastro-intestinal system.—Appetite has always been good. Bowels were always regular until the past four months, when he began to be troubled with persistent constipation. Never troubled with nausea or vomiting.

Genito-urinary system.—No history of gonorrhea or syphilis. No skin disease or alopecia. Has had to get up at least once a night for the past four weeks to urinate. No frequency of urination during the day.

Habits.—Up to about six months ago patient drank about four glasses of whisky and a glass or two of beer daily. Smoked and chewed tobacco moderately.

Present complaint.—Patient complains of pain in the stomach, which is continual, dull, and gnawing in character and aggravated by eating. He has frequently been nauseated during the past four or five days, but has never vomited. He has been persistently constipated during the past four months. He also complains of a mass on his left side, which he first noticed two months ago, and which is slowly becoming larger. His color has been poor of late and he complains of general malaise and loss of energy. There has been annoying pruritus of the scrotum and anus during the past two weeks.

Physical examination.—Patient is about 5 feet 6 inches tall; weighs 125 pounds. His complexion is sallow or yellowish white. Body is well nourished.

Head and neck.—Scalp is negative. He has a few small palpable glands on either side of the neck, just below the clavicles. Pupils are equal and react to light and accommodation. Ears and nose negative. Tonsils are visible and the pharynx greatly injected. Teeth good. Gums negative.

Chest.—There is a slight bulging of the chest on the left side, beginning at the seventh rib and extending downward.

Dullness of the left chest, which starts at the sixth rib and tapers to absolute flatness at the costal border. Dull area extends from the midclavicular to the posterior axillary line. Percussion negative over rest of chest.

Breath sounds were normal over entire chest, except over the dull area. The sounds over this area were distant and a coarse leathery friction rub was heard. Patient complains of no pain in this locality and deep breathing gave him no pain.

The apex beat was in the fifth interspace about 9 centimeters from the midsternal line. There was no enlargement or displacement of

EDITORIAL.

THE LESSON OF JOB'S WAR HORSE.

The trend of American writers on war neurosis has been toward emphasizing the importance, as a preventive measure, of greater care in the selection of recruits. That too much care can not be taken at the recruiting office is generally admitted. The weeding out at camps and training stations of the vagrant, the ne'er-do-weel, the potential criminal, the mentally unfit, is of incalculable advantage to the military services, but it is not enough in respect to war neurosis since the approximately normal are subject to this affection.

A broader conception of the whole subject is suggested by the able paper of W. H. R. Rivers, in Mental Hygiene, October, 1918, entitled "War Neurosis and Military Training," which is a report to the Medical Research Committee, London. It should be read by all those who are particularly interested in war neurosis or concerned in a general way with military training.

While Rivers does not specifically make the statement, it may be legitimately inferred from his arguments that military unpreparedness and the hurried and intensive training necessary to atone for that unpreparedness are no small factors in the production of war neurosis. It is known, of course, that such cases developed in the seasoned regulars, as well as in the raw recruits of the British Army, but this does not invalidate the proposition just affirmed if what he has to say about esprit de corps, the value of discipline, the relation of officers to their men, the importance of athletics is true. In all these things the *element of time* is an important consideration. To really play the part of elder brother or father to his men an officer must have something more than good will and good intentions. If he has not the wide range of information about his profession which will inspire confidence, he must have had experience in leadership such as the upper-form boys, acquire in the public schools of England—Rugby, Winchester, Eton, Harrow, etc.—which correspond in no sense to what we call public schools but rather to the academies at Exeter and Andover, to Culver, Groton, the Virginia Military Institute, etc.

The world knows now, and we have always known, that the American will fight and fight well but, alas, a good fighter may be a poor soldier. We may see many reasons for this or merely regret the fact, but at any rate the good fighter who is a poor soldier will have to pay

the penalty of brief superficial training and intensive hot-house methods and so will the Government and the Nation.

The word *repression* looms large in what the psychiatrists have to tell us about war neurosis. Rivers brings out the point that repression is a significant feature of the training camp. "A person who is being drilled is taken from our highly individualistic community, in which spontaneity and independence are encouraged, and is subjected to a course of training calculated to produce a state allied to that of existing communistic peoples or of animals which are accustomed to act in herds. One result of such a training, if it be not indeed also its chief aim, is to enhance the responsiveness of each individual to the influence of his fellows and the form which is taken by military training is especially designed to enhance his responsiveness to those who are immediately above him in the military hierarchy. * * * The other aim of military training which especially touches the liability to different forms of neurosis is to fit the soldier to withstand the trials and stresses of warfare. One of the chief instruments by which this aim is met is the one already considered which makes the individual soldier act as a member of the aggregate to which he belongs in a closer sense than holds good in civil life. This does away with or diminishes greatly the tendency of any one individual in the group to react to fear or other emotional state in a way which would interfere with his military competence. * * * Repression forms a necessary part of all education and adaptation to social life. *Perhaps the most important feature of the repression of military training is the relatively late period of life at which it takes place.* (Italics ours.) The older a person is the more difficult it becomes for him to give up habitual modes of thought and action. *It is where repression is incomplete and is the source of persistent mental conflict that it becomes a factor in the production and maintenance of neurosis.* (Italics ours.) If the repression which forms part of military training is complete it probably helps greatly toward the success of the repression which will become necessary when the soldier enters upon active service, but if it is incomplete, so that the soldier enters upon active service accompanied by the active conflicts so aroused, his success in the necessary repression of warfare will be prejudiced. * * * When the soldier is brought into contact with actual warfare a new set of repressions come into action. * * * It seems clear that different batallions show the incidence of neurosis in very different degrees, and this is probably due more than anything else to the nature of the relations between officers and men by which the private soldier acquires toward his officer sentiments of duty and trust, while the officer is actuated, it may be dominated, by interest which could not be greater if those under his command were his own children. * * * Any-

one having much to do with those who have taken part in the fighting of the present war must have been struck by the extraordinary manner in which an officer, perhaps only just fresh from school, has come to stand in a relation to his men more nearly resembling that of father and son than any other kind of relationship."

From all of the foregoing we deduce that, so long as the country is under the sway of pacifists who deny the possibility and probability of war and of those who in practice, if not in theory, agree with them and reject all effort to prevent war by preparing for it, we shall go into war whenever it comes with a maximum risk of war neurosis, because soldiers can not be trained overnight to shoot straight and live straight or to practice repression, whatever may be their spirit as fighters when they actually go over the top.

The power of repression spoken of by the psychiatrist is nothing more than the inhibition of ordinary pedagogic language. The training for this must begin in infancy and be continued to adult life. Universal physical training, a maximum of military training for those of military age, participation by all the students in our colleges who are not actual cripples in athletic games of one kind or another instead of the exaggerated training of the few to perform in a gladiatorial way under the eyes of the many—these are other features of a serious and determined effort to prevent neurosis in our next war.

With a far larger Army, Navy, and Marine Corps as a nucleus it will not be so necessary to employ the hasty methods made imperative by our predicament in 1917 and the life in camp, the special training of officers and men, can be lengthened, amplified, and rounded out so that they will not have to be rushed to the front before they have thoroughly accommodated themselves to the novelty, the restrictions, the trials of the early stages, so that they will not be subjected to the difficult process of accommodating themselves to the environment of war before they are even inured to the life of the camp.

The successful prophylaxis of war neurosis lies in the cultivation of inhibition or repression beginning in the nursery or kindergarten and continued through the period of military age; in the general development of physical prowess through participation of all youth in games and athletics which have a disciplinary and moral value; in such regular and prolonged military training as is calculated to make its details matters of habit and routine. Incidentally, of course, the defective, the degenerate, and the habitually vicious should be excluded.

To use plain language, war neurosis is in part based on some form of fear. Fear is practically universal in war, but it is controlled and dominated so it is not a matter of reproach. We have learned rather generally to call that man truly brave who with a full realization of the magnitude of a given peril faces it through subordination of fear

to other emotions. The war neurosis developing in the private is commonly due to defective inhibition of the instinct of self-preservation. In the officer the fear, equally real and disturbing, which induces neurosis is usually not so much of bodily harm as of failure to meet the responsibilities of his position. He is able to inhibit the fear of bodily harm in part through the previous circumstances of his life and in part through the nature of his position, but yields to an anxiety neurosis in regard to that very position.

That form of epidemic or contagious fear which we call panic leads to the precipitate flight and rout of regiments, of armies, and may wreck a cause with little damage to the individual. There is no consequent war neurosis because the disintegrating effect of internal conflict is lacking. A wave of emotion, sudden and transitory, affects a multitude at once and passes over it without mental or physical after effects. Overwhelming odds unexpectedly developed, errors of tactics or strategy so colossal and conspicuous as to be appreciable to the mass and destroying confidence in leaders, make the attempt at inhibition useless or seem useless to the multitude and solidarity still remains; the men act en masse rather than as individuals.

A homely illustration of the power of inhibition developed by training may be found in the horse, timidest of all animals, yet capable of becoming a valuable coadjutor of man in war, racing to the charge with keener relish the higher his spirit and breeding, the greater his nervous energy. What lover of horses but thrills at the following beautiful description:

> Canst thou make him afraid as a grasshopper? The glory of his nostrils is terrible.
>
> He paweth in the valley and rejoiceth in his strength; he goeth on to meet the armed men.
>
> He mocketh at fear, and is not affrighted; neither turneth he back from the sword.
>
> The quiver rattleth against him, the glittering spear and the shield.
>
> He swalloweth the ground with fierceness and rage; neither believeth he that it is the sound of the trumpet.
>
> He saith among the trumpets, Ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting.—Job xxxix, 20–25.

Similar conduct in a charger of to-day is the result of long training in habits of obedience to the rider's will, of unabused confidence in that rider's judgment, of such prolonged familiarity with sights and sounds like the flash of gunpowder and the roar of cannon that they no longer terrify. On the other hand, *instinctive horror of a dead animal of his own kind*, the *fear provoked by the smell of a fresh equine carcass*, often renders the best steed unmanageable. This is probably *the one experience of battle for which he has not been prepared by military training in time of peace, and it is too painful an experience to be covered by a limited, undeveloped repression.*

Ideal type of sanitary drinking fountain with rim to prevent contact of lips with spout.

SUGGESTED DEVICES.

SANITARY DRINKING FOUNTAIN.

By D. S. HILLIS, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

The sanitary drinking fountain designed by Captain C. M. De Valin, Medical Corps, United States Navy, is in use at the United States Naval Training Station, Great Lakes, Ill. This design seems to fulfill the requirements better than any fountain so far devised. The illustrations show the usual and proper method of use and the action of the ring in preventing direct contamination of the spout.

CLINICAL CHART MADE BY A RUBBER STAMP.

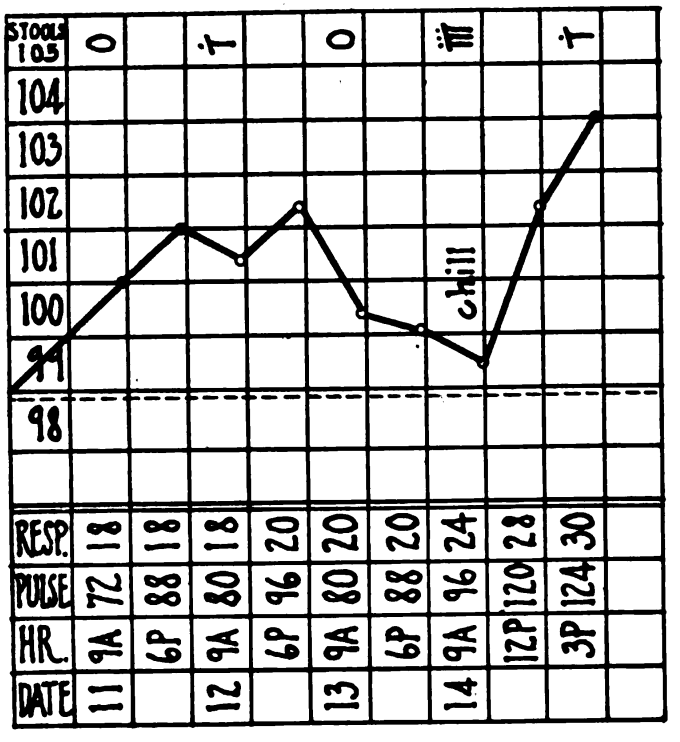
By J. J. CANCELMO, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

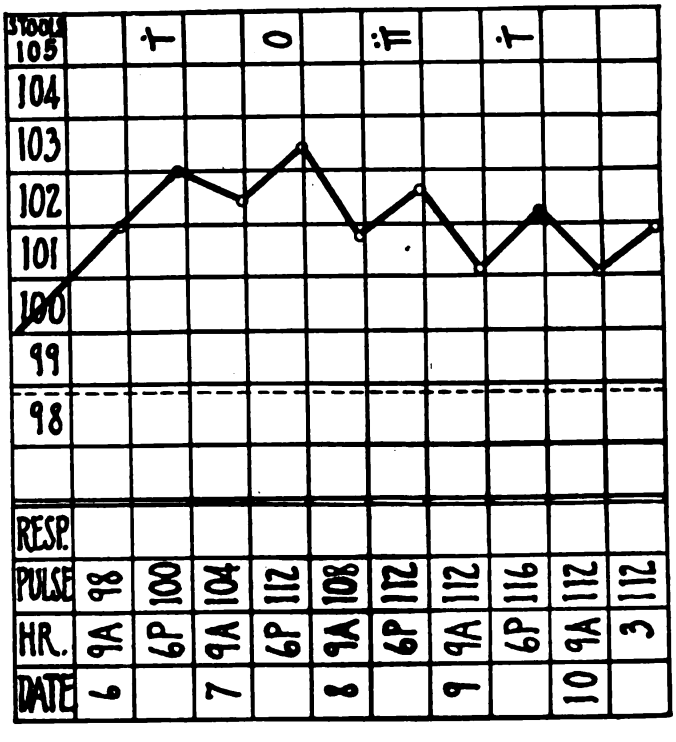
For the medical officer who wishes to give his brother officer a better idea of a case, a simple means of showing temperature, pulse, respiration, and number of stools should be of value. A rubber stamp may be made which will print a chart; such a stamp does not take up too much room; it is easily written up and tends to make the medical officer more careful.

The stamp need not be used in all cases, but only when a patient is transferred because of some complication which would be better treated at a hospital. Thus in figure 1 there is a case of pneumonia as a complication of influenza. The little effort in writing up a chart does more to make clear the patient's condition than a lengthy written statement. This is because the chart is graphic. Too frequently patients are sent to hospitals with little more than a diagnosis. The hospital medical officer is entitled to more than this. He should be given all the necessary clinical data that will make the patient's condition clear to him.

The chart would be of more value at sea, for it could be used with all febrile cases that are transferred. It might be also used in cases in which a permanent record is desirable because of some pending legal action.

The rubber stamp was ordered through the quartermaster in the usual way; that is, by drawing the necessary lines and figures on an N. M. C.-G. M. Form 637.





MEDICAL HISTORY.

JAN. 6, 1919.

Name of patient: K. G. K.
Place: U. S. S. *Ohio*, at sea.
A Scarlet fever.
Origin in line of duty. Not due to his own misconduct.
Symptoms: Characteristic punctate rash on chest and face; circumoral pallor, etc.; headache, severe sore throat; tongue heavily coated.
Treatment: Isolation, sodium citrate gr. x q. i. d. and gargle. To be sent to hospital on arrival in port.
1-8-19 Considerable itching. Treated with carbolated vaseline.
T 1-10-19 Transferred to naval hospital, Philadelphia, Pa.
4

MEDICAL HISTORY.

JAN. 11, 1919.

Name of patient: A. V. M.
Place: Marine barracks, navy yard, Philadelphia, Pa.
A Influenza (458).
Origin in line of duty. Not due to his own misconduct.
Symptoms: Prostration, myalgia and painful cough. Chest examination negative.
Treatment: Calomel, followed by mag. sulph., aspirin gr. x and cough sirup.
1-13-19 Cough continues; suggestive signs of consolidation in right base. Sputum rusty.
C 1-14-19 Diagnosis changed to—
3
A Pneumonia, lobar (667).
Origin in line of duty. Not due to his own misconduct. Consolidation found in right base.
T Transferred to naval hospital, Philadelphia, Pa.
O

A SYSTEM OF CLINICAL RECORDS.

By W. B. GROVE, Captain, Medical Corps, United States Navy, and G. B. CROW, Lieutenant, Medical Corps, United States Naval Reserve Force.

The following system of clinical records has been in use at the United States Naval Hospital, Norfolk, Va., since April 1, 1918. Samples of these records, together with brief explanatory notes were sent to the Bureau during the summer.

The plan is briefly this: The clinical record of every patient admitted to the hospital is kept on a 5 by 7¾ inch clinical card. Laboratory reports, X-ray reports, and records of operations are all made on additional blanks of the same size as the clinical cards. These various report blanks are printed on various colored papers to facilitate ease of recognition of the blanks. All such reports on a given case are sent to the ward and filed in a 5 by 8-inch jacket envelope, open at one side, provided for the purpose. Temperature charts and clinical records kept by the nurse are also folded once and filed in this same jacket when the patient is discharged or is transferred to another ward. The present forms of such charts and

records supplied by the Bureau are 8 by 10½ inches and therefore do not easily file in a 5 by 8 inch jacket. We therefore cut these charts to 7¾ by 10 inches so that when folded once they are the same size as clinical cards, laboratory report blanks, etc. In other words, all the data on the case are kept together on blanks of uniform size, and filed in the envelope. The following instructions explain the method of handling in detail:

INSTRUCTIONS REGARDING RECORDS OF PATIENTS' HEALTH RECORDS, CLINICAL CARDS, AND FILING SAME.

All Medical Officers, Hospital Corps, and Nurses:

1. On admission of a patient to the hospital the Health Records Office force will fill out first two lines on clinical cards, attach card to health record and send to medical officer in charge of case.

2. The medical officer in charge of case will make an abstract on clinical card of such data given in the health record as seems most important.

3. After making such notes as are deemed necessary on clinical card, the health record will be returned to the Health Record Office and clinical card sent to ward for file in card index-filing box. Clinical records shall be kept in the ward at all times except when temporarily removed for use of boards of survey, etc.

4. Medical officers will make such entries from time to time on clinical cards as are necessary to show condition and progress of case, e. g., history, symptoms, clinical findings, important treatment, etc. Records should be kept up to date, i. e., complications or new developments should be promptly noted.

5. All laboratory reports, X-ray reports, operation reports, etc., will be filed with clinical cards in each case in jacket envelope provided for that purpose. Surname of patient to be entered in upper left-hand corner of envelope. In cases covered by a single card and without laboratory or other reports the card need not be placed in envelope.

6. When a patient is transferred from one ward to another the medical officer will bring card up to date and sign it. In all cases of transfer the clinical record (card or envelope with all data, including temperature chart) will accompany the patient. When a case is transferred from one medical officer to another the medical officer making the transfer will bring both the health record and clinical card up to date and sign them, transferring both to the medical officer receiving the case, who will send clinical card to ward, and after reviewing health record will send it to the Health Record Office for file.

7. Change of diagnosis will be entered on card and change diagnosis slip sent to Health Record Office, as at present.

8. The nurse or senior hospital corpsman in charge of ward will be responsible for the proper filing of and care of cards, laboratory, and other reports and for transfer of all clinical records with patient to another ward. No one except medical officers and nurse in charge shall have access to clinical cards.

9. On final disposition of case the medical officer will send patient's name to Health Record Office and health record will be sent to him. He also notifies nurse in charge of ward to send clinical record to his desk. From clinical record he makes a brief abstract of case in health record, paying particular attention to "in line of duty" and points that may have a future bearing on health of patient. Health record and clinical record are signed and returned

to Health Record Office for file of clinical record and forwarding of health record.

10. Requests for laboratory and X-ray examinations will be made by medical officers on blanks provided for that purpose. The red request blanks should be used only for *emergency examinations.*

The two most important points in the use of these records are: (1) It affords an easy means of keeping together all the data on the case and of keeping it in the ward and easily accessible at all times. (2) These records are kept on file in the hospital by a card-index system and will be available for reference not only for statistical purposes, but for reply to inquiries frequently made from various sources regarding cases *after the patient has been discharged* from the hospital.

Before the use of this system the health records of all cases in the hospital were kept by the medical officers in charge of the cases in their desks in the medical office. This had two seriousness disadvantages: (1) Health records were frequently lost. (2) As the records were not kept in the wards (keeping them in the wards would increase the chances of their being lost) such entries as were made by medical officers were apt to be delayed and made from very hazy recollection of the points observed at the time the patient was examined. Furthermore, in a number of cases there are a great many points that arise that have a bearing on the case during that particular illness and should be noted for statistical purposes, but need not necessarily be entered on the health record.

Under this system the clinical cards and reports give a more detailed and accurate picture of the case than it is feasible to give in the health record. Entries on the health record, therefore, need not be made until the patient is ready to leave the hospital, or passes from the care of one medical officer to another, and such entries may be made comparatively brief, covering more particularly the question of "line of duty" and points that may have a bearing on the future health of the patient.

On first thought it might be concluded that this system added materially to the paper work required of the medical officer. As a matter of fact *this system does not add to the work* of the medical officers. If the notes on the case are made promptly, while fresh in mind, and at the time of sick call, a few minutes each day will serve to keep up the records on the number of cases ordinarily assigned for an officer after the case has been originally written up. As the original of all laboratory and X-ray reports are filed with the clinical card, the medical officer is not called upon to copy any of these records.

A DRESSING FOR WOUNDS.

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

The formaldehyde-phenol in camphor paraffin combination described by Connell (Connell, K., Surg., Gynec. & Obst., July, 1918) impels me to call attention to a somewhat similar combination that I have used since 1912 with the greatest satisfaction. It was originally recommended to me by Lieut. Commander E. E. Curtis, Medical Corps, United States Navy, and I know that it has been used by others. I now take phenol (liquefied by heat), 45 parts, and gum camphor, 55 parts by weight, and triturate these in a mortar. A clear, perfectly stable liquid results. No diluent or solvent is used.

I consider it an ideal dressing for *fresh* wounds, and have employed it in all varieties up to severe lacerations of the extremities. The suturing or adjustment of the parts is accomplished after the usual methods, and the area freed from aqueous solutions by dry sponging. The part is dressed dry, and the phenol-camphor combination poured freely onto the dressing. I have never had occasion to use it inside a wound.

Used in this manner, I have never seen development of clinical pus, injury to tissues (even normal skin) nor other untoward results. Dressing is required only every three days to a week, and each time one finds a clean, dry, granulating, and rapidly healing wound—one might almost say by first intention. As a matter of fact, habits acquired by the use of the older disinfectant solutions lead one to change the dressing much oftener than is necessary. There is a marked local anesthetic effect.

The combination can be recommended as a dressing for venereal ulcers in the form of a dusting powder (5 per cent with a talc base), or as a 5–10 per cent ointment. It is also of service as a local application for the trichophytoses.

CLINICAL NOTES.

EXTENSIVE ABDOMINAL WOUNDS FROM A HAND GRENADE.

By J. M. EMMETT, Lieutenant, Medical Corps, United States Navy.

The following is a case of a penetrating wound of the abdomen with perforations of the stomach and small and large intestines. It is primarily of interest because of the relatively short time the patient was incapacitated for duty.

The extensive wound in the abdominal wall was not treated with any of the chlorine preparations because early excision of the devitalized tissue and free drainage was possible.

J. C. P., 76th Co., Sixth Regiment United States Marine Corps, 18 years of age, was admitted to sick quarters, marine barracks, Quantico, Va., at 3 p. m. August 24, 1917. Diagnosis: Hand-grenade wound of the abdomen. Family history unimportant. Previous history: Usual diseases of childhood. He had had athletic training. Present condition: Admitted at 3 p. m. with a hand-grenade wound of the abdomen about 3 inches in diameter over the area of the umbilicus. Through this wound protruded a segment of the transverse colon and omentum. There was a history of an accidentally acquired wound one hour before by the unexpected explosion of a hand grenade. The patient was holding the grenade in his hand at the time of the discharge. Symptoms of shock, so frequently seen in such cases, were becoming very pronounced. His pulse was 130, the extremities were cold, and he was begging for water. Because of the evident intra-abdominal injury and probable hemorrhage it was thought advisable to operate even in the presence of the symptoms of shock. He was given morphine, one-fourth grain, and preparations were made for an exploratory laparotomy.

Through a high left median incision the abdomen was opened and a quantity of free blood was found in the peritoneal cavity. An offensive odor directed immediate attention to two large perforations in the transverse colon. After the escaped contents had been removed with bichloride sponges, both perforations were closed with linen sutures. A small leak was found in the second portion of the duodenum. An abrasion found in the lesser curvature of the stomach which extended down through the mucous membrane was repaired.

The gastrocolic omentum seemed completely avulsed from the anterior surface of the stomach. Hemorrhage was arrested and the detachment repaired with interrupted catgut sutures. Two large bleeding vessels were ligated in the greater omentum and an effort was made to sponge out the blood in the peritoneal cavity.

During the course of the operation several pieces of steel were found free in the peritoneal cavity. One fragment was found embedded in the posterior wall of the stomach. Examination of the abdominal wall showed much devitalized tissue. This was excised and an effort was made to fill in the wound by transplantation of rectus muscle and fascia. A cigarette drainage tube was placed near the site of the colon perforation, another in the pelvic cavity, and the third in the right kidney fossa, where much blood was found. All drains were brought out through the injured abdominal wall. The exploratory incision was closed in the usual way, layer by layer.

The time of operation was 1 hour and 20 minutes. The patient was in fairly good condition when removed from the operating table; pulse, 120. Subcutaneous saline injections were begun and morphine was given freely for the first 24 hours. Twelve hours after the operation the temperature was 100, the pulse 108. The wound showed free drainage of pus and blood. Small quantities of water were given by mouth in 36 hours and liquid diet in 72 hours. From the fifth day until the end of the second week the patient was septic, the temperature rising to 101 or 102 in the afternoon. At the time of removal of the drainage tube on the twelfth day a small fecal fistula became evident. The drainage from this lasted less than a week. At the end of four weeks the patient was up and about in a rolling chair; the wound was nearly closed. At the end of five weeks the patient was free from all symptoms and the wound had healed. He was able to walk about. On October 9, 1917, he was transferred to the United States Naval Hospital, Washington, D. C., for further disposition.

A letter from the patient's mother 10 months after the operation assures me that the boy is in excellent health.

A CASE OF FRACTURE OF INTERCONDYLAR SPINE OF TIBIA.

By G. G. Ross, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

E. W. H., Ensign, U. S. S. *Douglas*, age 30, was admitted March 25, 1918, complaining of a swollen and painful left knee joint. He gave a history of having been struck on the posterior surface of the left leg, just below the knee joint, by a snatch block weighing about 45 pounds. His boat was in the harbor preparing to put to sea and

the heart. No thrill. A soft blowing systolic murmur was heard in the fifth interspace about 4 centimeters from the midsternal line.

Abdomen.—There was marked bulging of the upper part of the abdomen and distention of the costal arch. The liver extended to the lower border of the ninth rib. The spleen could be distinctly palpated and extended to about 1 inch below the umbilicus and about one-half inch to the right of the median line. Tympany over the entire right side, flatness over the tumor mass on the left side. Abdomen otherwise negative.

Genitals were negative except for pruritus of scrotum. Cremasteric reflex normal.

Extremities were negative. Knee jerks normal. No Babinski or ankle-clonus. No pain over the long bones.

LABORATORY FINDINGS.

Hemoglobin, per cent	70	Small lymphocytes, per cent	8
White blood count	325,000	Transitionals, per cent	7
Differential:		Mast cells, per cent	8
Neutrophiles, per cent	49	Myelocytes:	
Eosinophiles, per cent	8	Neutro, per cent	23
Large lymphocytes, per cent	4	Eosino, per cent	8

Several nucleated red cells were also encountered. Poikilocytosis marked.

Stool was odorless, gelatinous in appearance and consistency and contained numerous bright-red blood specks throughout. Microscopic examination showed a large amount of mucus and epithelium and a considerable number of white and red blood cells.

Urine.—Slight cloudiness with very few shreds. Specific gravity, 1.024. Negative for albumin and sugar. Reaction, acid to litmus.

The patient was transferred to a United States naval base hospital on the day following his admission, thereby making further observations aboard ship impossible.

PERICARDIOTOMY.

By. L. R. G. CRANDON, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

T. N. was admitted August, 1918, with endocarditis acute, with fever, following acute tonsillitis. Went on for two months, running practically the course of a malignant endocarditis, except that there were no emboli. Blood culture always negative.

In October symptoms of cardiac distress became worse. Extraordinary ranges of temperature, sometimes to 105°. X-ray at this time showed a very broad triangular cardiac shadow, base down, consistent with pericardial effusion. Pulse, 160; sounds barely audible.

October 24, 1918, operation (one-half of 1 per cent cocain). Diagonal incision over left fifth costal cartilage 2½ inches long, beginning at the sternal edge. Cartilage nibbled away for about 1 inch with rongeur. At this point appears the only important matter of careful technic, namely, that the internal mammary artery runs 1 inch from the sternal edge and parallel to it, and it might be better to clearly reveal it at this stage than to puncture without seeing it, because if it were cut or torn it might retract under the closely adjoining cartilages and bleed to a perilous amount before it could be controlled. The pericardium was then lifted by forceps, external to the artery, incised, and a small piece of rubber dam drainage inserted. Practically no fluid escaped on the operating table, because, as it appeared later, the heart floated up in the wound like a ball valve and closed it. In the course of the next 12 hours in bed about 1½ pints of clear sterile fluid escaped, with great relief to the patient. December 8, 1918, five days after a complete embolic hemiplegia, patient died of general failure of heart power.

Necropsy showed acute and chronic vegetative endocarditis, with adhesive pericarditis; heart about twice normal size.

A CASE OF KERATOSIS PLANTARIS.

By J. M. Perret, Lieutenant, Medical Corps, United States Navy.

The feet are such important parts of the fighting man's make-up that anything unusual about them ought to be of particular interest to the military surgeon.

Keratosis plantaris is, according to Stelwagon, a "somewhat uncommon malady."

S. R. J., a white youth of 22 years, a native of Missouri, was admitted to the United States Naval Hospital, Pensacola, Fla., on July 8, 1918, with a diagnosis of influenza. While under treatment he complained of painful feet. The examination of these revealed the following interesting findings:

The entire plantar surface, except that part forming the arch and therefore not touching the ground, was yellowish, painful, smooth, hard, and thickened (about ⅛ inch). Near the outer edges of this hardened skin were vertical parallel fissures. The healthy skin just above formed a pinkish zone of about ½ inch. The soles looked like enormous callosities.

The patient said that his feet had always been like they were at present. He had frequently suffered from sore feet. He had been in the service for seven months and had had a great deal of trouble

Keratosis plantaris.

after marching. The skin of his hands and the rest of the body were normal.

A Wassermann reaction was negative.

The patient says that his father's feet are in a similar condition to his.

As the patient was evidently unfit for the service he was given a medical discharge and therefore nothing can be said as to the therapy of this interesting case.

The accompanying photograph will give some idea of how the feet looked.

REPORT OF CASE OF INFLUENZA WITH UNUSUAL COMPLICATIONS.

By F. G. FOLKEN, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

L. S. M. was admitted to the naval hospital on September 25, 1918. Prior to this he had been in a sick bay with the diagnosis of influenza.

Upon questioning him it was found that he had had the usual symptoms of the disease and physical examination revealed nothing further, so the diagnosis was confirmed.

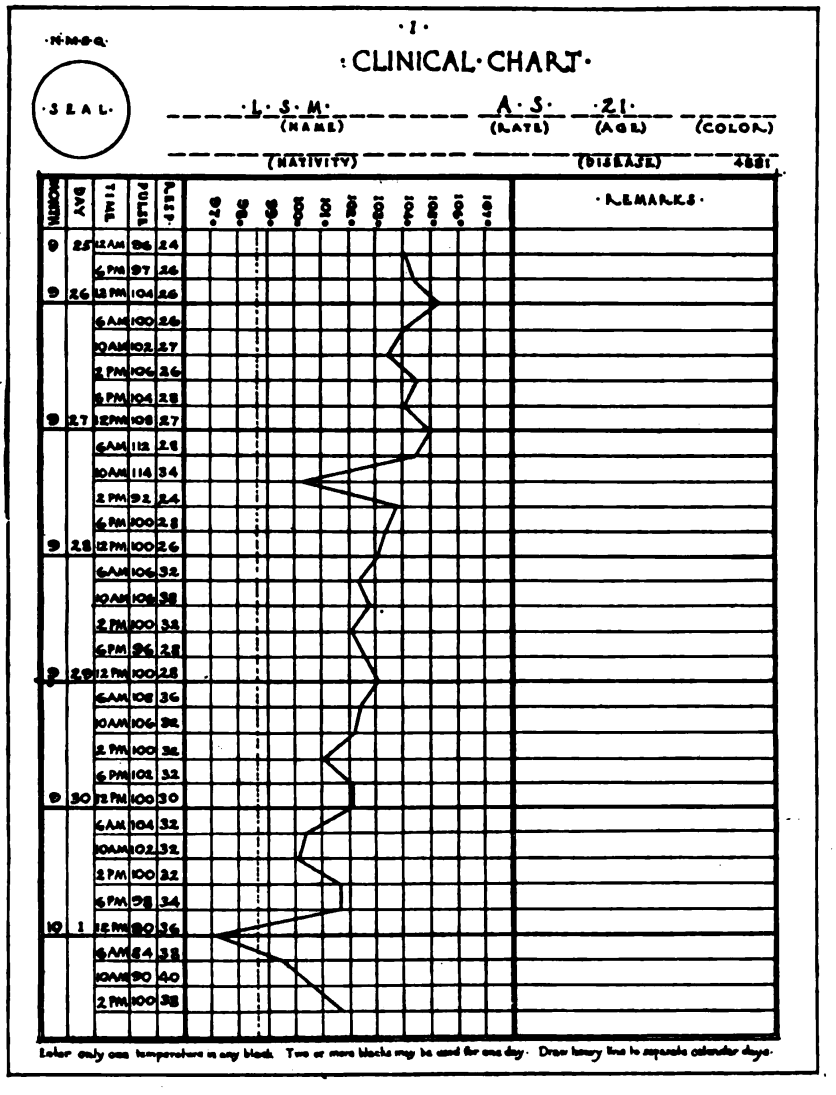
The patient was at once put on the usual routine treatment for admission.

On September 26, 1918, his general condition was fair, although the temperature still remained high. This continued with but one marked fall, to go down by lysis until October 1. On that date it was noted that the temperature dropped below normal, followed by a quick rise and there was a decrease in pulse rate accompanied by an increased respiratory rate. Physical examination of the chest brought out areas of dullness and bronchial breathing, particularly over the left lung. The patient was very restless, complained of difficult breathing, and became cyanotic later in the day. The diagnosis was then changed from influenza to broncho-pneumonia. From this date the temperature curve took a zigzag course. On October 2 the patient complained of violent sweating, which continued through the day. No blood cultures were made, but a general septicemia was believed to be present.

On October 3 the patient complained of severe pains in the right groin, but examination of the part was negative. Chest examination showed more extensive involvement of the left lung; the right lung was negative. A faint systolic murmur could be detected at the apex of the heart. It had not been heard at previous examinations.

On the morning of October 4 the patient was found in a dull mental state. Examination brought out a complete left-sided hemiplegia,

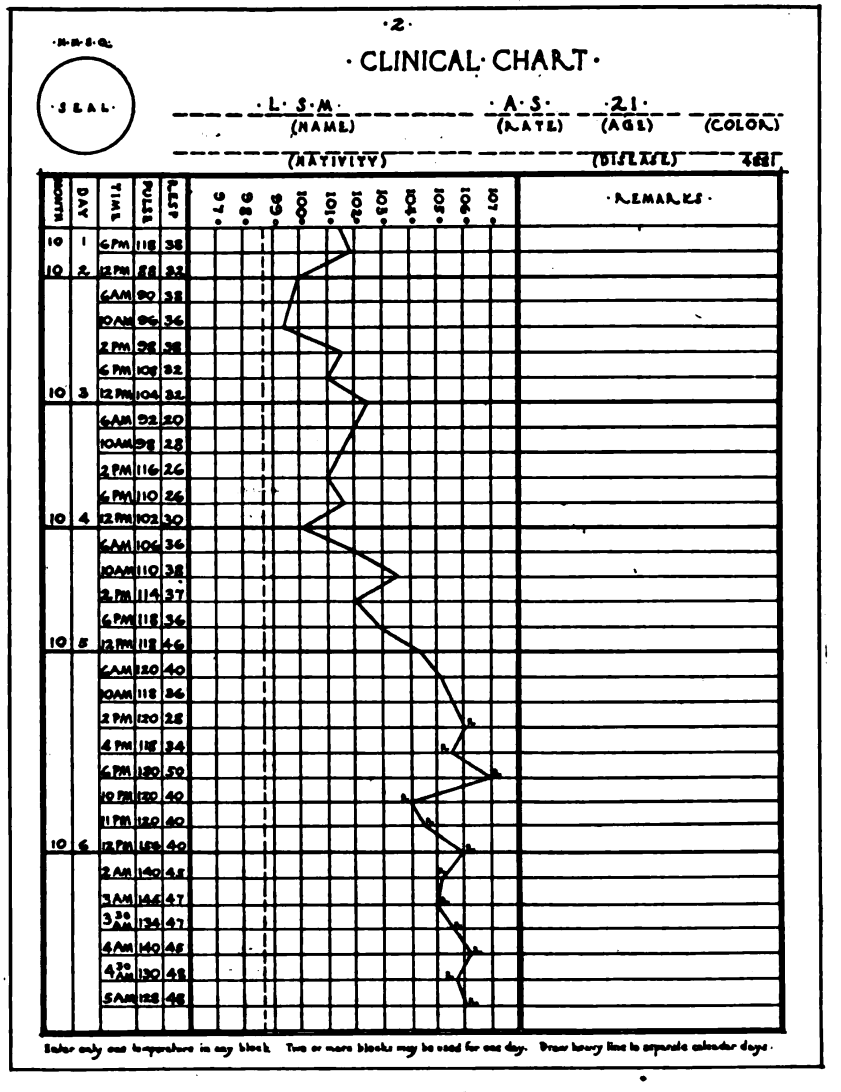
which had come on during the night. Closer examination showed the deep reflexes exaggerated and superficial reflexes absent. Babinski's sign and ankylosis were present on the left side. The right side was normal, including reflexes. Pupils were unequal in size, the left being slightly larger and more active to light. There was also a nystagmus of the left eye toward the right; however, this was



very uncertain, due to a depressed mental state. At this time there was no rigidity of the neck, and Kernig's sign was negative. Heart examination showed a more distinct systolic murmur at the apex. No loss of sphincter control. A diagnosis of endocarditis, acute, was made with an embolism lodging in the right brain. At 4 p. m. the findings were the same as in the morning, but in addition there was noted a depressed mental state and involuntary action of both sphinc-

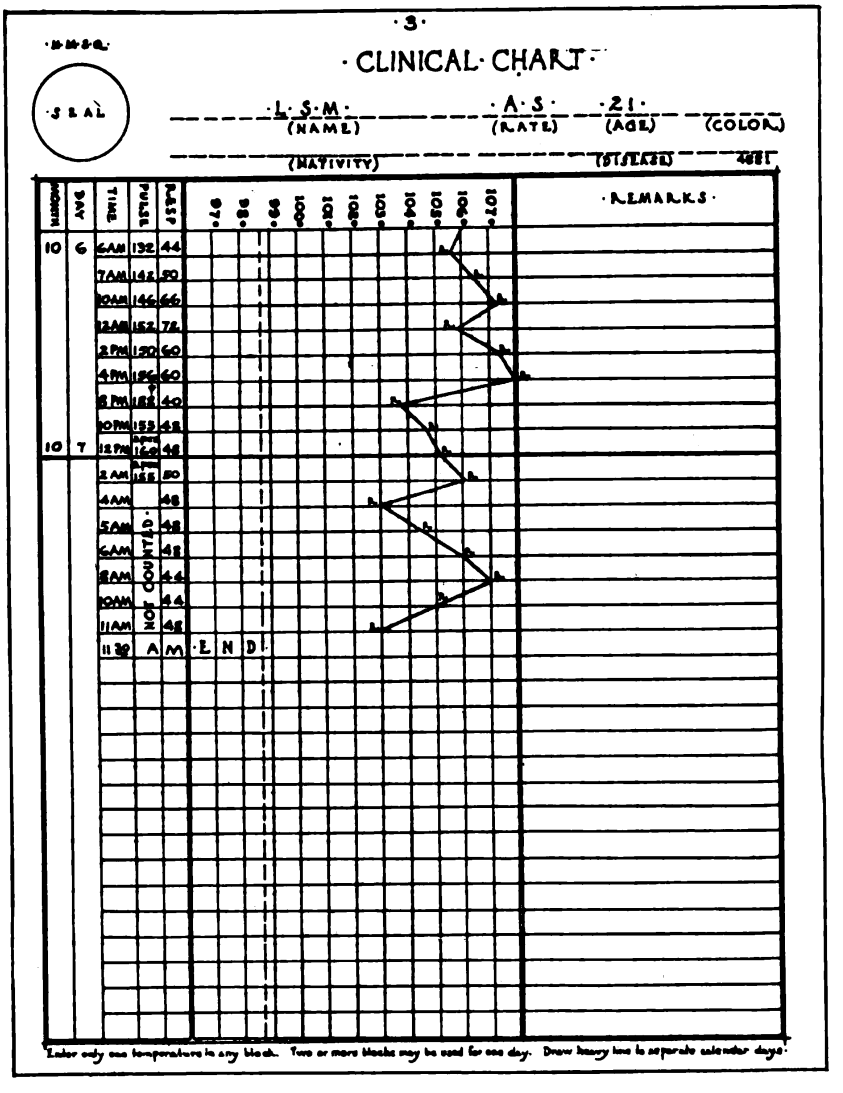
ters, indicating spinal irritation. There was no rigidity of the neck, and Kernig's sign was negative.

On the morning of October 5 the patient was examined and found in the same mental state as the day before, with no change in reflexes or paralysis, but in addition there was a marked anesthesia on the left side, slight rigidity of the neck, and a positive Kernig's sign. A diagnosis of meningitis was made, a spinal puncture was per-



formed at once, and a milky watery fluid obtained under slight pressure. Laboratory examination showed a high cell count and numerous pneumococci (Type I). At 2 p. m. another spinal puncture was made and 80 cubic centimeters of milky fluid was removed under high pressure, and 75 cubic centimeters of antipneumococcic serum (Type I) were injected. The temperature continued to rise until 11 p. m., when the curve showed a drop of 3 degrees, followed at once by a rise.

On the morning of October 6 the patient was found unconscious. At 4 p. m., same date, a third spinal puncture was made and 50 cubic centimeters of Type I antipneumococcic serum were injected. At this time 50 cubic centimeters of serum were also injected intravenously, which was followed by a rise in temperature to 108° by rectum. At 4 a. m. October 7 a spinal puncture was made and 4 cubic centimeters



of fluid removed under low pressure, and 20 cubic centimeters serum injected. At 11.30 a. m. October 7 the patient died.

Post mortem findings:

1. A thin layer of pus over surface of entire brain.

2. Abscess in the right ventricle of the brain, involving the right thalamus.

3. Left lung showed marked congestion and small areas of consolidation about the bronchi.

4. Heart findings showed numerous pinhead vegetations on the mitral, aortic, and tricuspid valves, the greater involvement being on the mitral.

5. Laboratory findings from smears taken from the brain abscess, valvular vegetations, and cut surface of the lung showed pneumococci.

Summary:

1. A true influenza, followed by broncho-pneumonia.

2. A broncho-pneumonia complicated by (*a*) general septicemia; (*b*) endocarditis acute; (*c*) hemiplegia, left side; (*d*) septic embolism of the brain, most probably from the valvular vegetations (this would also account for the ventricular abcess); (*e*) meningitis, cerebrospinal, coming on after the brain-abscess formation.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Captain J. S. TAYLOR, Medical Corps, United States Navy.
Commander G. B. TRIBLE, Medical Corps, United States Navy.
Lieutenant Commander G. F. CLARK, Medical Corps, United States Navy.

GENERAL MEDICINE.

RIVAS, D. **Diagnosis, treatment and prophylaxis of malaria in Brioni.** New Orleans Med. and Surg. Jour., January, 1919.

The author, who was at one time assistant to the Koch Institute in Berlin, gives with interesting detail the sanitary history of Brioni, an island in the Adriatic Sea, a few miles from Pola, and bearing southeast from Venice and south from Trieste, in the Province of Istria.

Brioni has quarries which in the past gave it an importance disproportionate to its size, and supplied building material for many of the palaces and public works of Venice, Vienna, and Berlin.

At different times while the island was the property of private individuals, both Italian and Portuguese, malaria so decimated the population that cultivation and tenure of the land became impossible and Brioni acquired the sobriquet of "Island of Death."

Brioni became a part of Austrian territory in 1866 and shortly afterwards was acquired for a trifling sum by a Swiss who attempted to cultivate the island but had only a temporary success. Malaria killed off his laborers and the project was abandoned. In 1880 Brioni was purchased by an enterprising and capable individual of the name of Kuperweisser, who proceeded to administer quinine to the inhabitants and to institute drainage. He further appealed to the authorities in Vienna for a commission to conduct a campaign against malaria in the island. As a result of this petition Dr. Koch took charge of the undertaking. After one year's work devoted to making blood examinations of the inhabitants and active treatment of all infected cases the malarial patients were reduced 50 per cent.

In 1901 the author formed part of a second expedition to Brioni. The work was now expanded by the treatment of chronic carriers and their quarantine or elimination from the island. (Fine for Brioni but not so advantageous for the localities to which the "eliminated"

betook themselves.) The third expedition in 1902 undertook the destruction of larval and adult mosquitoes and the screening of doors and windows and the island was subsequently declared free from malaria and has so remained. Herr Kuperweisser paid $40,000 for Brioni. By 1902 its value was estimated at $1,000,000. It soon became the garden spot of the Adriatic region and a summer resort patronized by the wealthy and fashionable, filled with luxurious private residences, villas, and castles owned by the Austrian aristocracy.

Dr. Rivas recommends the sulphate of quinine dissolved in dilute muriatic acid for oral administration as a routine measure and prefers the hypodermic to the intravenous method in special cases. Quinine by mouth should be taken on an empty stomach four or five hours after a meal—in the evening or on rising in the morning. The minimum dose for an adult is 15 grains and for children at the rate of a grain for each year.

Rivas considers the time at which the quinine is given one of the most important points in the treatment. Based on a study of the changes in the parasite incident to the various stages of the asexual cycle the patient's period of crisis following the febrile period is the one in which quinine should be given, because it represents the beginning growth of the trophozoite. The very young parasite is peculiarly susceptible to the action of the drug and easily destroyed by it and as its metabolic activity is now great it seems proper to assume that it will take more quinine than in a later quiescent period when as schizont it is like the gamete actually refractory to the drug.

The author considers the artificial lowering of high body temperature in pernicious types with prolonged fever a procedure of doubtful propriety because a high blood temperature is unfavorable to the growth and metabolic activity of the parasite as it enters the erythrocyte.

The administration of quinine should be continued for a certain period of time. It is recommended that a 15-grain dose be given when the fever begins to fall and repeated at the same hour for three days in succession. After four days without quinine repeat the treatment for three successive days and again give a free interlude. This should be kept up for two or better three months and thereafter a 10-grain dose once a week to the end of the season suffices.

(J. S. T.)

DRAGOTTI, G. **Epidemic lethargic encephalitis.** Policlinico, Rome, XXV, 40, October 6, 1918.

During the war human pathology has exhibited a multiform activity. Known diseases have increased, new types have developed, and forms of morbidity which had only a historical interest for the

present generation have reappeared. Among the latter may be the so-called epidemic lethargic encephalitis, which so far has manifested itself principally in England and France.

The cardinal clinical symptoms of this affection which may be regarded as an infective process, are somnolence, fever, and paralysis of some of the cranial nerves.

The cases have not been very numerous. Up to the end of May, 1918, 105 had been verified in Great Britain and 71 in France, but it must not be forgotten that some cases were probably not reported through error in diagnosis.

The malady is not a new one. In the spring of 1890 when the pandemic of influenza was beginning to waver there occurred in Italy, particularly in the district of Modena, a number of cases of a lethargic condition styled *nona*. Synchronously with them similar cases were observed in Hungary, Bulgaria, Denmark, Germany, Switzerland, England, and in the United States where Young gave to the syndrome the name "grippal catalepsy." Camerarius, in 1712, observed at Tübingen a disease which he called sleeping sickness. More recently in 1916 an epidemic prevailed having symptoms identical with those seen in France and England to-day. Von Wiesner, in 1917, claimed to have isolated the etiological factor in the shape of a coccus. The recent epidemic has been studied by Harris and Hall (Lancet, London, Apr. 20, 1918) and by Saint Martin and Lhermitte, who assigned the name primary polioencephatitis with narcolepsy, while the more commonly employed designation is that of Netter.

The symptom complex of the encephalitis in question varies in severity, in the duration of individual symptoms and especially in the matter of cranial nerves involved. However, the disease both in its positive and negative aspects is a distinct entity. It often begins with vague manifestations attracting attention to the mucous membranes of the respiratory and digestive tracts such as are common in influenza. The conspicuous feature, however, is the somnolence which is ushered in by headache and vomiting. The patient experiences a sense of prostration, the eyelids grow heavy, his whole being is invaded by an irresistible torpor. At first he is able to answer questions, but falls asleep the moment he is let alone. Gradually all movement becomes impossible and he lies helpless in bed. At intervals of two or three days he rouses himself to partake of food, but it may be necessary to feed him through a tube while still asleep. The sleep may become an actual state of coma, lasting weeks or months, interrupted by delirium, convulsions, paralysis of the sphincters, and profound decubitus.

Almost as constant as sleep is the paralysis of certain external muscles of the eye evidenced by bilateral or unilateral ptosis, strabismus, diplopia, and immobility of the globe of the eye. The oph-

thalmoplegia is central in origin. Nystagmus is common, while internal paralysis is relatively rare. The paralysis may extend to the muscles supplied by the trifacial when the patient will have a characteristic facies varying with the particular muscles involved. Paralysis of the joints is rare, a catatonia being more common and likewise tremors and incoordination. Aphasia and paralysis of the sphincters have occasionally been noted. Disturbances of sensation are rare.

Fever is present in all cases, but may be *brief*, attending the *initial stages only*, or else high and persisting throughout the attack. Rigidity of the neck is slight or absent, and the same is true of Kernig's sign and bradycardia, which characterize meningeal affections.

Lumbar puncture yields a clear fluid under normal tension with normal sugar and albumin content. There is practically no lymphocytosis. These features of the spinal fluid have important bearings on diagnosis.

The features enumerated are not constant, the only essential ones being sleep and paralysis of the cranial nerves. Epileptiform and apoplectiform seizures may occur, completely disguising the picture unless an epidemic is present.

The duration of the disease is subject to great variation. It may be for a day or two, ending in recovery or in death from bulbar paralysis. As a rule the disease drags on for weeks or even months. When a favorable crisis does take place it is very marked, though psychic and somatic disorders persist for a long time. The mortality is placed by various writers at from 25 to 55 per cent.

The pathological lesions are: Congestion and punctiform hemorrhages and cellular infiltrations around the vessels especially in the gray matter near the third, fourth, and lateral ventricles, and according to P. Marie, especially at the level of the *locus niger*. The encephalitis is diffuse, interstitial, of unknown origin, attacking by preference the vascular system. The pathology has some analogy to that of rabies, poliomyelitis, and sleeping sickness.

An attempt has been made to connect epidemic encephalitis with poliomyelitis. The hypothesis is invalidated by the marked preference of the latter for young subjects, by its higher mortality, and the lesser tendency to atrophies. On the other hand, in poliomyelitis the morphology of the spinal fluid is more distinctly altered and this feature permits the differential diagnosis from cerebro-spinal meningitis. An attempt has been made to connect epidemic lethargic encephalitis with botulism, but the *dryness* of the mouth and throat and the extreme dilatation of the pupil are lacking in encephalitis, while, on the other hand, lethargy and coma are not characteristic of botulism. Where botulism is present there is usually a history of the in-

gestion of some suspected article of food by a more or less varied group of persons while cases of encephalitis are usually in separate families.

The possible relationship between influenza and epidemic encephalitis should be considered in view of the striking fact that in 1889–90 and now the diseases have appeared concurrently.

ROYAL SOCIETY OF MEDICINE. **Encephalitis lethargica.** The Lancet, London, October 26, 1918.

At a general meeting of the Fellows of the Royal Society of Medicine on October 22, 1918, the subject of encephalitis lethargica was exhaustively discussed, and the following notes are from the report in the Lancet.

When cases began to develop in Great Britain they were reported as "botulism," but the failure to find the bacillus botulinus and the discovery of areas of perivascular infiltration in the central nervous system lead to the assumption in many quarters that the disease was a form of acute poliomyelitis of cerebral type. Clinical observers soon noted, however, that the cases developed a symptomatology all their own and essentially different from poliomyelitis. The extensive investigations since carried out established the disease as *sui generis* with a definite pathology and distinct epidemiological peculiarities.

The onset is frequently sudden but oftener preceded by a few days of lassitude, headache, and sometimes vomiting of cerebral type. The patient then becomes lethargic but can be roused and is conscious of what is going on around him. Nocturnal wakefulness is not uncommon. Asthenia is general with definite local paralysis, particularly of the ocular muscles, muscles of the face, and less commonly of pharynx. This results in strabismus, nystagmus, dysphagia, a mask-like expression, disarthria of speech. First one and then another group of muscles is involved. The course of the disease is variable. Death may take place within a few days from failure of respiration or there may be recovery after months of illness.

The disease occurs at all ages. The seasonal influence shows in the maximum of cases developing in the spring of the year. (J. S. T.)

ROYAL SOCIETY OF MEDICINE. **Enceptalitis lethargica.** Brit. Med. Jour., November 2, 1918.

In a report of the meeting of the Royal Society of Medicine, October 22, 1918, Lieut. Col. F. W. Mott, Royal Army Medical Corps, is quoted as citing two cases studied by M. Marinesco of the depart-

ment of neurology, Bucharest, from the standpoint of pathology. In these cases disseminated miliary or punctiform hemorrhages visible to the naked eye existed in the gray matter in the neighborhood of the floor of the fourth ventricle, the aqueduct of Sylvius, and even the third ventricle and were also found in the posterior part of the pons and peduncles. The cerebral cortex was practically negative in the two cases. On the contrary the first segment of the spinal cord, the portion available for study, presented the same histological lesions as the pons, bulb, and peduncles. The spinal fluid might or might not show lymphocytosis and albumin.

Dr. P. N. Panton reported a series of cases in which the spinal fluid was clear and held that the examination of this fluid was a valuable means of making a differential diagnosis.

Dr. A. S. MacNalty grouped the symptoms in three types.

1. General disturbance of the functions of the central nervous system without localizing signs.

2. Localizing signs manifested in (*a*) third pair of cranial nerves; (*b*) affections of the brain, stem and bulb with local lesions of other cranial nerves; (*c*) affections of the long tracts—pyramidal, prepyramidal and up-coming afferent tracts; (*d*) ataxic types (cerebellar mechanism); (*e*) affections of the cerebral cortex; (*f*) spinal cord involvement; (*g*) polyneuritic type.

3. Mild or abortive type.

The acute manifestations are slight early rise of temperature, marked asthenia, catalepsy, stupor, changes in speech, choreic movements of face, trunk and limbs, muscular pains, hyperaesthesia, skin eruptions dysphagia, constipation.

The rapid complete or partial clearing of the paralysis was the most remarkable feature of cases with nervous manifestations.

(J. S. T.)

Brown, G. E. **Syphilitic aortitis.** Am. Jour. Med. Sc., January, 1919.

The author, in a concise and convincing way, brings out three important points. The disease is common, is easily overlooked or confused with tuberculosis and other thoracic diseases and is amenable to treatment only in the early stages.

The first anatomical studies on the subject were made in the 18th century by Morgagni. The disease occupies somewhat the same position in medical literature that tuberculosis did 30 years ago in that only the full-blown cases are deemed worthy of note. The diagnosis in each condition must be made in the incipient stage if treatment is to be of value. There is little or nothing to be done for aortitis when gross changes have occurred in the vessel wall.

In the past diagnosis has been relatively rare, though post mortem findings amply demonstrate the frequency of the condition. This was due in part to the indifference of the profession or to ignorance, as the textbooks contain few allusions to the subject. Then it is often a late manifestation overshadowed by coexisting paresis, atheroma, tabes. In the early stages the signs and symptoms are often slight and misleading.

Brown quotes from various writers to show the frequency of aortitis. Thus Gruber reports a series of 6,000 autopsies with 4 per cent showing aortitis. Out of 256 autopsies on luetics reported by Marchand 82 per cent had the disease. Obendorfer found that 7 per cent of 1,436 autopsies on adults showed aortitis. The author made an antemortem diagnosis in 5.1 per cent of 136 luetics in whom a positive Wassermann or luetin reaction had been obtained.

Brown quotes Heller's affirmation that syphilis, as compared with atheroma, is an inflammation with reparative reaction. The gross lesions consist of irregular folds and roughenings of the intima—translucent and pearly plaques. These cushions or wheals may be yellow in color. Aortitis does not show the fatty and calcareous deposits characteristic of atheroma, but the two diseases may be concurrent.

Syphilis usually attacks the aorta at the orifice, and when the process extends centripetally serious damage to valves and coronaries is to be expected. It is least harmful when traveling in the other direction. While all portions of the thoracic aorta are liable to involvement, the abdominal segment usually escapes, and this has not been explained. Klots has shown that there is a rich lymphatic supply to the ascending and transverse portions of the arch which are in close relation to the mediastinal glands invariably affected by retrograde movements of the spirochete, but the abdominal aorta also has close relations with the glandular system.

Syphilis of the aorta may be confined to the first portion, may attack the valves, cause aneurysm or obliteration of the coronaries. Brown discusses only the symptomatology of the first-mentioned type. In this the cardinal symptom is pain located under the sternum at the junction of the manubrium and gladiolus. There may be moderate or very severe sensations of compression or constriction. Pain radiates along the brachial plexus in one or both arms, commonly in the left arm only. Mental and physical fatigue is complained of, the patient lacks energy, has a tendency to neurasthenia, and suffers from headaches. The early weakness is like that of incipient tuberculosis. Dyspnea is variable in degree, but nearly always present. Hoarseness and fever are less constant. A dry nonproductive cough occurs. Cyanosis is relatively rare. All these

symptoms approximate closely to those of beginning tuberculosis and may be very misleading unless great care is observed.

The physical signs furnish the basis for positive, constructive, and differential diagnosis. The chief reliance is to be placed on X-ray examination by plates and the fluoroscope to determine if enlargement of the aorta is present. Enlargement is always present in aortitis and it is in both diameters. This may often be demonstrated by percussion. The blood pressure is generally not elevated, which is an important differential point. The Wassermann or luetin test is usually positive. The last diagnostic measure is the therapeutic employment of mercury and the iodides. (J. S. T.)

MacCullum, W. G. **The pathology of the streptococcal pneumonias of Army camps.** Medical Clinics of North America, September, 1918.

It is interesting to learn that beginning with the early part of the sixteenth century there were numerous epidemics of pneumonia spreading over Italy, Spain, France, Germany, and other countries involving numbers of people and having a high mortality. It is difficult to determine the precise type of pneumonia that existed, but empyema was a frequent complication and it was probably streptococcal in origin.

In America similar outbreaks are recorded from the eighteenth century. In 1812 the troops in New York State and the civilian population of New England and of the Southern States were similarly affected. The epidemic dragged along for three years in the North and did not disappear in the South for 14 years.

During the Civil War, as recorded by Woodward and others, measles was extremely prevalent and was commonly followed by a broncho-pneumonia with associated empyema. During the four years 61,000 cases of pneumonia were recorded and many of them were separated as in some way related to measles. MacCallum has studied pathological specimens preserved at the Army Medical Museum, Washington, and finds that they correspond closely to the pathological material obtained in the recent epidemic. Streptococci were recognized in typical chains in the bronchi and pleural exudate and the gross appearance was that of the streptococcal broncho-pneumonia of to-day. (J. S. T.)

Stokes, J. H. **The venereal problem and the war.** Internat. Assn. Med. Museums Bull. VII, May, 1918.

The author of that valuable and timely book, the Third Great Plague, reviewed in a previous issue, begins his comparative survey of the attitude to the problem of veneral disease of the participants in

the war, with a reference to the pioneer legislation on sociological lines of Denmark, Norway, and Sweden.

The measures employed or contemplated by the belligerents fall into two groups.

Group 1: (1) Provision of universally available, reliable means of early diagnosis by the State. (2) Provision of universally available and efficient free treatment by the State. (3) Limitation of treatment to competent hands, suppression of quackery, drug-store prescribing, advertising cures, and patent medicines. (4) Moral and educational prophylaxis.

Group 2: (1) Suppression or regulation of prostitution. (2) Dissemination of knowledge concerning venereal prophylaxis, and sale of the agents employed for this purpose, to the public at large. (3) Compulsory measures and penalties making treatment obligatory on the patient until he is cured, with or without preservation of his secret. (4) Reporting of venereal disease in open or anonymous form to the health authorities. (5) Indirect legislation bearing on transmission of infection in or out of marriage, professional medical confidence, marriage laws, etc.

British activities are along the lines of group 1. Enactments in West Australia include all of 1 and a good deal of 2. Very little is known of what the French have done in this problem during the war. The Italian civil program antedates the English, and began in a Scandinavian type of provision for public treatment without compulsory treatment in August, 1907, dispensaries being organized by the several communes with the cooperation of the minister of the interior. In general, sentiment in France and Italy permits more drastic methods than would be tolerated in Anglo-Saxon communities. Up to 1903 Italian armies had the highest morbidity figures in Europe. In the present war Italy has passed rapidly from group 1 to group 2. Prophylaxis is carried out in connection with the houses of prostitution legalized as army institutions, thus imitating Japan in the Russo-Japanese War. Marked success is claimed for this measure and morbidity figures have been brought down to about those of the British.

The author considers that the Huns have incorporated into their public policy during the war a greater number of radical features than any other country, carrying them out with the painstaking attention to detail peculiar to the tribe. For a number of years prior to the war their army figures for venereal disease were the lowest in the world but the prospect of an increase due to campaigning led to lively discussion of the additional means to be employed. Neisser favored indiscriminate specific treatment for all women who had had relations with soldiers even if infection could not be proved.

He recommended the free distribution of condoms to the soldiers. Von Hindenburg signed an order for internment in prison camps or jails of all infected women. A regulated prostitution was enforced during the war for military districts. Many advisory clinics have been established to which army cases could be referred and over 70 special clinics have been established in Prussia by life insurance companies. Plans are being made to provide at least three years of active treatment for every syphilitic, and lifetime observation if necessary.

The position of the United States in the world-wide movement against venereal disease is in some respects not altogether an enviable one. Our public campaign has scarcely developed beyond the point reached by that of England in 1898.

Stokes lays down two facts of outstanding importance in the history of venereal diseases in armies and navies. (1) Increased incidence in war; (2) efficiency of modern prophylaxis. In the Franco-Prussian war the venereal incidence in the First Bavarian Army Corps rose from 10.2 to 77.7 per thousand from January to May. British army morbidity for venereal disease has been given as 48 per thousand in November, 1916, and 43.5 in February, 1917. The Italian figures up to December 31, 1915, were 90.5 per thousand. From January to June, 1916, they were 46.2 as a result of methods of regulation or prevention put in force. From French writers various estimates are reported. Thibiège estimates 4,000 to 5,000 cases of syphilitic infection per month, which in three years of war would mean 150,000 to 200,000 new syphilitics for that country alone.

The cases of venereal disease acquired by the Hun soldiery in Belgium during the period of occupation is estimated at 30,000. Allowing to Hun armies a rate of 40 per thousand this would give about 280,000 fresh venereal cases annually, 60,000 of them syphilis.

Our own best figures (prior to May, 1918) are nearly double those of the British or Italians and are greatly in excess of foreign figures for peace times. The author quotes the Lancet as authority for the statement that in British educational prophylaxis the distribution of pamphlets and leaflets has been disappointing. The presentation of a concrete case of bad venereal infection was a much better deterrent.

Stokes describes the prophylaxis of our Army and Navy as *punitive*, in that there is a loss of pay for days lost for venereal disease, in that a man must use prophylaxis if required and is punished for neglecting to do so. Great Britain has not formally adopted a policy, but her navy tolerates the prophylactic packet. Italy conducts prophylaxis in connection with its official military houses of prostitution. The Australian medical service claims good results from the prophylactic tents set up at the entrance of every camp. Riggs is

quoted as giving the percentage of failures of prophylaxis administered within eight hours as 1.5 per cent. Exner is quoted as giving 1.4 per cent for the failures in 10,000 treatments for one American regiment in two and one-half years.

Our author says, "* * * though not infallible, especially under conditions of Army life, medical prophylaxis is an indispensable weapon, and the nearer its application can be brought to the time of exposure, the higher will be the efficiency of the Army employing it, from a military standpoint."

Next comes a review of the various indirect and moral agencies in operation here and elsewhere in the interests of enlisted men. (The reviewer notes with regret that in a majority of instances in America these efforts began with the war; before that our people cared for none of these things.)

Reference is made to the effect of utter destitution in ravished Poland on the morals of her women; to the closing of "Animierkneipen" in Berlin by police order, which in 24 hours left 700 women without their usual means of livelihood. Industrial readjustments in many localities have "thrown the women into a camaraderie with men in the civil population, which in the general lowering of moral tone induced by the war, has led to alarming consequences." As a result of general conditions, both industrial and military, clandestine prostitution has increased enormously in all war zones, and repressive measures scarcely meet the indications of this feature of the situation. The Huns have required a special military pass into military districts for all women not duly inspected professional prostitutes, but neither this measure nor wholesale arrests, deportations, and imprisonments have yielded commensurate results. On the other hand, the repressive measures of the British war zones seem to have done good, judging by the official figures on incidence of venereal disease.

The real danger lies not in the fighting zone but in the cities whither men resort on furlough, the former being the domain of the clandestine, the latter of the professional prostitute.

The occasions fraught with the greatest possibilities for harm are: (1) During mobilization and training; (2) during delays in transit; (3) during furlough; (4) during period of billetting in private houses, in towns and villages; (5) during convalescence outside of military influence.

It has been estimated that in the Austrian service 5 per cent of infections took place at the front, 20 per cent on lines of communication and 75 per cent outside of the sphere of the army.

The question of pay has an important bearing on the problem. The low pay of English and French troops makes them less attractive to the harpy than the soldiers of Australia, Canada, or the United States. (J. S. T.)

DRAGOTTI, G. **The cocaine habit.** Policlinico, Rome, XXV, 31; August 4, 1918.

The cocaine habit became very general in Italy during the war. Cases of acute poisoning have been of almost daily occurrence in Europe. The habit of taking cocaine dates back some 30 years, when it was commonly used as a substitute for morphine in treating victims of the latter drug. The habit to-day is generally acquired deliberately and the number of addicts who drifted into the abuse of cocaine through the use of a physician's prescription, as for chronic rhinitis or neuralgia, is relatively small. The cocaine addict is prone to recruit companions in vice. The seekers of new sensations, the weaklings, the moral shipwrecks, readily become votaries of the drug. The habit is very common among prostitutes. A neurotic or hereditary taint predisposes to its use. Degenerates take to the drug very readily.

The effects of the drug on the human body are exerted particularly on the cardiac, circulatory, respiratory, and nervous systems. Pallor of the face and coldness of the extremities are usual in cocaine addicts. Praecordial pains analagous to angina pectoris, dyspnea and arrest of respiration occur. The nervous phenomena are the most characteristic. While under the influence of acute cocaine poisoning, cerebral excitation is evidenced by loquacity, agitation, anger, or distressing emotion leading to tears. Vertigo is common. There may be a condition of stupor. Incoordination of movement and of tactile sensation is not infrequent. Visual and tactile hallucinations occur though less commonly than in the chronic form of intoxication. Convulsions and even true epilepsy have been ascribed to cocaine.

To the above must be added digestive disturbances such as ptyalism (followed by excessive dryness of the mouth) and very occasionally vomiting and diarrhea, and urinary abnormalities (oliguria or anuria). Death may occur promptly or recovery be preceded by collapse, coma, or syncope lasting several hours. For months after acute poisoning a tendency to syncope, vague feelings of depression, dizziness, difficulty of speech, and incapacity for mental application may be manifest.

The fatal dose varies as in the case of most poisons when taken into the stomach. A dose of 10 centigrams is usually tolerated. Serious and possibly fatal effects on heart and respiration may be produced by 45 to 50 centigrams. The subcutaneous injection of 5 centigrams is reasonably safe for adults. Alarming symptoms may develop from the use of larger doses, and when 20 centigrams are exceeded death may occur. Submucous injections, as in dentistry, are peculiarly active and the dose should not exceed 2 centigrams. Chronic poisoning by cocaine has a symptomatology all its own. A few individuals experience no effect from the first adventure, but for the majority

the immediate sensations are most delectable, and the craving for the drug is quickly established. The desire for cocaine may not be so compelling as is that for morphine, but it develops sooner.

The general sense of wellbeing, the joy of life, the intellectual vivacity, the increased muscular energy begotten by cocaine are so delightful that once tasted these joys are hard to renounce for the future.

In chronic habitués the sensations of wellbeing which marked the early indulgences do not persist. On the contrary, there is a general weakening of psychic activity and a general bodily weariness. The memory is impaired, especially as regards dates, and hence there is a disorientation as to time. The cocaine addict is commonly without appetite, undecided, listless, incapable of exertion. The disposition changes. He becomes moody, irritable, and unresponsive. Periods of activity are brief. Gradually there is an undermining of the moral sense, the deterioration showing itself most conspicuously in those whose financial situation makes it hard for them to procure the drug. They stoop to any baseness or crime to get cocaine, life having no purpose or ambition except in that direction. Sleeplessness and horrible dreams like those of the dipsomaniac; auditory, visual, gustatory hallucinations, make the periods between indulgencies occasions of intense suffering. The addict has various paraesthesiae, among them the sensation of a moving foreign body under the skin or of hot or cold water applied to the body surfaces. Worms and insects are felt crawling over their persons. With time the victim accepts these things as realities. Delusions come on varying in type with the individual temperament. Hypochondriacal ideas and delusions of persecution are frequent. While a certain lucidity of thought survives in the cocaine habitué, excessive indulgence in the drug or other forms of excess, such as an overindulgence in alcohol, bring on a delirium not unlike that of the chronic alcoholic. It is during such crises that occur the dramatic scenes, the acts of violence, and uncontrolled agitation in public places which sooner or later lead to arrest and restraint in an asylum.

It is by no means uncommon for the users of cocaine to be the slaves of morphine or liquor as well. In appearance the cocaine addict is pale, thin, haggard, and hollow-eyed. Tremors of the extremities, twitching of the lips, disordered articulation, and an explosive type of speech are noted. There is a tendency to hyperhidrosis. The pulse is rapid and irregular. The eroticism of the early stages is followed by loss of sexual power. Among habitués who employ the drug in nasal tampons perforation of the septum is a common event.

The prognosis in cases of chronic cocaine poisoning is extremely grave, the majority of them eventually reaching the insane asylum.

Many end their lives by suicide. Others languish in a state of progressive mental, moral, and physical decay. They are ready victims to intercurrent infections. Withdrawal or voluntary abandonment of the drug does not always result in complete cure, the constitution having been so undermined that mental and physical disorders persist and complete return to normal is rare. The offspring of the users of cocaine are physical and moral degenerates.

In acute poisoning by cocaine the patient should be put in a recumbent position with the head low. Nitrite of amyl has a valuable countereffect upon the basoconstrictor action of cocaine, but in serious cases its employment is not advisable. In cases marked by convulsions chloral may be given, or inhalations of chloroform or ether. When cocaine has been swallowed give a solution of tannin. Hypodermic injections of caffeine, camphorated oil, or ether are recommended to counteract the depression.

For chronic cases the essential step is to withdraw the drug absolutely and immediately. This measure does not involve the painful sequelæ attendant on the sudden deprivation of morphia. The patient is put to bed and watched, and mild disturbances are met by the occasional administration of a stimulant. Gradual deprivation is advisable, however, in the presence of marked cardiac or renal disorders or of advanced cachexia.

The cocaine habit should be studied and handled from the political and sociological standpoint, since the victims are weaklings with organic defects of the central nervous system. The most important measures are those looking to the prevention of the habit, since its diffusion threatens the integrity of the race. (J. S. T.)

SURGERY.

PARIN, M. **Sterilization of wounds by electro-ions.** Presse méd., November 14, 1918.

All surgeons now agree on the value of wound suture for shortening the period of cicatrization or improving the functional result by shortening the period of immobilization. Some surgeons at the front obtain excellent results with primary suture after extirpation of suspected tissue. Sometimes, however, primary suture can not be employed because the patient's temperature or the appearance of the tissues and the results of the bacteriological examination make the procedure undesirable. Finally this technique has been found impossible when the number of wounded men requiring immediate attention was very large. When the primary suture has not been employed the patient usually reaches the base hospital with wounds that have become secondarily infected even if they were

not primarily infected. Such an infection retards the possibility of secondary suture. Indeed with serious infections and wounds containing pure or mixed growths of streptococci the surgeons abstain entirely from suturing until extensive disinfection has been made. The resulting delay is in marked contrast to the immediate sterilization of wounds which can be obtained by the use of electro-ions even where the streptococcus is present.

Prof. Leduc, of Nantes, in 1900 gave the first positive demonstration of the possibility of utilizing electrolysis to transfer the elements of a saline solution from outside the body to intimate contact with the internal tissues. Leduc studied the action of different ions but Dr. Parin discusses only the results obtained in connection with the use of zinc ions.

A very simple and instructive experiment consists in fastening to the positive pole of the source of electricity anodes made of different metals bathed in an albuminous solution. It is thus possible to estimate the action and the penetrative power of different ions. Thus the zinc rod will become surrounded by a compact and adherent collar of coagulated albumin, the albumin having appeared rapidly and uniformly around the pole, whereas the iron rod has caused no coagulation but led to the formation of an albuminate of iron precipitated at the bottom of the containing vessel. The platinum rod likewise gives rise to no coagulation but liberates oxygen. The size of the cylinder of coagulated albumin proves the facility with which the zinc ion travels through it. Now, the coagulated albuminoids and the penetration of antiseptics into the heart of a tissue represent the essential features of wound treatment, the attainment of the very object in view when wounds are cauterized, curetted or dressed. Chemical antiseptics actually interfere with the penetration of the tissues by the coagulation of the albumin but the zinc ion is not thus hindered. Its penetration can be controlled at will by the operator.

Leduc was the first to use this method with success in the treatment of boils and of anthrax. He also employed the zinc ion to cauterize and sterilize the uterine mucosa and to arrest hemorrhage.

The English physician, Dr. Friel, head of the nose and throat clinic of the Johannesburg Hospital in the Transvaal, who had become familiar with the new therapy of the Nantes school, was able by the use of the zinc ion to clear up suppurations of the middle ear and of the frontal and maxillary sinuses at one sitting. When Dr. Friel entered the English Army he used the ion method of sterilization of war wounds and in his surgical service at Abbeville war wounds were prepared for suture and healed up after one treatment.

Dr. Parin has employed this method for the wounded who come to him directly from the front. The source of the zinc ions was a

solution of zince sulphate but any salt of zinc in solution, the chloride for example, would answer as well.

He begins by cleaning the surface of the wound to be disinfected with a gauze compress soaked in the solution of zinc to be employed for the electrolysis, rubbing the wound vigorously so as to remove the contaminations—all the dead tissue which might prevent intimate contact between the wound and the solution. This intimate contact and the removal of foreign particles is an essential step in the procedure. The wound is then covered with 10 or 12 thicknesses of compressed gauze saturated with the zinc solution. Upon this is placed the electrode fastened to the positive pole, the whole retained in position by a few snug turns of a bandage. The adjacent integument is protected by the introduction between the skin and the compresses of a sheet of rubber dam cut so as to follow exactly the contour of the wound and resist the passage of the current through the undamaged skin. The negative electrode should have a wide area and may be applied to any part of the body. Sterilization is obtained at a single sitting. This is a distinct and indispensable feature of the treatment and Parin proceeds immediately to suture the wound, both the muscular and superficial layers, after widely freeing the integuments so as to promote the most accurate coaptation. Parin uses local anesthesia, stovaine either subcutaneously or by spinal puncture. He claims that the passage of the electricity causes no pain provided the intensity of the current is increased at the start and diminished at the end very slowly. When the current is carefully regulated the patient can stand 100 milliampères during the time necessary for treatment if the intensity of the current is changed very gradually. Sudden increase to 5 or 15 milliampères occasions considerable pain.

Parin reports 15 cases treated successfully by this method after bacteriological examination and culture had demonstrated the presence of streptococci and other pus germs in the wounds. He gives the details of several cases.

V.—Wounded July 19, 1918, by the explosion of a shell came under his care July 21 with a long deep wound of the left buttock which was kept open by contraction of the muscular fibers. On July 26 he was given a treatment of 3 milliampères for 30 minutes, after which the lips of the wound were brought together with Michel hooks. The patient left the hospital completely cured an August 5.

Dr. Friel has introduced a new electric unit milliampère-minute-square-centimeter and called it the Leduc. The Leduc, therefore, is the quantity of electricity produced by the current of 1 milliampère acting for a minute on 1 square centimeter of surface. Dr. Friel considers that a thorough sterilization can be obtained by the employment of about 4 Leducs.

Another case entered Dr. Parin's service with four bullet wounds which had a combined area of 146 square centimeters. He was treated by the Leduc method on July 30 and cicatrization was complete on August 14.

Perhaps the most interesting feature of Dr. Parin's report is the failure of the zinc to accomplish complete sterilization in two cases where bacteriological examination showed that streptococci were present in unusually large numbers. Recalling the fact that salts of copper had proved particularly destructive to streptococci in skin infections he substituted the copper ion for the zinc ion and obtained immediate results in the two cases which had previously proved refractory.

Parin does not claim that the zinc ion can be regarded as having universal bactericidal power. He considers it probable that each type of germ is peculiarly sensitive to some particular ion and suggests the propriety of determining this by a series of experiments.

He concludes his paper with the further suggestion that in order to employ primary suture to the best advantage ion sterilization of wounds be employed at the front, as the method is simple and would be available for a large number of wounded. (J. S. T.)

CALICETI, P. **Abscess of thyroid following septico-pyemia from otitis.** Policlinico, Rome, XXV, 50, December 15, 1918.

Writing from Field Hospital 204 Dr. Caliceti reports the unusual and interesting case of an infantry private of the Italian Army without history of previous illness who reported for treatment in March, 1918. Mild symptoms of aural disturbance covering several months had been disregarded, but the development of pain, the appearance of discharge from the ear and swelling of the mastoid brought the patient to sick call.

March 21, 1918. No pus found in auditory canal. Tympanic membrane red and infiltrated; scars in forward lower quadrant; bulging of upper quadrants. Redness, edema and tenderness over mastoid. Patient thin and not over muscular. Abdominal and thoracic organs negative.

Paracentesis gives exit to a few drops of pus mixed with blood. Active treatment failed to arrest mastoid symptoms and on March 30 the mastoid was operated on and cleaned out under general anesthetic. The curetting was carried well back to the wall of the lateral sinus which was normal.

The patient showed marked improvement after the operation but on April 4 there was an evening rise of temperature and complaint of pain in the front of the neck. The next day slight redness and

swelling of the front of the neck was observed and the patient began to complain of difficulty in respiration and deglutition. From day to day there was progressive increase of the following symptoms: Palpitation and tachycardia; pain on movement of the larynx; difficulty of respiration and deglutition; nausea and vomiting; tremor of the hands; marked psychic disturbances; nervous irritability; widening of the palpebral fissure; eyes glistening and moist; no exophthalmos; weakness of the internal recti with deficient convergence; daily evening rise of temperature; cough; increasing loss of flesh and general debility. No fluctuation but increasing enlargement, redness and tenderness over thyroid. Mastoid wound doing well.

On April 11 under ethyl chloride anesthesia the thyroid was incised and odorless pus evacuated containing a pure culture of streptococci in short chains identical with that obtained from the mastoid. The opening of the thyroid abcess produced a general alleviation of symptoms but nervous excitability continued marked. Weakness extreme. Sweating.

On April 18 severe pain in left loin developed with tenderness on pressure. No tumor. Lateral decubitus. Evening rise of temperature. Both wounds healthy. By April 22 all symptoms were aggravated and a swelling in the loin was apparent. Urinalysis showed albumen, cylindroids, granular and epithelial casts, leucocytes. Under general anesthetic an incision was made into the peri-renal fat and a large abscess evacuated. General improvement followed this intervention but on April 27 pain in the right buttock developed and there was limitation of movement in right hip. An incision over the point of greatest tenderness brought a few cubic centimeters of chocolate colored pus. A deep incision over the right trochanter gave access to a large abscess.

From now on slow but continuous improvement set in and by June 16 the patient was able to be transferred to a territorial hospital for convalescence.

The elaborate and detailed report by Caliceti from which the above outline of this interesting case is derived is followed by a discussion of the etiology of the pyemia and the various theories to account for the metastasis.

1. Was the infection transmitted through small intraosseous venules?

2. Did the infective agent travel by the blood direct from the capillaries of the mastoid or the tympanic membrane?

3. Was a small thrombus present in one of the minute vessels of the temporal bone?

MAYO, W. J. **Acute perforations of the abdominal viscera.** Surg. Gynec. and Obst., January, 1919.

Three important surgical conditions—the relation of appendicitis to general septic peritonitis, perforations of the pancreas from fat necrosis, infections and perforations of Meckel's diverticulum—were made known to us by the late Reginald Fitz of Boston. As his researches were wholly by autopsy a somewhat exaggerated idea of the fatality of these conditions gained credence.

The operating surgeon by the study of living tissues has developed a more hopeful view. The prognosis depends on the quantity and virulence of the extravasated material, the general resistance of the patient and the anatomical location of the perforation as it bears on the possibility of adhesions, walling off, etc.

The progress in surgical treatment is shown by the present attitude as to time of interference. An operation done from three to six days after perforation is not for the perforation but for the generalized peritonitis consequent upon that disaster in the hope of removing a still active focus or secondary deposits and so limiting the spread of the disease.

Acute perforations of the abdominal viscera may be considered in three stages: (1) Stage of contamination evidenced by shock, local pain and tenderness; (2) reaction, a stage in which apparent amelioration creates the delusive hope that intervention may not be needed; (3) general peritonitis.

In appendicitis 70 per cent may indeed recover from perforation that is from the one attack, but 30 per cent of fatalities is very high. The suposed recoveries are temporary. Subsequent attacks are common and may prove fatal.

Mayo comments on the occasional coincidence in time of acute perforations of appendix and gall bladder. In such cases a gall stone has usually been present and the flora of the two organs correspond. It is well to bear this in mind when operating for either single condition, since a successful treatment of the appendix or gall bladder may be followed by death of the patient if a rupture of the other organ passed unnoticed. Early operations for perforations of the gall bladder are frequently declined by the patient because he does not recognize the increased gravity of this over previous incidents connected with chronic cholecystitis or calculus. It is the delay that is fatal in these cases and not the inherent gravity of the accident. The anatomical surroundings of the gall bladder are excellent from the standpoint of protection.

There is a close association between diseases of the gall bladder and biliary tract and diseases of the pancreas. In Mayo's cases of

chronic pancreatic disease 90 per cent were associated with infected gall bladder usually containing calculi.

The danger of acute pancreatic processes "which may be spoken of pictorially as acute perforations" depends on whether or not infection is present. The prognosis depends largely on the question of infection.

Mayo inclines to conservatism in the surgical treatment of acute pancreatic disorders preferring an anterior approach looking to drainage when indicated to incising the organ for anticipated trouble.

Duodenal perforations into the abdominal cavity are the commonest of acute perforations. Happily the fluid contents of the duodenum are more or less sterile and of small bulk. These cases are often operated on for acute appendicitis, recovery following though the true cause of the symptoms was not discovered. An incision to the right of the mid-line through the rectus muscle enables the surgeon to examine appendix, gall bladder, duodenum, and stomach and engage in the precedure indicated regardless of the preoperative diagnosis.

Mayo notes a marked difference between results from intervention undertaken within 10 hours and those delayed from 10 to 30 hours. When the operation is performed within 10 hours the perforation will usually be found closed and contamination may be prevented. Perforations of the stomach are more serious owing to the larger capacity of that organ and the greater likelihood of spread of contamination, especially if they occur in the anterior surface. Chronic conditions usually precede perforation and give warning of the ever-present possibility of sudden acute dangers, but this has not been so generally recognized for gall bladder as for appendix cases.

(J. S. T.)

SORESI, A. L. **The use of paraffin for drainage in surgery.** Policlinico, Rome, XXV–G 12, December 15, 1918.

While the absolute necessity of giving escape to pus wherever or however produced and accumulating in different parts of the body is universally recognized, the daily experience of surgeons demonstrates the futility of the great majority of devices used for drainage and what is worse the frequent liability of these devices to be of positive harm. The following propositions regarding the essential features of any method of drainage will doubtless meet with general acceptance: (1) The method employed must actually facilitate the flow of pus or other liquid to the surface. (2) It must not be the immediate or remote cause of local or general disturbance either at the moment of employment or at any later period. (3) It must not interfere with the healing of the diseased part.

As it can easily be proved that none of the methods now employed for drainage fulfill the three requirements given above, the author feels justified in publishing an account of the method of drainage by means of paraffin which he has employed for over five years, three of which were devoted to the treatment of thousands of wounds handled in the present war.

Before describing the procedure in detail Soresi adverts to the complicated character of the fluids of the human body, all of which have the common property of tending to adhere in a greater or less degree to the parts with which they come in contact and of depositing on these parts either their organic or inorganic content. He notes further the familiar fact that nature has provided the blood vessels, lymphatics, and mucous surfaces of hollow organs and canals with special types of cells to which the liquids they transmit or contain will not adhere. To obtain adequate drainage therefore we can not do better than to imitate the performance of nature by employing devices which will have a minimum of affinity for the fluids to be withdrawn. Paraffin meets this requirement inasmuch as it does not fasten itself to the tissues and organic liquids do not adhere to it. In this connection the reader is reminded that transfusion as employed to-day relies largely on the fact that the coating of paraffin on tubes and containers permits the blood to flow without coagulating.

In brief, the advantages of paraffin for drainage may be summarized in the statement that it does not stick to the tissues with which it comes in contact nor with the secretions from them. It follows from this that between the paraffin drain and the cavity to be drained there will always without any exception be a free space along which secretions from the walls of the cavity to be drained will have outlet. The interval between the paraffin drain and the walls of the abscess cavity will in every case suffice for drainage no matter what quantity of pus or secretion is produced.

While the application of the proposed principle varies with the different types of wound, it requires no difficult technique, but on the contrary is so simple and so independent of special apparatus that it is within the reach of the humblest practitioner.

The paraffin available for this method of drainage is the ordinary paraffin of commerce—any paraffin will do splendidly. The paraffin to be used is prepared in the following manner: Water is set to boil in a tray, such as photographers use for developing, placed over an alcohol lamp. In this place a second smaller tray, making a water bath for dissolving the paraffin. The water bath prevents the paraffin from reaching too high a temperature and burning the patient. By this method the temperature of the paraffin will not

exceed 100 C., which will usually drop to 70° or 80 C. by the time the local application is actually made.

Take an ordinary muslin bandage, a strip of linen, or a piece of tape of the length and breadth required and holding it by the two ends pass it through the liquid paraffin by a series of up and down movements until the paraffin is equally distributed along the material. If the meshes are large two thicknesses of bandage may be used. Repeat the immersion until the drain has taken up the amount of paraffin desired. Now hold the drain by one end and dip the other into the paraffin. Drains prepared in this way can be used immediately, or after cooling can be put away between two sterile towels or preserved in some antiseptic liquid such as alcohol, to which a little iodine, bichloride of mercury, etc., has been added.

Another type of drain can be prepared by folding the edges of the strip of bandage on themselves and submitting the strip to a preliminary paraffin bath; then roll it between the hands and coat it with more paraffin. The last step should be performed quickly to prevent the first and inner coating of paraffin from being dissolved. By going over these steps several times a small, smooth rod something like a candle is obtained. The last step, of course, consists, as before, in paraffining one end of the drain. As the rod is withdrawn for the last time the excess of paraffin runs off the lower end and leaves a nicely rounded extremity which can be introduced into the tissues without pain or inconvenience.

For more minute drains strands of linen, silk, cotton, or metal can be prepared as described above.

Another way of using paraffin for drainage is to pour or inject the liquid directly into the cavity. The liquid paraffin can be drawn up from the container by a syringe, ladled with a spoon, or allowed to drip from a piece of gauze. When the paraffin is injected with a syringe into a wound having an entrance and exit aperture the most dependent one or both openings may be temporarily closed by a bit of gauze until the paraffin solidifies. Paraffin employed in this way when solidified becomes a "block" of paraffin ramifying through all the sinuosities of the wound. No fear need be entertained lest the paraffin becomes embedded in the tissues. It is expelled little by little as the cavity fills in. This will take place with a rapidity which will surprise anyone employing the method for the first time.

Soresi has largely abandoned the use of tubing for drainage except in those cases where the material to be abstracted comes from a considerable depth and where it is undesirable for the intervening tissues to be bathed in it. Tubing coated with paraffin is employed to advantage in draining the gall bladder and biliary ducts.

T bandages and many-tailed bandages treated with paraffin are of use in special cases, e. g., drainage of the prevesical space.

The paraffin method can also be profitably employed to drain cavities which at the same time require to be packed. With a piece of paraffined gauze of suitable width line the walls of the cavity somewhat as a paper hanger puts on the wall paper. Then use ordinary gauze for packing. When there is occasion to remove the latter it can be done easily and painlessly. Special indication for the use of paraffin threads of cotton, linen, or silk has been found in the closure of the abdominal wall by layers. Between the layers put a thread or two, leading the lower ends to the surface through a small special incision. This prevents those annoying accumulations of serum and blood which tend to make dead spaces in the depths of a wound and interfere with prompt healing either by the mechanical separation of the layers or by furnishing a culture medium for bacteria. The threads are withdrawn a little each day and completely removed by the eighth or ninth day after the operation.

In perforating wounds the "block" method may sometimes effect a removal of minute foreign bodies such as bits of dirt, shreds of clothing, etc. The wound of exit is occluded and slight pressure is maintained over the wound track while the cavity is being injected with paraffin. When the cavity is distended pressure on the lower opening is discontinued and more paraffin is forced in. The *vis a tergo* now causes the paraffin to exude from the distal opening bringing with it small foreign bodies. While far from claiming that this simple treatment will remove all foreign bodies the author does assert that it will bring away a great many of them and so reduce the trauma of operative interference looking to that end. The paper concludes with a detailed description of drainage of empyema, of mastoid, of prevesical space, summarizing the arguments in favor of the method described. (J. S. T.)

ELMER, W. G. **Surgical technic in orthopedic surgery.** Ann. Surg., December, 1918.

The extensive and varied procedures of surgery often involve forcible manipulation and more or less trauma of the parts. Hence perfect asepsis is indispensable. The following points made by Elmer are of interest to the general surgeon.

He considers the rubber glove as ordinarily sterilized a serious menace. To wrap this article in gauze often partially folded on itself and sometimes folded twice and boil it perhaps in the center of a pile of other gloves, for 10 minutes after a "clean" and 20 minutes after a "dirty" case is to fall far short of the requirements. While steam may reach all parts of the outer surface of a glove, the author believes that air pockets are to be found inside the fingers which the steam never reaches. Such parts are therefore subjected, on the in-

side, only to dry heat and for the destruction of all germs and their spores by dry heat a temperature of 350 F. for one hour is required whereas boiling water (212 F.) for five minutes answers the purpose if all parts are reached. The proper treatment consists of a thorough preliminary washing with soap and water inside and out. The glove is then filled with water to expell all air, immersed in boiling water and held down by a piece of wire gauze. After five minutes boiling and when the water has cooled the nurse, wearing sterile gloves, removes the glove with forceps, dries it with a sterile towel, powders it inside and out with sterile talcum powder and folds back the gauntlet. Into this is now to be tucked a small gauze pad covered with talcum for the surgeon to use on his hands. The glove, now folded, is covered with muslin and laid in a large glass jar.

When wanted for use gloves prepared as above, still wrapped in gauze, are laid in loose rows and not packed together in the autoclave, and sterilized for 20 minutes.

The head nurse should personally and directly supervise the work of her assistants and the directress of nurses is responsible for the head nurse. The directress should occasionally go unannounced into the operating room while an operation is in progress and remain throughout the séance watching with critical eye every detail of the work of her subordinates.

Silk to be permanently imbedded in tissues will defeat the purposes of the operation unless perfectly sterile. It should be boiled for 10 minutes in a 1–1000 bichloride solution and then for 10 minutes in plain water. If boiled with instruments the soda will impair tensile strength.

In opening a joint two knives should be used; one for the skin incision, and one for the deeper structures. Sand pillows and operating tables should have rubber covers sterilized with the same care bestowed on rubber gloves and then be covered with sterile cloths.

Instruments should not be provided in any considerable excess of actual needs. This complicates their proper handling and increases the wear and tear on them. Knives are not to be boiled but immersed for 20 minutes in 5 per cent carbolic and then transferred by sterile forceps to a tray containing 85 per cent alcohol. The glass tubes containing catgut are to be boiled and then placed in a tray of 5 per cent carbolic or 3 per cent formalin. Nurses should not put their fingers into a tray but remove needed articles with forceps. Talcum powder can not be sterilized in milk. (J. S. T.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

The laboratory diagnosis of gonococcal infections. Methods for the detection of spirochaetes. Pamphlet published by His Majesty's Stationery Office, 1918, for the Medical Research Committée (National Health Insurance).

METHODS FOR THE DETECTION OF SPIROCHAETES.

Collection of material.—Fluid freshly expressed from the lesion, after cleansing with salt solution or water, is to be used. If possible, the material should be collected before the use of any antiseptics. Puncture of the nearest enlarged gland and collection by syringe may yield results. Salvarsan and like remedies should not be used before the examination.

(*a*) For superficial lesions take up exuding serum in a capillary pipette. Avoid getting blood.

(*b*) Lesions of mouth. Same as (*a*) but care must be taken to avoid getting saliva, as it may contain organisms difficult to distinguish from the specific organism.

(*c*) Skin lesions. Scarify or scrape papule and obtain serum by cupping or squeezing. Macules may be blistered. Blister fluid is to be thrown away and fresh serum obtained.

(*d*) Lymph glands. Inject about 5 minims of salt solution into gland. Massage gland and withdraw fluid.

DEMONSTRATION OF THE SPIROCHAETES.

The dark-ground condenser.—The use of the dark-ground condenser is considered the ideal method. A note is made that the first application of the principle of the dark-ground condenser was due to English scientists. There is a discussion of the principles of the dark-ground condenser and the technique of the examination. Plates showing the appearance of the specific organisms, in comparison with *S. dentinum* and another organism, are shown. The *S. dentinum* is stated to have coils somewhat more angular and its motion is stiffer. The other organism has five coils to the diameter of a red cell while the specific organism has seven. The motion of the other organism is more active than that of the specific organism.

Stained films.—Prepare film and fix as soon as it is dry, by applying absolute alcohol, methyl alcohol, or osmic acid. Stain by Giemsa's method or by Leishman's or Wright's modifications. India ink may be mixed with an equal amount of secretion and smears made in the usual manner. Permit ink and secretion to dry. Examine with oil-immersion lens. Two per cent Congo red solution can be used instead of India ink. In the use of India ink or Congo red the organisms are distorted. If the film is thick, they appear as fine filaments; if

the film is thin they appear thick. Characteristic movement of organism can not be determined by any staining method.

Silver method.—Thibondeau's modification of Fontana's method is the one chosen.

Technique.—Prepare films and dry them in the air. Fix by formol-acetic acid solution (acetic acid, pure, 1 cc.; commercial formalin, 40 per cent, 2 cc.; distilled water 100 cc.), for one to five minutes. Treat with mordant (tannin 1 gram dissolved in 20 cc. hot distilled water) and heat until vapor arises, then allow mordant to act 30 seconds. Wash with tap water for 30 seconds and with distilled water for 30 seconds. Treat with silver solution for a few seconds in cold silver nitrate 1 gram, cold distilled water 20 cc. When solution is complete add ammonia water drop by drop. A brownish precipitate is first formed. On further addition of ammonia the precipitate begins to dissolve. Stop addition of ammonia when solution is faintly opalescent. Pour off silver solution and flood with fresh silver solution. Heat until solution steams gently and allow to act for 15 seconds. Wash in distilled water.

Soft chancre and balanitis.—The committee finds no sufficient evidence that soft chancre is a disease induced by a single species of micro-organism. It recommends that clinical observation of cases of soft chancre be continued for 12 weeks to exclude syphillis. A similar recommendation is made with respect to conditions of balanitis.

GONOCOCCAL INFECTIONS.

Introduction.—The venereal diseases act has caused an increase in laboratory diagnoses of gonococcal infections. To reduce incorrect diagnoses to the minimum the committee has recommended that certain methods be followed. It is thought that such methods will prevent grave injustice to individuals whose cases might be wrongly diagnosed. Gonococcus infection and on the other hand will serve to protect the families of men having the disease but in whose cases the diagnosis of gonococcus infection was not made.

Recognition of gonococci in films.—A positive diagnosis may be justified from microscopic examination of films alone.

1. When the clinical history and appearances are those of an *acute* gonorrhea.

2. When the proper technique has been employed.

3. When the observer is so thoroughly familiar with the appearance of the gonococcus in stained films as to be beyond the danger of confusing other micrococci with it.

There is a discussion as to the regions involved in the male and female. A note is made that a smear from the vulva is of absolutely no value, except in vulvo-vaginitis in children. It is recommended

that the smears be made from urethral discharge. Cultures are to be made after cleansing with alcohol.

Staining of smears.—Gram's stain is recommended. The committee thought the best results could be obtained by staining thin, evenly spread smears with 0.5 per cent solution of methyl violet; pouring off, and without washing, applying a strong iodine solution (iodine 1, potassium iodide 2, water 100), then washing with absolute alcohol and applying a solution of neutral red (neutral red 1, distilled water 1,000; 1 per cent glacial acetic acid 2).

Cultivation.—The media found most satisfactory were:

1. Thomson's human plasma glucose agar.
2. Cole's tryptic blood agar.
3. Gordon & Hine's trypsinised pea extract agar.

As the materials for (1) are most easily obtained in the service it is chosen for this review.

(*a*) Beef heart free of all fat, minced, and placed in an equal weight of distilled water. Heat to 40 C., stirring constantly. Maintain temperature at 40 C. for 20 minutes, raise to boiling point and boil for 10 minutes. Strain through four thicknesses of butter muslin.

(*b*) Dissolve 10 grammes disodium hydrogen phosphate (Na_2HPO_4) in 1 liter of sterile distilled water.

(*c*) Measure equal parts of (*a*) and (*b*) into a sterile flask and add peptone to make 1 per cent solution. (Best to make a paste with peptone and a portion of fluid.) Steam in Arnold for 45 minutes.

(*d*) Add sufficient agar to make 3 per cent agar jelly. Steam in Arnold until agar is dissolved (60–90 minutes). Filter. Titrate and make plus 6, Eyre scale (plus 0.6), using phenolphthalein as an indicator. Add to agar solution sufficient glucose powder to make 2.5 per cent solution of glucose. Steam for 20 minutes. Place about 4 cubic centimeters in each tube and store in ice chest.

(*e*) Collect blood in sterile centrifuge tubes, each tube containing 2 cubic centimeters of 2 per cent sterile solution of sodium citrate for 8 cubic centimeters blood. Centrifuge and collect plasma. Melt agar tubes and cool to 60 C. Add to each tube from 0.5 to 1 cubic centimeter plasma and mix by rolling between the hands. Slant. Incubate 24 hours to insure sterility.

Methods for production of a focal gonococcal reaction.—Vaccinating or inoculating with 50,000,000 to 100,000,000 autolysed organisms or 100,000,000 to 200,000,000 of suspension of the cocci killed by heat, may set up a focal reaction, frequently accompanied by active discharge containing gonococci. There is danger that such a procedure may light up a latent iritis or salpingitis. A 0.5 per cent

solution of silver nitrate introduced into the urethra may induce active discharge in case of doubtful urethritis.

Complement fixation test.—This has been little employed in Great Britain. Its disadvantages hitherto reported are: (1) It very frequently fails in acute gonorrhea. (2) Even in chronic cases if narrowly localized it may fail. (3) The test can not be used in patients treated with vaccines. (4) Antibodies from vaccine treatment may persist for months. (5) It may give nonspecific results. The committee does not recommend any one standard method of performing the test.

(G. F. C.)

EYE, EAR, NOSE, AND THROAT.

KERRISON, P. D. **Tests for malingering in defective hearing.** Laryngoscope, vol. XXVIII, No. 9.

Complete bilateral deafness is rarely claimed; the cases presented are usually advanced unilateral deafness or absolute deafness. Tests used by the author are Weber's loud conversational voice test; the binaural stethoscope test, eliciting incongruous variations and responses; the noise-apparatus reading test (Lombard's test). The routine is as follows: Only one registrant at a time is admitted to a room and is questioned regarding his condition, but at no time being led to suspect that his statements are under suspicion. Weber's test is now made, and if he refers the sound to the supposedly deaf ear, his honesty is probable. If he refers it to his sound ear, the next test is proceeded with.

Loud-voice test: Blindfolding the patient and requesting him to close his better ear, words and numbers are repeated to him, at first in a low voice and then louder. If, after reaching a sufficient degree of loudness to enable him to hear with the sound ear, even though tightly occluded, he still claims not to hear, he is an intentional malingerer.

Stethoscope test: Using the ordinary clinical stethoscope with a funnel-shaped chest piece, one ear piece is closed off with wax, and the stethoscope adjusted with the occluded ear piece to the supposedly deaf ear. Words in a low whisper are spoken into the chest piece, and should be heard perfectly. The stethoscope is removed and later replaced with the occluded piece in the sound ear. If he hears as well as before, the deafness was either exaggerated or pure malingering.

Tests eliciting contrary responses: The ordinary tests are gone through with while the patient's eyes are open and the amount of hearing is approximately determined. He is again blindfolded, and

the same tests are repeated several times, in varying order, and the results compared. It is likely, if he is malingering, that there will be contradictory responses.

Lombard's test is made with a Bárány noise apparatus, and depends upon the fact that the sound of the voice is necessary to proper regulation of tone and intensity. The apparatus is adjusted, and the machinery started, using the sound ear. The candidate is then given a book to read aloud, and told not to stop when the noise apparatus is set going. With a one-sided deafness, and the normal ear with a noise apparatus, the patient's voice rises, and may be almost a shout. A malingerer will continue to read with unchanged, or only slightly elevated, tone.

(G. B. T.)

Woods, A. C. **Ocular anaphylaxis.** Arch. Ophth., vol. XLII, No. 2.

Producing a hypersensitiveness of an eye by means of an intraocular injection of homologous uveal emulsion, then after two or three weeks an intraperitonial injection of uveal emulsion, it was found in this series of experiments with dogs that within two or three weeks after the intraocular injection the noninjected eye began to show irritation, a pericorneal congestion associated with photophobia. After the intraperitonial injection the affected eye became more active, while the uninjected or sympathizing eye developed a ciliary irritation, photophobia, iris finally becoming immobile, vitreous opacities developing and the globe showing lowered tension. It is believed the condition produced was sympathetic ophthalmia.

(G. B. T.)

Maclay, O. H. **Bacteriology of tonsil crypts.** Laryngoscope, vol. XXVIII, No. 8.

The cases presented the usual clinical symptoms; in children history of repeated attacks, while the cases showing systemic involvement were adults. The removed tonsil was immediately placed in sterile gauze and not handled until taken to the laboratory. The surface of the tonsil was cauterized and a sterile sharp kinfe used to cut cleanly into the crypts. Smears and cultures were made from the crypts.

Surface smears show many different organisms, but probably only represent the organisms present in the mouth, while those in the crypts are responsible for infection and may be entirely different.

Staphylococci were found in 166 cases, streptococci in 133, pneumococci in 121, streptococcus hemoliticus in 17, streptococcus viridens in 1, diplococci in 49, bacilli in 5, hay bacilli in 2, tubercle bacilli in 1.

(G. B. T.)

NOTES AND COMMENTS.

The Third Resuscitation Commission has sent to the UNITED STATES NAVAL MEDICAL BULLETIN and to many other periodicals a summary of the proceedings of the session held at the Rockefeller Institute, New York, on May 17, 1918, with the request that it be published in whole or in part, certain paragraphs being especially emphasized. The portion of this report which appeals most strongly to the editor of the BULLETIN is its appendix, which is herewith reproduced in full.

APPENDIX.

The commission consists of 15 members. Fourteen approved the foregoing report without qualifications. The fifteenth member wishes to qualify his vote by the following statement:

Dr. Yandell Henderson qualifies his support of the resolutions as follows:

While I concur in a considerable part of the report of the Resuscitation Commission, I dissent from the statement in resolution 8 recognizing "the great need of simple devices capable of performing artificial respiration reliably and efficiently."

Devices which are excellent from the mechanical standpoint are now available and widely sold, but the evidence regarding them indicates clearly, I believe, that even if these devices were on the spot where several gassings or electrocutions occurred, and if all the victims were treated with them, except one who was given manual (prone pressure) treatment, this one would have much the best chance of recovery. In actual practice the apparatus is seldom right on the spot, adjusted, and ready. Critical time is lost, and thus in the above supposititious cases, as they actually occur, the only victim with any considerable chance of resuscitation (aside from those who recover spontaneously and are credited to the apparatus) is the one treated manually.

Even more important is the fact, demonstrated now by universal experience, that when apparatus is known to be obtainable, it is sent for and the manual method neglected. Thus, to-day the apparatus in public use is, on the whole, contributing very materially to decrease the saving of life.

This is certainly sound, common sense and a very proper amplification of the second important fact emphasized by the commissioners: "That reliance upon the use of special apparatus diminishes greatly the tendency to train persons in the manual methods and discourages the prompt and persevering use of such methods."

We believe that the fact that in most accident cases no apparatus is at hand for immediate use is a matter of congratulation rather than regret.

The commission recommends the prone pressure or Schäfer method of resuscitation, the use of this method on the spot without the delay incident to transfer to a hospital and the employment in addition, in cases of gas asphyxiation, of inhalations of oxygen. The neglect to give proper instruction in methods of resuscitation at hospitals and in medical schools is deplored, as well as the disposition of police officers and even physicians to urge removal of the patient from the scene of the accident before normal breathing has been restored.

Lecture course at Great Lakes, Ill.—In a previous issue of the BULLETIN several papers were published which had originally been prepared for one of the bimonthly occasions on which the medical officers serving at the navy yard and United States Naval Hospital, Mare Island, Cal., met to talk over topics of common interest and to report and discuss interesting cases which had come under their care.

Some of our hospitals are too remote from large medical centers to make it feasible for the medical officers serving in them to take advantage of all the clinical and laboratory material and of the facilities for professional improvement afforded by those centers.

At the United States Naval Hospital, Great Lakes, Ill., a series of lectures has been arranged by which the busy medical staff may come in contact with the leaders of the profession in Chicago, Omaha, Fort Wayne, Iowa City, Milwaukee, Pittsburgh, etc.

The course of lectures began in October, 1918, and will continue till the summer. To have such men as Bevan, Zapffe, McArthur, Wyllys Andrews, the Becks, the Ochsners, Nagel, Lespinasse, Porter, Wayne, Lemon, and others equally well known speak at Great Lakes on subjects connected with the various fields in which they are supreme is sure to be of inestimable benefit to the Navy men there.

Both the conference and the lecture scheme might well be inaugurated at all our establishments.

A department of physical training.—Two years ago the University of Virginia inaugurated a department of physical training along the lines advocated in the BULLETIN. Credit was given toward the baccalaureate degree for satisfactory work done under the supervision of this department in the same manner as has always been done in Greek and Latin.

With the advent of the Reserve Officers' Corps and the Students' Army Training Corps the supervision of this undertaking had to be abandoned and turned over to the Army authorities.

Beginning with January, 1919, the department of physical training resumed its work. There are at present at the University of Vir-

ginia over a hundred students who would have no chance whatever of holding positions on the athletic teams but are doing interesting and effective work in mass athletics, in competitive games, in hand-to-hand and eye-to-eye work.

A program has been arranged by which men of less vigorous physique than football players, for example, will have opportunity to develop the endurance, the leadership, etc., which hitherto have been the reward only of those participating in the intercollegiate games.

The Germans and the scientific workers of Lille.—Dr. Albert Calmette, director of the Pasteur Institute of Lille, in his own name and on behalf of MM. G. Laguesse, H. Parenty, Duret, and Aimé Witz, representing virtually all the scientific workers detained in that city during the German occupation, has addressed to the Académie de Médecine a protest on the ill treatment which they suffered at the hands of the invaders. Without the slightest regard for their scientific work or their families they were on several occasions subjected to domiciliary visits of the most insulting nature. Even their scientific apparatus and instruments were not respected, and the members of the faculty of medicine were expelled from their laboratories. Among the "hostages" deported to Poland was Prof. Buisine, director of the Institute of Chemistry, aged 62, and suffering from long-standing intermittent action of the heart and stricture of the oesophagus. His wife called the attention of the German surgeon major, Dr. Krug, who was examining the prisoners, to her husband's condition, and received the brutal reply, "Madame, that is not contagious for the German Army!" M. Calmette speaks of the responsibility of the German people for the misdeeds of its army, and says that those who, like himself, have witnessed the eagerness, even zeal, with which men who are not professional soldiers—for instance, doctors—did the most hateful things without a word of excuse, regret, or pity, are compelled to recognize that, as a general rule, to which there are but two rare exceptions, the German heart is inaccessible to generous, or even simply human, feeling. Henceforth the German people, in spite of its laborious intellectual activity, can only excite disgust and horror at the crimes of which it has been guilty. For this reason M. Calmette and his colleagues state that they will not in future collaborate in any German publication or take part in any scientific meeting or international congress attended by any German workers who have not first expressed by a public declaration their disapproval of the antisocial acts of their Government in the war. They call upon their colleagues of the Institute of France, the Academy of Medicine, and the Academy of Agriculture

to join them in this declaration and to invite the scientific societies of all civilized nations to associate themselves with their action.—(Extract from the British Medical Journal, Dec. 21, 1918.)

Physical education.—Willard S. Small, of the United States Bureau of Education, in an address before the American Public Health Association, Chicago, December 9–12, 1918,[1] stated that 35 per cent of the men in the first draft were rejected as physically unfit. Deducting 5 per cent for rejections not due to any general unsoundness, but to special sensory defects and insufficient height, we have in the United States 2,500,000 men between the ages of 21 and 31 who are unfit in some measure for the fullest accomplishment of the best purposes of life.

He pointed out further, that passing the physical examination for the draft was in itself no demonstration of a man's ability, through muscular control and versatility, to endure the rigors of intensive military training.

Approximately 1,000,000 young men reach the military age each year. There are approximately 25,000,000 school children between the ages of 6 and 18 in the United States. At least 50 per cent of them have defects and ailments that impede normal development in some degree.

Economic disparities between States are marked. Mississippi has property to the value of $2,100 for each child. In California property is estimated as worth $15,000 for each child in the population.

The speaker advocated broad and liberal legislation for physical education, including medical supervision of schools, the dissemination of a knowledge of the laws of health, individual examination and record, provision being made for boys and girls alike between the ages of 6 and 18.

Federal aid should be given the States in the training and remuneration of skilled teachers. Duplication of effort and conflict of interests must be avoided. Autonomy and initiative in the different States must not be interfered with nor the native genius and traditions of localities be hampered.

The training provided for boys should not be a substitute for but only preliminary to military training, which should not begin for boys under 18 years of age. Such training should not be exclusively with a view to subsequent military service.

Corrective gymnastics, intensive physical training for the older boys, development of habits of health, and gradation of physical exercises are among the measures advocated.

---

[1] Interstate Med. Jour., December, 1918.

The National Committee on Physical Education has prepared for Congress the draft of a bill appropriating funds and making provision for cooperation between the United States Public Health Service and the Bureau of Education of the Department of the Interior in the development of a national system of physical training and education for the young of the country.

Transportation of sick and wounded.—Lieut. Commander R. G. Davis, Medical Corps, United States Navy, in a report on a recent return voyage of the U. S. S. *Northern Pacific* carrying troops and Army sick and convalescents, says:

A scheme of the ship's capacity was worked out and totals of each classification of sick and well forwarded by radio before arrival in France, giving hospitals and embarkation officers time to expedite our loading and departure. At least 500 well were requested for sentries, latrine orderlies, mess cooks, and cleaning detail.

Six hundred and twenty well troops with their officers were embarked on December 23, 1918, and those needed for the various details selected and assigned. The following two days 1,763 patients were received on board by serial number and ushered to their respective compartments, according to the nature of their cases, where medical officers and hospital corpsmen assigned beds and arranged for immediate feeding. When the last man was on board a complete classification had been effected and all were dressed and ready for the voyage.

Three medical officers and 17 hospital corpsmen were received in Brest, France, for transportation to the United States, and their assistance proved a valuable addition to the medical division. All medical officers and hospital corpsmen were so assigned that all dressings and treatments were done daily, and two men made an hourly patrol through all compartments, maintaining a close supervision over the patients and keeping the senior medical officer cognizant of any needs or complaints.

The messing was carefully arranged by the commissary department, and well-cooked, appetizing food was served in cafeteria manner to those in all wards and "helpless" compartments. All other cases were fed in the main mess hall.

It appears from observation of injuries weeks after their reception that the pendulum of splint enthusiasm has swung a little too far, and if always necessary to be applied splints are left in place longer than indicated, producing pressure sores and stiff joints. They are applied for wounds, deep or superficial, on any part of the limb, and some 15 cases of heel decubitus were noted on the present voyage.

Dr. Davis, whose report bears an indorsement from his commanding officer commending him for his "zeal and efficiency," describes two interesting cases transferred to the *Northern Pacific* for passage to the United States. One of these came aboard with a temperature of 101, pulse 124, respirations 30, badly emaciated from lobar pneumonia contracted two months before, and having an empyema drainage tube in his right side. Myocarditis and marked prostration from toxemia were present. He died on the fifth day out.

The other case had an abscess of the brain following shrapnel wound, with hernia cerebri. On the day after sailing complete left hemiplegia developed with symptoms of intracranial pressure. Death occurred within 27 hours of embarkation.

These two patients were clearly not fit to be evacuated.

Traumatic rupture of spleen.—The patient was on duty at the United States Naval Air Station at Rockaway Beach, N. Y., when, on September 22, 1918, he was pulled into the air by a rising balloon and fell a distance of about 40 feet. He suffered various contusions, but as there were also symptoms of internal hemorrhage a laparotomy was performed and a ruptured spleen discovered. The pedicle was ligated and the organ removed. He made a good recovery, but remains somewhat asthenic, anemic, and susceptible to cold. Discharge from the service as unfit has been recommended.

Officer Material School at Princeton, N. J.—Lieut. D. F. Luby, Medical Corps, United States Naval Reserve Force, reports success in preventing any extensive influenza epidemic and in controlling sporadic cases in the Officer Material School for the Pay Corps at Princeton, N. J.

With 250 men arriving each month the danger of the influenza being introduced at the school was appreciated and appropriate measures were taken in advance. This course was made possible by cooperation on the part of the commanding officer of the school and others in authority at Princeton. The first step was the formation of a military health board, consisting of Dr. Luby, the Army medical officer, the Princeton University physician, and the Princeton health officer. A campaign of education was conducted by means of lectures, dissemination of literature, and daily inspections of the personnel.

An isolation hospital was gotten ready *in advance* of the development of any cases, a fumigation room was installed, and the students were prohibited from visiting certain portions of the town and vicinity.

The military health board made a survey of the sanitary situation and took steps to correct any defects in sewerage, water supply, handling and sale of food, etc., that might contribute to sickness. Moving-picture shows, churches, schools, and restaurants were immediately closed on the appearance of the first case.

The special dormitory regulations were as follows: Windows open day and night. Moist sweeping of rooms and corridors. Beds placed 5 feet apart. Bedding aired all morning. Crowding in rooms forbidden. Spitting on floors punished.

There were few cases of influenza in the school in spite of the general prevalence of the disease in the neighborhood and of the constant arrival of men from the infected districts.

Wanted a diagnosis.—The following report from one of the vessels of the Naval Overseas Transportation Service offers scope for study. It is interesting because of the unusual character of the manifestations described. The writer of the report has done his best to record the facts and deserves credit for the picture presented in view of his not being a trained medical observer, and still more because he was himself the principal sufferer. The most accurate diagnostician would scarcely have done better under the circumstances. Still it is to be regretted that no details were given about the two patients who were involved in a minor degree and that the health of the crew was not referred to.

The existence of a real paralysis is confirmed by the Chilean physician, though the statement that all muscles were paralyzed must be taken with extreme reserve. Again it should be noted that the symptoms began on or about September 26, while the patients were seen by him on October 16. It is perfectly possible that the reflexes were increased at first and later diminished. This happens. Neither the tentative diagnosis of myelitis nor the adopted diagnosis of beriberi seem tenable.

The first step in analyzing the report is to reject summarily the suggestion of a definite vegetable or mineral poison or of some tainted article of food. There was in no case any pain or diarrhea. The persons affected, the captain, a fireman, and a denizen of the sick bay, were, in a sense, members of widely separated communities. Their habits of life, their associations, their food had nothing in common, or at least, nothing which would not probably have involved others in the crew as well. It is impossible to believe that oxalic acid or a salt of copper, tin, or lead would have had such a marked selective action as to attack the Jupiter, Vulcan, and Æsculapius of the ship, leaving other deities and their satellites untouched.

The symptoms were somewhat vague and indefinite at first since they were recognized "on or about" a certain date. The initial ones suggest an acute bulbar paralysis, but the ocular phenomena in addition to the glosso-pharyngeal paralysis introduce the idea of an encephalitis—motor disturbance following on central or nuclear involvement.

The weakness and prostration referred to probably included two distinct phases: That apparent from the beginning, the usual concomitant of a severe infective process; that which resulted from the progressive atrophy of muscular tissue due to impaired innervation.

With the typical bulbar paralysis or an encephalitis there might be associated involvement of spinal accessory and phrenic nerves and of branches of the brachial plexus, but the widespread paralysis suggests at once a polyneuritis, and if such was the case, what was its origin?

Our readers may choose between polyencephalitis superior, associated with an acute anterior poliomyelitis (an acute encephalitis following influenza would be a legitimate diagnosis had there been an antecedent grippe), a polyneuritis similarly caused, or some more special manifestation.

Now, there is a disease which appears coincidentally with or soon after an epidemic of influenza, but not necessarily in those who suffered from that disease.

It remains, therefore, to consider the possible diagnosis of the entity known as epidemic lethargic encephalitis, though no lethargy is specifically referred to in the report. This disease is characterized by paralysis, which almost always affects the eye and may be extensively distributed throughout the limbs, by lethargy which varies in degree, and by asthenia. The disease as a rule is marked by some fever, at least in the beginning, and in cases where mental dullness is noticeable. While Dragotti emphasizes the lethargy and places it among the cardinal symptoms (p. 308), and A. J. Hall, professor of medicine, University of Sheffield, does the same (Brit. Med. Jour., Oct. 26, 1918), the latter modifies this at once by saying that "one or even two of the three cardinal signs may be slight or absent," and mentions a case in his practice which had no lethargy. Another patient had been rather drowsy at first, but this passed off entirely, the salient feature becoming a "general asthenia," which "was so extreme that he gave a typical picture of immobility, and at the time reminded me of myasthenia gravis. The actual cranial palsies were slight and limited to a slight ophthalmoplegia. When watching me and answering questions the head was perfectly still. He could barely move his arms and legs from the bed. He could not turn over in bed." "Fever is noted in many cases. Possibly it was present in all, but of that there is no proof." Hall mentions a case whose temperature "never rose above 99 F., and that only on the first and eighth days. Yet his attack was severe and prolonged." Speaking of the lethargy, he says, "Often the patient was surprisingly awake to what was going on." Three cases are mentioned in which after six months recovery was far from complete, the incapacity being due to trunk and limb muscles generally. Pending an answer from the clinicians and internists among the BULLETIN'S readers, it is suggested that these might have been cases of epidemic lethargic encephalitis, and attention is invited to the reviews of articles on this topic in another department.

REPORT OF PECULIAR DISEASE ABOARD THE U. S. S. ———.

On or about September 26, 1918, the following three men: L——, Lieutenant Commander, United States Naval Reserve Force, commanding; P——, Pharmacist's Mate, first class, United States Navy; M——, Fireman, third class, United States Naval Reserve Force, began to show similar symptoms, viz, partial paralysis of throat and tongue, and weakness of the neck and shoulders, and loss of control of the eyes (seeing double, etc.). The ship was then four days out of Seattle, Wash., bound for Arica, Chile, with a cargo of coal. Slow poisoning was at first suspected, but there were no definite symptoms. Precautions were taken against an infectious disease. No further cases developed. Lieut. Commander L—— was able to continue duties on bridge. The other patients were isolated in the sick bay of the ship.

The following is the case of P——, Pharmacist's Mate, first class, United States Navy, who was unable after the first week to follow the other cases closely. The other cases were similar but not so severe, the commanding officer being the least affected.

Beginning with the paralysis of the throat, the mouth became dry, but much frothy, slimy mucous began to form in the throat, which it was necessary to remove with a piece of gauze on the finger. The appetite remained good at first, but after a few days became indifferent and was accompanied by a disagreeable brown coating on the tongue and a bad taste in the mouth. No diarrhea or other intestinal disturbance. The weakness, which was apparent from the first, became gradually worse until it was impossible at the end of the first week to stand erect or keep the head from falling to the chest. Deglutition became impossible at the beginning of the second week. Water was taken by rectum. The paralysis extended to the shoulders and arms and finally, at the end of the second week, to the respiratory muscles. Breathing became very difficult and was barely perceptible; lips and extremities became cyanosed. The mind was clear at all times. Slight improvement noticed after two days. Conditions continued to improve. By the middle of the third week he was again able to take nourishment in liquid form. The whole course of the disease was characterized by lack of all pain or fever. The temperature remained normal at all times. Atrophy of all muscles. Loss of weight, 30 pounds.

Ship arrived at Arica, Chile, on October 16, 1918. Port doctor was consulted. He could throw no light on cases. Arrived at Mejillones, Chile, on October 19, 1918. Port doctor consulted. Cases puzzled him. On October 21, 1918, P—— and M—— were transferred to Dr. G——'s hospital at ———, Chile. No marine or public-service hospital available.

Dr. G——'s report and diagnosis is as follows:

"Appearance of typhoid (facies). Paresis of all muscles. Reflexes diminished in general, disappeared in triceps muscles. Sensibility diminished all over skin. Paresis of palate. Lungs, heart, liver, and kidneys normal.

"Diagnosis: Beriberi in form of multiple neuritis of myelitis. I do not think it is myelitis on account of diminished reflexes. It is rather interesting how it has been a painless neuritis.

"Treatment: Strychnin (hypo) twice daily. Sodium salicylate every four hours.

"Diet: Raw fruit, raw milk, raw vegetables, eggs, and meat.

"Prognosis: Phenomena diminished. I think case is benign."

Returned to ship October 29. Condition of both patients slightly improved. Complication of pyorrhea and tonsillitis (chronic) retarding improvement of M——. P—— able to resume partial duties.

L——, commanding officer is greatly improved. Condition is nearly normal.

In this connection it is interesting to note the report of a death from acute ascending paralysis of a man from another vessel of the Naval Overseas Transport Service. The patient gave a history of having had mild influenza in August, 1918. He was seen by a medical officer of the Navy on December 15, 1918, and at once taken ashore to a United States marine hospital. The patient complained of marked weakness in arms and legs. There was no pain or fever. He died the next day at 11 p. m.

At the hospital the patient stated that his symptoms—weakness of legs and difficulty in swallowing—had appeared the night before. On admission there was partial paralysis of triceps, brachialis, and hamstring muscles. The flexors of the forearms were somewhat affected. The patient could swallow liquids; his mind was clear; extra-ocular movements were normal and the pupils reacted to light and accommodation.

By 6 p. m. on the day of admission movement of arms or legs had become impossible. There was great difficulty in breathing, apparently from interference with the movements of the diaphragm. The paralysis of the arms and legs was of the flaccid type. In the morning both prepatellar reflexes were present, but by 6 p. m. the left reflex had disappeared and by 9 a. m. of December 16, the other also. In the morning of December 16 breathing was performed with great difficulty. Swallowing was impossible. By noon the breathing was entirely through the accessory muscles of respiration. By 6 p. m. it was evident that the patient was failing rapidly. The mind was clear; heart action rapid and irregular. Death occurred at 11 p. m.

From this meager résumé of the symptoms it would seem possible that this was not a case of Landry's paralysis. Landry's paralysis may be of a reversed type—i. e., with rapid paralysis proceeding from above down instead of ascending—but in this case the involvement of the upper and lower limbs appears to have been simultaneous with dysphagia and not progressive from either direction up or down. The clear mind, flaccid type of paralysis, rapid onset and speedy fatal termination suggests Landry's paralysis, but this would constitute an atypical case. The dysphagia, the phrenic paralysis, and the paralysis of the upper and lower extremities, practically coexisting, suggest also epidemic encephalitis. The features lacking to this picture are lethargy and some disorder of the extrinsic muscles of the eye, but considerable variety in its manifestations is characteristic of the disease and not all writers insist on stupor and involvement of extrinsic eye muscles for a diagnosis.

REPORTS.

HOSPITAL ADMINISTRATION, UNITED STATES NAVAL HOSPITAL, NEW YORK.

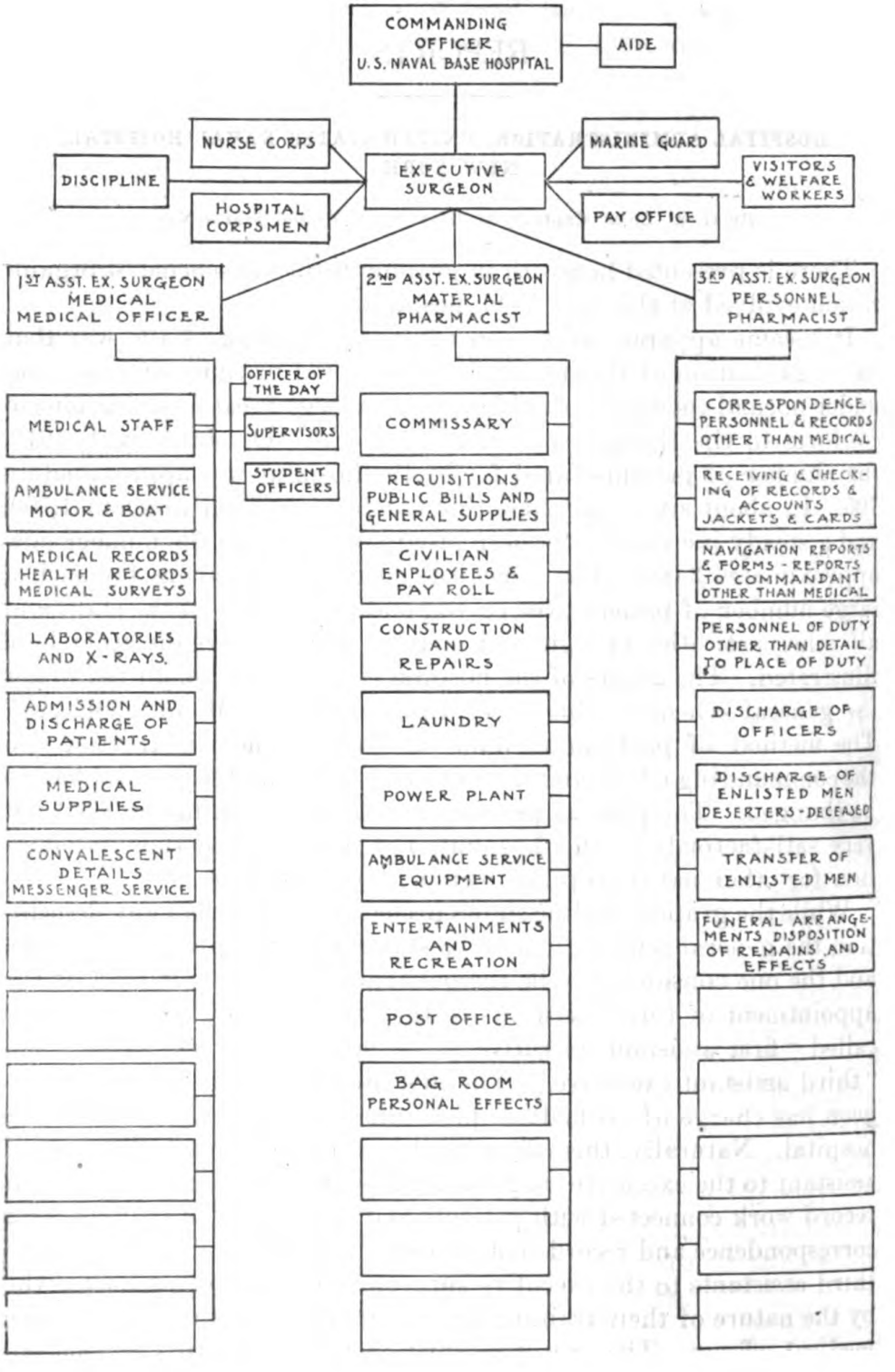
By G. A. Lung, Captain, Medical Corps, United States Navy.

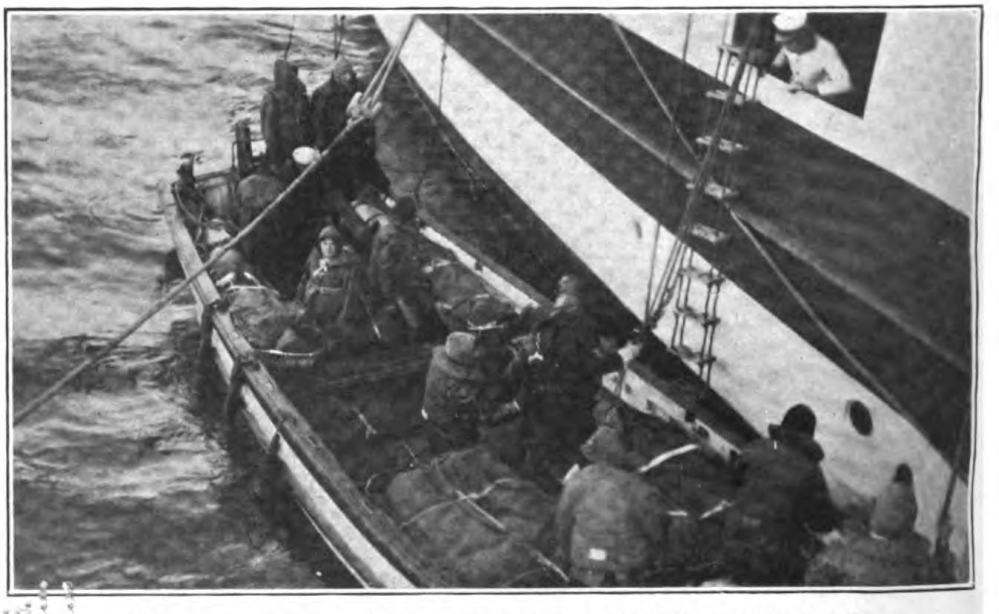
There is presented herewith in graphic form the scheme of organization evolved at the New York hospital.

It became apparent very soon after the outbreak of the war that the organization of this hospital as conducted in times of peace and under normal conditions would have to undergo great modifications to conform to the changes necessitated by war. On January 1, 1918, the number of patients cared for by the hospital was approximately 700. In about six weeks' time this number increased to about 1,700, and a steady increase has been in progress since until the number now approximates 3,000. The difficulties met with in caring for such a large number of patients, the corresponding increase in the staff, and all other activities brought out step by step the organization here illustrated. The affairs of the hospital could not be conducted under the general scheme outlined in "Instructions for Medical Officers." The method of performing duty imposed by these instructions on the commanding officer and the executive surgeon of a hospital had to be changed. The plan as presented in the diagram has worked out very satisfactorily at this hospital, and it is believed that its adoption for other naval hospitals would prove of benefit.

While the graphic outline shows probably plainer than any description the general scheme, it may be stated that the principal change, and the one considered to be the outstanding one of this plan, is the appointment of three assistants to the executive surgeon. They are called "first assistant executive," "second assistant executive," and "third assistant executive." The first assistant to the executive surgeon has charge of all matters pertaining to the medical side of the hospital. Naturally, this officer must be a medical man. The second assistant to the executive surgeon handles the personnel, which means record work connected with patients and staff in so far as it concerns correspondence and records not of a medical nature. The second and third assistants to the executive surgeon should be pharmacists, who by the nature of their training are better fitted for these duties than medical officers. The executive surgeon has, under this scheme, all the administrative work and a general supervision of all departments

ORGANIZATION OF U.S. NAVAL BASE HOSPITAL NEW YORK N.Y.





"Solace's" motor boat bringing wounded alongside of U. S. S. "Solace."

under the commanding officer, while he is relieved from the drudgery of minor detail work by his three assistants. This scheme is sufficiently flexible to allow of changes to suit any naval hospital, as long as the general idea of duties and responsibility is maintained.

REMOVAL OF WOUNDED MEN FROM U. S. S. *NORTHERN PACIFIC* TO U. S. S. *SOLACE*, JANUARY 3 AND 4, 1919.

By E. H. H. Old, Commander, Medical Corps, United States Navy.

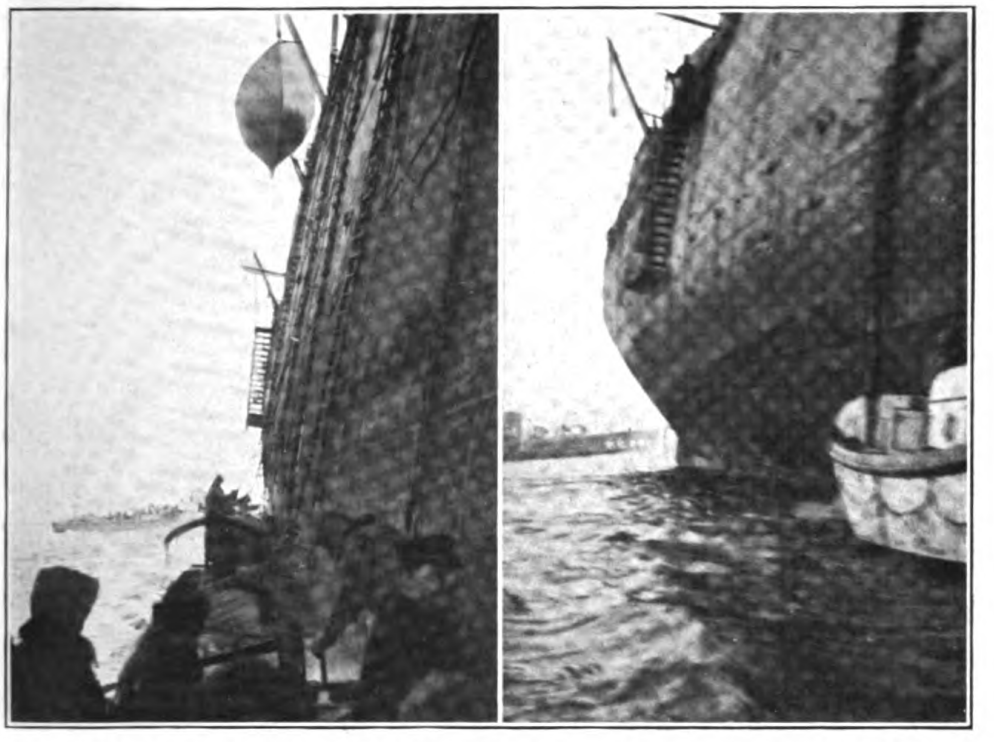
This ship was ordered on January 1, 1919, to proceed to the vicinity of the U. S. S. *Nothern Pacific*, then aground off Fire Island, and take on as many wounded men as possible for further transfer to New York. We anchored off Fire Island that night. On January 2 there was a strong northeast wind and the sea was unfavorable for small boats, so, by order of the senior officer present afloat, no transfers were made that day. On January 3, the sea having subsided to some extent, small boats (motor sailers) and submarine chasers were able to get to the lea side of the *Northern Pacific* during high tide to take on the stretcher cases and those with wounds in arms or legs. It was decided to send all the seriously wounded to this ship, consequently we received all the above class of patients. Two hundred and ten were received on this date and 214 on January 4; in addition, 34 hospital corpsmen were received as passengers. At that time there were already on board 85 patients, which made a total of 509 patients and 34 passengers to be looked after, with facilities on hand for properly berthing only 180 to 200. All bunks were used for those who had to remain in bed. "Gosso" bunks were put up in the wards and used in three tiers. Cots were placed in every available space. As the ship reached New York the night of the 4th, 248 of the above number did not require berths for the night. We arrived at Hoboken at 9.16 p. m., but all cases were not removed until 5.30 a. m. of the 5th. The galley was kept in operation practically all the time, day and night, in order to provide for this excess of complement. A majority of the cases had to be dressed, and some of them needed frequent dressing, consequently the medical officers were kept constantly at work.

During the time the above transfer was made there was too much of a swell to allow the gangways to be used for removing the stretcher cases from the small boats, consequently they were hoisted aboard by means of the sliding crane, with traveler, to which a hoisting block is attached, as is installed on either quarter of this ship. The cases were all placed in Stokes's stretchers, which are ideal for this work. We, fortunately, had 80 of them on board, an extra number having been obtained when war was declared, and these were sent to the *Northern Pacific*, also a number of blankets, so there would be no

delay from the men not being ready in stretchers when the boats arrived. More stretchers could have been used, and it is considered advisable for a hospital ship to have on board 125 to 150 or more. They should be kept in good condition, examined each time they are used, and if one is found broken at any point it should be set aside for repairs and not kept with the others, for in hoisting men over the side a defective stretcher might cause a serious and unnecessary accident. These stretchers can be readily repaired in a navy yard by being welded and regalvanized, and should be so repaired as soon as any part is broken.

The experience acquired by making such an extensive transfer at sea proved the great value of the submarine chasers for such work. It is believed that boats of that type, larger, more seaworthy and with a greater cruising radius would be a valuable addition to the fleet for the transfer of wounded from battleships to hospital ships. They would also be available for going to the assistance of sinking ships in time of battle to pick up the survivors. In time of peace they can readily be used as ambulance boats for the purpose of transferring cases from hospital ships to hospitals or from ships of the fleet to hospitals in the absence of a hospital ship. During our recent experience the submarine chasers came alongside of this ship and both stretcher cases and those on crutches, or with arms in a sling, were passed by hand through one of the large cargo ports taking advantage of the time the sea brought the boat near the ship, as the swell was too high to have the lines taut. In order to handle the stretchers and crippled two men were put over the side with bow lines, one on either side of the port, and they were able to pass the injured to the inside of the port even though footing at times was lost by the chaser being washed off. The only damage done by this work was breaking the chasers yard which fouled the rail of our hurricane deck; it is believed that this factor could be controlled by having the mast of such an ambulance boat made so the yard could be a cockbill, or lowered, for the same kind of an accident might occur when going alongside a battleship. Before going to a ship after action the ambulance boat should have a number of Stokes's stretchers and blankets to be used on the battleship, these should be kept on the hospital ship ready for such an emergency and obtained when needed.

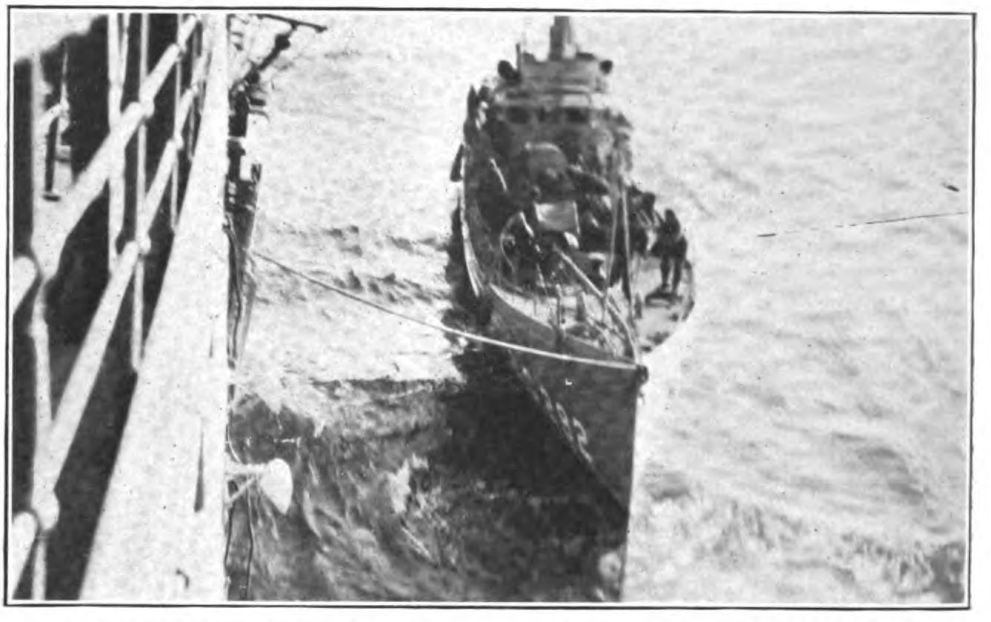
If the sea is such that the transfer can not be made through a cargo port, the cases can all be hoisted up by a crane such as is at present installed on this ship as mentioned above. It is believed that this crane could be improved upon by a few changes in the block so as to absolutely prevent the lines becoming jammed. During January 3 and 4, about 200 men were hoisted over the side from the motor sailers and there was not the slightest accident. After a little ex-



Small boats alongside "Northern Pacific," on lea side, waiting for wounded to be lowered in stretchers.

Stretcher with patient hoisted to level of deck and ready to be swung in and hauled aboard where section of rail has been removed.

350–1



Submarine chaser alongside with wounded. Note the swell prevailing at the time.

Submarine chaser with wounded. A number had already been taken off before the photograph was made.

perience in the fixing of slings, etc., we were able to take on board about one man a minute, though at times the heavy swell would cause some delay for fear of the boat rising and striking the stretcher before it could be hoisted clear. The sling used has a ring from which four lines lead, to the ends of which snap hooks are attached. The two lines for the head part of the stretcher are a little shorter than those for the foot. These are snapped in the handles of the stretcher opposite the hands and the knees, and *not* right at the head and foot. Two lines to use as guys also have snap hooks attached; these are snapped on the outboard handles of stretchers right at head and foot and are controlled from the boat. There is great value in having such slings already made up and ready for use, as they can be hooked on in a few seconds and do away with the loss of time that would be necessary in tying knots and getting lines of equal length, etc. A sling and guys of this kind should be in the medical department of every ship for use in case of transfer by stretcher in a heavy sea.

THE MEDICAL DEPARTMENT ON BOARD A TORPEDOED TRANSPORT.

By E. E. Curtis, Lieutenant Commander, Medical Corps, United States Navy.

On the morning of September 5, 1918, at 7.47 o'clock, the ship, steaming at an 18-knot speed in company with one other transport, well escorted by destroyers, was successfully attacked by an enemy submarine (German). The torpedo hit about midships, near the bilge keel on the starboard side.

The medical department had under its care 133 sick and wounded from the Army being transported to the United States who had been received on board just before the ship put to sea the previous evening on her homeward bound trip.

At the time of the attack I was making the rounds of staterooms occupied by sick Army officers and was in a room about half way between the bow of the ship and the location of the explosion. Attention was first attracted by shots fired at the attacking vessel, followed almost immediately by a loud explosion which jarred the whole ship, succeeded by a series of vibrations from bow to stern.

On going to the sick bay, which was about one-half the length of the ship away, many people were encountered, seemingly very active. However, none displayed any indications of excitement but instead all were going about the necessary procedures for saving the ship and caring for the wounded.

Staterooms occupied by wounded soldiers were visited and the occupants had begun to vacate their quarters, men who had lost an arm were assisting a comrade with only one serviceable leg. On reach-

ing the sick bay located on the uppermost deck it was found that breakfast had been in the process of being served at the time of the explosion, which accounted for broken dishes and food scattered about the beds and on the deck of the sick quarters. At this time none of the sick or bedridden cripples had left the bunks, but members of the medical and hospital corps were arriving from breakfast. In less than two minutes every wounded and sick man, including the following classes of cases were in boats: 70 surgical, 42 of which were absolutely helpless, the remainder requiring assistance; 15 medical, 10 of which were nonambulatory, and 45 mental and neurological, all of which were ambulatory. As soon as safely within a lifeboat, "Everwarm" safety suits and blankets were provided for their protection and comfort.

The helpless were all carried to the boats by individual men, using the "by one bearer, in arms" method, which to my mind accounts for the fact that the sick and wounded were evacuated in such a short time. The use of stretchers would be a hindrance on this ship where the factor of time is to be seriously considered.

As soon as all was in readiness for lowering the boats with their helpless occupants, details were made for preparing and serving hot soup and coffee, which was made possible within a very short time by having a diet kitchen in connection with the sick bay. Later on sandwiches were made by the commissary department and sent to the sick bay for distribution, and throughout the day patients who preferred remaining in the lifeboats were permitted to do so, and were served with hot soup, coffee, jam and meat sandwiches, and canned fruits. These patients were made so comfortable that nearly all of them chose to stay in the boats until port was reached, about 18 hours later. This was their desire, even after being assured that the ship would, in all probability, reach port and that they would not be encountering any additional danger by going back into the sick quarters. There was one case of pneumonia among the sick, who not only enjoyed swinging in a lifeboat from the davits, but was apparently benefited by the experience, as there was an improvement in his physical condition on the morning following this incident.

Just as the sick bay was evacuated of the sick and wounded, injured men began to arrive from the firerooms and coal bunkers in the vicinity of where the torpedo exploded. This included about 25 all told. Eight of them were seriously burned, 5 had received burns of less severity and extent and numerous bruises and lacerations on different parts of the body, inflicted by flying pieces of iron wreckage. In addition to these were several applicants for first-aid for bruises and lacerations of minor importance received in different parts of the ship from flying glass or due to being thrown down or against some solid object by the force of the explosion. Most of these injured,

however, were at the time in the crew's mess halls, which are located above where the torpedo struck. All dressings were hurriedly applied, regardless of the apparent seriousness of the injuries, and the injured put into lifeboats in the expectation of having to abandon ship at any moment with the exception of one, the most seriously burned, as it was considered that the disturbance incident to transferring him would be serious and that he could be gotten into a boat within a very short time should the signal be given to abandon ship. All those who were suffering in a marked degree were given relief by administration of morphine in addition to appropriate dressings, picric acid being the principal remedy used on the burns, which were of the first and second degrees, and extended over more than one-half of the body in most of the 8 cases. The most seriously burned case had developed a marked pulmonary edema, from which he died 10 hours later. When it was ascertained that it was safe to return the sick to the sick bay, the men who had been burned were again dressed. The dressings that had been put on so hurriedly were removed and others applied with more care and deliberation.

Upon arrival in port all the sick of both Army and Navy were transferred to their respective hospitals. The manner in which the authorities on shore, both Army and Navy, cooperated by an immediate response in removing the injured, sick, and wounded, and making provisions for preparing the bodies of the dead for transportation to the United States was most gratifying. Two medical officers and three embalmers were sent on board from Naval Base Hospital No. 5 to assist in this work.

It was 48 hours after the ship was torpedoed before it was possible to locate and recover any of the bodies, owing to the compartments being filled with water which had been raised to a high temperature by heat from the main steam pipes passing through them. This work continued for over 24 hours before all the 35 corpses were out of their death traps. Each body was identified as soon as possible and preparation for transportation was made, such as embalming, dressing, and inclosing each one in a Navy standard metal casket. Embalming all these bodies would have been a much greater task had it not been for the fact that three professional embalmers were discovered in the ship's crew. With this assistance, in addition to the three men sent from the hospital on shore, this work was accomplished as fast as caskets could be provided and properly prepared.

Upon viewing the bodies it was absolutely impossible in practically all cases to definitely establish whether the death was the result of burns, of the explosion of the torpedo, or of submersion, as all the bodies had been subjected to a combination of the three causes, any one of which could account for the loss of life.

With the above conditions to contend with, in combination with that of all bodies being subjected to a high degree of temperature

for from 48 to 72 hours, identification was very difficult, and at first seemed impossible, but was later rendered possible by seeking the assistance of those men who had been in constant association with them under all conditions of everyday life in the fireroom. Some were recognized by the way the shoes were tied, the kind of shirt worn while at work, or by some other peculiarity such as the kind of pipe smoked, etc., and in all cases so recognized, measurements or other perceptible characteristics would be confirmed by comparison with the descriptive list in the health record. Three were identified by their teeth, two were wearing their identification tag, and one had his tag in his pocket. Seventeen others of the number had been provided with identification tags but were keeping them in their ditty boxes.

Caskets required in addition to those already on board were procured from ashore and from ships in port in a sufficient number so that all the 36 bodies were thus provided for. After receiving a body the head end of the shipping box of the casket was marked with the name and rate of the dead and the relationship, name, and address of the next of kin.

It was most gratifying to witness the excellent individual adaptability displayed by all members of the medical department, which demonstrates the excellent material which is being enlisted into our hospital corps. To mention any one or more than one not including all would be an injustice to those not mentioned. Each and every one seemed to see the right thing to do at the right time and met any contingency that arose concerning the safety and comfort of the sick, consisting of 133 sick and crippled of the Army and 19 sick and injured of the Navy. They went about their work as though nothing out of the ordinary was happening, providing food and many other necessary attentions required, under severely trying conditions and being constantly subjected to inconveniences. If one man did more than another, it was because he happened to be at the right place at the right time.

A most difficult task was that of locating and removing those who lost their lives below. As soon as the water in the compartments had been lowered so that bodies could be located, plans were laid and provisions made for their removal. All went into any and all compartments where any one or a combination of the following existed—heat, water, wet coal dust, danger of being burned or injured, and intensely difficult work. Not one displayed a lack of interest, and everybody continued to assist in the preparation of the bodies recovered after hours of hard, gruesome work where the men met their death, and continued to work until 2 o'clock in the morning, this following the two days and sleep-disturbed nights of anxiety throughout a trying ordeal.

INFLUENZA AT THE UNITED STATES NAVAL HOSPITAL, WASHINGTON, D. C.[1]

By R. M. KENNEDY, Rear Admiral, Medical Corps, United States Navy.

This hospital received its first case of influenza on September 1, 1918, and pandemic proportions were assumed very rapidly. The admission rate soon rose to 25 and 30 cases daily.

From its first appearance in this hospital the disease was of an unusually severe type. Those cases complicated by pneumonia showed marked prostration, early asthenia, and exhaustion of the cardio-vascular system. A few cases promptly died within 48 hours following the onset of the disease.

A great majority showed a leucopenia and a red cell reduction.

The ordinary methods of treatment were most unsatisfactory. Despite the very best nursing and other therapeutic measures, the death rate assumed startling proportions.

After giving the usual methods of treatment a trial with unsatisfactory results, they were abandoned, and the employment of "immune serum" was resorted to with happy issues, manifested by a marvelous reduction in the death rate. In fact, but three deaths have occurred in this hospital since the serum treatment has been employed.

The serum employed was obtained by bleeding patients recovering from influenzal pneumonia during their first week of convalescence. It was taken in 0.2 per cent sodium citrate solution to prevent clotting and allowed to stand until the cells settled. Then the serum was taken through a pipette and kept in a container until needed.

It was given intravenously in 100-mil dosage every eight hours until the temperature was normal or other satisfactory signs of improvement appeared. Some cases promptly returned to normal temperatures within 12 hours following the injection. Others had two doses administered, and a very few required three.

The marked change in these serumized patients from the prostration and toxemia which characterized the pneumonic state to general improvement has been most remarkable and satisfactory.

At one time there were eight serumized pneumonic cases from two to five days old in the disease, and all of them with normal temperature and no subjective symptoms of the disease.

During the epidemic 568 cases were admitted. One hundred and fifty-seven of them developed pneumonia, of whom 31 died, a percentage of 20. Of those cases of pneumonia not treated with serum, 28 died, a percentage of 25. Forty-six cases were treated with serum and 3 died, a percentage of 6.5.

[1] Extract from Annual Sanitary Report, 1918.

NOTES ON POST-INFLUENZAL PNEUMONIA AT UNITED STATES NAVAL HOSPITAL NO. 4, QUEENSTOWN, IRELAND.

By A. M. Burgess, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force, and E. J. Staff, Phar. Mate 3, C., United States Naval Reserve Force.

This report comprises post-mortem and bacteriological studies carried out by the authors in cases of post-influenzal pneumonia occurring between October 10 and November 15, 1918, at base hospital No. 4. There are included, in addition, the results of necropsies performed on the bodies of 19 naval men who died outside the hospital at neighboring stations or on ships based in this region. It is hoped that at a later date a full report of the work done at the hospital during the course of the epidemic will be published by the clinical and laboratory staff. This short report is of necessity incomplete owing to the relatively small amount of material studied and to its having been carried out more or less under field conditions. The necessity, however, that all available data concerning the epidemic of influenza be collected justifies the recording of the following brief notes.

THE PULMONARY LESION.

The 27 necropsies performed on the bodies of patients who died with a clinical diagnosis of post-influenzal pneumonia, although they showed a very wide variation in the extent and character of the pulmonary lesion, still presented what appeared to be convincing evidence that in every case we were dealing with essentially the same process. In the majority of instances the involvement of pulmonary tissue was so extensive that but little functional lung remained. Various stages of the lesion were as a rule present in the same case, and it was apparently possible to trace the probable course of the extension and to determine the location of the earliest involvement. The lesion can not be described as "massive" or "confluent" broncho-pneumonia, nor as lobar or "septic" pneumonia, inasmuch as the use of any one of these terms serves to emphasize but a single manifestation or phase of the process.

The commonest picture was that of an almost complete involvement of three or more lobes in a process which at first glance appeared to be lobar in type, but which on palpation was distinctly nodular and in section showed a more or less strikingly mottled appearance. This mottling was due to the presence of irregular areas of pneumonia, lobular in distribution, which usually were firmer, lighter in color, and dryer than the surrounding pulmonary tissue. In some cases these areas were clearly defined and often surrounded by a dark, deeply congested zone. The alveolar tissue intervening was, as a rule, dark red, containing no air, and represented a more

recent superimposed pneumonic process which topographically could be considered lobar. In some instances the earlier broncho-pneumonic patches had become gray, opaque, and evidently necrotic, with a dry, almost caseous, type of necrosis and a prevention of structure resembling that seen in gummata. Some of these areas appeared to bear a relation to bronchi and others were pyramidal in shape, with the base of the pyramid at the pleural surface, thus resembling pulmonary infarcts and suggesting a vascular origin. Sometimes whole lobes presented the picture of a homogeneous process, clearly lobar in type. Minute miliary necrotic areas which closely resembled tubercles were found in five instances, and actual softening with the formation of abscesses, miliary or larger and irregular, in six.

An opinion as to the nature of the exudate in the alveoli could not be definitely formed, but was strongly suggested by the gross appearances of the lesions. The rubbery, almost gelatinous consistency of the involved portions of the lung in the earlier stages of the process and the relatively smooth-cut surface appeared to indicate a very small proportion of fibrin in the exudate. In cases where whole lobes were homogeneously pneumonic the difference between this type of lesion and that seen in ordinary lobar pneumonia was especially striking. The liver-like firmness characteristic of the latter process and the granular appearance of the cut surface, caused by the projection of minute plugs of fibrin from the alveoli, were absent and the appearance more closely resembled that of the "gelatinous pneumonia" due to the tubercle bacillus. Furthermore, the necrosis of pulmonary tissue, often with preservation of structure and little or no liquefaction, suggested that the proportion of polynuclear leucocytes in the exudate was probably low and that there was such a lack of the enzymes furnished by these cells that in many instances solution of the necrotic tissues did not take place. Neither the time nor the equipment at our disposal justified an histological study of this question, but a single specimen from one of these lungs was put through and showed the alveoli to be filled with an exudate in which the proportion of endothelial leucocytes was high and from which fibrin was practically absent.

The extent and character of the lesions found in our 27 cases is seen from the following analysis, expressed in tabular form:

I.

	Cases.
More than three-quarters of the entire lung area involved	12
Between one-half and three-quarters of the entire lung area involved	11
Approximately one-half of the entire lung area involved	2
Approximately one-quarter of the entire lung area involved	1
Very slight involvement	1
Total	27

II.

Lobar type in at least one lobe	10
Necrosis, early or advanced	15
Necrosis, with liquefaction (abscess)	6

III.

Location of earliest involvement, as judged by post-mortem appearance:

	Cases.	
Left lung:		
Lower lobe	7	
Upper lobe	0	
Undetermined	6	
		13
Right lung:		
Lower lobe	4	
Upper lobe	2	
		6
Earliest involvement undetermined		8
Total		27

It was noticed that the anterior thin portions of the lungs that lie beneath the anterior chest wall overlapping the mediastinum were almost uniformly normal. The most advanced lesions were usually located posteriorly in the lungs, quite frequently in the upper parts of the lower lobes and at times also in the opposing lower portions of the upper lobes.

Although pneumonia could be considered as the primary cause of death in all our cases save one, a number of other lesions were found at autopsy. The pleural cavities in 16 cases showed a serous or sero-sanguineous exudate with, as a rule, a relatively small amount of fibrin. But one case of empyema was brought to our notice, and this patient recovered following operation. In 18 of our cases a complete examination of all the organs was carried out with the following findings: Acute splenitis, nine cases; nephritis, very marked, two cases; general peritonitis, one case; toxic atrophy of liver, one case; adrenal hemorrhage, marked, one case.

On the basis of the observations made at the post-mortem table it seems possible to make a few general conjectures as to the progression of the disease in the lungs. Thus the following may be regarded as probabilities: (1) The disease usually begins as a relatively small area of broncho-pneumonia located ordinarily, but not always, in the lower lobe of one lung. (2) Under conditions of insufficient resistance to the infection a sudden spread of the lesion to other lobes or to other parts of the same lobe takes place. (3) This extension may occur either as a homogeneous involvement of one or more whole lobes (usually including the lobe containing the original pneumonic areas), or may take the form of widespread broncho-pneumonia, in which wedge-shaped subpleural areas resembling in-

farcts are found. Both these modes of spread appear to indicate that the infection is disseminated by way of the blood stream. (4) If death does not supervene necrosis of the earlier areas of involvement takes place with eventually softening and abscess formation. Sometimes throughout lobes homogeneously consolidated miliary necroses appear, which may go on to miliary abscess formation often so extensive as to cause puriform fluid to well from the cut surface of the lung on section. (5) In certain cases, as illustrated by one of our necropsies, presumably because of a better resistance to the infection, the disease remains localized in one or more lobes and later stages of necrosis and abscess formation may be reached. In our case several small abscesses had ruptured into the pleural cavity and an empyema would have resulted had not death occurred. (6) The lack of leucocytic reaction universally noted in the blood stream in clinical cases is associated with a corresponding relative lack of polynuclear leucocytes in the alveolar exudate and the course of the disease as well as the nature of the local lesion may be to a great extent determined by the proportion of these cells that reach the infected areas in the lungs.

REPORT OF EPIDEMIOLOGICAL STUDY OF DIPHTHERIA AT THE UNITED STATES NAVAL ACADEMY.[1]

By J. E. HOUGHTON, Lieutenant, Medical Corps, United States Navy, and D. G. RICHEY, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

From August 26, 1918, to September 13, 1918, seven midshipmen and three enlisted men from the crew of the U. S. S. *Reina Mercedes* contracted clinical diphtheria. They were immediately transferred to the United States Naval Hospital, Annapolis, Md., where the diagnosis was confirmed in each instance by culture. All cases responded to the administration of diphtheria antitoxin, making an uneventful recovery. The roommates of the individual patients were also sent to the hospital as contacts until they were proved not to be carriers of diphtheria bacilli.

At the time of the arrival of the laboratory unit, on September 13, 1918, only the members of the fourth class were in session. Work was begun at once, all members of this class being cultured and Schick tests given. One week later the remainder of the midshipman personnel returned from their 20-day summer vacation and the same measures were instituted. In addition, all mess attendants, cooks, and bakers, the crews of the *Reina Mercedes* and attached craft as well as the milkers at the Naval Academy dairy were inves-

[1] U. S. Naval Medical School, Mobile Laboratory Unit, Washington, D. C.

tigated by culture and with the exception of the mess attendants and dairy hands received the Schick tests.

The technique of culturing consisted in a thorough swabbing of the tonsils and posterior pharyngeal wall with a sterile, cotton swab. This was introduced upon a slant of Loeffler's blood serum, incubated for 18 hours, at the end of which time a smear was made from each culture, stained by Neisser's method and examined microscopically. Those cultures which showed the morphological characteristics of corynebacteria, with bipolar staining, were then checked by Gram's and Ponder's stain. It was found that not infrequently Gram negative bacilli gave a very confusing picture. These upon further investigation were found to be in the main *B. proteus vulgaris*, *B. pyocyaneus*, and *B. prodigiosus*.. For purposes of comparing the efficiency of our method, 350 cultures were stained with Loeffler's methylene blue and 35 per cent of these showed diphtheroid organisms. When checked by Neisser, Gram, and Ponder stains, we were able to eliminate all but a few, which gave the characteristic bipolar and barred forms. Those cultures which contained the morphologically typical diphtheria bacilli were plated on 5 per cent blood agar, incubated, and when possible, the colonies suggestive of diphtheroid organisms were fished and seeded in a tube of Loeffler blood serum. In some instances it was quite impossible to isolate these colonies, due to the symbiosis of such organisms as *B. proteus* and *B. mucosus capsulatus* group.

If the organism could be isolated in pure culture, a suspension of a 24-hour growth was made in sterile normal saline (5 cc.) and 0.5 cubic centimeter was introduced into the abdominal cavity of a guinea pig. A similar dose was given intraperitoneally to a guinea pig previously protected by antitoxin. When the suspected organisms could not be isolated in pure culture, a suspension of the original culture was made in 5 cubic centimeters of saline and an intradermal injection of 0.1 cubic centimeter was given into the shaven abdominal wall of the guinea pig, a similar injection being made in a protected animal. Those animals which died were autopsied, particular note being given to adrenal congestion, peritonitis, and cardiac dilatation. Only those cultures which killed the unprotected pigs, in the absence of peritonitis or blood stream invasion, were regarded as virulent. Death invariably occurred in six hours to three days. At the end of five days, if the pig was healthy, it was used again. The criterion of a positive reaction in the intradermal method consisted in an area of induration at the site of inoculation, along with a serosanguinous exudate and a coagulation necrosis of the surrounding soft parts. The shaven abdominal wall was so divided that four tests could be made on each pig.

Later, for corroborative evidence, all strains which were isolated were planted on a "set," consisting of dextrose, saccharose, and dextrin serum broth. The carbohydrates were added in the strength of 1 per cent, using Andrade's decolorized fuchsin indicator. Without exception, those organisms which killed the unprotected guinea pigs were found to be dextrose and dextrin fermenters.

The following Table I gives the results of the cultural investigations:

TABLE I.

Contingent.	Number cultured.	Number virulent.	Per cent positive virulent.	Morphological typical bacilli.	Per cent positive nonvirulent.
Midshipmen, first class	476	1	0.21	5	1.05
Midshipmen, third class	668	2	0.30	6	0.90
Midshipmen, fourth class	932	17	1.82	38	4.07
Reina Mercedes crew	567	20	3.52	39	6.87
Mess attendants, cooks, and bakers	265	0	0.00	3	1.13
Dairymen	32	0	0.00	1	3.12
Total	2,940	40	1.36	92	3.12

It was our good fortune to have available a standard, stable, diphtheria toxin, which was obtained through the kindness of Surgeon Leake, of the United States Hygienic Laboratories, Washington, D. C. The M. L. D. of this toxin was 0.006 cubic centimeters, and when used for the Schick test was freshly prepared by diluting with normal saline, so that 0.1 cubic centimeter contained 1/50 M. L. D. As a control, an equal portion of the diluted toxin was inactivated by heating to 75 C. for one hour in a water bath. The flexor surface of the forearm was the site of election for the introduction of the diphtheria toxin. Both arms were cleansed with alcohol, 95 per cent. By means of a finely graduated 1 cubic centimeter Luer tuberculin syringe 0.1 cubic centimeter was injected intradermally. Platinum needles were used and heated to redness between injections. Few complain of pain from the injection other than the slight discomfort which might be observed from a bee sting. It was noted that a successful intradermal inoculation caused a white, round, sessile, edematous elevation, varying from three-fourths to one centimeter in diameter, when 0.1 cubic centimeter of the saline toxin was employed. The active toxin solution was given into the skin of the left forearm and the inactive toxin solution into the right forearm.

In the beginning, two injections were given in each arm. The rationale of this procedure was to ascertain if the same individual reacted similarly to a given dose of the material. It was found, however, that the reactions were so constant that the second injec-

tion could be eliminated. Controls were employed throughout the entire work.

Observations were made at 24, 48, and 72 hour intervals. We agree with other investigators that the most convincing information can be gotten after the 72-hour interval. The recording of the reaction was as follows:

The test was called negative when, at the end of 72 hours, little or no reaction was noticed at the site of inoculation and absence of palpable induration. The positive reactions were classed as +, ++, or +++, according to whether the diameter was from 0.5 to 1 centimeter, 1 to 1.5 centimeter, and over 1.5 centimeter. Redness and induration proved valuable guides in judging the extent of the reaction. Where both arms showed a similar reaction, the test was put down as a pseudoreaction. These were found to be 9.3 per cent of all cases. Neither from the rapidity with which the reaction appeared nor in the redness or induration could any material difference be detected in this group of cases. It is therefore our belief that the reading of a pseudoreaction without a control is an extremely hazardous undertaking, if not impossible. Fully 5 per cent of the pseudoreactions persisted for a week or longer.

Our experience has taught us that as late as six weeks after the appearance of a positive Schick the induration will persist, the primary redness gradually becoming an area of brownish pigmentation and scaling.

As will be seen from Table II, 2,643 Schick reactions were made. Of these, 1,342, or 50.7 per cent, were positive and 1,301, or 49.3 per cent, were negative. Pseudoreactions were included under the negative and comprised 9.3 per cent of all cases.

TABLE II.—*Table of Schick tests.*

Group.	+	++	+++	Negative.	Total tests.	Per cent positive.
Midshipmen, first	182	35	2	255	474	46.2
Midshipmen, third	239	115	9	305	668	54.3
Midshipmen, fourth	345	210	10	371	936	60.3
Reina Mercedes crew	138	54	3	370	565	34.5
Total	904	414	24	1,301	2,643	50.7

Further study of Table II reveals the fact that of the fourth class of midshipmen, where was all the active clinical diphtheria, as well as 85 per cent of carriers in this group of men, 60.3 per cent were found nonimmunes, in contradistinction to 46.2 per cent and 54.3 per cent in the first and third classes, respectively. The low percentage of positive Schick tests on the *Reina Mercedes* can, in part at least, be attributed to the fact that the average age of the personnel was higher than among the midshipmen.

Twelve, or 27.9 per cent, of the carriers gave positive Schick reactions. Of these only one had had a previous attack of diphtheria eight years ago.

From an epidemiological standpoint several points of interest were observed. The entire seven cases among the midshipmen occurred in the fourth class. Of the 23 carriers found in the fourth class 4 said they had had diphtheria varying from a period of 2 to 10 years previously. Six carriers admitted contact with clinical cases. It is also to be remembered that all clinical diphtheria was among the young unseasoned individuals who had just entered training from civil life. In all instances the disease developed in from two to five weeks after entering the academy.

Two of the 20 carriers from the crew of the *Reina Mercedes* gave a history of diphtheria, one having had two attacks, the last being 22 years ago, and he has given continued positive cultures over a period of more than six weeks. All carriers from this crew were found to come under three groups, consisting of nine in the fire-room force, seven seamen, and four privates in the Marine Corps. All these men stated that they had been in more or less constant association with the other members of their respective group. In fact, five of the seven seamen group belonged to a boat's crew. As in the case of the midshipmen, the three men who developed diphtheria had been attached to the station from two to four weeks. One of these gave a history of a previous attack of diphtheria six years ago.

By consulting Table I it will be seen that 1.82 per cent of the fourth class were carriers, while in the first and third classes less than 0.5 per cent were found to harbor virulent diphtheria bacilli. Again, with only three clinical cases on board the *Reina Mercedes*, the percentage of carriers increased to 3.52 per cent, due in part to the closer billeting and association. The midshipmen involved had at no time come into contact with the crew of the *Reina Mercedes*.

All efforts to hold the mess gear accountable were futile. No mess attendant, cook, or baker proved to be a carrier. Cultures from the drinking fountains yielded no growth of *B. diphtheriæ*. There was nothing about the outbreak which suggested the milk supply, but for sake of completeness the milk was cultured at various intervals and found to be devoid of diphtheria organisms. None of the milk handlers at the Academy dairy could be put down as a carrier. All attempts to trace the more or less sporadic case to extramural sources were of no avail. Since the work was inaugurated no new cases have as yet developed on the station.

The administration of the toxin-antitoxin mixture to those having positive Schick reactions was necessarily delayed by the advent of

influenza among the personnel. It is our intention to give three doses of 1 cubic centimeter subcutaneously at weekly intervals. Three months subsequent to the last injection it would seem expedient to do Schick tests on all those who receive the toxin-antitoxin mixture.

The carrier situation has presented the same problems which other investigators have encountered. We were afforded the opportunity of observing the carriers and cases, following them by cultures from day to day. Of the 43 carriers and 10 cases which were in the diphtheria isolation wards, all but 20 have returned to duty. There was no case or carrier permitted to leave isolation until at least three consecutive negative cultures had been obtained at not less than 24-hour intervals. Here again we have experienced what others have observed, that a case may yield a negative culture one day and a positive one the next. It was found that unless careful vigilance was maintained the carriers, in their ambition to return to duty, would hasten to gargle their throats immediately prior to taking the cultures. Therefore it was necessary to eliminate all opportunity for such procedure. By this precaution several carriers were found to be repeatedly positive which previously had given negative results.

Other factors enter into the carrier state, however, these being particularly pathological conditions, and of these hypertrophied tonsils, with deep crypts, and adenoids, seem to play the leading rôle. Most of them were found to maintain the infection in both nose and tonsils.

Various methods were employed such as gargling and spraying with antiseptic solutions, local applications of silver nitrate, iodine, and dusting powders (kaolin). The efficacy of the local applications of diphtheria antitoxin in our hands is highly problematical. It is our conviction that a large percentage of the so-called " chronic " carriers will continue to be so until all pathological conditions of the nose and throat are corrected. In a few instances it has been possible to exterminate the organism by application of 10 per cent silver nitrate or tincture of iodine into the crypts of the tonsils. Our experience is confirmatory of the work of others that the efficiency of any method lies largely in the thoroughness of the application, rather than the agent employed.

In the examination of the throats at the time of culturing a direct smear was taken from any suspicious condition. In addition to cultures, a direct smear was made from 567 men cultured as a matter of routine. It was our purpose in this to ascertain in what percentage fuso-spiral (so-called Vincent's) organisms were present. Gram stain and dilute carbol fuchsin were used and 10 per cent of all smears showed long fusiform bacilli and evenly undulating spirilla. From brief notes taken at the time, the vast majority of these occurred in those cases where small caseous plugs were noted in the crypts of the tonsillar lacunae.

STUDY OF AN EPIDEMIC OF INFLUENZA AT PENSACOLA.

By J. M. PERRET, Lieutenant, and C. M. SHAAR, Lieutenant, Medical Corps, United States Navy.

The great pandemic of influenza, which originated in Spain during the spring of 1918, made its appearance at the United States Naval Air Station, Pensacola, Fla., on September 11, 1918. On that date 17 Marines came down with the disease. Why the Marines should have been the first victims can not be satisfactorily explained. There had been no new drafts among them for three months, and although they were somewhat crowded in their barracks, they fared no worse than the sailors. For four days preceding the outbreak of the epidemic 160 men were received at Camp Bennett, which is a detention camp about a mile from the Air Station, 30 of whom were a draft from Cambridge, Mass., and 3 from Great Lakes, Ill., at which place influenza was then epidemic. As the epidemic first started at the Air Station, and among the Marines, we do not think that the blame can be laid on incoming drafts.

It would be futile to try to determine absolutely how the station became infected. The men go on liberty in Pensacola, which is about 6 miles from the station, and may have become infected from the civilian population. The disease follows the lines of travel, and naturally when it crossed the Atlantic Ocean our big seacoast cities were the first attacked. Afterwards the cities in the interior got their share. This could have been easily noticed by reading the newspapers. The war, with its massing of great numbers of men in Army camps, naval stations, shipyards, munition plants, etc., offered favorable conditions for the rapid spread of the disease.

At the Naval Station, Pensacola, Fla., a good many men live in tents, two occupants to a tent. It was interesting to note that the number of cases was about evenly divided between men living in tents and those living in somewhat crowded barracks.

It is well known that of all pandemic diseases influenza is the one which attacks the greatest number of the population. The complement of the Air Station is 5,359, and as we had 1,454 cases of influenza, this shows that 27 per cent of the personnel became infected. These 1,454 cases developed between September 11 and October 27, 1,018 of which occurred between September 22 and October 4, a period of 13 days. The epidemic reached its height on the nineteenth day, September 30, when 117 cases were admitted to the sick list. It was under full control on October 27, seven and one-half weeks from its onset.

Chart No. 1 shows graphically the number of cases developing daily and also the daily temperature of the weather and the rainfall. It will be noticed that the temperature and rainfall did not seem

to have any important bearing on the course of the epidemic. The mortality rate of influenza is put down by Osler as being very low. He cites 55,263 cases in the German Army, with a mortality of 0.1 per cent and 22,972 cases occuring in the civilian population of Munich with a mortality of 0.5 per cent. These figures do not have reference to the present epidemic. Unfortunately in this outbreak the disease has exacted a much higher toll. Thus in the October 5, 1918, number of "Notes on Preventive Medicine for Medical Officers, United States Navy," 39,503 cases are tabulated, with a mortality of 4.26 per cent. Our deaths at Pensacola numbered 24 out of 1,454 cases, a death rate of 1.6 per cent—a comparatively low figure for

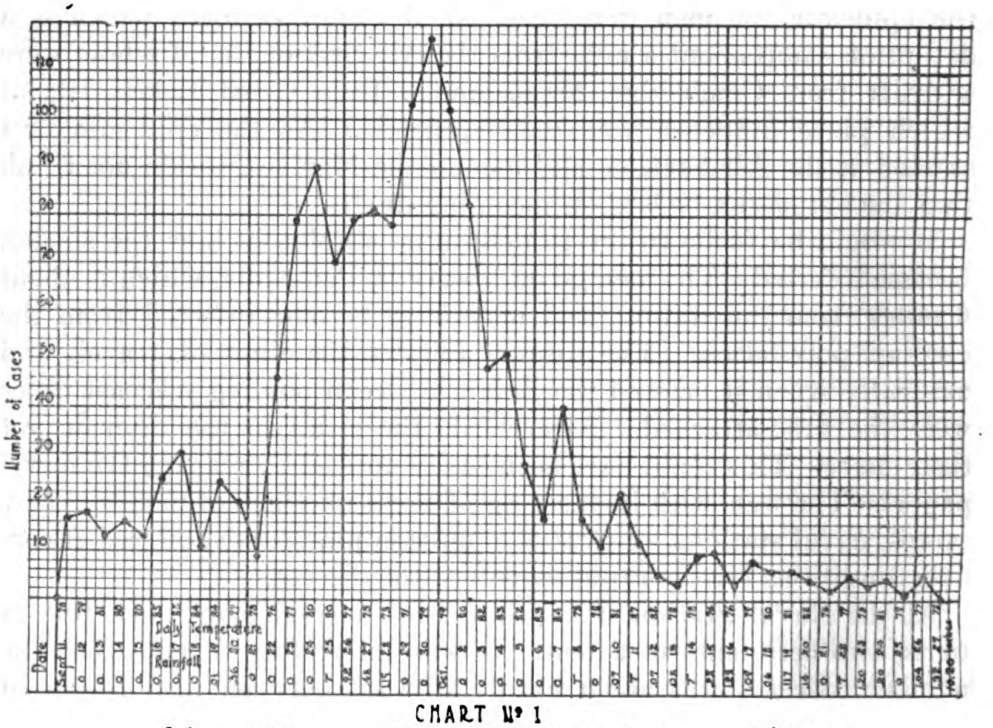


CHART No 1

Epidemic of Influenza U.S. Naval Air Station, Pensacola Fla. Sept-Oct-1918
Complement 5359 Total Number of Sick 1454 Percent 27

the present epidemic, but high in camparison with previous epidemics.

The above figures, of course, relate only to the immediate mortality of the disease. The expectation of life of millions of people has been shortened by it. The damage which the respiratory tract has suffered will probably weaken its resistance to the pneumococcus and meningococcus so that pneumonia and cerebro-spinal fever may show a marked increase this winter. The well-known fact that an attack of influenza may light up a dormant tuberculous focus must not be forgotten. It is too soon, as yet, to estimate how much injury the heart muscles and kidneys have suffered. The strenuous work incident to military life will certainly throw a heavy

burden upon the cardio-vascular-renal system of the convalescents in the Army and in the Navy.

During the epidemic our medical personnel consisted of the following:

	Medical officers.	Nurses.	Hospital corpsmen.
United States Naval Hospital	12	14	58
Dispensary, Air Station	12	0	62

Out of this personnel, which numbered 158, we had many uncomplicated cases of influenza, and one broncho-pneumonia, but no mortality. We have gone over the records of 566 uncomplicated

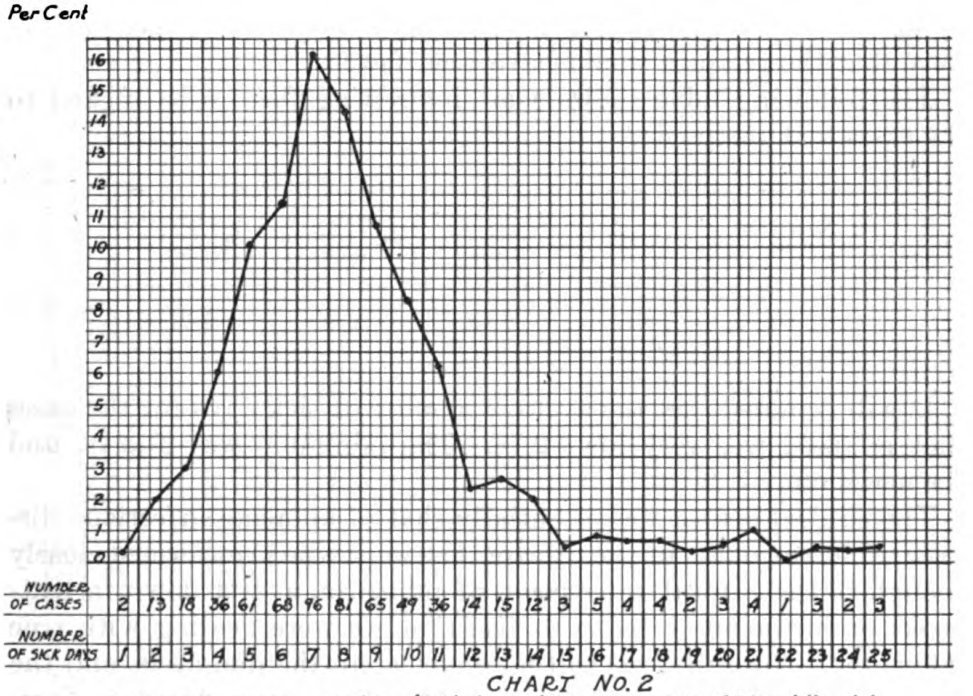


CHART NO. 2

Showing the average number of sick days of 600 cases at the U.S. Naval Hospital.

TOTAL AVERAGE OF SICK DAYS = 5.8

Notice that 82% of the cases had sick days varying from 4 to 11 days.

cases to get the average length of the disease from the number of sick days, which was found to be 6.2 days. This appears on the whole to be rather short. Like the "line" we will have to plead military necessity. During an epidemic, just as during an engagement, conditions are not always ideal and we must do the best that the circumstances will allow. Our object was to send the men out as quickly as was reasonably possible, so as not to interfere with military activities, and also to make room to care for those who were sicker and needed more attention. Chart No. 2 shows graphically

the number of sick days of 600 cases at the naval hospital, and it will be seen that the average number of sick days was 5.8. This number is smaller than that of the sick days of the 566 cases, because some of these cases had been kept at the dispensary a day or two before being transferred to the hospital. The average of 6.2 days was calculated from the date of admission to the dispensary to that of discharge from the hospital.

The naval hospital has a capacity of 237 beds and during the epidemic we handled at one time as many as 386 patients. This of course necessitated the putting up of tents. At the Naval Air Station it became necessary to take over two bungalows with a capacity of 80 cots each, and one officers' quarters with a capacity of 30 cots, and convert them into temporary hospitals. The dispensary itself accommodated about 30 patients. We had 66 relapses, 4.57 per cent of our cases. Had we been able to keep our cases longer we believe that the relapses would have been fewer.

The following table shows some interesting facts with regard to the cases that relapsed:

Number of cases.	Per cent.	Average sick days before relapse.	Average sick days between attacks.	Average sick days during relapse.
66	4.5	2.78	9.8	2.77

It will be noted that the average number of sick days for the cases that relapsed was very low—2.78. The minimum was 2 days, and the maximum 27 days.

The clinical course was essentially that of an acute infectious disease. The earmarks of the disease that we studied conformed closely enough to the clinical description of influenza, as put down in textbooks on medicine, to make us feel that we were dealing with true influenza. Clinically, we had no doubt as to the diagnosis, and the finding of the influenza bacillus could hardly be considered a coincidence. The reason why the influenza bacillus was not found more frequently is because the organism is so hard to grow.

The onset of the disease, as a rule, was marked by sudden elevation of temperature, headache, muscular and joint pains, burning of the eyes, severe backache, and great weakness. The prostration was well marked and often the patient would sleep most of the time for several days. A few cases complained of slight sore throat. The marked prostration and the severe pains in the lumbar muscles were the outstanding features. After several days the patient would complain of pain in the chest under the upper part of the sternum near

the trachea and bronchi. As the cough became productive the chest pains would diminish. We observed nothing characteristic about the sputum. The fever was high in many cases.

Chart No. 3 shows the result of an analysis of 680 fever charts of uncomplicated cases, wherein are tabulated the number of cases with their highest fever. We see at a glance that 357, or 52 per cent, had a temperature between 102 F. and 104 F.

A careful study was made of 144 fever charts to see whether there was anything peculiar about the fever curve. We noticed that 10

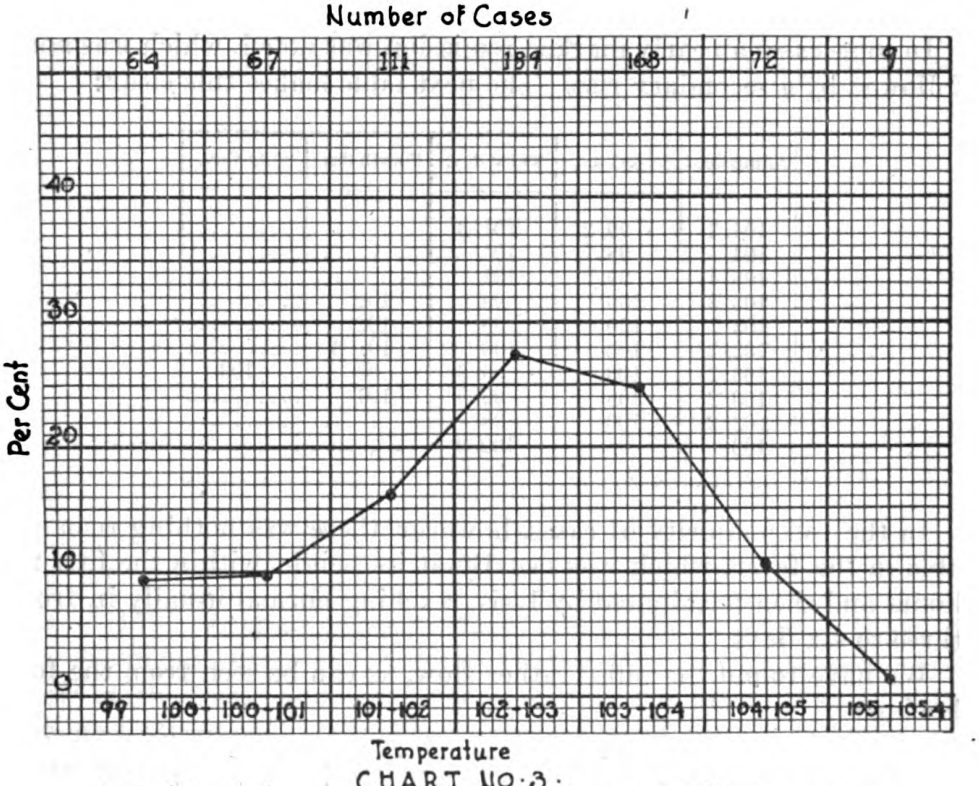


CHART NO. 3.
Highest temperature of 680 uncomplicated cases of Influenza occuring at the U.S. Naval Hospital, Pensacola, Fla. September - October 1918
Notice that 52% of the cases ran a temperature between 102° and 104°

cases (6.8 per cent) ran a course with a double paroxysm of fever. The afebrile period would last 24 hours, followed by a secondary rise, which, in all cases but two, was lower than the first fever. The secondary fever lasted from two to four days—one day, three cases; three days, two cases; four days, four cases. One case had an apyrexia of 24 hours on the second day, then three days of fever, no fever for 24 hours, and finally 24 hours of fever. This type of fever with double paroxysms made it necessary to consider dengue, yellow fever, bubonic plague, and trench fever in the differential diagnosis.

The fastigium would not always be reached within the first 24 hours, as the following illustrates:

Admission.	Third day.	Fourth day.	Fifth day.	Sixth day.
102. 1	103	.....	.....	.....
101. 3	102. 1	.....	.....	.....
101. 5	.....	104	.....	.....
101. 5	.....	.....	105. 5	.....
103. 2	.....	.....	105	.....
102	.....	.....	.....	103. 5

In some cases an early marked remission was noted, which was soon followed by a secondary rise. The next table makes this clear:

Admission.	Second day.	Third day.	Fourth day.	Fifth day.
104. 3	99. 2	101. 3	.....	.....
104	98	101	.....	.....
103. 4	99. 2	101	.....	.....
103. 3	100	99	102	.....
103. 2	100	99	102	.....
103. 2	103	99	101. 3	.....
103. 2	103	99. 3	99	103
103. 2	103	99. 3	101	.....
103. 2	103	98	.....	.....
103	98	102. 2	.....	.....

In the vast majority of cases, however, there was nothing remarkable in the fever, which was usually at its height within the first 24 hours and then terminated by lysis, reaching normal usually in from three to six days.

We have found the pulse rather slow, as can be seen from the following:

Number of counts.	103°-104 F.	102°-103 F.	102°-104 F.
100	93	.....	.....
100	.....	86	.....
200	.....	.....	89

The following table will show the respiratory rate:

Number of counts.	103°-104 F.	102°-103 F.	102°-104 F.
100	22	.....	.....
100	.....	21	.....
200	.....	.....	21+

Eighty-four and five-tenths per cent of 200 cases, with a temperature between 102° and 104 F., had respirations between 20 and 24.

The marked predilection of the influenza bacillus for the respiratory tract has been a noticeable characteristic of this epidemic.

Only a few cases had any gastric symptoms and in these it was no easy matter to decide whether the nausea and vomiting were from the disease or from the medication which had been given, such as calomel, Dover's powder, sodium salicylate, etc.

Physical findings in most cases have been conspicuous by their absence. Injection of the conjunctivae and slight redness of the throat were usual. The lungs were clear in most cases.

A table of the total white count per cubic millimeter is given below:

Number of counts of uncomplicated cases.	Average white blood count.	Highest count.	Lowest count.
40	7,800	17,600	4,000

The urine examination of 200 uncomplicated cases follows:

Number of cases.	Negative.	Per cent.	Number with albumin.	Per cent.	Number of casts with albumin.	Per cent.	Number of casts without albumin.	Per cent.
200.....	142	71	32	16	16	8	10	5

It is interesting to compare these urinary findings with those of the pneumonia cases as tabulated a little later in this paper. The cases at the onset and when the epidemic was at its highest were the most severe ones. The first complication to appear was an acute otitis media, which occurred nine days after the onset of the epidemic. The following day four cases of pneumonia developed. The following table will show the complications and sequelae that we noted:

COMPLICATIONS AND SEQUELAE.

1. Pneumonia, 79 cases. Unresolved pneumonia confirmed by X-ray, 2 cases
2. Empyema; 1 case.
3. Nephritis with pneumonia; 7 cases.
4. Otitis media acute; 13 cases.
   Otitis media acute with pneumonia; 4 cases.
5. Subcutaneous emphysema; 1 case.
6. Psychosis infectious; 2 cases.
7. Frontal sinusitis; 3 cases.
8. Acute thyroiditis; 1 case.

9. Phlebitis of left leg; 1 case.
10. Acute cholecystitis; 1 case.
11. Corneal ulcer; 1 case.
12. Acute laryngitis with aphonia lasting two weeks; 1 case.

Pneumonia.—This has been our most frequent as well as most serious complication. Pneumonia has accounted for all of our fatalities. All of the seven nephritis cases have been associated with pneumonia and had they existed alone would undoubtedly have been responsible for some of our deaths. The average number of days from the onset of influenza to the development of pneumonia in 63 cases averaged 5.6 days.

The onset was insidious. A chill, pleuritic pain and herpes were very uncommon. Delirium was frequent. A dusky color of the skin and cyanosis were early and striking features. The rusty, thick, and sticky sputum characteristic of penumococcic lobar pneumonia was rarely noticed. A few cases early in the course of the disease expectorated bright, bloody sputum. The fever was high—102.5° to 105 F., continuous, and having slight remissions. In the majority of cases it terminated by lysis. The respirations were increased as in ordinary pneumonia cases. The physical signs were fairly constant. They were always bilateral but far more marked in one lung in most cases. The first evidence of the trouble would be found at the bases posteriorly. In one lung there would be evidence of a small consolidated area deeply seated, i. e.: slight dullness, bronchovesicular breathing, distant bronchial breathing or whispered pectoriloquy. At the opposite base one would hear subcrepitant râles. If the case was reexamined at the end of 24 to 48 hours evidences of a massive consolidation could now be made out in one lung and the physical signs would not be well marked in the other lung. This will explain why in our table we show broncho-pneumonia in one lobe. This really only means that this was the lobe most affected. Whispered pectoriloquy was our most valuable aid in arriving at an early diagnosis of lung consolidation.

Although the cases as we have gathered them from the records show a large number of lobar pneumonias, we believe that the reverse was the real state of affairs. It must be remembered that the broncho-pneumonia in this epidemic was not typical and that so much lung tissue was involved that the diagnosis of lobar pneumonia made on clinical findings was excusable. Usually a diagnosis of broncho-pneumonia has to be made on signs of a localized bronchitis with symptoms of pneumonia. The insidious onset, the rarity of the pleural involvement and rusty sputum together with the low blood count ought to have made us favor a diagnosis of broncho instead of lobar pneumonia. The autopsy findings which are being reported have shown that the lesions were those of broncho-pneumonia.

The following tabulations of our pneumonia cases are of some interest.

LOBAR PNEUMONIA.

Number of cases noted.	Site of lesion.		Resolution.		Total number of pneumonia.	Average age.	Deaths.	Per cent of deaths.
	Right lung.	Left lung.	Crisis.	Lysis.				
25....	Upper lobe, 0; middle lobe, 2; lower lobe, 10. Both lower lobes, 5.	Upper lobe, 0; lower lobe, 9.	14	14	47	25	13	31.9

BRONCHO-PNEUMONIA.

19....	Upper lobe, 0; middle lobe, 1; lower lobe, 3. Both lower lobes, 10.	Upper lobe, 0; lower lobe, 5.	5	14	32	24	9	28.0

The following table shows the results of our blood counts:

Influenza cases with pneumonia.

Total number of counts made.	Average count.	Lowest count.	Highest count.
29.....	10,200	2,777	65,000

It will be recalled that the average count of 40 uncomplicated cases was 7,800. The kidneys in our pneumonia cases have suffered severely as the following will show:

Number of cases.	Negative.	Per cent.	Albumin without casts.	Per cent.	Albumin with casts.	Per cent.	Casts without albumin.	Per cent.
51.....	3	5	14	27	32	62	2	3

Of our influenza cases 5.4 per cent developed pneumonia. We believe that as high as this figure appears it would have been much higher had the epidemic occurred during the winter.

The treatment of uncomplicated influenza cases was on the following lines: Calomel, gr. 5, followed by magnesium sulphate, was given at the onset. Aspirin, gr. 10, t. i: d., and Dover's powder in gr. 10, b. i: d, were used in some cases. Another class was given sodium salicylate, sodium bromide, and sodium bicarbonate; still others received phenacetin, salol, and quinine in capsules. Rest in bed, hydrotheraphy (internally and externally), and a nutritious, easily di-

gested diet were the main factors in the treatment of the disease. Of the drugs used aspirin and Dover's powder were probably the best. During convalescence elixir of iron, quinine, and strychnine was employed as a routine measure.

The treatment of pneumonia cases was symptomatic, plus the routine administration of creosote 1 drop on crushed ice every four hours, kept up for a few days after the temperature reached normal. Captain G. T. Smith, Medical Corps, Unted States Navy, the commanding officer of the United States Naval Hospital, Pensacola, Fla., says that he has seen excellent results with creosotal in about 50 cases of lobar pneumonia, not losing a patient. As we did not have creosotal, creosote was used instead. We could not see that it had any effect on the course of the pneumonia. It is worth noting that creosote was tolerated and caused nausea in but very few cases, and this subsided promptly when the drug was discontinued. Creosote was stopped in the nephritis cases as we did not wish to increase the work of the kidneys, which were already overtaxed by the toxemia of the disease. Our main reliance was on fresh air, hydrotherapy, plenty of fluids, liquid diet, stimulants as needed, and last but not least, careful nursing. To facilitate the handling of all cases they were placed in one ward. An ice cap was applied to the head and chest on the side that had the most trouble. Tepid sponging was used every three hours for a temperature of 102.5 F. or over. In some cases compresses wrung out in water at 60 F. were applied to the chest every two hours and seemed to do good. Although we believed that the cases should have a liquid diet while the temperature was very high, we did not hesitate to give the patients solid food with a temperature of 101° to 102 F., if this occurred during a protracted lysis. We are of the opinion that, besides calories a patient needs plenty of food even if he has fever, to supply him with antibodies to overcome the infection. The solid food was well tolerated and we could not see any bad effects that could be charged to its use.

The treatment was begun wtih calomel 5 grains, followed by a saline. The calomel was given in one dose as we did not wish to disturb the patient any more than was absolutely necessary. As our patients were young adults and in good physical condition before the onset of their present disease this treatment did not seem too drastic. We have gone over 780 routine urinalyses made at the United States Naval Hospital and found indican in 450, or 57 per cent of the urines. This gives us an idea of putrefaction going on in the bowel and makes us feel that a purgative at the onset of an infectious disease is not superfluous.

Whisky, one-half ounce, well diluted with water was used every four hours as a matter of routine when the pulse became weak. We could notice no striking beneficial results following its use.

Tincture of digitalis, 30 drops every four hours by mouth, or 10 to 15 minims by hypodermic in very bad cases, seemed to be of real value. If we were asked which was the one best stimulant in pneumonia we would have no hesitation in saying that it was digitalis. The tincture by needle is a little irritating and painful and is sometimes followed by some induration, but we did not see any abscesses.

Another drug that appeared to do good when the patient was restless and could not sleep was codeine sulphate one-half grain by hypodermic. Trional in 5 to 10 grain doses acted well. In the early days of the disease, when bright red blood was expectorated a hypodermic of atropine sulphate acted beneficially. Later on when there were coarse râles present and edema of the lungs was developing atropine would do no good. The patient would drown in his own secretions.

Camphor in oil, grains 5; strychnine sulphate, grain 1/30; caffeine and sodium benzoate, grains 2, by hypodermic, were all tried, but seemed to be of very little value.

Spinal puncture, using cocaine ½ per cent solution as a local anesthetic was used in one case with delirium which had lasted three weeks. Twenty cubic centimeters of clear fluid were removed under pressure and the patient was quiet for six hours after the puncture. Spinal puncture to relieve delirim in pneumonia is based on good grounds and is a valuable procedure which ought to be used more frequently.

Venesection was done in two cases, showing cardiac embarrassment. From 180 to 200 cubic centimeters were removed. The patients were relieved for a few hours. Both cases died. We believe that venesection should be kept in mind and used more often than is the present practice.

Oxygen was given by inhalation when the patient became cyanosed, and proved useless. In two cases we gave it by needle in the subcutaneous tissues of the abdominal and thoracic walls. An important precaution in carrying out this procedure is to insert the needle subcutaneously and see that no blood flows out, as the giving of oxygen directly into a vein would cause an air embolus. The purpose of using this method is based on the theory that the red blood cells are capable of utilizing the oxygen and make up for the difficulty of oxygen absorption in a lung which is extensively involved and where the exudate is so excessive as to diminish the surface of contact between the blood and oxygen inhaled; that the latter is not absorbed in sufficient amount to sustain life. Another advantage is that the oxygen is held in a reservoir as it were, and can be utilized continuously. The patient would be allowed to sit up in bed for one hour, using a back rest, seven days after the fever had been normal. The time was gradually lengthened so that in about two weeks after the fever subsided he would be walking about.

Bacteriological work.—The present pandemic of influenza has been characterized by the great divergence of bacteriological findings as reported by various workers. Influenza vera is a disease caused by the bacillus of influenza. Influenza nostras on the other hand is a disease, the cause of which has not been definitely determined; the micrococcus catarrhalis, streptococcus, etc., have all been incriminated.

A considerable amount of bacteriological work has been done during this pandemic to determine the cause of the infection, and in a majority of the reports the evidence seems to be in favor of influenza nostras. Bacillus influenza has been reported at times, but in many of the reports it was not blamed as being the chief mischief maker.

We have examined the sputum of 120 patients who had been clinically diagnosed influenza (respiratory type) and 28 out of 66 uncomplicated cases and 33 out of 54 cases complicated with pneumonia showed an organism which morphologically and tinctorially was consistent with that of the influenza bacillus. Pneumoccus, micrococcus catarrhalis, staphylococcus, and streptococcus were also found.

The following technic was used in collecting specimens for cultures: The patient was instructed to cough and the sputum which came from deep down in the bronchi was immediately received in a sterile Petri dish. A small amount of this material was at once taken up with a platinum loop and planted on freshly prepared blood agar and blood-streaked agar. This media has a slight alkaline reaction. The Petri dish was then incubated at 37 C. After 24 hours incubation the colonies were barely visible, but after 36 to 48 hours they appeared as minute dewdrops. When touched with a loop the colony could easily be picked up and formed a smooth and even suspension with a drop of water on a slide.

The microscopical examination of the smear showed that the influenza bacilli prepared from the culture were much larger than those prepared from the sputum. Another striking feature was the variation in the size of the bacilli in smears made from both the sputum and the cultures.

The staining that gave the most satisfactory results was Gram's stain, using dilute carbol-fuchsin as the counter stain. Four cultures out of 31 uncomplicated cases and one out of eight cases complicated with pneumonia showed the influenza bacillus, micrococcus catarrhalis, pneumococcus, staphylococcus, and streptococcus were also found.

Agglutination test.—In five cases the influenza bacilli obtained from subcultures on blood agar and blood-streaked agar were agglutinated by the serum of convalescent pneumonia patients. The method consisted in picking up the influenza colony and emulsifying in normal salt solution. This emulsion and the serum of a pa-

tient recovering from influenza were mixed on a slide in dilution of 1 to 40. At the same time horse serum and the bacterial emulsion were mixed on another slide in the same dilution and was used as a control. Both slides were examined after 20 minutes incubation. Only the slide with the patients' serum agglutinated. The slides were then dried, fixed and stained and the results confirmed the above observation.

Bacteriological findings.—The sputum of 120 patients clinically diagnosed influenza (respiratory type) were examined. The following information was obtained:

Number examined of uncomplicated cases, 66.

1. Influenza-like bacilli, 28—42.4 per cent.
2. Gram negative diplococcus, probably M. catarrhalis, 20—30.3 per cent.
3. Pneumococcus, 51—70.3 per cent.
4. Streptococcus, 4—6.6 per cent.
5. Staphylococcus, 3—5 per cent.

Number examined of influenza cases complicated with pneumonia, 54.

1. Influenza-like bacilli, 33—61.1 per cent.
2. Gram negative diplococcus, probably M. catarrhalis, 7—12.9 per cent.
3. Pneumococcus, 48—88.4 per cent.
4. Streptococcus, 4—7.3 per cent.
5. Staphylococcus, 2—3.7 per cent.

Thirty-nine cultures were taken from bronchial secretions, collected in sterile Petri dishes and planted on blood-streaked agar and blood agar. The 39 cases showed the following flora:

Number examined of uncomplicated influenza cases, 31.

1. Influenza bacilli, 4—12.9 per cent.
2. M. catarrhalis, 29—93.8 per cent.
3. Pneumococcus, 20—64.5 per cent.
4. Streptococcus, 11—38.6 per cent.
5. Staphylococcus, 9—29 per cent.

Number examined of influenza complicated with pneumonia, 8.

1. Influenza bacilli, 1—12.5 per cent.
2. M. catarrhalis, 6—75 per cent.
3. Pneumococcus, 4—50 per cent.
4. Streptococcus, 1—12.5 per cent.
5. Staphylococcus, 5—62.5 per cent.

Ten nasal cultures were negative for influenza bacilli.

SUMMARY AND CONCLUSIONS.

1. Complement of station 5,359; total number of influenza cases, 1,454—27 per cent. Number of pneumonias, 79; number of deaths, 24. Mortality, 1.6 per cent. The epidemic was under control within seven and one-half weeks.

2. The number of cases at the isolation camp has been much smaller than that of the station (not previously mentioned in text).

3. The men living in tents at the Air Station have suffered equally with those living in barracks.

4. The present epidemic has had a higher death rate than preceding ones, as noted in the literature.

5. The very low white blood count leads us to believe that most of the pneumonias were due to influenza bacillus, as pneumococcus, streptococcus, or staphylococcus would have caused a leucocytosis.

6. The pneumonias are in the majority of cases massive bronchopneumonias.

TRAINING SCHOOLS FOR NURSES IN HAITI.

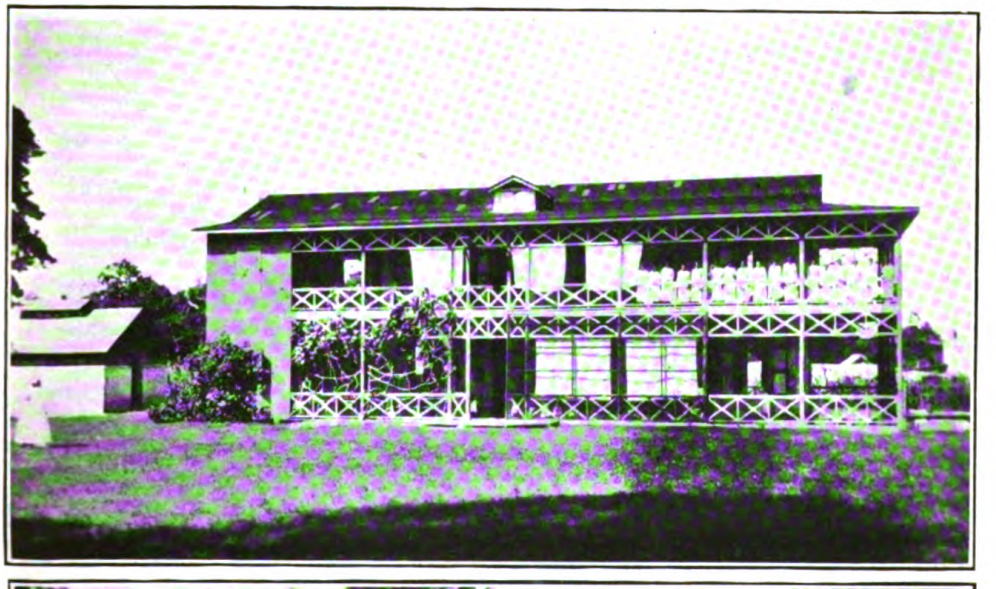
By L. D. JORDAN, Chief Nurse, United States Navy.

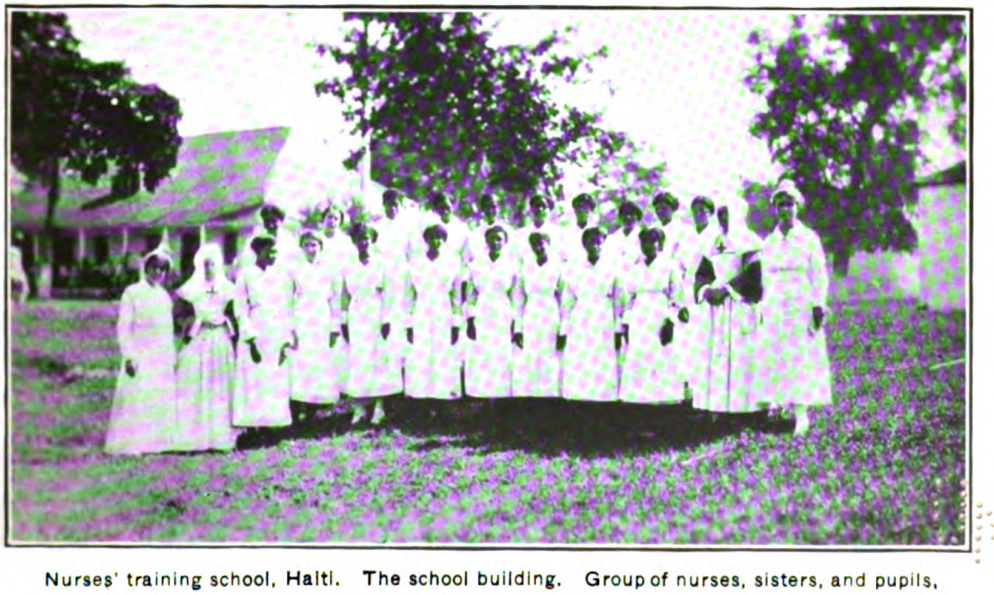
The treaty of September, 1915, between the United States and Haiti provided among other details for the establishment of a public-health service under the control of a sanitary engineer nominated by the United States. In December, 1916, Surgeon N. T. McLean, United States Navy, was appointed to this detail, and plans for the organization of the service were begun.

In July, 1918, Chief Nurse L. D. Jordan, and Nurse J. Y. Raymond, United States Navy, were detailed to duty in connection with the establishment of a training school for Haitian women. The necessity for Haitian trained nurses was early appreciated, but until the development of the service had been brought to a point where the school could be properly administered it was deemed inadvisable to begin this work.

The negro Republic, with over 2,000,000 inhabitants, the great mass of whom are illiterate and without the most elementary ideas of hygiene, had no organization from which even inexperienced nurses could be obtained.

The deplorable hospital situation in Haiti at the time of the formation of the public health service gave great concern. During the time of the occupation the naval medical officers attached to the Marine regiments in Haiti undertook such improvement in the local hospital as was possible. Their work brought the city general hospital in Port au Prince from a condition of filth and squalor to a real working basis. This hospital, as most others in the Republic, had been more or less under the general administration of French Sisterhoods, who, in the face of greatest difficulties endeavored to attend to the needs of the sick. The Sisters were not trained nurses and at best could but administer such funds as they were able to obtain from the Government and private sources. No organized plan existed in relation to the care of the sick.





Nurses' training school, Haiti. The school building. Group of nurses, sisters, and pupils.

Preliminary work having been accomplished, one of the buildings of the city general hospital was set aside for a training school. Interest among the better class of Haitian women was established by means of a number of articles in the daily press, and the influence of the Sisters actually in the hospital and through their associations at the various schools throughout the island. As a result, from a large number of applications from all parts of the country, 38 were selected, and on October 15 the school was opened with 24 pupils in attendance.

French being the national language, all instruction is given in it. The school is conducted as nearly as possible along the lines adopted by standard American schools with such minor changes as were advisable to meet local conditions in a tropical country.

The uniform is blue with large soft white collar and cuffs. The first three months are the period of probation, after which the cap is received. Lectures and practical demonstrations are given. The course extends over two years with a diploma at the end of that time to those who have satisfactorily completed the course. The usual instruction will be given in medical and surgical nursing, operating-room technique, children's diseases, dietetics, and a special study of nursing in tropical diseases.

The first month's work at the school shows that the pupils possess a high ideal of the qualifications of a nurse. They show great interest in their practical work and already give evidence that they have the ability to understand and put into use the instructions which they have received. Two Sisters live in the nurses' quarters and maintain discipline.

The pupil-nurses will receive their practical experience in the wards of the city general hospital, which has a daily average of over 300 patients. In addition to the hospital instruction proper, an out-patient dispensary, located in one of the poorer sections of the city, will be used to give instruction in social service. It is believed that this training will be of inestimable benefit in teaching the poorer classes the elementary principles of hygiene.

From the interest taken by the pupils themselves, their families, the Sisters, and the people generally, it is evident that the spread of a knowledge of the hygienic principles necessary for good health will be increased as the pupils graduate and return to their homes in the various towns of the Republic.

OBSERVATIONS ON 200 MEN EXAMINED FOR CANDIDATES FOR THE LISTENERS' SCHOOL.

By F. B. GALBRAITH, Lieutenant, Medical Corps, United States Navy.

After having examined a large number of men for the Listeners' School I noticed that about only one in every five qualified. To determine the cause of the failures I decided to keep records of all the men examined. The records of 200 men examined consecutively were taken for the basis of this report.

The following instructions furnished by the Bureau of Navigation were followed, with slight modifications. (The numbers and letters are not the ones given in the examination for obvious reasons.)

DETAILED RECOMMENDATION FOR THE EXAMINATION OF CANDIDATES FOR THE LISTENERS' SCHOOL.

1. Qualifications of candidates for examination.

(*a*) The general training of a seaman, especially military discipline, care of seaman's belongings and person, and the ability to handle firearms effectively.

(*b*) General intelligence sufficient to profit by an intensive course of school work.

(*c*) Loyalty to and interest in naval work.

(*d*) Enough self-reliance and initiative to carry the responsibility of the listener's task

(*e*) Enough team spirit to make him livable in cramped quarters.

2. On the basis of these requirements, the best available men should be recommended for examination by the drill officers from the senior companies at the several training stations.

(*a*) It should be made clear to the officers in charge that all candidates for this examination should be selected men. It is a waste of time to examine men who do not meet the above requirements, at least presumptively.

(*b*) At least four times the quota required by the communication on the "quota of men for Listeners' School" under date of January 29 should be examined at each naval district.

(*c*) In the absence of other clear indications the requisite general intelligence to profit by school training (1, *b*) may be decided by actual school experience. Wherever practicable candidates should have had at least two years' high-school experience, but any other indication of superior intelligence should be regarded as satisfactory.

3. The examination of the selected candidates should consist of two parts.

(*a*) A general medical examination to determine the candidate's general fitness for the tasks of the listener, with especial reference to the integrity and normal functioning of the auditory apparatus, and possibly with less emphasis on the visual equipment.

(*b*) A special examination to determine by approximate trial the men who seem to be best fitted for the special and peculiar task of a listener.

4. The ideal special examination would probably mean to try out every candidate with the special apparatus used under the actual conditions of service. Since that seems to be impracticable, a set of tests had to be developed that would correspond to these tasks as closely as possible. After a considerable experience with the men selected by these tests, consequent to which the tests have been checked and corrected, it seems important to give them as uniformly

as possible in all naval districts and to make no intentional changes either in substance or method until that change has been fully considered by the Bureau of Navigation and checked by correlation with the actual work of the man at the school.

5. Examination blanks similar to the inclosure should be used as far as practicable for all examinations. Until enough printed forms can be supplied for all the districts, sufficient similar blanks for one or two examinations may have to be prepared by hand. In this case it will be unnecessary to duplicate the 6-inch rule at the bottom. The graded examination papers should be forwarded to Pelham Barracks with the successful candidates. It is important in the final selection to take all available data concerning the candidate into account.

6. Groups of 12 to 20 men may be examined together. Each group examination requires from 15 to 20 minutes.

7. The examination room should be at least 30 feet long. It should contain (1) a table at least 8 feet long for the examiner's sound screen; (2) provision for seating 20 men in two rows, the nearer row being 20 feet from the sound screen; (3) provision for the candidates to write their papers, including pencils and appropriate tables or lap tablets; (4) no disturbing noises should be permitted either inside or outside the room; (5) a petty officer and an orderly should be present throughout all examinations.

8. Introductory statement: Before the examination of any squad begins the examiner should state (*a*) that the object of the examination is to select those men who have the special qualifications for a special and very important naval task which demands the best possible hearing and the ability to locate the direction of sounds; (*b*) that the closest attention is required and instructions will not be repeated; (*c*) that looking at the paper of another will disqualify a candidate immediately. Note it is the business of the orderly and petty officer to see that this rule is enforced.

9. The first two lines should then be ordered filled in by the candidates as indicated by the printed directions.

(*a*) The first line should have the candidate's name in full, and the date.

(*b*) The second line should give the candidate's rating, billet number, battery station, and the name of the naval district or training school.

10. *Test 1.*—The memory span, 7, 8, and 9 place digits. Procedure: The examiner should state—

(*a*) "The first test is your ability to remember numbers.

(*b*) "In column 'A' you will write 10 series of numbers, one series on each line, after I have read them to you and given the order to write.

(*c*) "I shall give the order, 'Pencils up.' On that order you must raise your pencils from the paper at least 2 inches. Then I shall read 7, 8, and 9 place number digits, each second. You should remember these numbers and write them in the order that I gave them, when I give the command 'Write.'"

(*d*) For example: Pencils up; 1, 9, 4, 7—write.

(*e*) Now pay attention:

Pencils up; 3, 7, 2, 8—write.
Pencils up; 0, 8, 6, 9—write.
Pencils up; 5, 1, 8, 3—write.
Pencils up; 9, 4, 1, 6, 3—write.
Pencils up; 2, 8, 9, 4, 1—write.
Pencils up; 3, 7, 4, 8, 5—write .
Pencils up; 6, 8, 2, 7, 1, 9—write.
Pencils up; 0, 3, 6, 2, 4, 2—write.
Pencils up; 7, 9, 1, 3, 0, 5—write.
Pencils up; 5, 9, 2, 8, 3, 6—write.

This series of numbers may be used for all examinations until further notice.

11. *Test 2.*—Ability to read a circular scale to an error of 1 degree.

(A) Apparatus: (*a*) A circular scale at least 15 inches in diameter, divided into 5-degree arcs and numbered every 30 degrees with number that should be legible at 30 feet; (*b*) a hand lying close to the scale and capable of being set with an accuracy of 1 degree: (*c*) both scale and hand may be constructed of heavy cardboard divided and lettered by hand.

(B) Procedure: The examiner should say—

(*a*) "In the column B you will write the setting of this hand on this circular scale, when I give the command 'Write.'

(*b*) "Note that the circular scale is like a compass scale, reading from 0 to 360 degrees. Each division marks off 5 degrees. Each 30 degrees is numbered.

(*c*) "You are expected to read to an accuracy of 1 degree. For example, this (setting the pointer to correspond) would be 90 degrees, this would be 95 degrees, and this could be 92 degrees.

(*d*) "Now pay attention to the settings and write each on a separate line in column B when I give the command 'Write.' Set the scale at 180 degrees; give the command 'Attention,' and after 5 seconds give the command 'Write.'"

Set the scale at 0 degrees; command "Attention" and after 5 seconds "Write."

Set the scale at 50 degrees.
Set the scale at 65 degrees.
Set the scale at 70 degrees.
Set the scale at 27 degrees.
Set the scale at 133 degrees.
Set the scale at 107 degrees.
Set the scale at 201 degrees.
Set the scale at 96 degrees.

12. *Test 3.*—The location of sound.

(A) Apparatus: (*a*) A cotton cloth screen about 8 feet long and 30 inches high, on which are printed six vertical lines 1 foot apart and about 8 inches high. Above these lines should be printed numbers 1 to 6, one for each line. The numbers should be legible at 30 feet. (*b*) A steel snapper such as is sometimes used in elementary telegraph instructions. Any other convenient source of uniform sounds would do which can be made to give separate clicks close to the cloth screen. (*c*) Since it is important that no other indication of the source of sound be given other than the sound itself, it must be carefully arranged that no part of the examiner is visible above, below, or through the screen. The snapper must not touch the screen, though it should be as close as possible without touching to avoid parallel. Neither experimenter nor snapper should cast shadows on the screen.

(B) Procedure: The experimenter should say—

(*a*) "Now we shall test your ability to locate the direction of sounds. This is the most difficult and the most important of all the tests.

(*b*) "I shall sound the snapper (sound it) behind that cloth screen, directly behind one of those numbered lines. In each case I shall make six slow clicks and six rapid ones.

(*c*) "You must try to tell by the sound which number it is behind, and when I give the command 'Write,' set it down in column C. Do not try to guess. Do not look at one number and try to make it seem behind that one. Turn your head slowly from side to side, looking at each number in turn, to tell whether you are getting nearer or further away.

(*d*) "Now we shall try it once just for practice."

(*e*) The experimenter should then hide himself behind the screen, taking particular care not to indicate by his eye or by the direction of his disappearance where he intends to sound the snapper. He should then sound the snapper as previously described (six slow and six fast snaps) behind the line numbered 4. Raising the snapper above the screen vertically above No. 4, he should say, "I sounded that behind No. 4. Those who got it right, raise their hands. Those who made it either 3 or 5 raise their hands." According to the showing he may then say, "That was pretty good," or "That was poor. Now, try it again for practice." This time it should be sounded behind 2 and demonstrated as before.

(*f*) The examiner should say: "Now we shall try it in earnest. Pay strict attention, and when I give the command 'Write,' write the number where the sound seems to be in column C. 'Attention.'" Sound the snapper as before behind line 3 and give the command "Write." Then in exactly the same way behind 2, 5, 1, 3, 1, 4, 6, 1, 4.

13. *Test 4.*—The discrimination of familiar sounds. The examiner should say—

(*a*) "In the last column, D, you will write the syllables that I shall pronounce. For example, I shall cover my mouth and speak a syllable very softly." (Covers his mouth and speaks the syllable KAZ, then spells it and asks how many got it right.)

(*b*) Then the examiner should take up his position directly in front of the cloth screen and say, "Now pay attention when I cover my mouth and write the syllable that I speak in column D when I give the command 'Write.'

"Attention. (Covers mouth and speaks softly) DON—Write.
"Attention. (Covers mouth and speaks softly) EY—Write.
"Attention. (Covers mouth and speaks softly) DER—Write.
"Attention. (Covers mouth and speaks softly) LY—Write.
"Attention. (Covers mouth and speaks softly) PU—Write.
"Attention. (Covers mouth and whispers softly) CNT—Write.
"Attention. (Covers mouth and whispers softly) TARA—Write.
"Attention. (Covers mouth and whispers softly) MAR—Write.
"Attention. (Covers mouth and whispers softly) DES—Write.
"Attention. (Covers mouth and whispers softly) SEA—Write."

(*c*) The exact degree of force with which the syllables are spoken by the several examiners is incapable of standardization, and it doesn't matter how they differ, provided each one maintains the same standard for all the groups that he examines in filling one quota.

14. After this test, candidates should be ordered to leave their papers and pencils, rise and file out. Another group should take their places and the examination be repeated until all the candidates are examined.

15. Grading the papers is best done by making first a complete list of answers.

(*a*) *Grading test 1.*—Begin at the bottom of the list of figures. Mark each error. Inability to get two or more figures of a series counts minus 10. Failure to get one of the numbers of a series counts minus 5. Numbers all right but with one inversion counts minus 5. If the six place numbers are right the others may be graded correct without reading.

(*b*) *Grading test 2.*—An error of 1 degree in reading the scale counts correct. It may easily result from differences of position. An error of 2 to 4 degrees counts minus 5. An error of 5 or more degrees counts minus 10.

(*c*) *Grading test 3.*—An error of any sort counts minus 5 for each place. For example: The first source of sound was line 3. If the answer is 2 or 4, the

answer is graded minus 5; if the answer is 1 or 5, the grade is minus 10; if the answer is 6, the grade is minus 15.

It is evident that one question may count minus 25, as for example, if the place were 6 and the answer were 1.

(*d*) *Grading test 4.*—If one sound is wrong the answer counts minus 5. If two sounds are wrong, the answer counts minus 10.

16. *Total grades.*—(*a*) The highest possible grade is 400. The highest grade that I have ever seen is 370. Passing grade is 300.

(*b*) There are some exceptions to this. Thus, if a paper is marked perfect on the first two tests and only 100 on the second two, the paper is lacking in the most essential part. So the last two tests are regarded as unsatisfactory if they fall below 120. Again a candidate may fall down completely in reading the scale. This is a serious matter, but it may readily be learned and if the rest of the paper, especially the sound tests, are excellent the paper should be passed. But in this case the candidate should be shown the paper and passed only on the promise of learning to read the scale immediately.

It should be borne in mind that the main point of the tests is to find listeners. Any correctable errors should not invalidate a candidate. Memory span for figures does not improve with practice to any considerable degree. A candidate who makes serious errors with 5 place figures is probably not fitted for the school work. Two errors of two or more points in the location of sound is a serious matter. Two errors of three points should disbar a candidate, even if the rest of the locations are all accurate. If other evidence shows that the candidate is an otherwise exceptionally good man, he may be given another test in the location of sound.

17. Individual examination for the listeners' school.

(A) Purposes: The purposes of the individual examination are: (*a*) To check other sources of information concerning the personal fitness of the candidate. (*b*) To test the auditory discrimination of differences of intensity with the same type of apparatus that they must rely on in actual service. (It appears that the ability to locate the source of sound is not infrequently greater than the ability to discriminate the differences on which the location chiefly depends.) (*c*) To test the quickness and certainty of the reactions to differences of intensity. (Slow hesitating and uncertain reactions appear to be fatal to a good listener.)

(B) Apparatus consists of a stethoscope earpiece to which is attached a rubber tube about a yard in length. This should be marked at its middle point. When scratched with a quill toothpick faint sounds are produced which may be located as at the middle or toward one side or the other.

(C) Procedure: (*a*) The candidate should be watched with care to discover any indications that may appear of personal unfitness. (*b*) Seated opposite the candidate with a table between, the experimenter should say: "We are going to test your hearing with this apparatus. When you have put these earpieces in your ears, I am going to scratch this tube with a quill. If it seems to be more in your right ear raise the fingers of the right hand; if in the left ear raise the fingers of the left hand; if it seems just the same to both ears, exactly in the middle of the forehead, raise both hands. The point of the trial is to find quickly and accurately when it is in the middle. But if it seems just a shade over one eye or the other, raise the corresponding hand. (*c*) Now put this earpiece in your ears, bow your head, and shut your eyes." (*d*) The first test should be for practice, 6 inches on one side, 6 inches on the other, and then in the middle. If the candidate gets them right, he should be told so. If there are errors that distance, the existence of gross differences in the two ears

should be suspected. The reactions of the appropriate hands should be immediately decided. If these reactions are correct, the examiner should say: "That was good; now we will make it a little finer." From now on, no information should be given whether the answer is right. (*e*) Various points around the middle should now be scratched and occasionally the middle. Starting from 2 or 3 inches to one side move by half-inch stages to the other side, well beyond where it is correctly discriminated. Then back again until the examiner is convinced that he can tell how wide the candidate's center is, and whether the center is displaced toward either ear.

(D) Grading these performances. A perfect performance would be considered when no personal fault was discovered, when the reactions were immediate and certain, when the middle exactly corresponded to the middle of the tube, and when a displacement on either side of one-half inch was uniformly accurately discriminated. Such cases exist, but they are not common. (*a*) Five grades are given for each of these characteristics, perfect, fair, average, poor, impossible. I represent them on the alphabetical list by symbols rather than by numerals. (*b*) Five points are noted: Personality, quickness or reaction, and assurance, breadth of the apparent center, displacement of the center, consistency. (*c*) There can be no fixed rules for grading personality. The possible varieties of criticism are too numerous. But most of the clearly bad cases should have been eliminated before the individual examination. (*d*) Quickness and assurance of reaction is also difficult to give rules for grading. But a little experience will enable the examiner to make a pretty accurate judgment. In practice, this quality may very properly be left to the final reviewing officer. (*e*) Breadth of center: Average is 1 inch, poor is 2 inches, anything more than that is impossible. (*f*) The same dimensions hold for displacement of the center. (*g*) Consistency is determined by the number of different variations. Impossible consistency is usually a matter of pure guesswork. The intermediate grades will be proportional parts of the total number of stimuli which lie just outside the candidates center, and those which lie just inside the center. Mixing right and left of the true centers is poor. One-third of centers called right or left and of the proximate rights and lefts called centers is average. Anything between that and perfect is good. (*h*) No one should pass this test with less than an average "good."

Permission was given any man on the station to take the examination, irrespective of his education, as it was necessary to do this in order to fill our quota. I found that the same percentage of men passed with only a grammar-school education as there were men with one or more years in high-school in the first series. In the second series the high-school trained men did better.

The room used for the examination was on the third floor of a concrete warehouse, where the accoustic properties were very poor, allowing a great deal of echoing. There was also considerable noise from the streets below, of mechanics working and men drilling. This was considered, however, somewhat of a desirable feature in that it compelled the men to concentrate their minds on their work and to eliminate extraneous sounds, as they might possibly have to do on board ship in eliminating noises from machinery and the propellers of their own ship.

The procedure in test 3 was varied somewhat. Before beginning the test, the snapper was sounded in front of each number where the men could see and hear the location of the sound, and then twice behind the screen, allowing them an opportunity to tell the number and then telling the correct one.

In the test of auditory discrimination of differences of intensity I believe that a method I have adopted is a little more satisfactory than that given in the instructions as a better opportunity is given to determine the candidates mental alertness, since invariably the candidates that did not grasp the instructions, failed in one or more parts of the test as well as the individual test. The candidate seated in a chair in front of the examiner was told to "Hold up the hand on the side on which you hear the noise the loudest; if it is equal in both ears, hold up both hands. Fit these in your ears." Hand him the stethescope connected to the rubber tube. "Now watch where I scratch." The center and each side, 6 inches from the center, is scratched. "Do you get the difference?" If the candidate answers "Yes," he is then told to close his eyes and the test is proceeded with. I graded candidates on assurance and reaction in this manner. If the candidate responded quickly I credited him with excellent reaction; the other marks good, fair, and poor in keeping with the time in which the candidate responded. Assurance was excellent if he showed no element of doubt. If he apparently hesitated it was "good," if he showed plainly noticeable signs of doubt it was "fair," and if he changed from one to the other side in indicating the side on which the sound was louder it was considered "poor" assurance. A candidate of poor assurance and reaction usually failed in other parts of the test.

The men taking this examination were those who were not able or who did not wish to qualify for the officers' class or other special training branches offered at this station. This accounts for the low number of college-trained men.

Two series of 100 men each were taken. The second 100 were used as a check for the first series. By comparing the two columns it will be noticed that there was very little difference in the results obtained. The results of the first series of 100 men are shown in the first column, the second 100 in the second column of each table.

The following are the tabulated results:

	First series.	Second series.
Number of men examined	100	100
Number of men passed	18	14
Number of men failed	82	86

OCCUPATIONS REPRESENTED.

	Farmers.		Mechanics.[1]		Students.		Clerks.[2]		Laborers.[3]	
	First series.	Second series.	First series.	Second series.	First series.	Second series.	First series.	Second series.	First series.	Second series.
Passed	4	1	3	3	2	2	3	7	6	1
Failed	5	11	8	15	6	8	23	26	30	26
Total	9	12	11	18	8	10	26	33	36	27

[1] Mechanics included electricians.
[2] Clerks included business men, newspaper men, and bookkeepers.
[3] Laborers included painters, miners, railway men (street-car men, etc.), teamsters, firemen and the like.

This classification reduced to a minimum the number of professions and trades given as the occupation of the candidates before enlisting in the Navy.

	Passed.		Failed.	
	First series.	Second series.	First series.	Second series.
Education:				
Grammar school	8	1	37	25
High school	9	11	42	57
College	2	2	3	4

Grammar school included up to the ninth grade. High school included those of one to four years' training.

Results of those who passed.

	First series.	Second series.
Number of men that passed	18	14
Average total grade	315	317
Average age (years)	21	21
A—Memory test	85	84
B—Reading circular scale	97	94
C—Location of sound	67	68
D—Discrimination of familiar sounds	69	68
Breadth of center:		
No breadth of center	6	4
Breadth of center ½ inch	6	2
Breadth of center 1 inch	6	2
Breadth of center 1½ inches	4	3
Displacement of center:		
No displacement of center	5	2
Displacement to the right only	4	4
Grouped as follows—		
½ inch	3	2
1 inch	1	.....
1½ inches	.....	2

Results of those who passed—Continued.

	First series.	Second series.
Displacement of center—Continued.		
Displacement to the left only	6	5
Grouped as follows—		
½ inch	4	2
1 inch	1	3
1½ inches	1	.....
Displacement to the right and left	3	3
Grouped as follows—		
½ inch to right and ½ inch to left	.....	2
½ inch to right and 1 inch to left	3	.....
1 inch to right and ½ inch to lett	.....	1
Reaction:		
Excellent	3	2
Good	14	12
Fair	1	.....
Assurance:		
Excellent	.....	1
Good	13	13
Fair	1	.....
Consistency:		
Excellent	5	1
Good	13	9
Fair	.....	4

The highest mark was 360, made by a clerk with two years' college training. His marks were as follows:

A—Memory test	100
B—Reading the circular scale	100
C—Location of sound	80
D—Discrimination of familiar sounds	80
Breadth of center	None.
Displacement of center	None.
Reaction	Excellent.
Assurance	Excellent.
Consistency	Excellent.

Results of those who failed.

	First series.	Second series.
Number of men who failed	82	86
Average total grade	252	251
Average age	21	21
A—Memory test	70	73
B—Reading circular scale	76	78
C—Location of sound	42	44
D—Discrimination of familiar sounds	53	45
Breadth of center:		
No breadth of center	28	43
Breadth of center, ½ inch	15	10
Breadth of center, 1 inch	14	17
Breadth of center, 1½ inches	3	4
Breadth of center, 2 inches	15	8
Breadth of center, 2½ inches	0	2
Breadth of center, 3 inches	1	1
Breadth of center, 3½ inches	1	0
Breadth of center, 4 inches	1	1

Results of those who failed—Continued.

	First series.	Second series.
Displacement of center:		
No displacement of center	30	31
Displacement to the right only	7	12
Grouped as follows—		
½ inch	7	8
1 inch	0	2
1½ inches	0	2
Displacement to the left only	13	13
Grouped as follows—		
½ inch	7	8
1 inch	5	2
1½ inches	1	1
2½ inches	0	1
3 inches	0	1
Displacement to the right and left	32	30
Grouped as follows—		
½ inch to right and ½ inch to left	10	15
½ inch to right and 1 inch to left	3	1
1 inch to right and 1½ inches to left	0	2
1 inch to right and 1 inch to left	15	6
1 inch to right and ½ inch to left	0	2
1 inch to right and 1½ inches to left	0	2
1½ inches to right and ½ inch to left	1	0
1½ inches to right and 1½ inches to left	1	1
2 inches to right and 1½ inches to left	1	0
2 inches to right and 2 inches to left	1	1
Reaction:		
Excellent	18	13
Good	53	61
Fair	5	10
Poor	6	2
Assurance:		
Excellent	15	12
Good	47	58
Fair	11	13
Poor	9	3
Consistency:		
Excellent	6	17
Good	46	48
Fair	14	11
Poor	16	10
Causes of failures:		
"C" and "D" at or below 120	61	72
Consistency poor	15	10
Assurance poor	9	3
Reaction poor	6	2
Breadth of center 2 inches or more	14	12
Failed in two or more parts	27	17

CONCLUSION.

I find that very few college men take this examination, because they can qualify for better ratings. It is not desirable to exclude a man from qualifying for a listener if he has only a common-school education. All but 7 candidates of the first series and 11 of the second series were able to pass the membory test and circular scale test satisfactorily. The test for the location of sound and the discrimination of familiar sounds was the cause of the greatest number of failures.

In the test of auditory discrimination of differences of intensity it seemed very difficult for many of the candidates to discriminate between ½ inch to either side of the center with the following procedure: Scratch the center of the tube, then 2 or 3 inches to right or left of center, then ½ inch to right or left of center. This manner of testing appeared to be more difficult than scratching on the tube at ½ inch intervals, beginning at 2 inches to the right and passing through the center and to 2 inches to the left.

Very few of the candidates knew anything about the kind of work to be done, where they were going, or their rating and pay, as practically the only information that has been received was from men of this station who had been to the " listeners' school " and had written to their friends here regarding it. Most of the men took the examination because it seemed to offer a good opportunity to be transferred to an eastern station and early sea duty, the ambition of practically every man on this station. I believe that it would be a greater incentive to the men if definite information could be given them regarding their status in case they pass the examination.

Following is a sample of the form of examination paper used:

Examination of candidates for listeners' school.

Name in full..... Rate..... NRF.....
(Surname first.)

U. S. NAVAL RESERVE TRAINING CAMP, SAN PEDRO, CAL., TWELFTH NAVAL DISTRICT.

Date....., 1918.

Examination.				Markings.				
A.	B.	C.	D.	A.	B.	C.	D.	Total.
Grand total.....								

Final examination—Sound test:

Personality.....

Reaction.....

Assurance.....

Breadth of center.....

Displacement of center.....

Consistency.....

Candidate{Passed / Rejected} Examiner.....
U. S. N.

Age..... Occupation..... Education.....

BOOK NOTICES.

THE PRINCIPLES AND PRACTICE OF OBSTETRICS, by *J. B. DeLee, A. M., M. D., professor of obstetrics, Northwestern University.* Third Edition. W. B. Saunders Co., Philadelphia, Pa., 1918.

This is a superb volume, thanks to the author's direct, clear style and the completeness with which the subject is handled and owing also to the excellence of the many illustrations, the good type, and other features of the bookman's craft.

The procedures described are primarily those of the writer and have all the force of his authority, but the reader enjoys in addition a wide survey of the methods in vogue in Europe which are referred to with truly judicial discrimination. The many historical references and the summary of the literature of the subject at the end of each chapter give to this work a scholarly finish lamentably rare in the medical press of America.

MASSAGE AND THE ORIGINAL SWEDISH MOVEMENTS, by *Kurre W. Ostrom, from the Royal University of Upsala, Sweden.* Eighth Edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1918.

A small, handy volume written for those wishing to employ this valuable therapeutic measure under the direction of physicians. The author's ethics appear to be sound, and he makes a very earnest and proper plea for the regulation, by competent authority, of massage in this country.

PAPER WORK OF THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY, by *R. W. Webster, M. D., Ph. D., Major, Medical Corps, United States Army.* P. Blakiston's Son & Co., Philadelphia, Pa., 1918.

PHYSIOLOGY AND BIOCHEMISTRY IN MODERN MEDICINE, by *J. J. R. Macleod, M. B., assisted by Roy G. Pearce, B. A., M. D.* C. V. Mosby Co., St. Louis, 1918.

The tendency of modern medicine is to place less and less emphasis on pathological anatomy and more on pathological physiology. We are, for instance, beginning to classify diseases of the heart, kidneys, and many other organs according to the studies made while the patient is still alive rather than according to the autopsy findings. Macleod has therefore written "an advanced text in physiology for those about to enter upon their clinical instruction, and at the same time a review for those of a maturer clinical experience who may desire to seek the physiological interpretation of diseased conditions."

There is a real need for a book of this sort which will emphasize the newer laboratory studies of clinical importance. "Physiology and Biochemistry in Modern Medicine" furnishes an excellent review of a large mass of work which should be more or less familiar to every physician who pretends to keep up with his profession. Many hours can be profitably spent in skimming over the whole

book and reading carefully the more important chapters, especially those which deal with respiration.

The medical man will be disappointed in finding the work contains comparatively few clinical references. The physiologist, in turn, will consider that certain subjects are treated rather sketchily and hastily. The ordinary reader can obtain but little information from the brief discussion of the clinical applications of the electrocardiograph and polygraph. The endocrine organs are treated with reticence. Apparently the authors feel that much nonsence has been written about internal secretions and hesitate to expand on the subject. This is somewhat disappointing because a critical review by such careful workers as Macleod and Pearce would be more than welcome. We must remember that the field covered by this book is vast and that only a portion can be included in 900 pages. On the whole the style is good, the type is clear and the illustrations excellent.

(E. F. DuB.)

INFORMATION FOR THE TUBERCULOUS, by *F. W. Wittich, A. M., M. D., in charge, Tuberculosis Dispensary, University of Minnesota Medical School.* C. V. Mosby Co., St. Louis, 1918.

It is a very dangerous thing to put a medical work into a patient's hands, as he usually lacks the ability to get the proper focus on a topic which so vitally concerns him, and the medical phraseology proves a serious stumbling block. The task of preparing for the tuberculous a special volume free from technicalities and not likely to fasten the sufferer's attention unduly upon his symptoms has been very successfully accomplished by Dr. Wittich, who writes without dogmatism, simply and clearly. The volume is, however, distinctly one for the patient of intelligence, education, and means.

MENTAL DISEASES, by *W. V. Gulick, M. D., Assistant Superintendent, Western State Hospital, Washington.* Illustrated. C. V. Mosby Co., St. Louis, 1918.

The subtitle of this modest volume of 139 pages is "A Handbook Dealing with Diagnosis and Classification." The book aims to standardize nomenclature and classification of mental diseases and to be an outline guide to the study of this branch of medicine. It is difficult for the general practitioner to get his bearings in the intricate mazes of the larger and completer workes on mental disease, and for one who desires to begin the study of this subject by a preliminary review and to seize only the cardinal points of the principal types of mental alienation it should prove of service. The subheading would have made a better title than the one chosen, for it is manifestly impossible to present any adequate picture of mental diseases in a work of this size.

DIETETICS FOR NURSES, by *Fairfax T. Proudfit, former Instructor in Dietetics, Lucy Brinkley Hospital and Baptist Memorial Hospital, Memphis, Tenn.* The Macmillan Co., New York, 1918.

Books on this topic should be based on sound scientific principles and yet be thoroughly practical and simple in style. The present volume appears to meet these requirements fully. Section I treats of food and its selection. Section II is entitled: "The Human Machine and its Relation to Food." Section III discusses nutrition in disease and includes formulae for infant feeding, the regimen of the obese, etc.

U. S. NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to the pathological collection, United States Naval Medical School, October, November, December, 1918.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
1552	Ovarian cyst	No report	Lieut. J. J. Mundell.
1555	Various organs	Malaria	Lieut. T. T. Gately.
1557	do	Tuberculosis	Capt. L. W. Spratling.
1558 to 1574	Appendices	No report	Capt. R. Spear.
1575	Goiter	do	Do.
1576	Bladder (cancer)	do	Do.
1577	Kidney	do	Do.
1578	Caecum and ascending colon (gangrene).	do	Do.
1579	Submaxillary calculus	do	Do.
1580	do	do	Do.
1584	Tumor	Mole, benign	Capt. J. G. Field.
1586	Testicle	Tuberculosis	Lieut. T. T. Gately.
1588	Mesentery	do	Gulfport, Miss.
1590	Ovary and tube	Subacute inflammation.	Capt. R. Spear.
1593	Humerus	Benign tumor	Key West, Fla.
1594	Dog's breast	Carcinoma	Lieut. T. T. Gately.
1595	Kidney	Genito-urinary and nephritis.	Norfolk, Va.
1599	Small tumor	Adeno-myoma	Lieut. J. J. Mundell.
1600	Lymph glands	Hodgkin's disease	Lieut. Commdr. L. M. Schmidt.
1601	Cervix	Adeno-carcinoma	Capt. C S. Butler.
1602	Appendix	Appendicitis	Capt. J. D. Gatewood.
1604	Breast	Carcinoma	Do.
1606	Lymph glands	Lymphangioma	Capt. C. S. Butler.
1607	Epithelial tumors	Carcinoma	Do.
1608	Breast	Myxoma	Paris Island, S. C.
1609	Lymph glands	Tuberculosis	Commdr. H. F. Strine.

Reports made on all cases, except those sent only for museum collection.

103396—19——15

NOTICE TO SERVICE CONTRIBUTORS.

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

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

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

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

Only the names of actual reviewers for a current number appear.

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

VOL. XIII NO. 3

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
CAPTAIN J. S. TAYLOR, MEDICAL CORPS, U. S. NAVY
IN CHARGE

JULY, 1919

(QUARTERLY)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

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.

NOTE.

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

Volume VII, No. 2, April, 1913.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
Volume XII, No. 3, July, 1918.

SUBSCRIPTION PRICE OF THE BULLETIN.

Subscriptions should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C.

Yearly subscription, beginning January 1, $1; for foreign subscription add 25 cents for postage.

Single numbers, domestic, 25 cents; foreign, 31 cents, which includes foreign postage.

Exchange of publications will be extended to medical and scientific organizations, societies, laboratories, and journals. Communications on this subject should be addressed to the Surgeon General, United States Navy, Washington, D. C.

TABLE OF CONTENTS.

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, 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.

U. S. NAVAL MEDICAL BULLETIN

VOL. XIII. JULY, 1919. No. 3.

SPECIAL ARTICLES.

PREVENTIVE MEDICINE AT TRAINING CAMPS AND STATIONS.

UNUSUAL OPPORTUNITIES IN THE MILITARY SERVICES FOR THE STUDY OF EPIDEMICS: OUTLINE OF A WORKING PLAN.

By C. E. RIGGS, Captain, Medical Corps, United States Navy.

About two and a half centuries ago Sir Thomas Browne wrote, "Physic is either curative or preventive." This classification of medical knowledge and activities is scarcely made nowadays, and yet it conveniently meets modern needs. It was made a century and a half before Jenner's discovery which marks the beginning of preventive medicine, and, of course, centuries after the establishment of the curative branch of medical science. Browne was both a physician and a philosopher. He spent much time serenely absorbed in metaphysical speculation on the mysteries of life. It is therefore fitting and to be expected that his division of the medical sciences should be both comprehensive and fundamental and likely to suffice for all time.

It is the preventive branch of medicine rather than the curative one that appeals to military interests and actually marks military efficiency. It is no longer proper for the military physician to withhold his activities till disease or injury has reached the threshold of a disabling manifestation. His highest military duties require that he use the special knowledge he has obtained in the study and treatment of past incapacitating disorders to the prevention of their recurrence; that he surround the soldier with the protection of modern sanitary science so that through good health the soldier can continue to enjoy his maximum efficiency as a fighting machine. The glamour of surgery has been cast over the duties of the physician in war time; but, as a matter of fact, the work of a surgeon usually begins only after the duty of the soldier is done and he is out of the fight and consequently a military burden.

On the other hand, preventive medicine belongs with the healthy, active soldier or sailor. The association begins at the recruiting

office by selecting for the service only those who may be expected to stand the test of military hardships. It continues and is especially watchful during the period of training. This surveillance follows even to the front-line trenches. Besides present military efficiency, a further object is to return the discharged soldier to his home a healthier and stronger man than he was when he enlisted, and also a more valuable citizen to the community.

Of course, any means to this desirable end should be encouraged. In the prevention of ill health and in the promotion of good health the military surgeons should use the knowledge they now have—all of it. Furthermore, the excellent opportunities for investigation and research along preventive lines which a military organization affords should be utilized to the fullest possible extent. When the fundamental causes as they relate to disease and injury are better understood in their relation to known results the fatalism which is now associated with accidents and epidemic visitations will be largely eradicated. "Even accidents, viewed largely, are not isolated causes, but the outcome of events which we can understand and control."[1]

Preventive medicine is so new a study that its existence and meaning are still unknown to many informed persons. Human psychology has seemed to prefer for our ills curative and remedial agencies rather than prevention. As an act of public caution quarantine is more familiar than medical inspections, and appeals for the support of hospitals and sanitaria are still more urgent and general than demands for the spread of knowledge of the rudiments of sanitation. It has not yet been properly understood that the manifestation of disease is a last call, not a first call, to action.[2]

A new viewpoint should be acquired. It is preferable to recognize that disease is a terminal condition which has been brought about by the occurrence of one or, perhaps, a considerable number of preceding events. These events, in most instances, lie within the very recent past and a proper analysis of them, if it were possible to make it, would demonstrate the actual incident by means of which they were brought about. It is safe to assume that a specific knowledge of the usual mechanism of a particular infection would be followed by the solution of the problem of avoiding it.

Unfortunately, with most persons the happenings of the predisease period are marked with considerable complexity. Many difficulties are encountered in attempting to ascertain from the infected person the source and mode of his infection. Memories are particularly short for the smaller incidents of everyday life and events are crowded. Also, the amount of variability in the period of incubation of a disease gives just that same degree of latitude as to the time of infection.

[1] Cooley: Social Progress. New York, 1918. p. 165.
[2] King: Industry and Humanity. Boston and New York, 1918. p. 356.

It is rare that circumstances are such that the time and method of infection may be actually demonstrated. But when these instances do occur they should be carefully recorded, as they are likely to throw useful light upon practical means for avoiding the disease.

The newer science of preventive medicine is more dependent upon the causes of disease than is the curative one. It requires a study of that period of time prior to the onset of disease and of sufficient remoteness to include the causal incidents. In making this study medical science has found itself in some new and unexpected relationships with other branches of science. For instance, former Surgeon General Gorgas has pointed out that low or high wages have an important bearing upon the health of a community; that a poor economic situation is reflected in a low state of public health. Also epidemiology is intimately associated with sociology. Practically all germ diseases come under the head of "social diseases," as they are disseminated through physical or social contact of men with each other, and hence spread most widely and rapidly where social relationships are closest.[1]

This broadening of the scope of preventive medicine by the necessary inclusion of parts of other interdependent sciences tends to complicate its study. The cause of the spread of an epidemic is often so completely hidden in a complexity of economic, sociologic and other related factors that it is impossible to unravel. Opportunities for the observation of an unobscured phase of an epidemic are rare. Where they have occurred they have generally added to our knowledge of the epidemiology of the disease. For instance, the first introduction of measles among the inhabitants of the Faroe Islands was so helpful in determining the period of incubation of this disease that the incident now has historical importance. Simplicity of situation, in particular as manifested by uniformity of the activities of individuals composing a community, is a very desirable condition when carrying out research work in the cause and prevention of disease. The military services excel in this respect as compared to civil communities, and, therefore, offer practically unequaled opportunities for students of preventive medicine.

When a group of men is assembled under military control, such as that existing at a training camp, for instance, they present a greater uniformity of physical and social conditions than can be obtained in any other community. The reason for the presence of this uniformity is, of course, the singleness of purpose of a military organization. The different ways in which its results are manifested in the behavior of the individual are so numerous as to be almost incalculable. Such factors pertaining to social conditions as age, sex, and occupation may

[1] Fairchild: Applied Sociology. New York, 1916. p. 245.

for practical purposes be considered as reduced to single components. There is uniformity of housing, food, drink, clothing, exercise, work, and play. Also, there are for all the same environment, discipline, routine, and drills which have a strong tendency to mold to a likeness all activities of the individuals who compose the organization.

Another feature of military camps is the marked concentration of individuals that it is necessary to have in order to satisfy military requirements. This concentration is so great that it frequently amounts to five times that obtaining in the worst civilian rookery.[1] This increased density of population naturally increases the intensity of human intercourse. Therefore, a military camp exhibits not only an intensity of physical and social relationships on the part of the individuals therein, but also those relationships are fixed and unvarying as compared to those met with in civil communities.

These comparatively fixed physical and social conditions of a military organization can be utilized to great advantage for the study of the methods of transmission of the acute infectious diseases. Given the presence of an epidemic disease its further transmissibility is probably more dependent upon the social comminglings of its locality than upon all other attributes that may be present. In fact, modern practice for the control of infectious disease consists not in the *physical surveillance* of whole communities, but in the *sociological study* of *infected persons* in them.[2] In other words, an epidemiological study in any community is fundamentally mingled with the applied sociology of that community. A study of the means of spreading of a germ disease in any location requires a considerable acquaintance with the sociological conditions with which the disease is coexistent.

This modern conception of epidemiology has been made possible only by means of the knowledge obtained through the new and wonderful science of bacteriology. It is only a few years since this science was little more than a "germ theory of disease." Yet nowadays one does not stop to think that bacteria have an essential influence upon all forms of living matter and that life upon our earth is actually dependent upon the continued activities of these tiniest living things. It is not to be wondered at that the science of bacteriology has been the great reconstructing force in preventive medicine. Credit for the correct application of bacteriology to the problems of infection is largely due to Chapin and to others who sat at the feet of Chapin. His "Sources and Modes of Infection" marks the real beginning of scientific public health in America.

The great value of Chapin's work to public health consisted in the new methods which he applied to the study of the means of transmission of the communicable diseases. These methods, through keen

[1] Lelean: Sanitation in War. London, 1917. p. 96.
[2] Hill: The New Public Health. New York, 1916. p. 77.

analysis, gave new and admittedly correct values to many of the different factors that promote or retard the processes of infection. As a result several theories that were based largely upon the germ theory of disease in its early stages had to be abandoned. For instance, the air-borne theory, which seems to have been a combination of bacteriology and demonology, was no longer applicable in explaining epidemics. The supposed efficacy of terminal fumigations did not stand the test of critical analysis. When these and other theories of infective processes were no longer workable it became necessary to find substitutes. The epidemiologist assumed this task and he has already made considerable progress. He has found that the field is broader than it was in the early bacterial days. He is endeavoring to answer the question as to when, where, from what source and by what means did the recently infected individual receive the germs causing his disease. The reward sought is great, for it seems safe to assume that when these processes are understood the menace of acute infections will be practically destroyed.

The path of the progress of science is paved with abandoned theories. These theories were for the most part abandoned because in the light of present knowledge they are absurd; some on account of newly discovered facts, no longer serve even the purpose of theories.[1] A theory has been defined as an explanation founded upon inference drawn from principles which are established by evidence. This definition of theory gives emphasis to the first importance of evidence. In epidemiology, opportunities for collecting evidence are to be found only in field work. If anything of value is to be discovered it is to be expected that it must be done by those whose duties are in the midst of epidemic devastations. They, so to speak, are on the firing line, or to use a more up-to-date term, in the trenches. Particularly advantageously placed are those who are engaged at training camps among the well and the sick before hospitalization takes place. This constitutes the zone where infective processes are actually operating before one's eyes. In such places the collecting of data should be most rigid. Any medical officer who has had the golden opportunity of watching the course of one of the infectious diseases at a training camp and, in the end, has nothing new to add to the knowledge of preventive measures can well afford to "count that day lost," for the sun has set upon his opportunity. The achievements made by Lynch and Cumming,[2] and Rossiter, during the recent influenza epidemic, in attempting to solve the problem of the transmission of infection as they found it in their respective units, strikingly demonstrate the assistance afforded by the definiteness and

[1] Lay: Man's Unconscious Conflict. p. 51.

[2] Lynch and Cumming: The Rôle of the Hand in the Distribution of the Influenza Virus, etc. Military Surgeon, December, 1918.

simplicity of a military organization for the carrying out of research work in preventative medicine.

It goes without saying that every military organization should have some relatively definite plan to study and to control the progress of any epidemic disease that may appear among its personnel. Such a plan for the acute infectious diseases may be conveniently viewed in two general aspects—the sociological and the bacteriological.

The sociological side will depend largely upon local conditions as they exist in the military organization and have to do with the social relationships of men with each other. Here local conditions vary considerably and are created by the purpose and function of the group of men under consideration. A receiving ship, on account of its continuously changing personnel and comparatively unfixed organization, offers almost the same difficulties in tracing a source of infection as are met with in civil communities. On the other hand, ideal conditions are to be found among a group of men in a permanent camp or barracks having a fixed organization and few changes in personnel. Whatever the organization and its purpose may be, it is incumbent upon the medical officer to be conversant with it, so that he may intelligently act immediately upon the incipiency of an epidemic.

The classification of the bacterial aspect of an epidemic situation is based largely upon the available knowledge concerning the known germs of infection. Unfortunately, the bacteriology of the seven prominent camp diseases—measles, mumps, influenza, tonsillitis, diphtheria, scarlet fever, and cerebro-spinal fever—is not fully understood. For measles, mumps, and scarlet fever it is practically nil, and for the four other diseases it has a wide range of completeness. On account of this lack of knowledge any plan for opposing the bacterial forces of disease during an epidemic can not be marked by a high degree of definiteness. But some plan or classification is desirable, even though it have no further merit than to state the order of the occurring of events. The plan to be submitted here attempts to take up the bacteria at their original source and to follow them throughout till their final destruction by disinfection. It may be roughly classified as follows:

I. Location of the germs before infection takes place.
  1. Aside from the human host.
    (*a*) Fomites borne infection.
    (*b*) Air-borne infection.
    (*c*) Food and drink borne infection.
    (*d*) Insect-borne infection.
  2. Within the human host.
    (*a*) Recognized cases.
    (*b*) Missed cases.
    (*c*) Carriers.
    (*d*) Latency.

II. Method of transmission of germs.
    1. Direct contact.
    2. Indirect contact.
III. Germs subsequent to time of infection.
    1. Period of incubation.
    2. Earliest symptoms.
IV. Methods for control of epidemics.
    1. Isolation.
    2. Disinfection.

The theory of infection by fomites such as toys, books, or clothing was practically demolished upon the appearance of Chapin's classical work in 1910. It is singular that only a few years past yellow fever furnished what seemed to be the strongest support for the fomites theory in the transmission of disease. Now newly discovered evidence has shown that fomites will not transmit this infection, and the actual method of transmission by means of the mosquito has been established beyond cavil. The fomites theory was no longer tenable when it became understood that bacteria aside from their normal host are extremely short lived. In other words, the real danger consists in contact with persons, not things. The theory, however, can still serve a useful purpose in the warning that frequently association has been mistaken for causation.

The air-borne theory of infection has been discarded even more remotely than the fomites theory. It is an interesting fact that from time immemorial, the air as a causative agent has appealed to the imagination of those who have attempted to explain natural phenomena. The air served primitive man as an instrumentality for the greater number of his few beliefs. With the exhalation of his last breath his soul was thought to depart from him.[1] His demons were resident in storms, solitary chasms and other uncanny places. The evil spirits supposed to cause sickness and other ills were of various kinds, and each class appears to have had its special function. Some clearly represented shades of the departed, who return to earth to plague the living; others are personifications of disease.[2] It is not to be wondered at that in the beginning scientific men accepted the air to explain the contagion they only imperfectly understood. There is more cause for amazement in the fact that the superstitious beliefs of primtive man should so closely conform to the findings of modern science. Indeed, primitive demonology has been repeatedly associated with modern bacteriology by the ethnologist as a parallel etiological concept.[3] Nowadays the former belief that the air was the habitation of agents which had the power to injure man's physical welfare forms a fascinating study, if not a practical one.

[1] Wundt: Elements of Folk Psychology. New York, 1916. p. 192.
[2] Jastrow, quoted in The Scientific Monthly. Vol. 4, No. 6. p. 505.
[3] Wright: "Demonology and bacteriology in medicine." The Scientific Monthly. Vol. 4, No. 6. p. 494.

Food and drink are now considered less important factors as carriers of infections than formerly. At the time of the beginnings of bacteriology there were a few striking demonstrations of the spread of disease through the medium of drinking water. Among such instances were the Broad Street well in London, which became infected and caused the dissemination of cholera, and the North Boston well, which was instrumental in spreading typhoid fever. These and other spectacular instances led to unwarranted generalizations giving undue importance to drinking water in the spread of disease. Of course, good food is of great importance in maintaining the health and contentment of a command. But food and drink are spoken of here only as carriers of infection. Naturally any medical officer of experience is able to recall several occasions when food or drink has caused outbreaks of sickness. Since the time when typhoid fever was stricken from the list of military diseases these outbreaks are important only for the moment and immediately disappear with the removal of the cause. Recently, at a training station there was a severe outbreak of so-called ptomaine poisoning involving several hundred men, or more than a third of the command. By questioning the sick and the well as to whether they did or did not eat of the different dishes of the menu it was easily demonstrated that the ice cream was the contaminated article of food. This was confirmed when the ice-cream factory was inspected and found to be very insanitary. Another instance of an acute outbreak which might have been considered as caused by food or drink was witnessed on board ship. This was the complete subsidence in a tropical climate of an epidemic of about 40 cases of tonsillitis, which subsidence was coincident with the thorough cleansing of the ship's scuttle butts and frequent sterilization by boiling of their drinking-fountain cups. If this were not a mere coincidence, it is likely that the epidemic was kept alive by contaminated drinking-fountain cups. In such case it should be considered as an instance of indirect contact infection and not as caused by food or drink. The point to be made of these instances is that in the military services food and drink infections form a factor of relatively little importance.

Insects may transmit disease as biological carriers or they may do so by acting in a merely mechanical manner. Malaria, yellow fever, typhus, and plague are instances of insect-borne diseases of which it is generally believed the insect acts as a true biological carrier. The rôle of the house fly in the spread of typhoid fever is an instance of the mechanical transmission of germs. That insects could transmit infections has been known to science for only a comparatively brief period of time. Yet a record was recently made of 226 organisms of disease that could be transmitted by insects to man or animals. Two hundred and eighty-two species of insects were recorded as capable of disseminating the 226 infections. Notwithstanding the great de-

velopment of the subject, Dr. Howard declares that there is a dangerous tendency to exaggerate the importance of insect transmission as compared to other modes of infection. In the military services, aside from special circumstances such as duty in the Tropics, for instance, the number of infections caused by insects is insignificant.

The recognized or known cases of an epidemic form that part which is directly visible and tangible. They are practically the only means that define the epidemic in size, location, and progress. It is estimated that recognized cases form not more than half the total sources of infection.[1] The percentage varies, of course, for different diseases and probably for different epidemics of the same disease. For instance, the percentage of known cases is relatively high in an epidemic of measles; at the other extreme, it is so low in cerebro-spinal fever as to present the curious anomaly in which a contagious disease appears to be contracted from the well instead of the sick.

Other things being equal, it is naturally easier to deal with an epidemic if the percentage of recognized cases is high, or, in other words, if a greater number of the sources of infection is known. Known cases are the basic points in epidemiology and every endeavor should be made to ferret out and convert unknown into known cases. Also, an accurate statistical record of the epidemiological data of each case, and of the doubtful cases as well, should be made upon prepared forms. As this information is being compiled it should be carefully studied not only for the immediate needs in controlling the epidemic, but to "throw invaluable light upon the problems of preventive medicine and guide us in our preparation for the next great conflict."[2]

Lelean recommends an elaborate blank form for the purpose of collecting epidemiological data from those who have just been stricken with an infection. This form asks for information upon more than 40 items. If so extensive a blank form is used it requires considerable training to properly fill it out. At our training stations it is more satisfactory to use a simpler form that can be placed in the hands of a hospital corpsman for execution. A form that was recently satisfactorily used at one of our training stations asked for information concerning each epidemic disease that appeared, as follows:

Name_____	Rate_____
Date_____	Diagnosis_____
Camp_____	Street_____
Bungalow No_____	Company_____
School section_____	Date taken sick_____
Date isolated_____	Date of appearance of rash_____
Source of infection_____	Names of exposed_____

[1] Hill: The New Public Health. New York, 1916. p. 93.
[2] Lelean: Sanitation in war. London, 1917. p. 106.

This blank form, when completed, is immediately sent to the office for examination. At the office the name of the infected individual is given a number and written in its proper place upon the "epidemic sheet." This sheet summarizes the epidemic, the cases appearing in numerical order in accordance with the date of onset of a previously determined important symptom. For instance, if the epidemic be measles, the time of appearance of the rash would give the case its place in the progress of the epidemic. Also, in practice, the preparation of these forms indirectly serves a further important object—that is, to educate the personnel in proper epidemiological principles. It is interesting to observe how quickly those who are engaged in collecting this epidemiological data grasp the new and real significance of what is meant by "catching" a disease.

"Pin maps" of epidemics are sometimes made and kept up by insertion upon a diagram of the locality, a pin representing the location and giving the date of appearance of each case. These maps are of no real value and may even do harm, because they tend to encourage the false idea that mere physical propinquity is responsible for infection. However, any diagram which shows the proper social relationships of the cases to each other, if it be a messing plan or a seating arrangement, is of real value.

By "missed cases" is meant those infectious diseases which are a part of an epidemic but for some reason fail to become recognized. Failure to recognize these cases is due, as a rule, to the mildness of the disease. No doubt a majority of these slightly indisposed individuals never apply for treatment, or to be excused from duty. Their infectivity is probably equal to that of recognized cases and, being ambulant, their opportunities for disseminating infection are greatly superior. Also, atypical cases may fail of diagnosis and never be identified as a part of the epidemic. There is also a small class of persons who do not seem to know when they are ill. They are likely to apologetically present themselves for treatment or a "a little rest," when it will be found that the infection has almost completed a course of disease. Such persons have done, probably, as much harm in disseminating infection as is possible, because, contrary to former beliefs with acute infections, the early part of the disease is the period of greatest infectivity.

The percentage of unrecognized cases in an epidemic varies for different diseases and also, probably, for different epidemics of the same disease. Scarlet fever is kept alive largely through mild and unrecognized cases.[1] Missed cases are a prolific source of spreading infection and they are an important factor in preventive medicine.

A "carrier" may be defined as a person who harbors and disseminates the normal germs of a disease without manifesting signs of

[1] Rosenau: Preventive Medicine and Hygiene. New York and London, 1918. p. 179.

illness from that disease. Carriers may be temporary or chronic, and their germs probably possess normal infectivity. The proportion that the number of carriers during an epidemic bears to the number of recognized cases in the epidemic varies greatly, depending largely upon the disease causing the epidemic. In measles and smallpox there are probably few carriers. There are many in cerebro-spinal fever and diphtheria. The diphtheria bacillus is carried by about 1 per cent of healthy school children.[1]

The carrying phenomenon is probably closely allied to the phenomenon of latency. Also, in certain instances, at least, there is some relationship between the carrying period and the period of incubation of the disease. Individuals may act as carriers before they have experienced the disease of that particular germ, or the disease may terminate as a carrier instead of by normal convalescence.

Theoretically, the ability to become a carrier would appear to depend upon the presence of a proper balance between the virulence of the bacteria and the degree of normal immunity present in the individual. If the immunity is comparatively high, the bacteria are immediately thrown off upon entrance. If the immunity is comparatively low, disease follows, resulting, generally, in establishing a high degree of immunity which usually throws off the germs before the disease has even run its full course. But there might be a certain balancing of forces on account of which the germs could neither incubate into a disease nor could they be thrown off, and in this manner a carrier might be formed. Of course, this is only theory, but it is difficult to abstain from speculation when dealing with a problem so practical and yet so abstruse. Without doubt, the persistent, nonmanifesting carrier, when present, is the most dangerous of the four circumstances in which the germs of disease may exist within the human host. The military services offer excellent conditions for work in the detection and elimination of carriers, and much work in these services has already been done along these lines. While the phenomenon of carrying is pretty well understood, yet in practice the solution of the problem of detecting and disposing of carriers does not seem to have reached satisfactory results.

Latency is the least understood of the four classified circumstances under which the bacteria of disease may inhabit the human host. The phenomenon of latency has not yet assumed practical importance in epidemiological work. Latency is said to be quite general,[2] and to be closely allied to the carrying phenomenon.[3] In medical literature most germ diseases are spoken of as at times existing in a latent condition. Latent tuberculosis, tetanus, and malaria are among the

[1] Rosenau: Preventive Medicine and Hygiene. New York and London, 1918. p. 163.
[2] Chapin: Sources and Modes of Infection. Boston, 1912. p. 122.
[3] Rosenau: Preventive Medicine and Hygiene. New York and London, 1918. p. 403.

most typical instances. Latent tuberculosis is of little practical importance to the health officer, as it is not a source of danger to others. On the other hand, persons having latent malaria are to a certain extent typical carriers and should be actively treated from a standpoint of malarial prophylaxis.[1] It is conceivable that under a considerable number of circumstances it is impossible to distinguish between the phenomenon of latency and the carrying phenomenon. Even though the two phenomena may be related there are practical circumstances under which one has no hesitancy in deciding that the person is a carrier, or that he has harbored the germs of disease in a latent state. For instance, one enjoying good health and from whose throat the bacillus of diphtheria could be persistently cultured would be considered a typical carrier of the germs. On the other hand, when a previously healthy individual manifests a disease provocatively induced (as an attack of malarial fever following a change of climate) it seems eminently proper to consider these germs as having been thus aroused from a state of latency instead of exhibiting a diversion from the carrying phenomenon.

The theory of contact infection presumes a certain physical relationship by means of which the bacteria of disease are transmitted from the sick to the well. If the healthy individual does not possess sufficient immunity to throw off the disease the contamination may result in establishing one of the four conditions just described—a recognized case, a missed case, a carrier, or, perhaps, latency. As repeatedly stated, this physical relationship is something very different from mere physical propinquity. A susceptible person may be in the closest proximity to the sick and not catch the disease. On the other hand, a person may become infected in the absence of proximity to the source of infection; for instance, by the method of indirect contact. The causal relation between the recently infected and a source of infection has long been recognized as expressed by the popular term "catching" a disease. The causal mechanism has not been known and the theory of contact infection is a step in the direction of explaining this mechanism.

The fact that a mechanism is required to bring about an infection implies that there are hindrances to overcome in the processes of infecting an individual. If the human economy had made no provision to protect itself against attacks of ubiquitous bacteria it would furnish a startling exception in evolutionary processes and probably there would be no humanity to protect. As a matter of fact, every normal person is provided with ample barriers against infection. There are two such barriers, one anatomical and one physiological. The skin forms an effective anatomical barrier. It is so efficient in this respect that probably no germs of disease have the

[1] Stitt: Diagnosis and Treatment of Tropical Diseases. Philadelphia, 1919, p. 84.

power to penetrate the unbroken skin. The other and physiologically protective process exists in the immunizing properties of the fluid and organized elements of the blood. As a result, then, of ages of evolution nature has built up for man two protective systems—one anatomical, general, and passive; the other physiological, specific, and active. Without doubt hundreds of exposures to infection occur which fail to break through these natural barriers. When bacteria succeed in surmounting these barriers and causing disease, the occurrence should be classified according to the latest views, as an accident in which man has flown in the face of nature and not merely as an incident.

It is very exceptional that the mechanisms of a particular invasion and infection are fully known. Many difficulties are encountered in attempting to trace the progress of bacteria from the time they leave one host till they reach the seat of their pathological activities in the next host. Bacteria have little motility and no power of transporting themselves, so their part in reaching the new host is purely passive. After the bacteria have been brought into contact with the person about to be infected there is a certain period of time consumed by them in reaching the particular lodgment within the body where they produce disease. During this period of time the germs of disease exhibit considerable individuality. Ordinarily the blood is considered the battle ground of infectious processes. But the blood is not the ultimate destination of all disease-producing bacteria. For instance, the typhoid bacillus reaches the blood early, but leaves in about two weeks to carry on its pathological processes from other seats. Also the germs of cholera and diphtheria probably never reach the physiological interior of the body in a considerable quantity. They seem to do harm by opening ways in mucous membranes and sending forth toxins which attack vital centers. With rabies it seems that the microorganisms themselves select the nervous system. In the case of a disease like acute anterior poliomyelitis, where our knowledge of the microorganism which causes the disease is yet in its infancy, it is impossible to decide whether the injuries noted in the motor areas of the cord and medulla are due to toxins or to the lodgment of the germs themselves.[1]

Not only do the different bacteria of disease have particular localities within the human body, where they carry out their infectious processes, but also certain bacteria, in order to produce disease, require to be introduced through certain portals of entry. Some germs, as those of typhoid fever and cholera, for instance, have a preference for admission by way of the digestive tract, and yet others are not infectious if introduced through this path. Also, there is a

[1] Zinsser: Infection and Resistance. New York, 1918. p. 40.

minimum as to quantity and virulence below which infection can not be successful. In the progress of germs from the abandoned host to the seat of their infective activities in the susceptible individual it is difficult to say at what point infection may be considered as having established itself beyond the possibility of prevention. It would seem that for practical epidemiological work the susceptible person may be considered as infected when a quantity of contagion above the minimum requirement has been introduced into the body by the normal path. This statement does not take into consideration the fact that even when the bacteria have gone this far they still have to overcome the immunological processes of the blood and tissue cells, which may throw them off and there may be no resulting disease. Without doubt, this "second line of defense" (Zinsser) throws back more infections than it permits to pass.

The bacteria of disease, then, must overcome two important natural barriers before they can thrive within the body as infective processes. As a means of defense the first barrier, the skin, in two respects may be likened to a military wall. That is, entrance must be made either through a break in continuity or through one of its normal portals. There is no such thing as scaling this wall. It is assumed that in the great majority of instances the route of infection has been through one of the natural openings, as the eyes, nose, or mouth. Even after the germs of infection have passed through the first line of defense there is a general belief that they still can be directly destroyed by the use of artificial means. For this purpose presumably infected wounds of the skin are hurriedly cauterized; in the presence of communicable diseases, antiseptic solutions are used in the mouth and throat; and, for the other apertures of the skin, instillations of the silver salt solutions are used almost exclusively as prophylactic agents and often with fortunate results.

In the vast majority of communicable diseases the route of infection lies by way of the eyes, nose, or mouth. Past ideas as to the relative importance of these portals of entry have varied considerably, depending upon the then prevailing conception of the mechanism of invasion of the germs of disease. While the air-borne theory was in ascendancy it was naturally assumed that the poisons were taken in in the inspired air. This idea was followed by an unwarranted prominence of the food and drink borne theory of infection. At present the droplet theory of infection is accepted for that large group of so-called respiratory diseases, and also many other diseases are evidently transmitted by this method. This theory draws particular attention to the exposed conjuctivae as avenues of infection.

It is surprising that the eyes remained for so long a time practically unnoticed as avenues of infection, notwithstanding the fact that there were numerous recorded instances in which accidental contami-

nation of the conjunctiva by certain germs had resulted in producing the disease. Also, the character of these diseases has been quite varied. For instance, Dodge reports the case of a laboratory worker who got some of a culture of the dysentery bacillus in his eye; the tears ran profusely and were swallowed, and in 24 hours an attack of dysentery developed.[1] Also, the accidental instillation of a drop of a fluid culture of the infective agent of poliomyelitis into the eye caused an abortive attack of the disease in an experimenter.[2] In the case of hydrophobia it is related that in Paris a young man contracted hydrophobia by rubbing his eyes with a finger contaminated with the salvia of a rabid dog.[3] Also, plague and glanders may be transmitted by simple instillation of infectious material into the uninjured conjunctival sac.[4] In view of the wide dissimilarity of these five diseases, it seems reasonable to infer that when the germs of most diseases have reached the conjuctiva the external part of the mechanism of infection may be considered as having been accomplished.

The use of face masks during the recent influenza epidemic has drawn popular attention to the droplet theory of the transmission of infection. The availability of an innocuous, easily identified bacterium like the *B. prodigiosus* has permitted the performing of non-hazarding experiments to demonstrate the mechanism of the phenomenon of droplet infection. Investigators have used this harmless microorganism to parallel experimentally various conceptions of the droplet theory. They have measured the distance that bacteria may be carried by unhampered droplets under various conditions as to talking and coughing, and also counted the number of infected droplets thus deposited upon a definite area at each ensuing foot of distance from the mouth. Also, the same has been done for droplets obstructed by gauze face masks having different layers of material and different mesh. In fact, it seems that the mechanism of the propulsion of droplets has been determined with almost mathematical accuracy.

Having determined that infected droplets are projected for a number of feet into the surrounding atmosphere, it seems safe to assume that their portal of entry into the body of the susceptible individual is through the eyes, nose, or mouth. Maxcy[5] has attempted to measure the exposed areas of these portals. He estimates that when the eyes are open and the lips separated in talking the exposed areas of the eyes, mouth, and nose amount to 600, 500, and

[1] Chapin: Sources and Modes of Infection. Boston, 1912. p. 183.
[2] Greeley: Boston Med. and Surg. Jour. April 12, 1917.
[3] Zinsser: Infection and Resistance. New York and London, 1918. p. 13.
[4] Ibid, p. 13.
[5] Maxcy: "The transmission of infection through the eye." Jour. Am. Med. Assn., Vol. 72, No. 9.

200 square millimeters, respectively. But taking into consideration the hindering influence of outward currents of air and the time during which the lips are closed, he expresses their relative, practical importance as eyes 6, and nose and mouth 1 each. In other words, a perfect face mask covering the nose and mouth alone would be only 25 per cent efficient as a protection against infected persons talking into the face of a susceptible one.

Face masks have a twofold function in preventing the transmission of droplet-borne diseases. In the first place, they provide the healthy wearer with a certain degree of protection. Again, when worn by recognized cases, missed cases or carriers, they prevent to a great extent the projection of infected droplets into the faces of well but susceptible individuals. When worn by the infected they prevent the indiscriminate distribution of germs and thereby lessen opportunities for infection by indirect contact.

When infected droplets are projected directly from the sick to the well by talking, coughing, laughing, sneezing, or sobbing, it is considered as a form of direct contact infection. Indirect contact infection means that some object has been interposed to assist in conveying the germs on their passage to the new host. Formerly, many innocent articles, as toys, books, and letters, presumably acted in this capacity. This belief is no longer held, as it is now known that in general the lives of disease germs aside from their normal host is exceedingly short, and that to keep them alive under such artificial conditions often taxes the great skill of the bacteriologist.

It can safely be assumed that the bacteria of disease having escaped from one host must be transferred quickly to a new one in order to maintain their viability. In general, their portal of entry for the new host is the eyes, nose, or mouth. The droplet method of infection is practically invisible to the unaided eye and consequently entitled to be regarded with some mystery. The agents of the indirect contact infection are probably always visible. The part played by dust in transmitting infection is very insignificant or entirely negligible as compared with infection by contact.[1] Probably in all instances the agents of indirect contact infection are visible ones.

Then, what are these visible household agents which transmit disease? It must be confessed that the search for them has not met with much success. The common drinking cup, the telephone mouthpiece, and the freshly moistened pencil point have long been suspected and justly condemned. I can recall but one instance of infection in which the pencil point is believed to have acted as the transmitting agent. This single instance is contrasted with several instances in which the droplet method could be practically conclusively proven as the means of transference. For instance, at a training station a petty officer met a

[1] Chapin: Sources and Modes of Infection. Boston, 1912. p. 295.

new recruit returning from the drill ground before the drill hour had expired. He inquired the cause, and the recruit explained that he was feeling sick and on his way to the sick bay. From the sick bay he was sent to the hospital with measles. Thirteen days later the petty officer had measles. Investigation could discover no other contact than this brief one in the open. These two persons were quartered in separate buildings, had separate messes, different associates, and the recruit had been at the station only a few days. The absence of other known sources of infection would seem to prove the droplet method as the only possible one in this case. Such instances can be multiplied, and from a practical point of view it does not appear that the visible agents of indirect contact of infection are nearly as important as direct contact in spreading disease.

The wearing of face masks has an educational value, as their presence distinctly points to that invisible but most important factor (droplet infection) in the spread of disease. Also, face masks serve to keep the fingers from the mouth and nose and eyes. The hands are without doubt the greatest single factor in the method of indirect contact infection. Chapin [1] in civil life and McCulloch [2] in the military service have pointed out with emphasis the important rôle played by the hands in the dissemination of the bacteria of disease. There is a great need for further education as to the methods by which the hands may transfer germs and in how to avoid the danger of droplet infection. To see a physician, while descending in a crowded elevator, turn to talk into the face of a companion during the height of the influenzia epidemic, reminds one that there is much to be accomplished among all classes by teaching the real importance of these dangers.

So very little is known about the so-called period of incubation of a disease that that portion of the medical history of a case may be likened to the Dark Ages. The "incubation period" may be defined as the expression applied to the interval of time, usually quite definite in length, between the moment of entrance of bacteria into the body and the first appearance of the symptoms of consequent disease.[3] It is reasonable to suppose that as soon as the bacteria of disease have entered the body they begin at once those processes of the incubation period that are required to establish their particular disease. However, it is not unlikely that in some diseases, as cerebro-spinal fever, for instance, there is at times a carrying period of more or less indefinite length before the germs and the body take up those steps which definitely lead to the first manifestation of disease.

The selection of the time of appearance of the first symptom of the disease as the time of termination of the incubation period is an arbi-

[1] Chapin: How to Avoid Infection. Cambridge, 1917.
[2] McCulloch: Military Hygiene. Med. Rec. New York. Vol. 91, No. 22. p. 947.
[3] Editorial. Jour. Am. Med. Assn., 1916. Vol. 47. p. 1805.

trary one. Without doubt, some pathological activities begun in the incubation stage, carry through into the stage of symptoms. The incubation period is practically without signs as contrasted with the succeeding period which is replete with signs. Therefore, it seems likely that the termination of the period of incubation marks a considerable change in the nature of the pathological activities which the bacteria have set up within the body.

The period of incubation, in particular its length, is of special interest to the epidemiologist. Most diseases are considered noninfectious during this period. Smallpox is said to be contagious during its period of incubation. The length of the incubation varies in different infections and in different individuals having the same infection. With scarlet fever and diphtheria it is from 2 to 6 days. With rabies it has wide fluctuations, and is usually counted as from 4 to 6 weeks. With smallpox and measles it is comparatively uniform in length. In general, measles has an incubation period of from 9 to 11 days and smallpox has one of from 10 to 14 days. The length of the period of incubation of a disease is influenced by the quantity and virulence of the infecting bacteria, and also by their path of introduction into the body. Spontaneous smallpox has an incubation period of "oftenest 12 days," the inoculated variety 8 days, and the modified germs (vaccinia) develop their disease in from 3 to 4 days. In the case of vaccination a previous attack shortens the period of incubation, giving rise to what is known as the accelerated reaction. Also, it appears that vaccination performed subsequent to infection by true smallpox may lengthen the period of incubation of modified smallpox to as much as 25 days.[1]

The delay required by bacteria after they have entered the body and before they can manifest disease is quite definite and characteristic. This period is probably in no sense a resting stage but perhaps a period of considerable biologic activity. The quantity of germs introduced by the original infection is evidently quite small. Therefore, it is natural to assign a part of the incubation time for the purpose of multiplication and distribution of the bacteria. Also, true bacterial toxins when introduced do not act immediately like other poisons but require a certain incubation period before manifesting their characteristic symptoms. On account of these two different factors the incubation period may be considered as made up of two definite divisions—one the time necessary for growth, distribution, and accumulation of the bacteria, the other the time necessary for the action of the toxin or poisons which may be secreted.[2]

[1] Riggs: "The epidemiology of virulent oriental smallpox." Military Surgeon, 1918. Vol. 43. No. 5. p. 492.

[2] Zinsser: Infection and Resistance. New York, 1918. p. 26.

Bull[1] in some interesting experiments upon the dog attempted among other things "to follow quantitatively the fate of the injected bacteria from the beginning to the end of infection." He found that intravenous injection of pneumococci was followed by their rapid disappearance from the circulation; and that, before the disappearance was complete, there was an increase in number which was followed by the complete disappearance of the microorganisms. He believed the first rapid decline in the number of bacteria present to be due to the action of the natural antibodies of the blood, and that the second decline and disappearance was due to the action of acquired antibodies. As a result of his experiments he suggested that—

> the incubation period of infectious diseases is due to the fact that the infecting agents must become adapted to the adverse conditions encountered in the newly infected host before they can multiply sufficiently to produce the symptoms of disease. It is further suggested that epidemics may arise because the infectious agent is passed from person to person in the ascending stage of the disease and thus enters the new host in a state of maximum resistance to the natural antibodies of such individuals. When early contacts are avoided epidemics tend to subside because the infectious agent is weakened by the action of acquired antibodies during the period of convalescence.

It is interesting that the deduction of Bull, to the effect that the communicable diseases probably have their greatest infectivity during their ascending stage, or, in other words, when the bacteria are in the state of their maximum resistance, has received confirmatory support along other and independent lines. Recently, field workers in epidemiology have come to look upon the early stages of the infectious diseases as the period of their greatest communicability.

Earliest symptoms, for the purpose of making a diagnosis, are of twofold importance. It is desired to know as soon as possible the nature of the ailment at hand, not only for the care of the afflicted person but also to protect others. Without doubt the sooner proper care is instituted the better for the patient. Yet the relation of early care to the warding off of complications—in measles, for instance—seems problematical, according to two recent experiences. Two small epidemics of measles were studied, one of 65 cases and the other of 81 cases. A record was obtained from the hospital of those individuals who developed complications. It was presumed that the complications would be found among those who had not had the advantage of early hospitalization. This assumption did not square with the facts. Relatively, complications appeared as often in those sent to the hospital in the early stages of the disease as in those sent when the disease was more advanced. It would seem from this that the appearance of complications is determined by some other factor than the absence of early care.

[1] Bull: "Immunity factors in pneumococcus infection of the dog." Jour. Exper. Med., 1916. Vol. 24. p. 7.

The principal object in the early detection and removal of infectious cases from among a group of men is to protect others. For the carrying out of this work much depends upon the skill and experience of the inspecting officer. In the presence of an epidemic this work is essentially practical, has to make many adaptations, and requires considerable cooperation. Ordinarily, fever is the first symptom of an infection. Yet, nowadays, it does not seem practicable to take temperatures and to segregate all men showing a rise of temperature. Medical officers when searching a group of men for a particular infection under the various conditions found in the service soon develop lines of action best suited to meet the situation at hand. For instance, inspecting officers who are intensively engaged in detecting cases of measles get into the habit of looking, in the first place, for a finely congested conjunctiva, then a coryza, or Koplik spots, or a negative history of a previous attack, and, finally, a search is made for the rash and other signs. By giving proper weight to the first signs of infection, on many occasions a case of smallpox has been isolated on account of the presence of the initial symptoms alone, even when no probable source of infection was known. The task of going among a group of men for the purpose of selecting out for isolation those who have a real or suspected infection is a very practical one. From the nature of this work it is evident that its efficient performance does not depend so much upon the observance of any set of rules or routine as it does upon the skill, experience, and adaptability of the inspecting officer.

Recognized cases are sent to the isolation hospital under proper surveillance. Contacts with recognized cases and suspected cases are preferably isolated at camp. The isolation of so-called contacts is of doubtful efficiency. In two epidemics of measles the percentage of new cases occurring among contacts was higher than for the rest of the camp, and yet the difference did not seem sufficiently large to warrant the considerable trouble. Contacts need not be isolated at once. Each instance should be investigated and a date set for beginning isolation. The time at which to begin isolation may be calculated by subtracting the number of days exposed from the minimum number of days of the period of incubation of the disease.

During an epidemic a good plan for the handling of suspected infections is to have a number of small isolation units. Each unit should contain men having about the same degree of suspicious involvement in particular as regards the time at which the disease is expected to develop. Contacts should not be isolated with suspected cases. At best any scheme of isolation offers many disappointments.

Isolation is always enforced in the military services for measles, mumps, diphtheria, scarlet fever, and cerebro-spinal fever. It is seldom enforced for tonsillitis or influenza, though these diseases

are spread in the same manner as the others. Isolation is a failure in measles and cerebro-spinal fever;[1] it is not always practicable in influenza. The frequently long incubation period of mumps and the probability that mumps, like other acute infections, is most contagious in its early stages, render isolation difficult of application for this disease.

Isolation is a failure because it is only applicable to recognized cases. It is with difficulty that carriers are isolated to a limited degree only, and missed cases probably receive no amount of isolation. Even with known cases isolation has restricted application, because most germ diseases are infectious for a certain period before they have developed sufficiently to be recognized. This is particularly true of measles. In a recent epidemic of 63 cases of measles isolation was given the fairest trial that has yet come under my observation. The epidemic began with 3 primary cases, which were followed by two generations of 30 cases each, as follows:

MEASLES.

Date.	Cases.	
4, 25	1	
4, 26	1	First generation; 3 cases.
4, 28	1	
5, 6	4	
5, 7	2	
5, 8	8	
5, 9	9	Second generation; 30 cases.
5, 10	3	
5, 11	3	
5, 12	1	
5, 15	5	Third generation; 30 cases.
5, 17	1	
5, 18	7	
5, 19	6	
5, 20	6	
5, 21	3	
5, 22	2	

All cases that had not been previously isolated were, of course, isolated upon the appearance of the eruption. By carefully ferreting out persons having symptoms more or less suggestive of measles it happened that 32 persons were selected out for isolation at periods prior to the appearance of their rash, as follows:

	Cases.
1 day prior to rash	10
2 days prior to rash	13
3 days prior to rash	7
4 days prior to rash	1
5 days prior to rash	1

[1] Chapin: Sources and Modes of Infection. Boston, 1912, pp. 145–6.

Measles is communicable for 3 or more days before the rash appears. Let it be assumed that it is just 3 days, and then the degree of efficiency of isolation in the above instance may become a matter of mathematical calculation. Three days for each of the 63 cases gives 189 infectious days, and from this it is permitted to subtract only 63 days, which is the total number of days the 32 cases were isolated while infectious prior to the appearance of the rash. Then, in this instance, not considering possible carriers, and also "missed" cases, isolation was at best only one-third efficient.

It is now generally believed that terminal disinfections are of no value in preventing the spread of any of the diseases of this group. Chapin has stated that he can see no use in disinfecting after measles, influenza, or cerebro-spinal fever; that disinfection after diphtheria is absurd, and that disinfection after cerebro-spinal fever is also absurd.

The practice of terminal disinfections was adopted when the germ theory of disease became accepted. It was based upon the false hypothesis that places and things held the contagious entity of disease and that disease germs have a considerable power of maintaining their viability aside from the human host. This theory was accepted so completely that buildings were constructed for the special purpose of disinfecting articles which had been in contact with the sick and which it was desired to return to general use. Some of these buildings contained immense autoclaves and chambers for the reception of toys, books, tools, bedding, clothing, and other inanimate objects to be subjected to live steam or pungent gases which would destroy the lives of those disease germs that were supposedly clinging to the surfaces and crevices of these objects in wait for their next victim.

Disinfection was adopted entirely from theoretical considerations. It now seems strange that the practice prevailed so long while no tangible results were being obtained to justify, even in a small way, the considerable inconvenience and expense. In explanation, it does not seem unlikely that the practice of fumigations and disinfections filled a psychological want. The beliefs of primitive man abound with the idea of the potency of malodorous substances for the cure and prevention of disease. In further support of this view it may be pointed out that "the Egypto-Assyrian prototype of the Jewish and Christian censers, smoking with resinous drugs which developed the antiseptic vapors of ethereal oils, forms some sort of a parallel with the now discarded weapons of the fumigators of our boards of health in their early bacterial days. Nevertheless, even though no more than a coincidence, other things taken into consideration, it is rather remarkable that antiseptic ethereal oils were let loose in fumigation to exorcise the little demons of disease in old Judea some 3,000 years

ago, and let loose again some 30 years ago to exorcise the little red and blue devils we saw under our microscopic objectives. The efficacy of the fumigating performance, so far as the disease is concerned, doubtless was the same, but there is no occasion for scoffing at the performance of either date, but rather for reflection on the transitoriness of theory and the evanescence of facts." [1]

WITH MARINES IN FRANCE.

By F. E. Locy, Lieutenant, Medical Corps, United States Navy.

GENERAL OPERATIONS OF THE REGIMENT.

The past year has been one full of the greatest activity for this regiment. During January the battalions and companies which had been scattered in various towns in France joined the Second Division in a training area near Bourmont, Vosges, France, and on February 11 the regiment was completed by the arrival from the United States of the Second Battalion. Here the regiment, united for the first time since September, 1917, began intensive training in preparation for a tour of duty in the trenches. On March 14 the regiment entrained for a quiet sector south of Verdun. During the two months of our stay the battalions alternated in the front line, our casualties were not large, and a great many plans were worked out which were to stand us in good stead during the darker days to come. On our relief on May 12 we proceeded to a new area near Vitry-le-François for a week and then to another area about 40 miles north of Paris.

On May 31, after having been out of the Verdun trenches for only 18 days, we hurriedly entrained on motor trucks and after a ride of approximately 75 miles arrived near the now famous town of Bouresche and the Bois de Belleau, where the entire regiment was rushed in among the retreating French soldiers and fleeing civilians to help stop the headlong German advance on Paris. During the first two weeks of our six weeks' stay in this locality came our heaviest casualities, and the care and evacuation of the wounded became an enormous problem. After a total of 10 days "en repos" the regiment was again suddenly entrained and rushed northward to a point near Vierzy, south of Soissons, to participate in the great allied counter offensive starting July 18. After sustaining casualties approximating 50 per cent on the 19th, the regiment was relieved to rest, refit, and replace losses. After several movements the regiment entered a quiet trench sector at Pont à Mousson, north of Nancy, for nine days.

[1] Wright: "Demonology and bacteriology in medicine." The Scientific Monthly. Vol. 4, No. 6. P. 506.

About the middle of August we entered a new training area about 15 miles south of Toul and except for interbattalion movements the regiment remained in place. It was here that for the first time opportunity presented itself to attempt to bring our uncompleted clerical work up to date. However, comparatively little was accomplished. On September 2 the regiment started to march by easy stages to the front, 15 miles north of Toul. On September 12 the regiment advanced with the general attack which resulted in the closing off of the St. Mihiel salient. After four days we were relieved and proceeded gradually to rest billets near Toul, where we stayed six days. From this point we proceeded by rail to the Champagne region near Chalons-sur-Marne.

After various moves we attacked on October 3, advancing about 3 miles and taking Blanc Mont Ridge, a strategic point for the surrounding country. After making small further advances and holding this point until the line was consolidated on either side we were relieved and had six days in billets near Chalons-sur-Marne. On October 20 we started moving again, not to stop for nearly two months. After several tactical moves in the Champagne, the regiment started across the Argonne Forrest to join the American First Army, which had been fighting along the Meuse River north of Verdun. On November 1 the regiment again attacked, advancing about 6 miles the first day against determined resistance, and making further advances to the Meuse River near Mouzon, until the cessation of hostilities on November 11. On November 17 the march to the occupation of the Coblenz bridgehead was started, and we passed through the remaining portion of France, through Belgium and Luxembourg, and across Germany, reaching the Rhine on December 9 and settling down in our present location on December 16.

PERSONNEL.

The medical personnel of this regiment has changed greatly during the past year. Of the original 8 medical officers, 2 dental surgeons, 1 pharmacist, and 50 hospital corpsmen at the beginning of 1918, there are still attached on December 31, 1918, 1 medical officer and 16 hospital corpsmen now doing duty with the regiment. Twenty-four different Navy medical officers and dental officers and 165 hospital corpsmen have been carried on the rolls of the medical department during the year. Of the officers that have left the regiment several have returned to a naval status, or are still in base hospitals or on duty in the Service of Supply after having been evacuated on account of wounds or sickness. Three officers are now on duty with the Division Sanitary Train. One dental surgeon and four hospital corpsmen have been killed in action, 5 officers and 53 hospital corpsmen have been evacuated, wounded, or gassed.

There was at first little opportunity offered naval medical officers to serve with other than one of the two marine regiments or the machine-gun battalion. However, during the past six months a few have been attached to the various field hospitals and ambulance companies of the division, and thus have had an opportunity to widen their experience. It is the opinion of the writer that more opportunity should be offered for the relief of medical officers and hospital corpsmen serving with a combat infantry regiment. For example, after having served in such a capacity for three to six months they should have an opportunity to alternate with personnel of like grade serving in ambulance companies, field, evacuation, or base hospitals. In this way relief could be had from intense nervous strain and physical hardship of work in the line, and they would secure the benefits of better surroundings, and have an opportunity of doing something more in a medical way than is possible in a first-aid station.

Dr. W. G. Farwell, Lieutenant Commander, Medical Corps, United States Navy, was the regimental surgeon until July 21, 1918, when he was evacuated, sick. Up to this time the medical work under battle conditions was being systemized and developed. In this work he was ably assisted by Lieutenant J. T. Boone, Med. Corps, United States Navy, who succeeded him as regimental surgeon. Working under continually bettering conditions, methods of evacuation were reorganized and a plan developed by which part of our Navy records could be kept while the regiment was in combat. On September 23, following the St. Mihiel engagement, Lieutenant Boone was detached and appointed assistant division surgeon and was succeeded by the undersigned. During February and March Lieutenant Boone attended the Army Sanitary School of the American Expeditionary Forces, studying the hospital and evacuation methods of the French and British.

The regimental medical detachment has been fortunate at all times in having an abundance of well-trained, willing, and courageous hospital corpsmen, and to them belongs the greatest share of the credit in giving first aid to the wounded in the most advanced positions. Sixty-nine citations for bravery in action have been given members of the hospital corps of this regiment and over half of them have been made by line officers. There have been a number of distinguished service crosses and *croix de guerre* awarded. Many have been mentioned in divisional orders and many citations have not as yet been heard from.

The naval hospital corpsmen serving with marines and the Army in the American Expeditionary Forces are still at a disadvantage in the question of pay. They do not receive the 20 per cent increase for foreign service which both the Army and Marine Corps receive. When transferred or evacuated to a hospital or an Army unit they

can not receive their pay until transfer pay accounts are in the hands of some marine paymaster, who often must make a special trip to pay them. Army enlisted personnel have service records which contain their pay accounts, and these go with the man or are sent after him when he is transferred or evacuated and any Army disbursing officer may pay them. Fortunately the marine paymasters have been paying many hospital corpsmen $10 to $20 a month until their transfer pay accounts are received.

There has been little opportunity for textbook instruction during the past year on account of so much work in the field and recently through lack of textbooks. The work has been almost all of a practical nature, especially in first aid, minor surgery, nursing, and sick-bay duties. It is believed that the training these hospital corpsmen received has been of the greatest value in developing their initiative, self-reliance, and dependability. Their courage and spirit of self-sacrifice has always been in accordance with the best traditions of the Navy.

CASUALTIES AND SICKNESS.

All infantry organizations in modern warfare suffer constant changes in personnel, and the Sixth Regiment was no exception to the rule. Approximately 2,000 officers and men of the regiment were evacuated on account of sickness, 593 were killed in action, 4,345 wounded, 239 missing in action, and 19 taken prisoners. Some 205 officers and men have been reported as having died of wounds or from the effects of gas while patients in hospitals in the rear. The reports of those dying in hospitals are known to be very incomplete.

The chief causes of evacuation of patients on account of sickness were respiratory diseases and diarrhea.

Our battle casualties, although often severe, have never been out of proportion to the tactical advantages gained. According to the best available records, the casualties according to engagements are as follows:

Engagements.	Dates.	Officers.	Men.
Toulon Sector, Verdun	Mar. 15 to May 12	12	350
Château Thierry	June 1 to July 7	46	1,752
Soissons, Vierzy	July 18 to July 20	51	1,213
St. Mihiel, Thiaucourt	Sept. 12 to 16	12	381
Champagne, Blanc Mont	Oct. 2 to 10	28	788
Meuse-Argonne	Nov. 1 to 11	23	487
Total, exclusive of missing and prisoners		172	4,971

At Verdun about 300 out of the total casualties known were due to enemy poison gas. On April 13, during the early morning hours

some of our rest camps near the front line were bombarded. One of the camps in a hollow about 2 miles from the front line was bombarded for four hours with yellow and blue-cross gas shells and high explosives, approximately about 1,000 shells being thrown in all. About 300 men were billeted here in wooded shacks. The onset of the attack was at about 4 o'clock in the morning, and so it caught most of the men asleep. Practically all of these men were evacuated during the day on account of the effects of the gas. Thirty-three deaths occurred amongst these men. The cause of most of the deaths was a secondary pneumonia. The great majority of the men who lived have not returned to the regiment, as they have not been physically fit to perform heavy duty. According to the regimental gas officer at that time the causes of the casualities were: Shell bursting in a shack, 60 cases; respirators not put on in time, 25; premature removal of respirators, 75; disobedience of orders, 75; insufficient clothing for change, 60.

During the actions about the Bois de Belleau (Château-Thierry) there was much gas thrown by the enemy; however, as a rule the casualties were light on account of our added experience. On the nights of the 13th and 14th of June a large area was gassed for about four hours with what was apparently chiefly mustard gas with some phosgene added. Approximately 600 gassed cases were evacuated through the aid stations of the regiment on the 14th, but only about 250 were our own men. Most of the cases were gassed while lying in close support of the front line in the woods or in the small ravine that ran along the back of the woods.

The enormous casualities at Soissons practically all occurred in 18 hours on the 19th of July. On account of the almost complete lack of evacuation facilities for the wounded the aid stations were rapidly congested, and soon presented a condition that anyone who ever saw it will remember as a nightmare. The regimental aid station was in a large cave and there, for most of the day, several hundred wounded lay without morphine, proper bandages, water, or any comfort. Principally on account of the roads being so crowded and the primary necessity of bringing up guns and ammunition, ambulances did not run during the day. During the afternoon returning ammunition trucks took most of the seriously wounded, placing them on a layer of straw over the bottom of the truck. Under cover of darkness ambulances came forward and evacuated the aid stations.

During our part of the Argonne-Meuse attack a severe epidemic of diarrhea developed in the regiment. Practically the whole command was affected and several hundred men were evacuated to the rear. The supposed cause was bad water, but sleeping in wet clothing on wet ground aggravated the symptoms. Most of the cases

returned to duty in three to five days. The disease was characterized by frequent watery, often bloody stools, malaise, prostration, and anorexia. Nausea, vomiting, and low fever were present in a few cases.

Venereal disease has not been a large factor in this regiment since our arrival at the front last spring. The chief reason for this has no doubt been the lack of opportunities for exposure. Practically all of our new cases come from men returning to the regiment from base hospitals in the rear, returned from leave, or from detached duty in the Service of Supply. Every opportunity is offered to the men to avail themselves of the benefits of prophylaxis. Nearly every village or town in which our troops are quartered has a well marked prophylaxis station which is available for use at all times. Talks have been given to the men of this regiment by the medical officers at regular intervals. Venereal inspections are held twice a month.

FOOD, WATER AND KITCHENS.

Under the varying conditions encountered on the different fronts and in the rear our food naturally varied much as to quality and quantity. As a rule, when in rest or reserve the food has been good. However, at the front, especially in our early days near Verdun and in the Bois de Belleau, food was occasionally scarce and on a few occasions very bad. As the line of communication developed and we became more experienced in preparing and handling food at the front, conditions grew much better. While serving with the French during May and June we drew their rations *minus the red wine.* Since then we have had the American ration, which is well balanced and satisfying. Recently we have been drawing the following ration:

Fresh beef, 20 ounces. Fresh mutton, bacon, and fresh pork may be substituted.
Bread, soft, 16 ounces. Fifteen per cent of this ration may come in the form of flour, cornmeal, oatmeal or macaroni.
Baking powder, 0.08 ounce.
Beans, dry, 4 ounces.
Rice or hominy, 2 ounces.
Potatoes, fresh, 20 ounces. Twenty per cent of total issue may be substituted by onions, canned tomatoes, fresh vegetables, canned corn or peas.
Jam, 1.12 ounces, or tea, 0.32 ounce.
Sugar, 3.2 ounces.
Milk, evaporated, unsweetened, 0.16 gill.
Salt, 0.64 ounce.
Pepper, 0.02 ounce.
Cinnamon, 0.14 ounce.
Butter, 0.50 ounce.
Candy, 0.80 ounce.
Tobacco, 0.40 ounce. May substitute four cigarettes.

The reserve ration carried by the men has changed during the year. At the present time two days' supply is carried in the pack. One ration includes the following:

Canned meats, 16 ounces. This may be corned beef, canned frèsh roast beef, corned-beef hash. Sardines or other canned fish may be substituted.
Bread, hard, 16 ounces.
Coffee, soluble, 0.75 ounce.
Salt, 0.16 ounce.
Sugar, 3.20 ounces.
Soup, cube, 1 ounce.
Solid alcohol, 2 ounces.

It has been noticed by everyone who has been close to the front that often when large cans of meat from the reserve rations are opened only about one man's share is eaten out of the can and the rest is left to spoil. It is the opinion of the writer that canned meats for the reserve ration should be separately put up, with just enough in one can for one man's meal. The can should be flat, similar to an ordinary sardine can, so that it will fit well in the pack.

The water in France is said to be often highly contaminated. Occasional cases of typhoid fever have developed among the troops in the American Expeditionary Forces. While in the rear it has often been possible to treat the water with calcium hypochlorite or to boil it, but during an action, or even while on an active front, it is impossible to use Lister bags, and usually, of necessity, any water available is drunk by the men.

The "Magorcar" and the "Steinburn" rolling kitchens have been used by this regiment. The kitchens that can hold the fire in the fire-box while on the move are the best. When the command is moving from place to place with such a kitchen the men can be supplied at noon with hot coffee and the evening meal may be started during the afternoon, so that on their arrival at their destination they will not, as a rule, have to wait any longer than an hour for their supper.

CLOTHING AND EQUIPMENT.

No Marine Corps clothing has been issued to this regiment since our training area was left. When the existing Marine Corps issue had been rendered unserviceable Army clothing was substituted. The campaign hat was discarded in this regiment during March, and since that time the overseas cap and the steel helmet have been worn. There has been much discussion as to the suitability of this type of cap. The chief point in its favor for use at the front in France is that it is small and easily carried in the pocket or pack or may be worn beneath the steel helmet. This is, no doubt, a great advantage

at the front, as a larger hat or cap would surely be lost or thrown away on the first day of the attack. Its chief disadvantages, as noted by the writer and many others, were encountered on either very sunny or warm days or on rainy days. When the sun shines there is absolutely no protection afforded the eyes by the cap. This has been obviated by making a paper visor or putting a paper between the cap and the forehead, so as to shade the eyes. When it rains one is equally unprotected; the rain beats directly into one's face and eyes and the cap rapidly becomes like a wet rag over the head. A soft cap with a visor, similar to that worn by the Canadians, is much superior to our overseas cap in the opinion of many.

The Marine Corps overcoat is heavier, longer, and better made than the Army overcoat but not so suited to active service. The length of the marine overcoat is a distinct disadvantage in most trench sectors. It is so long that it interferes with active movement and the lower foot or so of the coat becomes rapidly saturated with mud and water. The coat then gains many pounds in weight and it is almost impossible to clean or dry the coat while in the line. Our experience with the shorter Army coats has shown them to be more suited for that kind of work.

A so-called "trench coat" worn by almost all of the officers here is worthy of mention on account of its many good qualities. It is a lined raincoat cut in the loose "Raglan" style, gathered at the waist by a cloth belt and extending usually to the knee or a point just below. The outer layer is of a smooth, tough material, which does not easily tear and is easily cleaned by scrubbing with soap and water. Between the outer layer and the thin inner lining of the coat proper is a layer of oiled silk. A detachable lining of a thick woolly material may be buttoned on the inside of the coat, thus adding great warmth to the rain-proof qualities of the garment. The chief advantages of this coat are that it is readily rain proof, comfortable, easily cleaned, and may be made into the warmest of overcoats by buttoning in the detachable lining. This type of coat has been worn by our officers under all sorts of weather conditions, and it appears to be the best coat yet devised for use in the field.

The question of footwear has been a very important one, particularly to us. When a man drops out on a march we have learned to look for ill-fitting and wornout shoes. The United States Army field shoe is the best all-around shoe for everything except looks. We have used the Marine Corps hobnail shoe and the British field shoe and find them very inferior. The marine hobnailed shoe has a lining which wears through and then causes irritation of the foot at that point. The British shoe is too stiff and is not fitted properly around the heel.

Wrap puttees have been used almost exclusively by our men since last February. On the whole, they are rather satisfactory. Their points of advantage are comfort, warmth, softness, and usually neat appearance. Mud can not work up between the puttee and the leg as in canvas or leather puttees. The disadvantages of the wrap puttee show themselves especially when wrapped too tight, as is often done, especially about the calf of the leg. This shuts off healthy circulation and the legs become tired more easily and in cold weather the feet chill more easily, and thus the men are more predisposed to frozen feet and possibly to trench foot. When the wrap puttee is exposed to water and mud it readily becomes saturated through, thus tending to constrict the leg more, and as the puttee dries it becomes as stiff and uncomfortable as a plaster cast on the leg.

MEDICAL AND SURGICAL SUPPLIES.

Each of our battalions brought over a complete standard Navy "regimental medical and surgical expeditionary outfit." The quality and selection of both drugs and instruments was excellent, and while in our training area the best of the material that we used was from these outfits. However, when we left for the trenches in March our transportation was limited and only parts of the outfits could be carried by the battalions. What we could not take or did not consider necessary was stored in our training area and was later taken over by the Army. The medical material that we did not take along was in most part soon expended, lost in action, or turned over to Army hospitals or supply depots and we drew all further supplies from Army sources.

The transportation question with an active infantry regiment is a great one for all concerned. During April we were issued a small two-wheeled mule-drawn cart for each battalion and finally reduced our supplies so that all might be carried on these carts. However, we found that, while the supplies carried on these carts were of great value in the rear, when going into action everything from the carts that was intended to be used must be carried in on the backs of the hospital corpsmen. In explanation of the small amount of supplies of drugs and instruments found to be actually needed by us it must be said that at the front all wounded, gassed, or sick, except the slightest cases are evacuated to a field hospital as soon as possible, while in the rear there are rarely facilities for the care of bed patients, and all except the slightly sick are evacuated to field hospitals daily. In the field hospitals most of the more pretentious medical and surgical work is done, and the chief work in the regiment consists in diagnosing cases, caring for the slightly sick, supervising and organizing the care and evacuation of the wounded from the battle

field during action. While on the line, stretchers, splints, bandages, and morphine are carried in by stretcher bearers and hospital corpsmen. These supplies usually do not last more than a few days and replenishments are brought up by ambulances coming from the ambulance heads and from there are carried to the line by returning litter bearers.

As a means of carrying first-aid material the Navy Hospital Corps first-aid and dressing pouches have proved a blessing and are in our opinion much superior to the Army Hospital Corps belts. The reason for this is that Navy pouches hold more, are just as easy to carry, may be taken off without removing the pack, and are much more handy to get things out of.

The Thomas leg splint when it was available was a godsend to put on a fractured thigh or leg in the line. The patient's relief has always been pronounced. Of all the types the large straight-leg splint has been the only one for which we have found use. The arm splints are not practical at the front because, with one of them on, it is difficult to carry the patient on a stretcher and usually impossible to load him on an ambulance. In our experience the Thomas leg splint can usually be put on in the battalion aid stations and always at the regimental aid station or ambulance head. The chief advantages of this splint are that it immobilizes the limb and at the same time allows the application of extension and by drawing apart the ends of the injured bone further laceration of the surrounding tissues and the accompanying pain is obviated.

The Greely units of morphine supplied us through the American Red Cross have been the only practical, and often the only possible, means of giving morphine at the front.

The United States Army litter is almost universally used at the front. The French have a litter of the same type with the addition of a contrivance for a raised headrest. It is generally thought among us that the Navy Stokes splint stretcher would have great advantages for use at the front. However, we have never had one to make the experiment with. It is not practical to have two stretchers of such entirely different type at the front, however. As the stretcher goes to the rear with the patient and he is not usually changed from one stretcher to another, because this is of necessity often an awkward move, it delays his evacuation to a safer spot and in the more serious cases will further endanger his life. Thus a wounded man may be picked up on the field, placed on a stretcher and remain on it until he arrives at a base hospital far in the rear, one or two days later.

We have had a great deal of difficulty in carrying typewriters with us. The large Underwood typewriter with its wooden case is too bulky for the battalions to carry in the field. We have only been

able to carry one such typewriter for doing the entire paper work of this regiment. The battalion medical unit has to do the paper work of over a thousand men with no typewriter. For use in the field a small folding typewriter such as the Corona could be transported easily and would prove of the greatest assistance in getting out reports, forms, and memorandums.

AID STATIONS AT THE FRONT AND CARE AND EVACUATION OF WOUNDED FROM THE FRONT LINE.

Apparently very little has been written by medical officers concerning treatment and evacuation of the wounded before they arrive at a field hospital. It is true that, from a purely medical standpoint, little of interest occurs forward of the first emergency operating team in one of the more advanced field hospitals. This point is usually 5 to 8 kilometers back of the front line. The work forward of the field hospitals is done by medical officers and hospital corpsmen of the combat regiments and ambulance companies. During the last months before the signing of the armistice, the fighting engaged in by this regiment assumed more and more the character of open warfare. Our front line usually advanced from day to day, sometimes as far as 10 kilometers. These movements necessitated frequent change in location of aid stations and routes of evacuation, thus greatly increasing the difficulties and dangers in the care and evacuation of the wounded. From a medical standpoint the well-planned and well-carried out engagements of St. Mihiel, Champagne, and the Argonne-Meuse are more typical of what may be done than the earlier and more heroic battles near Château-Thierry and Soissons in which the regiment also participated.

Our authorized personnel consists of 7 medical officers, 3 dental surgeons and 48 hospital corpsmen. During the last three engagements we entered with an average of 7 medical officers, 1 dental surgeon, 60 hospital corpsmen and 156 litter bearers, the latter being marines permanently assigned and trained for their duties as litter bearers at the front. The personnel usually was distributed as follows:

Regimental aid station and regimental headquarters.
- Regimental surgeon.
- Assistant regimental surgeon (none after Sept. 23, '18).
- Dental surgeon.
- Chief pharmacist's mate.
- Hospital corpsmen (6 or 8).

Battalion aid stations.
- Two medical officers.
- Chief pharmacist's mate.
- Hospital corpsmen (5 to 7).

Each company.
- Hospital corpsmen (2 to 4).
- Litter bearers (12).

The ambulance company personnel varied in numbers and location but there were always at least one Army medical officer and about 60 litter bearers attached to the regiment during action, taking over most of the evacuations from the battalion aid stations. Necessary ambulances were provided and came up to, or as near to the battalion aid stations as possible.

When a man is severely wounded in the line one of the hospital corpsmen detailed with his company proceeds to him at once, if possible, or litter bearers bring the man back to the hospital corpsman. If it is impossible to move the man, often his rifle is stuck into the ground alongside of him by the fixed bayonet.

If the wounded man can walk or crawl he usually starts out to the nearest hospital corpsman. The individual first-aid packet may or may not have been applied by the man himself or one of his comrades. At all events the hospital corpsman assures himself that the man has on a satisfactory dressing, always, if possible, gives the patient an injection of morphine, and writes out and attaches a diagnosis tag to his clothing and is occasionally able to apply a rough splint to a fractured bone. From this point the patient goes back to the battalion aid station, usually by routes marked with strips of bandages on bushes or sticks. If he can walk he goes back alone or is helped by a litter bearer, otherwise he is carried back by four litter bearers. The battalion aid stations are located as close to the front line as possible, the distance usually varying between one-half and 2 kilometers back, according to circumstances. On arrival at the aid station the medical officer or chief pharmacist's mate examines the man and the dressing, does whatever is possible under the circumstances, as improving the dressing, applying a Thomas splint, removing or applying a tourniquet. In other words, he gets the patient in the best possible position and condition to travel to the rear. Occasionally we have been able to give the patients hot coffee here. From the battalion aid stations the patients usually walk or are littered to the rear in charge of litter bearers from the ambulance companies or our own personnel. If ambulances can come to the battalion aid stations the patients usually go through from there direct to the field hospital, sometimes, if necessary, stopping at the regimental aid station or ambulance dressing station if they have been established.

Antitetanus serum is usually given at the regimental aid station, ambulance dressing station, or field hospital, although sometimes it is given at the battalion aid stations if circumstances permit and it is necessary to keep the patient there for some time.

Speed combined with care are essentials in handling patients under fire. A wounded man is a noneffective and the sooner he gets back out of fire the better are his chances of not being hit again.

Chest and abdominal cases, especially, must be carefully and speedily evacuated to a field hospital for obvious reasons.

The selection of an aid station is an important matter and there are many points to be taken into consideration regarding location. Conditions vary so much in various places that no set rules can be laid down and an ideal place is never found. In our various engagements our aid stations have been in houses, cellars, dugouts, wooden shacks, culverts, ravines, ditches, and even in the open. In my opinion the most important considerations are as follows:

1. Proximity to the battalion being taken care of—ideally between flanks of the battalion as it is in position.

2. Nearness to roads or paths by which evacuation may be further continued. Just off a road along which ambulances can come is ideal.

3. The aid station itself should be large enough to work in; where a light may be burned at night without being seen, and where available protection from fire may be utilized. A bombproof dugout with wide steps, down which a litter patient may be carried easily, room enough below to work and keep a number of stretchers and sitting patients awaiting evacuation, is ideal. Our regimental aid station during our Champagne attack was in such a place, having two fair-sized rooms in addition to passages having 60 bunks. It had been built by the Germans and was used by them as an underground aid station until our arrival.

4. Locations to be avoided if possible in the selection of an aid station: Close proximity to crossroads; active battery or machine gun displacements; ammunition or ration dumps; battalion or regimental headquarters or, where direct or balloon observation of the station is possible, or large deep hollows or ravines that may be shelled with gas.

During an advance the question of moving the aid station forward becomes a problem. It has been found that a good station once established should not be abandoned in an advance. As a rule medical officers of following units take over the next aid station ahead relieving the medical personnel left there to go on ahead with their own unit. When moving an aid station forward into new territory it has proved a waste of time and to add needless danger for the doctors and all of their aid-station personnel to move forward together to hunt for an aid station. The best way is to have a doctor or a dependable pharmacist's mate with one other hospital corpsman, and a runner go forward, possibly with the battalion commander; and, when a halt is made, or numerous casualties begin to occur, to reconnoiter the ground, and establish an aid station, and at the same time send back the runner to bring up the doctor and hospital corpsmen and litter bearers with the supplies, splints, etc. In this way an aid station is always in full operation, and the main part of the aid-station personnel and supplies are not out wandering over the terrain, but when they move they go forward rapidly and directly to a definite place.

We hear a great deal from the line officers about "liaison" and there is no doubt that in attacks and advances it is all important. We have felt the great importance of it in our medical work, as the best aid station in the world is not of much value if you are not in touch with the ambulance service and litter bearers to evacuate the rapidly accumulating wounded. A battalion aid station should have its exact location known to everybody but the enemy. Good battalion aid stations have been established and received no patients because battalion and company commanders did not know their location. Other stations have accumulated dozens of litter patients and many more sitting patients who have stayed there for hours on account of poor liaison with ambulances. To improve our liaison with other units the following steps have usually been taken in this regiment: A consultation of all of the medical officers in the regiment is held before the attack, the plan of attack is discussed, coordinated maps of the area on a large scale are given to each battalion medical officer, and the terrain over which the attack is to proceed is studied from the map. When a battalion medical officer locates a new aid station he sends the coordinates of his new station to this battalion commander and back by runner to the regimental surgeon or ambulance head so that wounded may be directed to the station and litter bearers, ambulances, and supplies may be brought up.

NAVAL REPORTS IN THE FIELD—CLERICAL WORK.

Since we first entered the trenches in March little has been done toward completing our naval records. We expected to spend only about a month in the line and then we were to return to our training area so that all of our health records, desks, etc., were left stored and we only took up to the front one typewriter, a field desk, blank forms, and loose leaves from health records. We expected to be able to keep our records in the rough journal and on the loose leaves. However, we never returned to our training area, and it was not until August that an opportunity presented itself to get the health records and attempt to catch up on the back work. From March until the end of July we had approximately 3,423 casualties, 1,000 evacuated sick or transferred, and had received several thousand replacements, most of the latter not having their health records. Lieutenant Commander J. T. Boone, Med. Corps, United States Navy, sent to our training area and had the health records brought up, and while we remained two weeks in one place we started to bring our health records, Form F, smooth and rough, K, K2, and N, up to date. Form K2, for the action in the months of March, April, and May, were completed in so far as was possible and were sent to the bureau. However, as the work progressed it was soon realized that all of the back work could not be completed under existing conditions even if

we had all of the health records. During an engagement we have had over 1,200 casualties in one day. At all times during action it is not even possible to write out a diagnosis tag for the wounded. The care of the dead has not been a part of the medical officer's duties. In this way usually at the end of an engagement we have the carbon copy of the diagnosis tag for the wounded and usually get a list of those buried by the chaplain or others. Little or no information about any man evacuated to a hospital is ever received by the regiment, and it is practically impossible to trace the progress of a man from one hospital to another, where he may finally die or from which he may be sent back to the United States or be put on some duty in the Service of Supplies.

On account of the above conditions it is impossible to complete an "F" card because the information required under Nos. 2 and 3 is not available on account of not having the man's health record or service record at hand. The sick days can not be estimated except as under a "T" disposition and no sick days. Health records were transferred with patients for a short time but they were often lost or returned without entries from the Army hospitals. So when it is impracticable to transfer a man's health record with him on transfer to an Army hospital, his health record has been available, he has been admitted and data entered and then the record left open. If he returns from the Army hospital, additional data has been added and the man discharged and sick days computed. An "F" rough can then be completed. However, only on rare occasions has this procedure been carried out, and there have been no health records available to make the proper entries or else the patient does not come back to the regiment.

When we started to move up to the front again for our participation in the St. Mihiel offensive we experienced great difficulty in transporting the records that we had accumulated, and it was impossible to set up an office and accomplish anything in a short halt.

Even if the regiment had all of the health records of the men in the regiment or who had been in it, it would be impossible to bring all of the back work up to date in a reasonable time. While the regiment moved about from place to place and while in the line Lieutenant Commander J. T. Boone, Medical Corps, United States Navy, made attempts to have a more or less permanent office established near the chief surgeon's office in Tours, France. Here all reports for the regiment could be made out from data sent back from the front, access could be had to the Army reports from hospitals and occasional trips could be made to the various hospital centers in France. In this way accurate reports could be gotten of the diagnosis, sick days, etc., of our marines after they had left the regiment. This proposed medical records' office never materialized, but

during the last three engagements participated in a small brigade medical records' office was established consisting of two hospital corpsmen each from the Fifth and Sixth Regiments and one from the Sixth Machine Gun Battalion. This office was a great help when data could be sent back to it. Within a few days after our return to the rear our Forms K2 for the action would be completed.

When we arrived on the Rhine on December 9, 1918, we immediately established our regimental office and started in again to catch up on back work. Unfortunately all cases transferred went to Army hospitals, and their sick days could not be entered. In preparation for writing up the health records and making Form F, rough, N, and other required forms, health records known to be in France were sent for and our casualty lists were gone over carefully and card indexed alphabetically. Forms F and K for the months of March, April, and May were completed and sent in. At this point, by an order from the commanding general of the Fourth Brigade, all of our health records, card index, and casualty lists, one typewriter, and two hospital corpsmen were sent to the brigade medical records' office established by Lieutenant Commander R. J. Lawler, Med. Corps, United States Naval Reserve Force, the surgeon of the Fifth Regiment, Marines. Since that time, of course, nothing could be done by our regimental office toward catching up on back work.

It is our intention during the coming year to keep all of our records up to date as much as possible, and we have made loose-leaf health-record sheets for approximately 4,000 officers and men now in the regiment, giving name, rate or rank, place and date of birth for all, and place and date of enlistment for enlisted men. We are doing every thing possible to follow all evacuations through the local Army hospitals. We have now practically no Navy forms, such as F cards, but requisitions on Form O were sent in August and again in December. We have heard that these supplies were shipped, but as yet they have not been received.

CONCLUSION.

In conclusion the writer wishes to state that during the past year, fraught as it has been with many trials and tribulations, the medical detachment of this regiment has always felt that it had the warmest and most whole-hearted support of the line officers of the regiment, who have been ready at all times to carry our recommendations into effect wherever possible. Special mention should be made of Colonel Albertus Catlin, United States Marine Corps, who was our original commanding officer, and of Colonel Harry Lee, United States Marine Corps, who succeeded him on June 6, 1918, in the Bois de Belleau, and who has led the regiment since that time.

In compiling this report the writer has felt the almost complete lack of notes and accurate data in our own files. Most of the material, except that relating to the Soissons engagement, is written from a memory on which the events and trials in most of the engagements are indelibly stamped. Lieutenant G. L. White, Medical Corps, United States Navy, who returned to the regiment since this report was started, has given valuable assistance in writing the fifth, sixth, and seventh sections and especially in regard to the Soissons engagement, which was not participated in by the writer.

BONE GRAFTS.

By E. M. Foote, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

The operations which form the basis of this paper were all performed at the United States Naval Hospital, New York. The subject of bone grafting, always interesting physiologically, has become of the greatest importance practically at the present time, on account of the desirability of supplying parts of bones which have been been carried away by projectiles or have been destroyed by the infection which has developed in compound fractures received in battle.

The series of operations reported here is not a long one, but it is instructive in that there is quite a variety in the grafts employed and in the manner of their application. All of the patients operated upon were United States marines, and in every case the loss of bone was due to a gunshot injury. All of the patients were in good physical condition at the time of operation, sufficient time having elapsed since the receipt of their injuries to permit their wounds to heal and their normal health to be restored.

Grafting, whether performed on a plant or an animal, is an operation full of mystery. One never ceases to wonder that a slice of bone or other tissue cut off from all of its own blood supply can remain alive long enough for a new circulation to be established. If osmosis can perform this miracle in the presence of a severe traumatism, why can it not keep alive the portion of kidney or spleen whose terminal artery has been blocked by an embolus? One would suppose that such vascular organs were far better fitted to do this than the bones.

What are the conditions which are essential to the successful transplantation of a slice of bone? In the grafting of plants and trees these are fairly well known. The chief points to be observed are these:

(1) A time of year in which the plant naturally adds to its growth.
(2) A minimum of traumatism.
(3) Accurate approximation of the growing layers.

(4) Preservation of the necessary moisture and keeping away the agents of decay.

(5) Immobility of the graft.

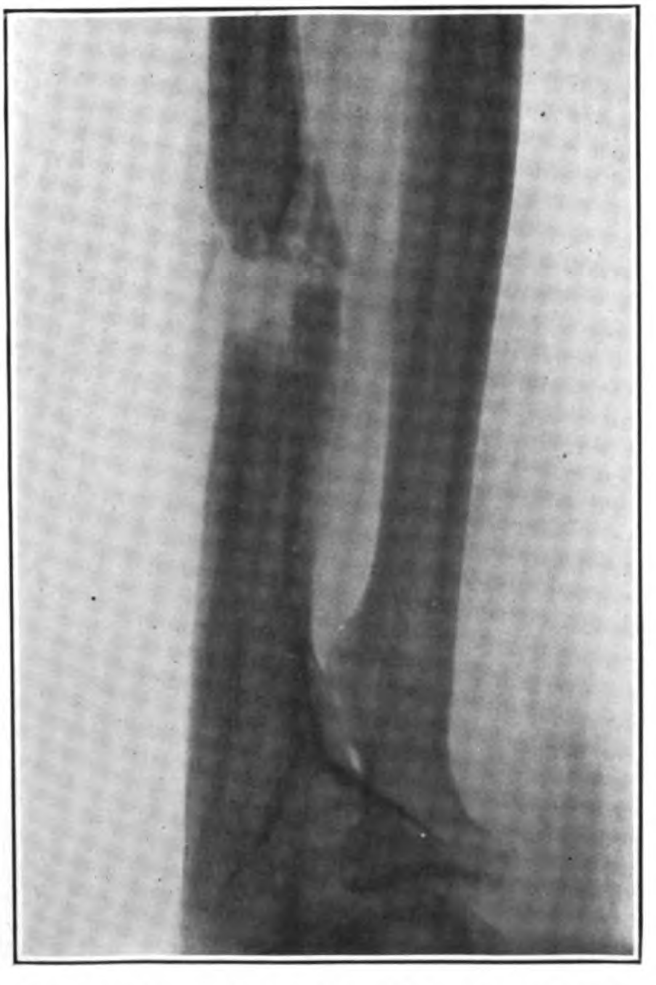
The conditions for success in human grafting are very similar:

(1) The time of year is not important, but the patient must be in sufficiently good physical condition to develop new tissue which, in the case of the plant, is produced chiefly in certain seasons.

(2) A minimum of traumatism, both in cutting the graft and preparing the bed, makes for success. It is my practice to cut the slots in the broken bone first, and then to cut a graft to fit. It is easier to cut the graft to measure, than it is to cut the slots to fit the graft; and when this order of procedure is followed, there is no drying of the graft and it does not need to be placed in any solution.

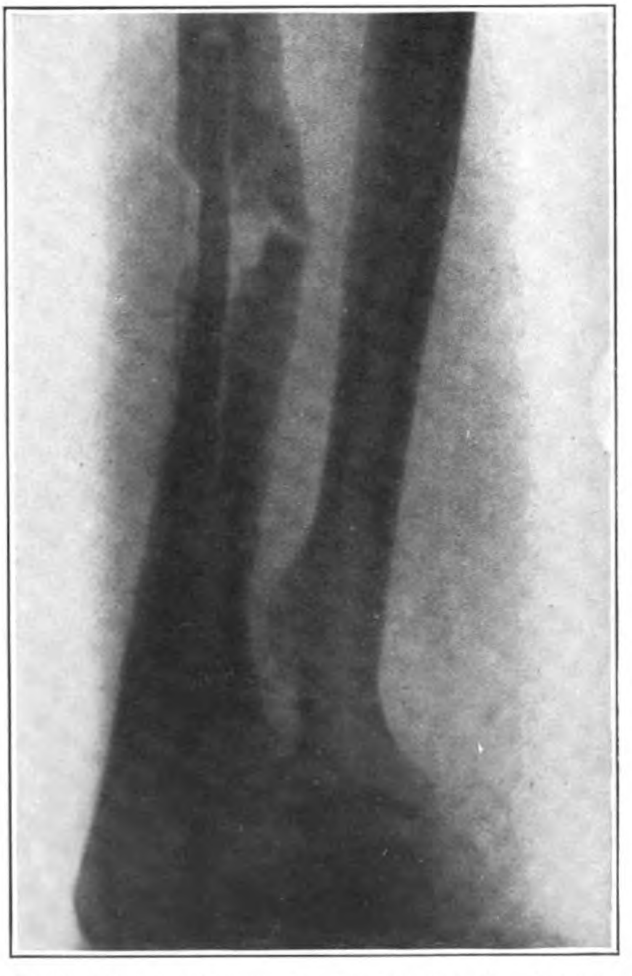
(3) Nurserymen lay stress on the accurate approximation of the inner layer of the bark in tree grafting, although they admit that this approximation need not occur throughout the whole length of the inserted portion of the graft. A corresponding approximation in the human subject would seem to require that the outer surfaces of the graft be just on the level of that of the bone in which it is placed; but experience does not support this theory, for the graft may live, become attached and grow new bone, either at the level of the bone in which it is placed, or above or below its surface. Take as an extreme example the case of a graft placed in the medullary canal of a broken bone. None the less in most cases it is desirable that the surface of the graft should be on a level with the surface of the bone in which it is placed; and that it should fit accurately into the slot prepared for it. The more broad and accurate the approximation of the bony surfaces, the more rapid and firm will their fusion be. It is just here that the double electric saw is of the greatest help, as it produces surfaces of slot and graft which are absolutely parallel.

There is one other point in connection with accurate approximation, which seems to me of considerable importance. If slot and graft are cut with the double rotary electric saws, set at the same distance from each other in both cases, it is obvious that the graft will be thinner than the slot, in which it is to be placed, by an amount equal to the thickness of both saws. As a result, the graft will lie loose in the slot. Albee avoids this by marking out slot and graft with double saws, and then cutting them with slightly beveled sides, using the single saw for this purpose as it is obvious that one can not cut bevels with the double saw. He presses the graft into place until it is firm, and fixes it in position with bone pegs driven into small holes drilled in the sides of the slot. This technic requires considerable mechanical ability, and even when performed by an expert takes a good deal of time.



Ulna injured by machine-gun bullet, October 3, 1918. Wound healed; nonunion of bone. (See figure 1.)

434–1



Radiograph taken five weeks after insertion of graft from tibia. (See figures 1 and 2.)

434–2

I hit upon a simple expedient to overcome this difficulty, varying the width of the space between the double saws by the use of washers, so that the saws when set to cut the graft shall be farther apart than when they are set to cut the slot, by just the thickness of both saw blades. The graft so cut will fit the slot so accurately that pegs and sutures are not needed to hold it in place, unless there is some strain on the fragments of the broken bone. (Figs. 1 and 2.)

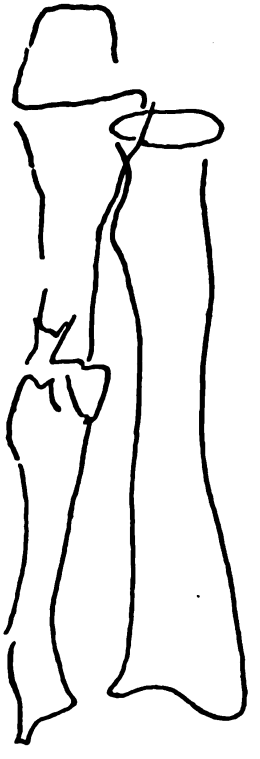


FIGURE 1.—Ulna, injured by machine-gun bullet October 3, 1918; wound healed, nonunion. Graft from tibia inserted February 3, 1919; primary union.

This raised the question as to the effect of pressure upon the vitality of the graft. If it is wedged tightly into place, will the blood circulation in it be impaired so that it is more likely to necrose? This is the effect of pressure upon the skin when sutures are tied too tight. A similar effect has not thus far been observed in the bone grafts; possibly because bone is so rigid that its circulation is not affected by pressure; possibly because it does not swell after operation to the extent that the skin and other soft parts do when unduly constricted. If further experience confirms the statement that tight wedging is no handicap to the nutrition of a bone graft, the method of grafting which gives an inlay which fully fills out the slot is surely the one to follow. The result is mechanically stronger from the start, and less new bone has to be formed to fuse the two bones into one.

FIGURE 2.—Position of ulna and radius 5 weeks after insertion of graft.

(4) When a tree is grafted the grafting wax prevents undue evaporation of moisture, and protects the wound from agents of decay. The carefully sutured flesh and skin render the same service to the grafted bone. But in neither case is such protection absolutely necessary. One sometimes sees a tree in the forest whose limb has rubbed against another until the bark of both has been worn through and the equivalent of a grafting process has grown them into one, without any wax to preserve the moisture and keep out destructive agents. Experience also shows that primary union of the wound in the flesh and skin, though most de-

sirable, is not absolutely essential to the success of a graft of bone. Figures 3 and 4 show the bones of the forearm of a patient whose wound suppurated slightly, and yet the graft remained in place and grew new bone. Possibly the infection did not extend as deep as the graft.

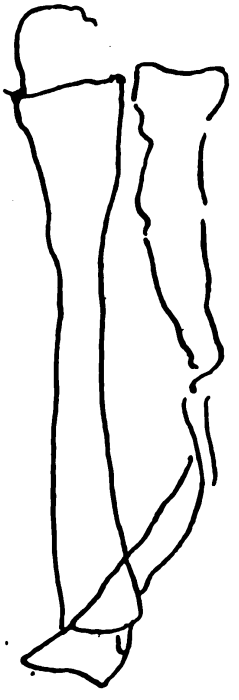


FIGURE 3.—Gunshot wound of radius June 8, 1918; infection with gas bacillus; wound suppurated for 4 months. Bone graft from tibia inserted December 22, 1918; slight suppuration of skin wound.

In another case the grafts showed their ability to live in the presence of a mild suppuration in a very striking manner. This patient received a bad wound of the head from a high explosive shell, and his right forehead was trephined while he was still in France. He entered the United States Naval Hospital, New York, January 23, 1919, with a healed and adherent scar over a large trephine opening directly above the right eyebrow. Pulsation of the brain was very noticeable. The X-ray showed no foreign bodies present. At operation the skin with its scar tissue was dissected from the brain, a thin layer being left to act as a dura. The skin with its central scar was sutured over the two portions of rib which were sutured into the defect in the skull. There was no suppuration at first, but after a few days bloody serum was discharged from the wound and the central portion of the flaps sloughed, leaving the grafts exposed in part. Yet in spite of this they remained in place, retained a pinkish color, and gradually became covered by growth from the skin edges. (Figs 5 and 6.)

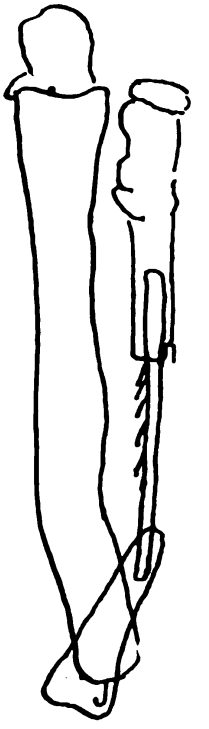


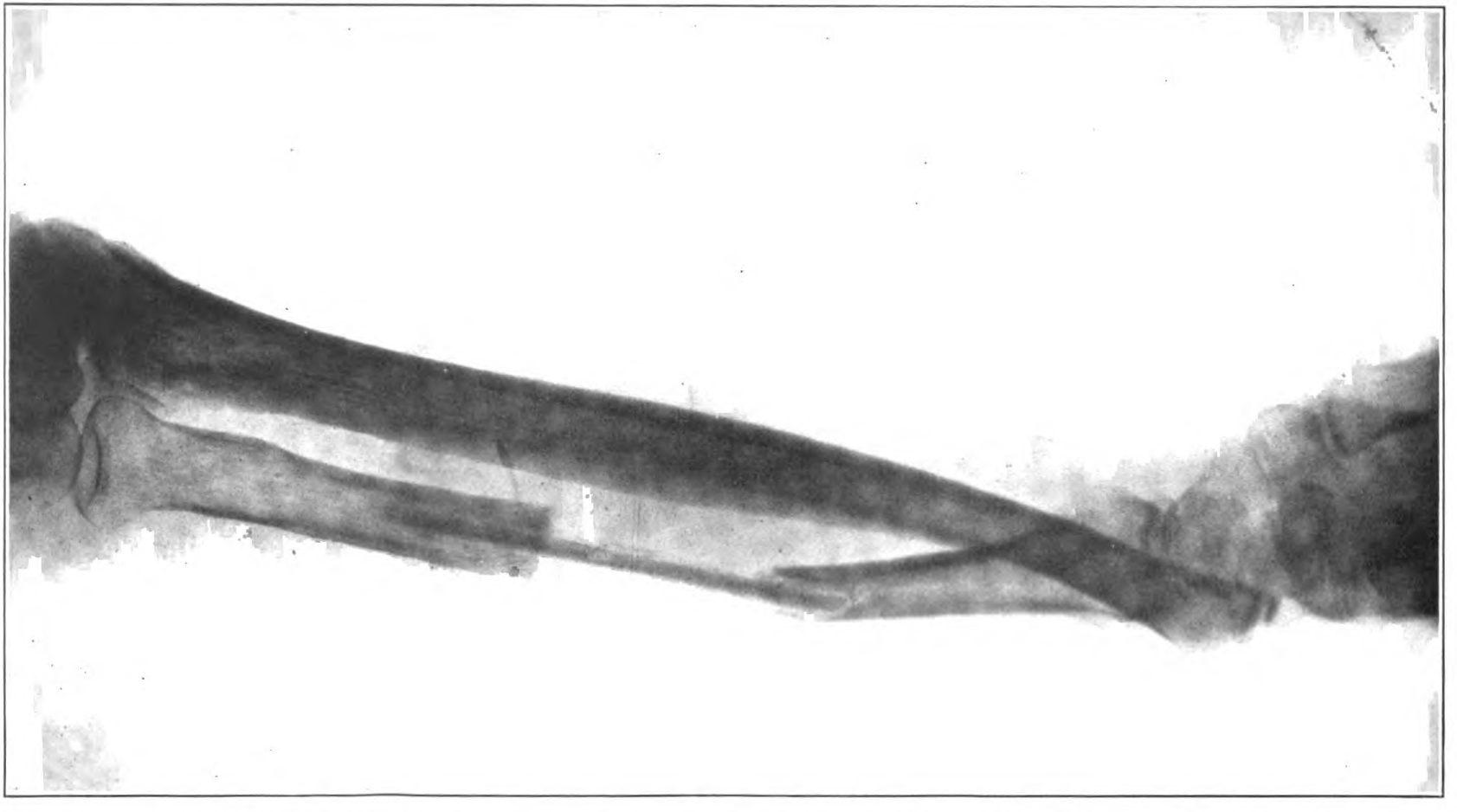
FIGURE 4.—Bone graft showing growth of new bone 7 weeks after operation.

(5) The final essential of success in grafting is the immobility of the graft until it has time to attach itself firmly. This is often the hardest one of the five essentials to achieve. In a case like that shown in figures 1 and 2, or that shown in figures 7 and 8, in which the the bone ends are in line and are only a short distance apart, it is not difficult to put into place a bone inlay which will be almost as

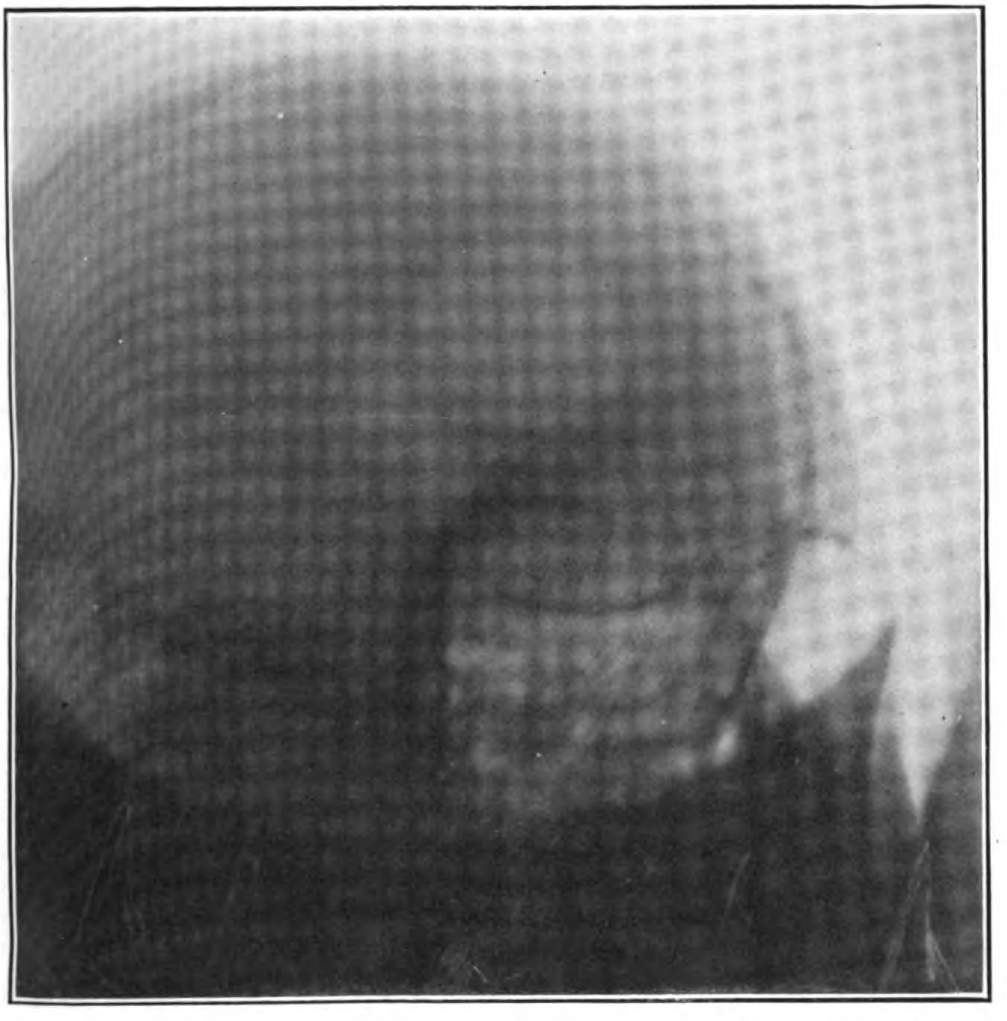
436–1

Wound of radius, June 8, 1918. Infection with gas bacillus; suppuration for four months afterwards.

436-2

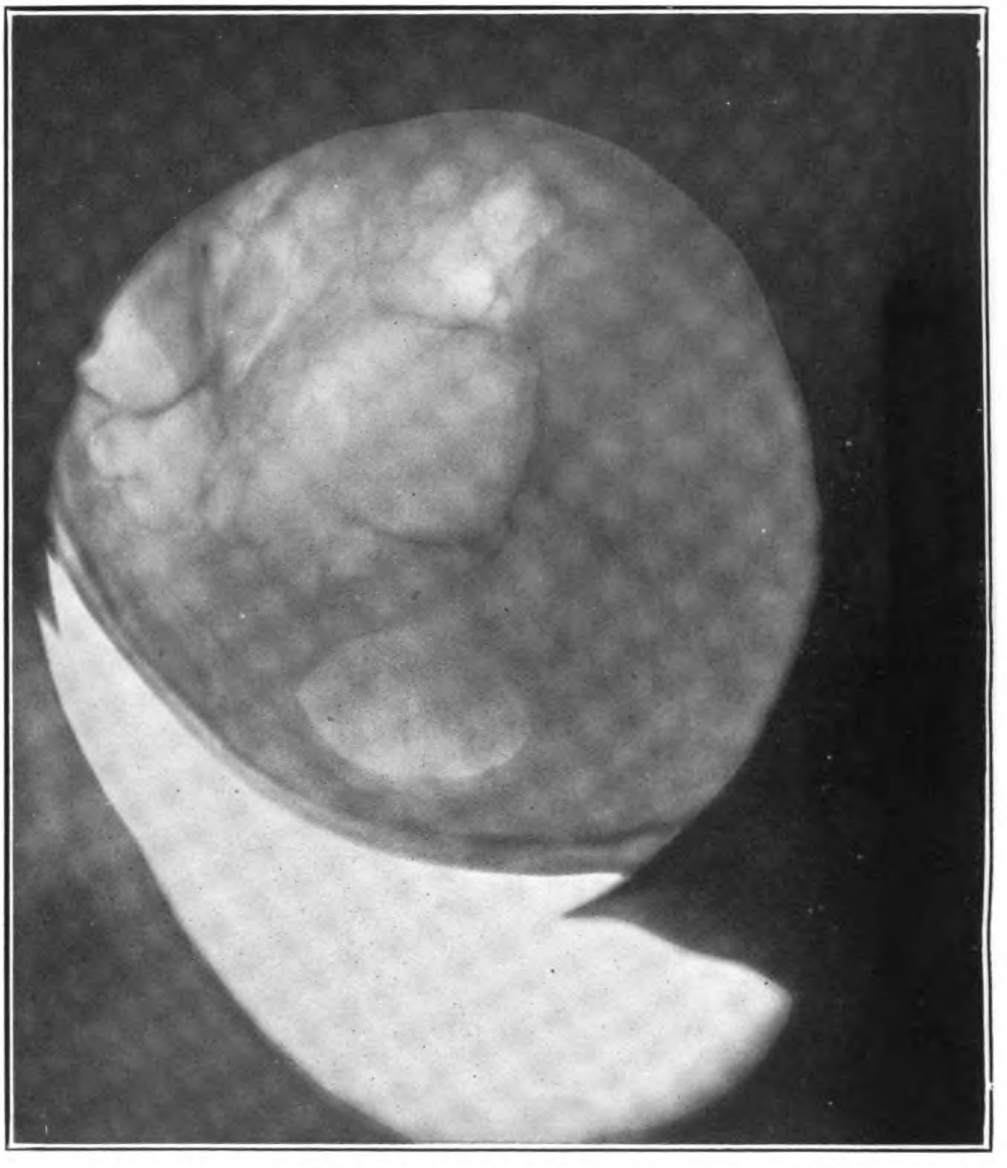


Graft from tibia inserted six months after suppuration had ceased. Radiograph taken seven weeks after operation shows slight growth of new bone along the graft. (See figure 3.)



Compound fracture of skull from high explosive. Trephine opening healed with pulsation of brain and adherent scar. Operation eight months later. (See figure 5.)

436–3



Two grafts from a rib remain in place five weeks after operation in spite of partial slough of the covering skin. (See figures 5 and 6.)

436-4

rigid as one that a cabinetmaker might insert; but in these simple cases the broken ends usually heal of themselves without the help of a graft. When the gap in the broken bone is a long one, and if, as often happens, one of the broken ends has been drawn out of line and has become fixed in a false position, the insertion of the graft is more difficult and its hold on the bone fragments is less secure.

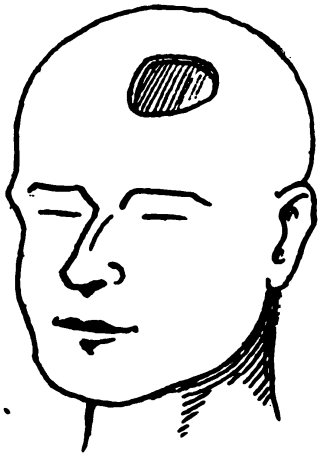


FIGURE 5.—Compound fracture of skull from high explosive shell, trephine opening healed with pulsation of brain and adherent scar. Operation 8 months later. Grafts from rib fixed in trephine opening.

In all of the cases thus far mentioned in this article the grafts were cut from other bones than the one to be grafted. It is, of course, possible to cut a graft from one end of a broken bone and slide it in its own groove into a slot cut in the other broken end of the bone, much as a bolt is slid from the door to the doorframe to hold the two together. The smaller fragment is sometimes placed in the gap caused by sliding the graft into place.

There are several drawbacks to this method of grafting. The bone from which the graft is cut is more or less weakened by the injury and probable inflammation which followed it, so that it is not as strong nor as healthy as a graft cut from a sound bone. The slot cut in one end of the broken bone is much longer than would be necessary if the graft were cut from another bone. This weakens unnecessarily the bone which one is endeavoring to repair. The damage done to a sound tibia by cutting a graft from it is so slight that it can not be considered to counterbalance this disadvantage of the sliding graft, certainly not if the graft is to be inserted in one of the smaller bones. It is technically more difficult to make a sliding graft fit accurately if the fractured bone ends are not exactly in line. These objections all have greater weight in the case of a smaller bone than in the case of the tibia or femur; also in case the gap to be spanned is a long one. Figures 9 and 10 illustrate the only sliding graft that has been employed in this hospital during the period of this report. Operation was performed by Dr. Meeker December 2, 1918, a graft about 2½ inches long being cut from the upper fragment of the ulna and slid into a groove prepared in the

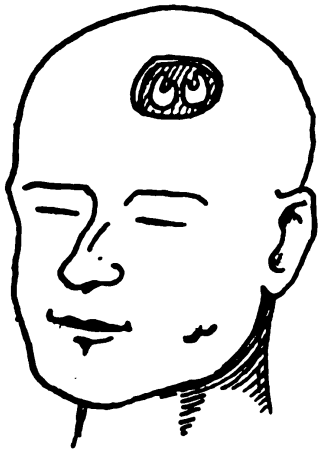


FIGURE 6.—Grafts in place 5 weeks after operation, in spite of partial slough of the covering skin.

lower fragment and fixed with kangaroo tendon. The wound healed primarily and the early result was good. Figure 9 shows the condition of the bone after seven weeks.

This patient wore a plaster splint, at first fixed and then removable, for more than two months, and the result appeared good. Three months after operation motion was noticed about 4 inches above the lower end of the ulna, apparently due to a lack of union between the graft and the lower fragment. It would not be fair to say that this was due to the type of graft employed, as it is one of the difficulties which one has to contend with in any type of grafting.

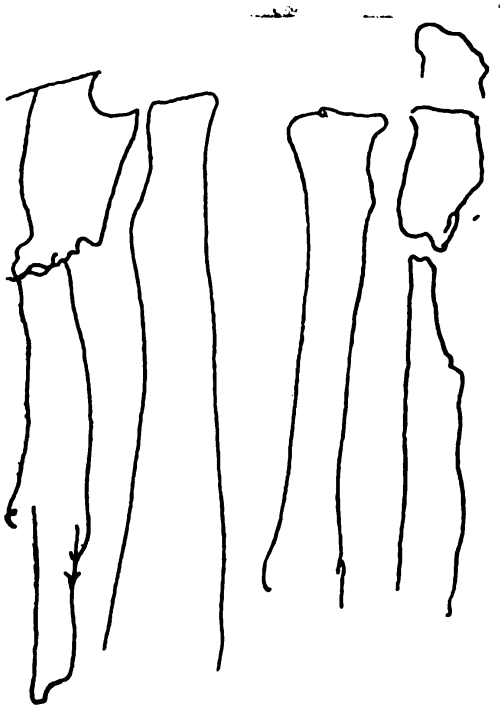


FIGURE 7.—Compound fracture of ulna from machine-gun bullet July 19, 1918. Arm entirely healed on entrance to New York Naval Hospital January 6, 1919. No bony union.

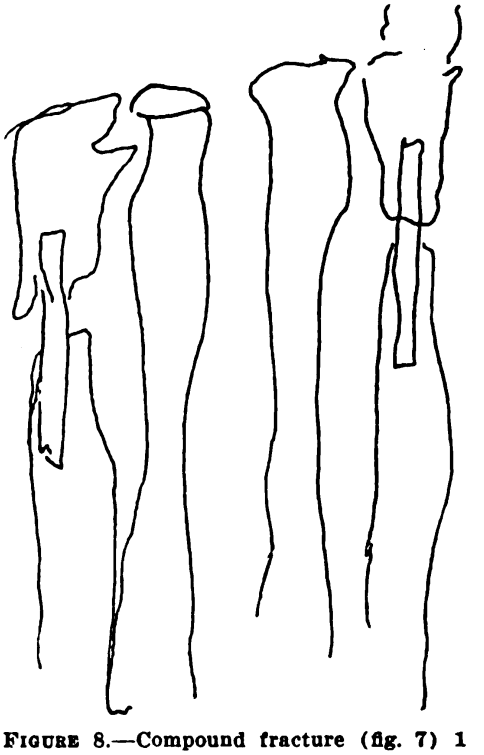


FIGURE 8.—Compound fracture (fig. 7) 1 month after insertion of a bone graft from the tibia; primary union of arm and leg; graft firmly in position; bone regenerating.

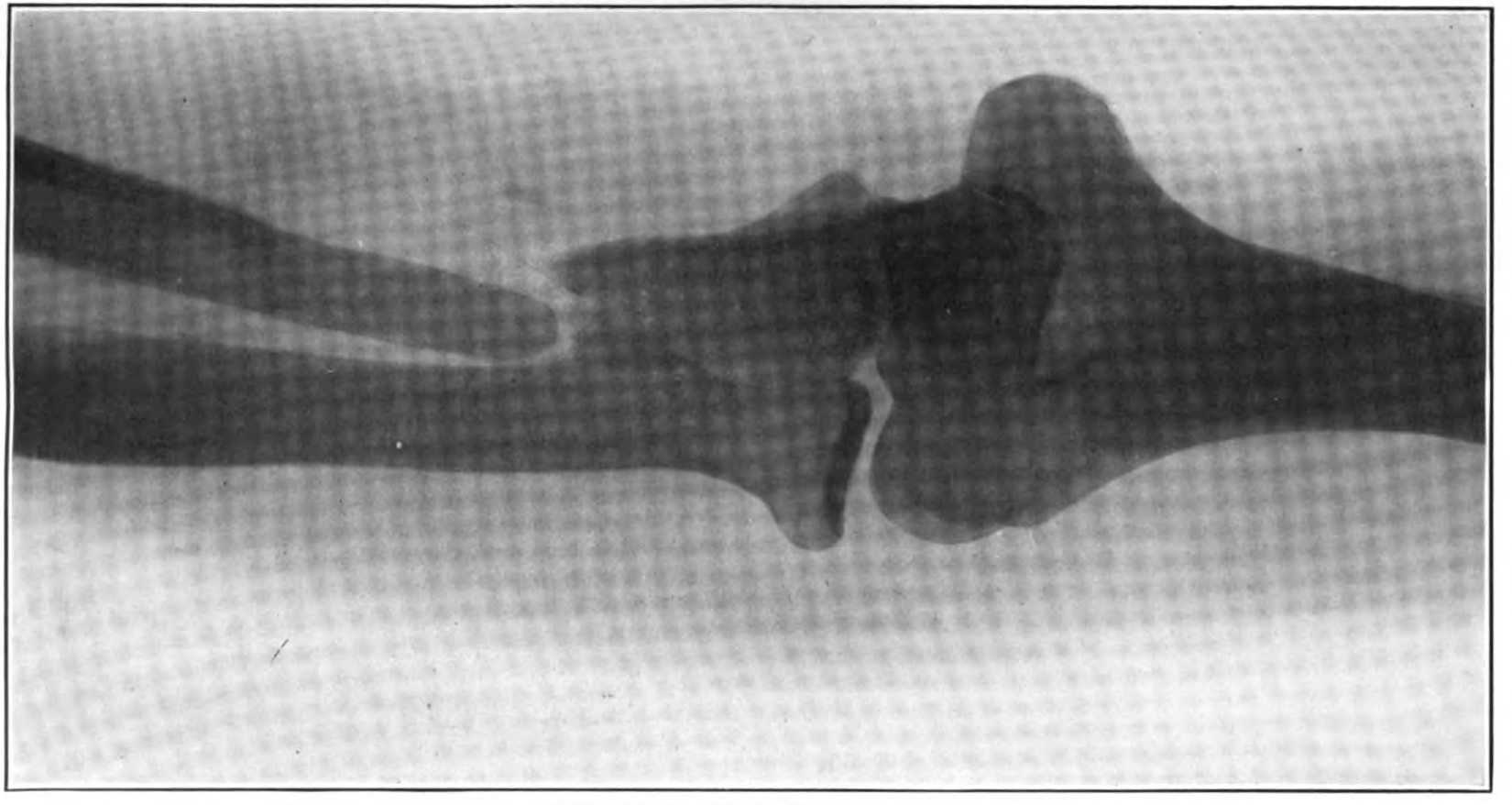
The operation of grafting is by no means difficult if one has an electrically driven small rotary saw with two blades adjustable at different distances from each other. The motor need not be sterilized, as it is readily held in a towel when used. The saws are fixed at a distance of one-quarter inch from each other, and sterilized. The stem on which they are fastened is slipped into the end of the motor and fixed by a screw. An incision is made directly down to the bone to be grafted. The periosteum is split and pushed back to either side. The slot is sawed and the fragment removed. This is done in each end of the broken bone. It is important, if the graft is to be cut from the tibia, that these two

Compound fracture of ulna from machine-gun bullet, July 19, 1918. Arm entirely healed on admission to hospital, January 6, 1919. No bony union.

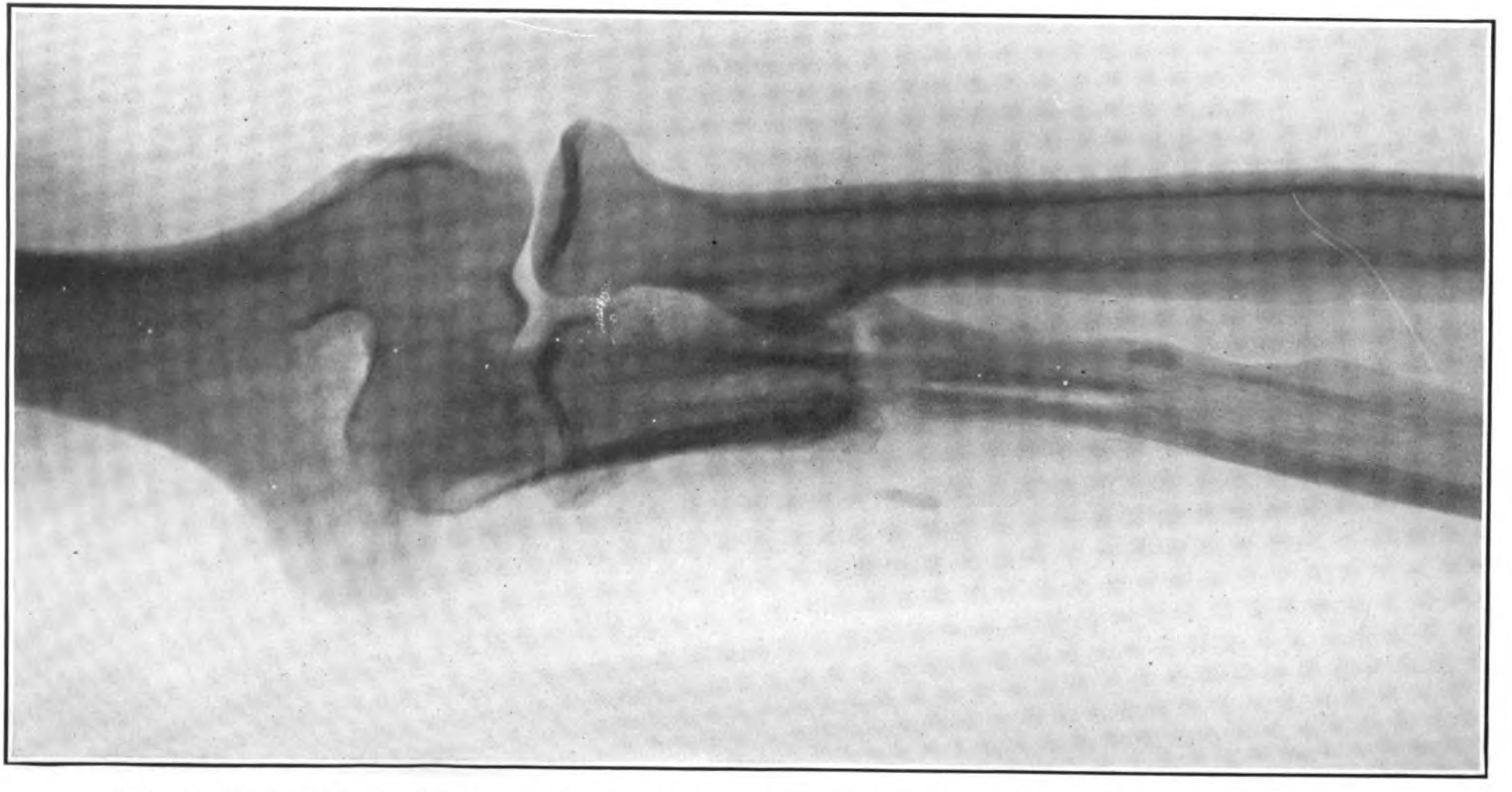
438-1

Radiographs one month after insertion of bone graft from tibia. Graft in firm position. Bone regenerating. Primary union of arm and leg.

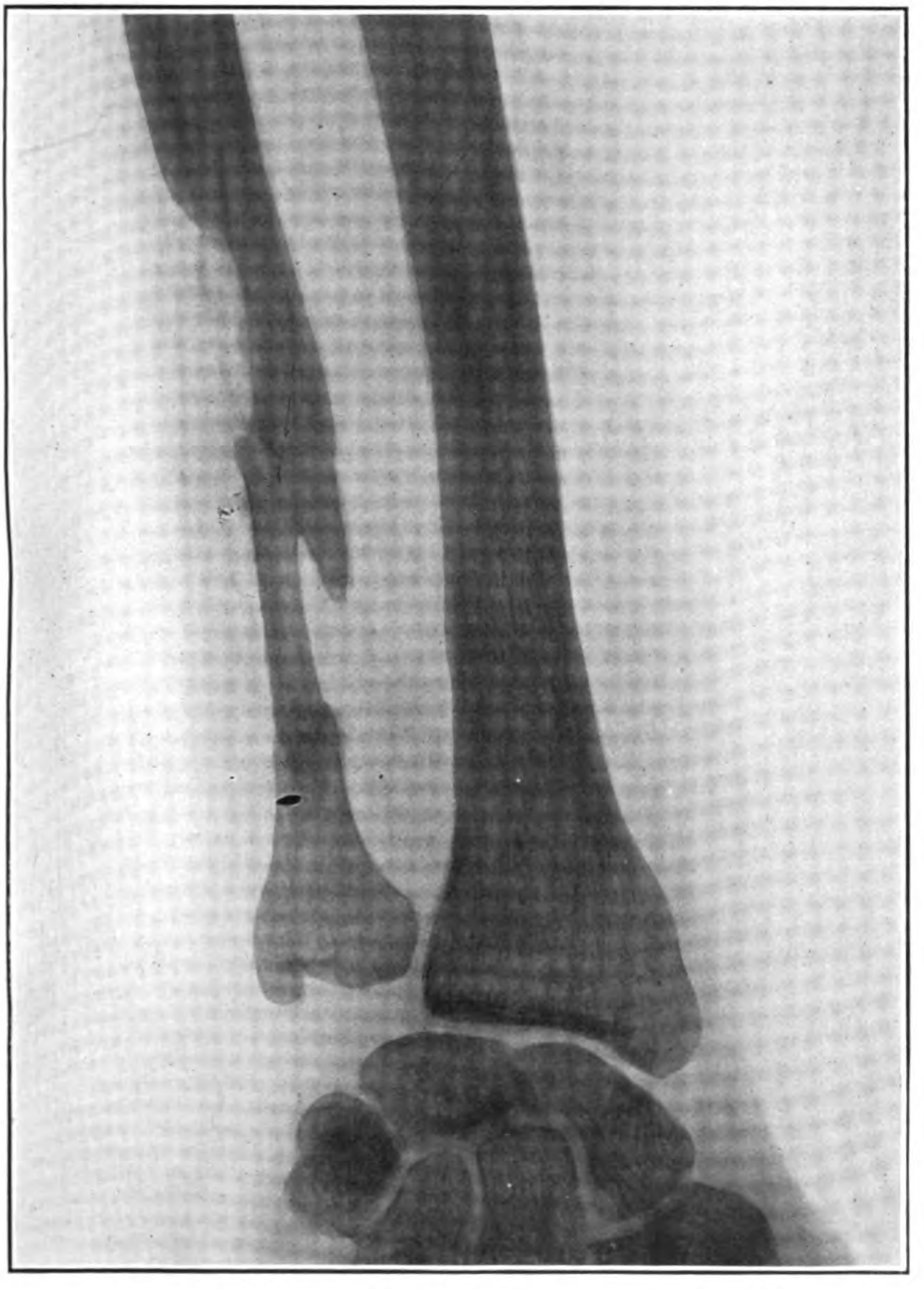
438-2



Compound fracture of ulna from machine-gun bullet, July 19, 1918. Arm entirely healed on admission to hospital, January 6, 1919. No bony union. (See figure 7.)



Radiograph one month after insertion of bone graft from tibia. Graft in firm position. Bone regenerating. Primary union of arm and leg .



Sliding graft of the ulna three months after operation. (See figure 10.)

Ulna fractured by revolver bullet. Prompt healing. Operation six months later. Sliding graft of ulna seven weeks after operation. (See figure 9.)

slots shall be exactly in line. An attempt to cut one slot out of line with the other, in the hope that the graft can be used to pry the broken ends into line, is almost certainly doomed to failure, either by fracture of the graft or by one end of the graft slipping out of place. The distance between the saws is widened by the addition of two washers equal to the thickness of the saw blades, and the stem and saws are resterilized. An incision is made down to the tibia, near the posterior border of its subcutaneous surface, but the periosteum is not cut. A graft is cut with the double electric saws. The periosteum remains attached to it if care is taken. The ends of the graft are cut across with a single electric saw, or a small chisel, and the graft is lifted from its bed and placed directly in the groove prepared for it in the broken bone. It may be necessary to chisel out this groove in places, or cut away more scar tissue in the gap between the ends of the bone, but if one takes the trouble to cut and fit a few grafts, using a basswood splint to practice upon, before attempting the grafting of bones, he can soon acquire an almost perfect technic in this respect.

FIGURE 9.—Fracture of ulna by revolver bullet. Prompt healing. Operation 6 months later; sliding graft of ulna 7 weeks after operation.

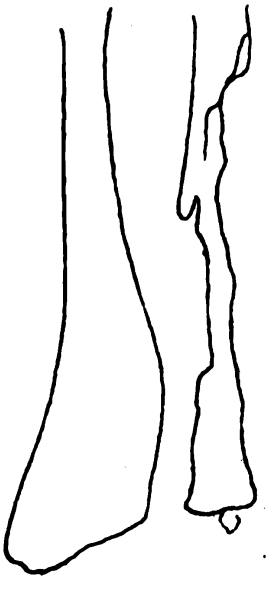


FIGURE 10.—Sliding graft of ulna 8 months after operation.

If the graft fits well and shows no tendency to ride out of one of the slots, two or three stitches of chromic catgut are all that need be used. They are passed through the periosteum or other soft tissues as close to the graft as possible. If the placing of the graft is less firm, or if a single bone like the humerus is grafted, the graft may be fixed more securely by driving small bone pegs into holes drilled in the sides of the slot near the upper surface of the bone.

The soft parts are sutured over the graft, if possible in two lavers, by a buried suture of plain or fine chromic catgut, and an intracuticular suture of plain catgut. A dry dressing is bandaged in place, and the arm fixed in a light plaster splint, which should include the joints above and below the grafted bone.

The wound of the leg is closed in the same manner as that of the arm, absolutely no drainage being employed. A blood clot fills the

gutter cut from the tibia, and the wound heals aseptically with very little discomfort to the patient. One patient without permission got up and walked about on the second day. He was put back to bed promptly, but no harm resulted from this early use of the leg, nor is it easy to see how any damage would be likely to occur, as no muscles are exposed and the incision is well away from the joints.

If there are no symptoms to indicate other treatment, the plaster dressing on the grafted limb is not disturbed for two weeks or longer. It is then cut off, the wound dressed, and another light splint applied, circular or removable as the case may be.

There are three complications which may follow bone grafting. The first is suppuration. This may amount to little more than a stitch abscess, and may not defeat the object of the grafting. If more active it will require drainage, and the removal of the graft. Thus far I have not had this complication in a form requiring removal of the graft, but it may be necessary in the case shown in figure 13 as one end of the graft is misplaced.

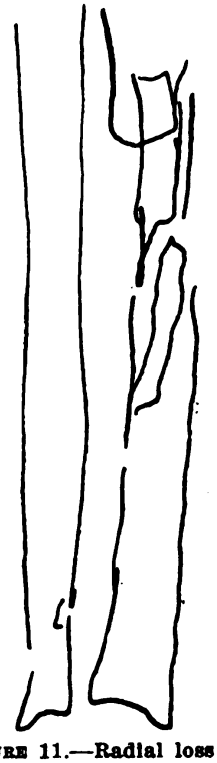


FIGURE 11.—Radial loss due to explosive shell July 19, 1918. Bone graft from tibia October 4, 1918; primary union; fracture of graft due to fall 3 months after operation.

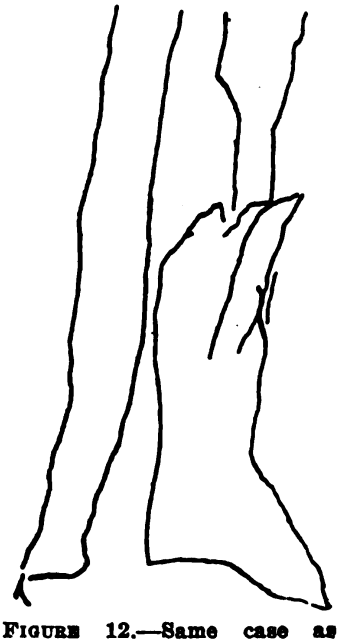
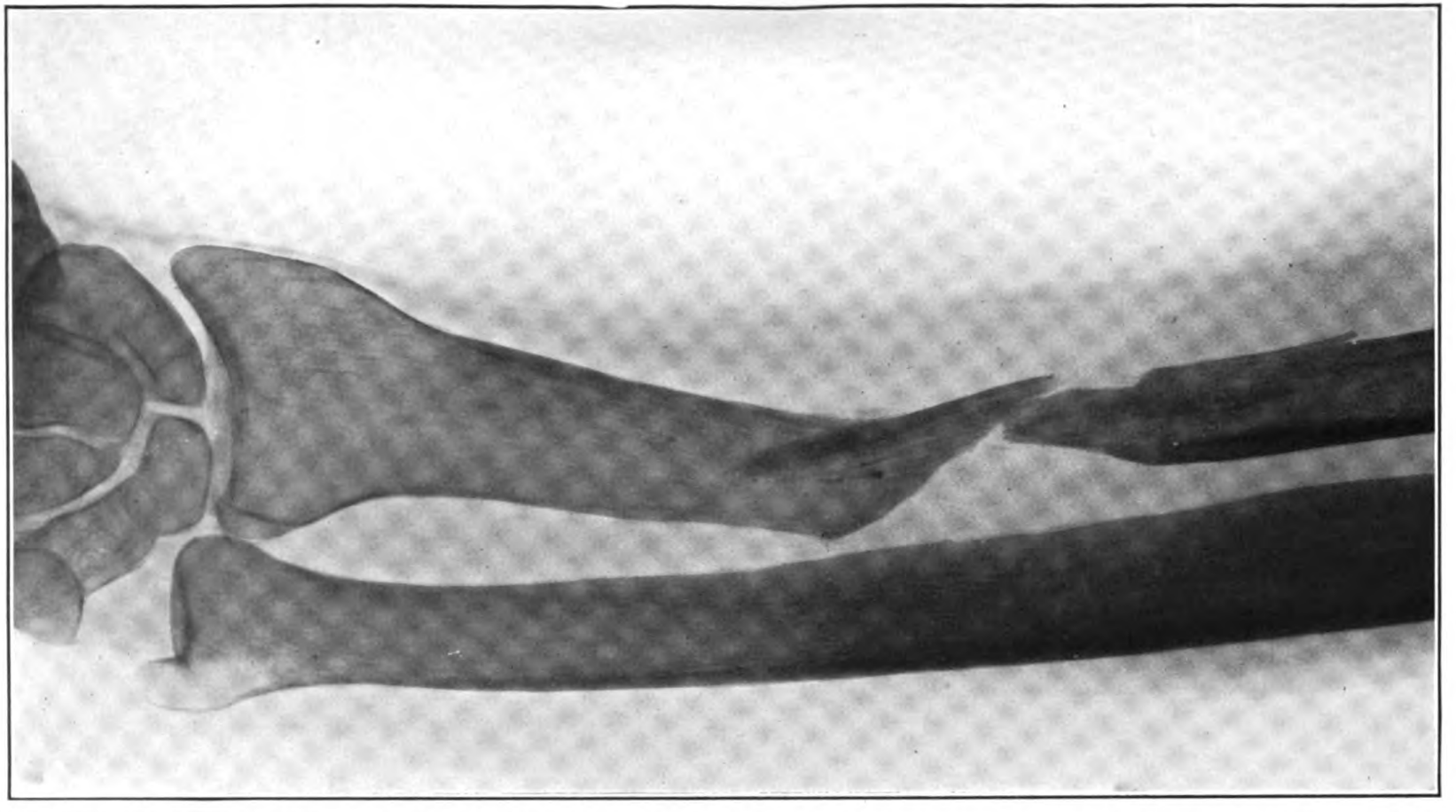


FIGURE 12.—Same case as figure 11, 5 weeks later, showing continued growth from fractured graft.

Another complication is fracture of the graft. This occurred in a bone graft removed from the tibia and implanted in the radius. The patient was operated upon by Dr. Bowman at this hospital. The wound healed primarily. Three months after operation, the patient fell down and hurt his arm. The X-ray showed that he had broken his graft near the center. (Fig. 11.) Another X-ray taken two months later showed a good growth of new bone from the broken graft as well as from the ends of the radius.

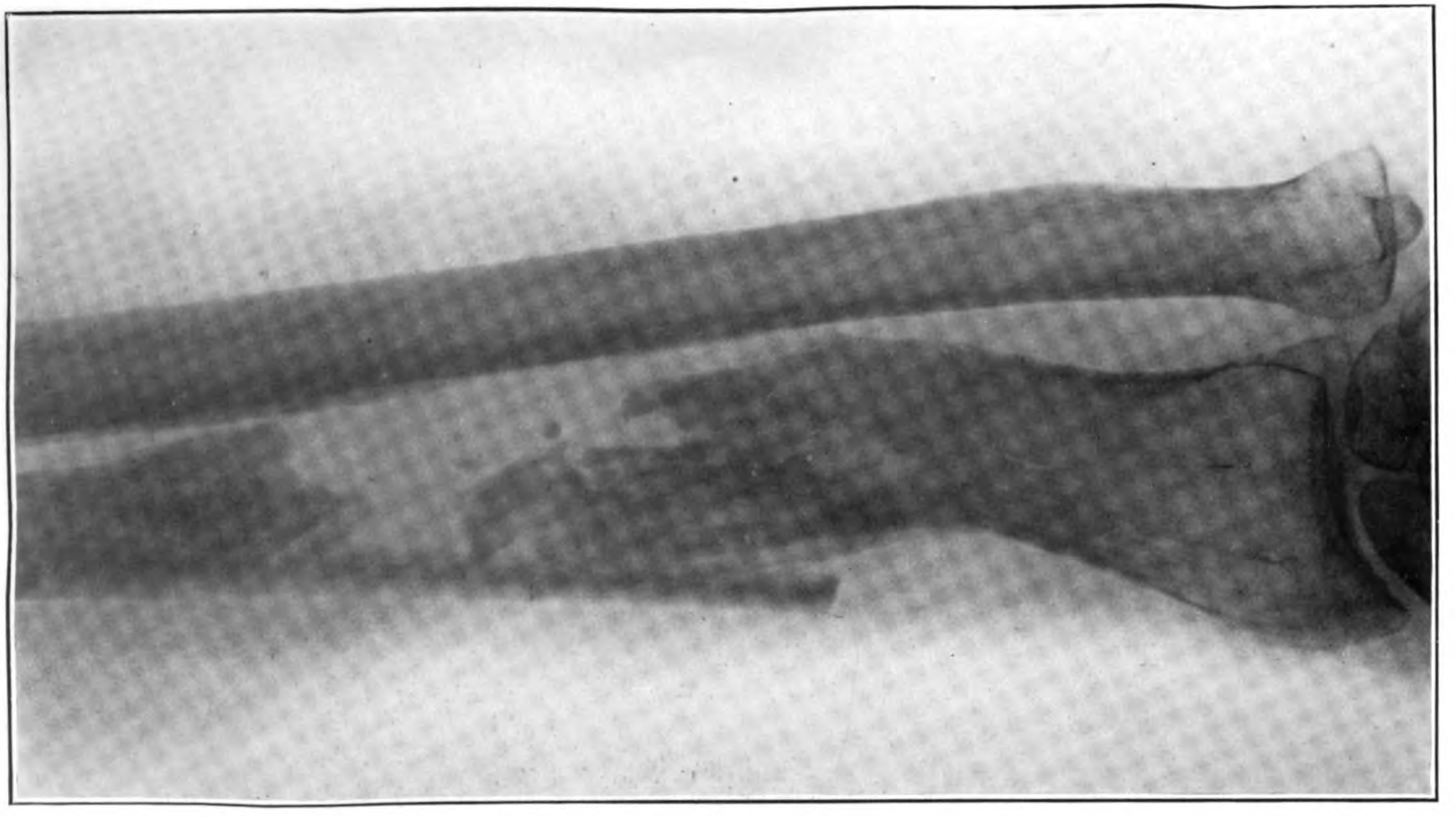
A third complication is loosening of the graft probably from one end. A poor fitting of the graft at operation; the bad alignment of the slots, so that there is a strain on the graft; and sup-



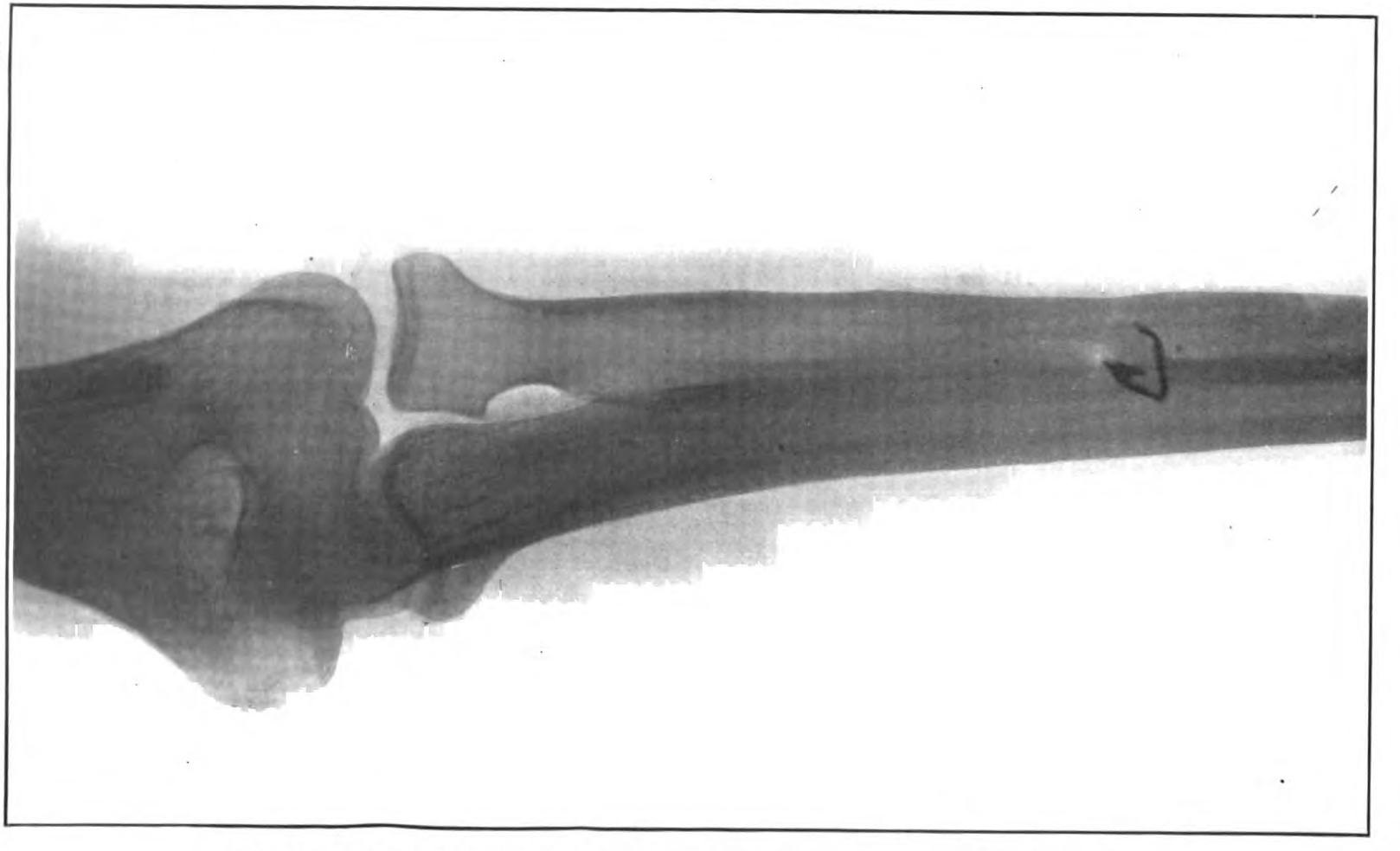
Radial loss due to explosive shell, July 8, 1918. Bone graft from tibia, October 4, 1918. Primary union. Fracture of graft due to a fall three months after operation. (See figure 11.)

Same case as 11. Radiograph taken five weeks later shows continued growth from fractured graft.

440-3



Comminuted fracture of radius due to high-explosive shell. Lower fragment badly shattered. Prolonged suppuration. Operation one month after end of suppuration. Sluggish suppuration; graft loosened; outcome uncertain. (See figure 13.)



Graft inserted in radius which still contained a buried piece of silver wire. Primary union; firm bony union.

puration are the most likely causes of displacement. In the case figured in figure 13, the cause may have been a very slight suppuration, or it may have been due to the fact that the lower third of the fractured radius was so badly shattered that the graft had a very poor hold in the slot.

FIGURE 13. — Comminuted fracture of radius due to high explosive shell. Lower fragment badly shattered. Prolonged suppuration. Operation 1 month after suppuration ceased. Sluggish suppuration; graft loosened; outcome uncertain.

Foreign bodies, at least small metallic ones, do not seem to give rise to any complication in bone grafting. Many of the war wounds caused by high explosive shells heal up, although there are numerous small bits of metal in the soft parts and even in the bones. Naturally, they are removed when accessible, but it does not seem to be good practice to cut the tissues into shreds in the hunt for every last bit of metal. The same pathology must underlie repair after bone grafting as operates during repair after injury. A good illustration of the indifference of a bone graft to a small foreign body is shown in figure 14. This patient had a fracture of the radius, which was wired, but without success, although the wound healed perfectly. In this condition he entered this hospital. The X-ray showed a nonunion of a nearly transverse fracture, with a double loop of silver wire. Unfortunately, the X-ray plate was broken. The broken bone was exposed, and the greater part of the wire removed, but it was so firmly imbedded in the bone that it broke below the surface of the bone, and in order not to weaken the bone too much by their removal, the pieces of wire were left in the bone. A graft was inserted from the tibia and the wound sutured and the arm put up in plaster. Primary union resulted, and a firm bony union followed.

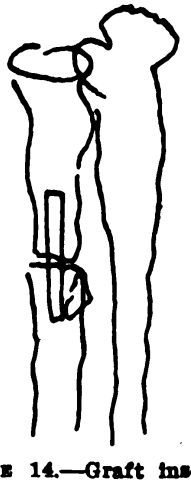


FIGURE 14.—Graft inserted in radius, which still contained buried pieces of silver wire. Primary union; firm bony union.

One question remains to be answered. What bone in the body furnishes the best graft? One thinks at once of the tibia. Certainly no other bone is so accessible, and none could give fewer symptoms after the graft is removed from it. But a tibial graft is brittle. It may be broken not only in an accident such as a fall on the grafted limb but it is sometimes broken in prying it from its bed in the bone, although no very great force is used. Moreover, it is absolutely rigid and can not be adjusted to a

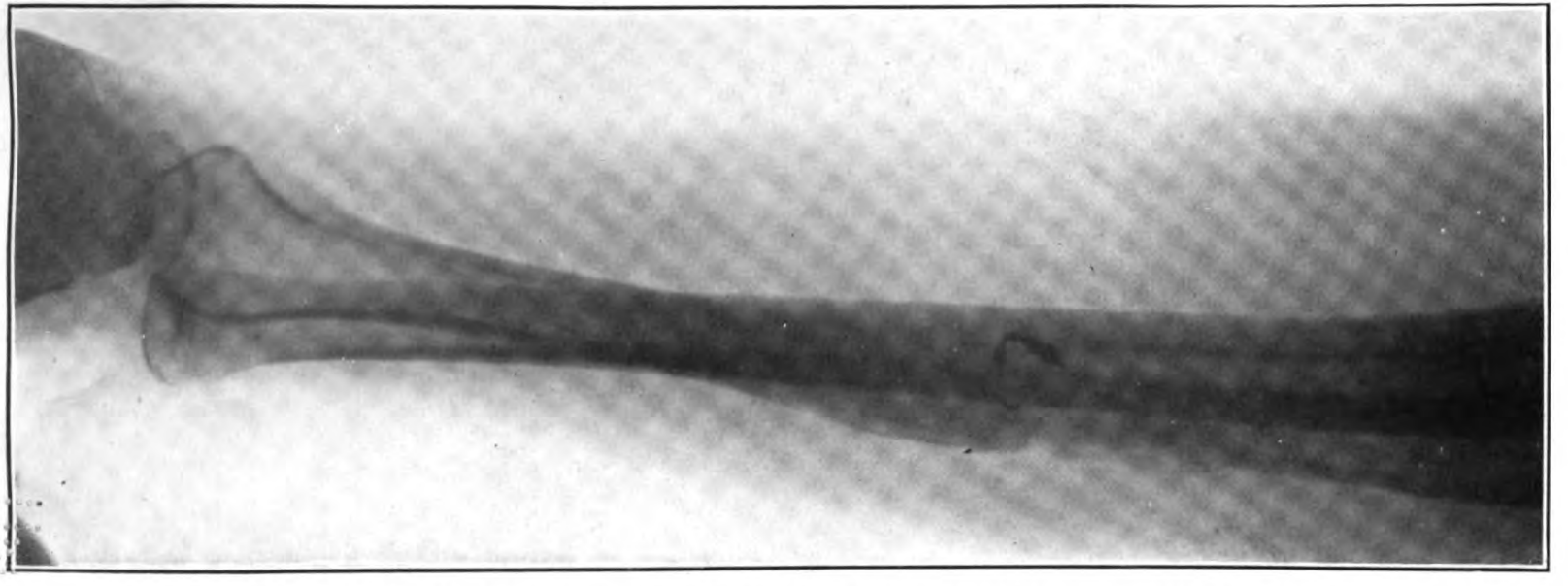
slightly irregular alignment. A graft from the rib is quite different. It is very tough, so that it can be bent almost double without breaking, and yet it holds its shape. Its greater vascularity, and the persistent way in which a rib reforms after a portion is removed for drainage in empyema, strongly suggests that it may have a valuable power of growth as a graft. The graft from it has to be chiseled out, but this is not difficult if one has a few thin chisels with sharp edges. If a graft from the rib will outgrow one from the tibia, this virtue alone will outweigh all the disadvantages of cutting and shaping it in many cases. For if the gap to be spanned is considerable, a graft is of little use unless it will either grow thicker itself or induce growth in the grafted bone. If one of these two things does not happen, the graft is almost sure to be broken sooner or later. Further experience is needed to decide what bone makes the best graft for the long bones; for the skull the question seems to lie between the ribs and the costal cartilages.

INTERNAL DERANGEMENTS OF KNEE JOINTS.

By C. F. Painter, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

There are two periods in young manhood when there seems to be an unusual number of injuries of the knee joint which come under the heading of "internal derangements." These are at the two extremes of adolescent life. There is a notably greater incidence of semilunar-cartilage displacements in the period of boyhood when football is first played as a part of organized athletics in public, high, and private-school life. Boys at that age if they are big and husky are promising candidates for football teams, but are too poorly knit together to withstand the hard knocks of the game as it is played by young men in late adolescence, the period covered by collegiate training. This is noticeable in civil practice. On entering the service of the Navy I was quite surprised to find so many cases of semilunar and other knee-joint injuries among young men of from 20 to 24 or 26 years of age. On analyzing the cases it would appear that the greater incidence of these in this period, and in the naval service, is due to the strenuous existence lead by these young men and the traumatisms incident to the service and the athletic contests in which Navy men engage.

The more common injuries among these men are semilunar-cartilage displacements, injuries to the bursa beneath the biceps femoris tendon just above its insertion into the fibula, and hypertrophies of the alar ligaments.



442-1

Graft inserted in radius which still contained a buried piece of silver wire. Primary union; firm bony union.

These lesions all give symptoms more or less alike so far as the subjective features are concerned. Their objective signs may not be notably different except in the case of the bicipital bursæ.

The failure to discriminate between these lesions and simple traumatic ruptures of the lateral ligaments of the knee joint or synovitis of the knee are often attended by consequences which may be more or less serious as is shown by one of the cases reported later on in this communication. In this case the diagnosis had been "undetermined" for several weeks and the patient had been returned to duty; he had fallen twice because the knee suddenly gave out under him and he was sent to the sick bay with a diagnosis of fracture of the humerus. On another occasion he dislocated a thumb in the same manner. He had been confined in the hospital, or away from duty because of "leave" granted after these injuries, for several months all told. This represented a distinct loss of service to the Navy and an expense for carrying this man the 14 months which had elapsed since the injury, most of which might have been avoided had the correct diagnosis been made when it was first possible.

Semilunar-cartilage injuries are of two kinds. In one variety the ligamentous connection between the tibia and the face of the semilunar cartilage is torn away and the cartilage acquires a mobility which permits a catching in the joint at times, but seldom any locking of the articulation. Associated with this catch there is usually an effusion; almost always in the earlier repetitions of the catching. There is pain at the time and lameness, with a definitely localized tenderness along the line of the ruptured ligamentous connections with the cartilage.

This second class of cases is concerned, as is the above, with the internal meniscus of the semilunar cartilage in a great majority of cases, and besides having had the anterior ligament torn away the cartilage has been fractured. As a result of this there is a free end of cartilage, which flaps in and out of its normal position. This free piece may be detached from its anterior ligamentous connections for as much as an inch or an inch and a half. This break occurs at about the same place in all instances, viz, at the junction of the inner and middle thirds of the internal meniscus. The free end sometimes turns up at right angles to the direction in which it normally lies and projects itself in between the femoral and tibial condyles, where it becomes shredded by the traumatism of repeated crushes. This is observed more particularly in the old untreated cases. An inevitable effect of the looseness of this cartilage is injection of the synovia in the region traumatised, effusion into the joint repeated with every redislocation, resulting at last in more or less thickening of the synovial membrane, and traumatism to and

hypertrophy of the alar ligaments, causing an interference with the function of the joint from this alone. It is impossible to cause an injury which will tear or rupture the semilunar cartilage when the leg is fully extended, unless it is associated with a fracture or dislocation of the knee joint proper. The force which produces it must be delivered while the leg is flexed to some extent and the pressure exerted upon the outer side of the knee or the inner side of the leg, directed either inward or upward and outward, as the case may be. If when the foot is held immovably on the ground and the body is turned forcibly outward, i. e., in the reverse direction of the hands of a clock as regards the knee in question, the leg is slightly flexed, at the same time the cartilage may be dislocated. Rarely the outer semilunar meniscus is dislocated, and causes the same set of symptoms referred to the outer aspect of the knee. This external dislocation is frequently associated with bicipital bursitis, the cartilage being found protruding into the bursa through the opening which so frequently connects the bursa with the knee joint.

Given a history of injury to the knee joint sustained in the manner above described and especially if under similar provocation, there is repetition of the initial symptoms of pain, effusion, disability, flexion deformity, and tenderness referred to the internal or external meniscus, one is reasonably sure of the diagnosis of a semilunar dislocation. This needs to be distinguished from osteochrondritis dessicans (the ordinary "joint mouse") and hypertrophied alar ligament fringes.

Radiographic studies will assist in this differentiation and here it may be remarked that it will be found of much assistance in employing the X-ray to determine the presence of a displaced semilunar cartilage by the ordinary methods of exclusion of other things if oxygen is injected into the quadriceps pouch. This separates the synovial surfaces widely, leaving an absolutely black space wherever the joint surfaces could be separated, and if the cartilage is loosened from its moorings, the oxygen will work its way in behind it and show a black area there also. These appearances are identical with the black areas one sees in X-rays of the intestine where gas has accumulated. Bodies possessed of any opacity are thrown into high relief against this background. This method I first saw in use in the clinic of General Sir Robert Jones, of Liverpool, England. It has the merit of furnishing positive instead of merely negative evidence in a majority of cases of semilunar-cartilage displacements. Once this diagnosis is made, after careful study and examination, there is no treatment at all satisfactory except excision of the displaced meniscus. Every knee joint should be gotten ready for operation by a two-day local preparation and by the administration of 20-25 grains of urotropine per day for two or three days before, and four or five days after

operation. The technique of the operation is simplified if done with the leg flexed. The incision which affords the best exposure in a majority of instances is a slightly curved one with the curve toward the median line at its lower third. The upper two-thirds is parallel with the long axis of the femur and tibia and crosses the line of the joint after it has commenced to curve at a point over the juncture of the middle with the inner third of the internal meniscus. Nothing but instruments should be inserted within the joint and it is better to perform the operation under a tourniquet. On only two occasions have I seen a hemorrhagic effusion in a knee joint after this operation when done under a tourniquet. If the vessels are caught up before the capsular stitches are taken, any possible trouble would be avoided, and the advantages of the clean field, which are secured by the use of the tourniquet, would be enjoyed.

The capsule should be closed separately from the skin and without drainage. The first dressing should be applied with firm compression from an elastic bandage. Fixation in a cast or ham splint is not necessary, and early manipulation is desirable. At the end of a week passive attempts to secure flexion should be made and by the end of the second week right-angled flexion should be possible. When this has been attained walking may be permitted, and by the end of the third or fourth week, at the most, good function should be restored. Massage and resistive exercises should be directed to the thigh muscles (extensor and flexor) for a long period after the operation or until there is practically no atrophy remaining.

The diagnosis of hypertrophied alar ligaments is suggested when, after a trauma to the front of the knee joint, or a severe strain unaccompanied by any history of locking at the time of the injury, the joint shows local swelling on either side the patella, and slightly below it. There is rarely any effusion in the articulation but capsular thickening is quite common. The symptoms develop progressively two or three days after the injury and consist of pain or ache in the joint, particularly after standing or walking for a time. Complaint is made of a feeling of distention in the joint and stiffness which develops after keeping the leg in one position for a considerable time. When the trouble is marked there is often a sensation of pinching in the joint, but the carrying out of the motions is not prevented as it is in the semilunar dislocations. In the very chronic cases there may be some continuous inability to completely extend but without pain or sense of locking.

If such patients are put to bed at the beginning of the trouble, within two or three weeks of the time that the trouble starts or a diagnosis made, and a cast applied so that no further trauma may result to the hypertrophied ligaments, the proliferated tissue will be absorbed and the ligament be restored to its normal size. These injuries are

purely traumatic. The initial trauma may be slight, but once the ligament becomes hypertrophied it is very easy, through the everyday use of the joint, to add to the original injury little by little and create a situation from which it is hard to recover, necessitating operative interference in some instances.

The alar ligaments serve as automatic distributors of the synovial fluid over the face of the femoral condyles. They are covered by synovial membrane and are made up of a mixture of fat and connective tissue in such proportion and so arranged that a very plastic sort of a "sweep" is made useful for the purpose of keeping the synovial fluid properly distributed.

Trauma causes proliferation of both the fat and connective tissue elements, and the entire ligament becomes converted into a gristly, hard substance that easily gets in the way of the flexion and extension of the leg. The synovial membrane becomes congested and injected, as does the synovia in the immediate neighborhood where the hypertrophied alar ligaments chafe against it.

If operative treatment is indicated, and it is in the chronically irritated ones at any rate, the best route to approach them is through a lateral incision on the inside of the joint, starting close up to the muscle near the top of the quadriceps pouch and about halfway between the edge of the patella and the adductor tubercle. With good retraction the hypertrophied ligaments are easily exposed and, with scissors, may be dissected out from the space between the front of the femoral condyles, the face of the tibia, and the inferior surface of the patella. Hemorrhage (venous) from this may be annoying, but can usually be controlled by washing out with hot water. The preliminary and postoperative treatment should be the same as in the semilunar lesions. After removal of the stitches the joint should be manipulated daily until full motion is restored. Because of denudation of synovia a tendency to the establishment of adhesions is rather more noticeable here than after semilunar operations, and therefore attention to the "follow-up" treatment is imperative. Prognosis is good in these cases.

The third lesion referred to above, viz, bicipital bursitis, is apparently a purely traumatic affair, but the trauma is that of the inordinate use of the biceps femoris, combined with the fact that there is a minute communication between this bursa and the knee joint. The typical bursitis is shown by swelling the size of a 25-cent piece over the outer aspect of the knee joint beneath the tendon of the biceps and about one-half an inch above its insertion into the fibula. This is hard, tense, and full of a gelatinous material. The lining of the bursa is commonly somewhat thickened. Apparently when trauma is inflicted upon the outer side of the joint the external semilunar may be dislocated; and as the normal communication between the

bursa and the joint opens right at the insertion of the cartilage along the head of the tibia, I have on two occasions found a portion of the semilunar actually pushed out into the bursa through this opening.

The symptoms of this bursitis are pain over the region described above and tenderness to pressure. Sometimes the patients limp a good deal. In the Navy it has seemed to me the fact that all the cases seen have been in seamen who have been obliged to climb up and down ladders a great deal, which is an exercise calling upon the biceps femoris for a good deal of work. It may well be that this, coupled with the fact that a communication with the knee joint is of very frequent occurrence, would account for stirring up the bursa, and attracting fluid into it from the knee joint.

The operative removal of this is the only method of treatment that gives permanent relief. The bursa should be dissected out and tied off from the knee joint. Care should be used in the dissection because the external popliteal nerve is close to the head of the fibula and the biceps tendon; it has been injured in this operation with a troublesome peroneal paralysis.

The following cases are the ones referred to earlier in this paper, and are cited chiefly to indicate the importance of an early diagnosis in troubles involving the knee joint.

Case I.—J——, F–2, 22 years, March 29, 1919. While hoisting a timber with a jigger beneath a wharf the stick struck his lower leg from below and forcibly drove it up and out, knocking him off the girder upon which he was standing. Could not straighten the knee, but was able to go to sick bay of his own accord. Iodine was rubbed on it, but nothing else was done for it. For 10 months there was nothing else done for it, and then he was sent to the City Hospital on Blackwells Island, but no recommendation for treatment was made, though at that time the leg was flexed and could not be extended. Shortly after this he was able to secure extension of it by his own efforts. After that he was sent back to duty and repeatedly since then there has been a redislocation of the cartilage, which he has been able to manipulate back into place himself, but until he does there is no power to extend the leg completely. Sometimes it dislocates itself several times a day. Sometimes a long time may elapse between dislocations. There is now no swelling connected with the dislocation, but pain invariably occurs. The last time was a week ago. There have been a dozen or more X-rays taken, which are said to be negative.

Physical examination: Well-developed and well-nourished man. Left knee appears normal, though the thigh and calf are slightly atrophied. In the sulcus between tibia and femur can be felt a resilient, slightly movable mass where the internal meniscus of the semilunar lies. It is slightly tender over this place. There is no

swelling of the soft parts or effusion in the joint. Flexion and extension of the leg are normal in extent and without spasm of muscle.

Diagnosis: Dislocated internal semilunar cartilage.

Case II.—G ——, U. S. M. C., 27 years, December 25, 1916. In practicing high jumping he fell on the left knee striking on the side, with the leg in a position of flexion. Had to be picked up and carried to quarters. Leg could not be completely extended for three months. There was much swelling and pain with tenderness over the inner aspect of the left knee.

He remained in bed with knee bandaged for four days, and was then returned to duty on December 30, 1916 with diagnosis of sprain. On January 6, 1917, reported again to sick bay because of synovitis and pain in knee. Then was transferred to hospital, where the diagnosis of synovitis was continued. He was kept in bed 10 days, where he was given exercises and massage. On January 17, 1917, there was limitation of motion in flexion of the knee. On the 28th there was still some swelling and disability. On March 9, 1917, it is recorded that he was "exercising freely without marked discomfort." He was discharged to duty on this date.

From that time to November 18, 1918, no mention is made in his health record of any further trouble with the knee joint, though the patient says that after March, 1917, when the hospital discharged him to duty with a diagnosis of sprain of knee, there had been about a dozen occasions when a slip occurred in the joint accompanied by pain, swelling, and limitation of motion. In the above-mentioned interval he had had the diagnosis of mumps, urethritis, influenza, and chronic articular rheumatism.

On March 3, 1919, he had a displacement of something in the left knee joint, which was accompanied by effusion and pain. On that occasion he stated that from time to time this had occurred, during the previous three or four months, with comparatively little provocation. He could do no bayonet drill without causing a slipping of the cartilage.

On March 12, I had an opportunity to examine this man's knee. He stated that there had been recently three or four slips of the same sort that he had been having before. There was a moderate effusion, tenderness over the inner meniscus of the left semilunar and a palpable mass to be felt filling up the sulcus between the tibia and the femur. Forced extension and flexion are slightly painful. Calf and thigh show slight atrophy.

In view of the history and physical signs, it seems certain that this man's semilunar cartilage had been displaced on Christmas Day, 1916, but the diagnosis has been carried as a "synovitis" or a "sprain," so far as the knee joint lesion was concerned, ever since.

THE CLINICAL MANIFESTATIONS OF TROPICAL SPRUE.[1]

By E. J. Wood, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

Before the Association of American Physicians in 1915 I [2] called attention to the occurrence of tropical sprue in the Southern States among those who had not lived nearer the Tropics and who had not visited there. Since that time the number of cases recognized has increased, and the disease is slowly becoming one of importance in these States. When the subject was discussed before the Medical Society of North Carolina [3] in 1918 it developed that quite a number had observed the condition, though not recognizing it as sprue. The evidence points to the existence of the disease in North Carolina, South Carolina, and Georgia at least. One of my series was from New Hampshire. He had lived in North Carolina 25 years ago, and had visited Florida once.

Having nothing new to add about the nature of the disease, and no further suggestions in the treatment, it is with some reluctance that I bring the matter up again; but, having in mind the location of so many of our larger Army camps in the South, it has seemed justifiable to point out the possibility of its existence in the hope that it might be of aid to medical officers who have had no acquaintance with it.

By the term "sprue" is meant a chronic disease characterized by a sore mouth and tongue, diarrhea, anemia, and a marked tendency to remission. The diarrhea is peculiar in that the movements are large and soft, acid and filled with gas bubbles, light in color, and very offensive. There is a marked tendency for the movements to occur in the early hours of the day with cessation in the afternoon and earlier hours of the night.

Many conditions have been confused with sprue and the term has been used in a very elastic manner. The very synonyms of sprue have often been erroneous. For example, Cochin-China diarrhea is given as one of these, while this is a distinct disease entity. Added to this is more confusion brought about by the views of such men as W. E. Musgrave and T. W. Jackson who regard it not as a definite disease but as a condition or state which may occur in many of the intestinal affections. In spite of all this there is a generally recognized, more or less definite group of symptoms under the name sprue. The inveterateness of the condition and the large number of deaths attributed to it certainly justify the most serious consideration. The unsettled state regarding its place in medicine only tends to justify more investigation and more published records in order that the condition may be more generally recognized and consequently more carefully studied.

---

[1] Read before the Association of American Physicians in May, 1918.

[2] Trans. Med. Soc. of North Carolina, 1918.

[3] Trans. Assn. Am. Phys., 1915, and Am. Jour. Med. Sc., November, 1915.

In the Southern States sprue is being very generally confused with pellagra. This fact seems to justify the position which I have always assumed regarding the diagnosis of the so-called pellagra-sine-pellagra.[1] Owing to the large number of cases incorrectly diagnosed because the skin lesion was not counted essential in pellagra it seemed justifiable to assume the position that unless the skin lesion was present or there was a very definite history of it the diagnosis should not be made. In those sections where pellagra has existed for many years and the medical profession is very familiar with it the diagnosis might possibly be ventured, but our experience seems not to justify it. There are cases in which I have been utterly unable to distinguish between the two when the skin lesions were absent and the feces had not been studied. This difficulty is often lessened by a more careful study of the whole skin surface for inconspicuous lesions. I now have under observation a case which was diagnosed as sprue and referred to me. There was no history of a skin lesion nor any evidence of it on admission to the hospital. After five days' observation there is now a very slight indication over the knuckles and the webs of the fingers of a desquamating process which is enough to establish the diagnosis of pellagra. It is interesting to note in this case that the tongue is not typical of sprue but in itself suggested pellagra. The feces were liquid rather than soft and without the excess of fat. The anemia was not marked as is the case with sprue.

The name sprue and the commoner understanding of the condition placed the emphasis on the mouth symptoms. As the disease is now regarded this is only one of a group of several symptoms and, indeed, cases of sprue are recognized by some writers in which the mouth symptoms are wanting just as, again, there are cases of sprue without intestinal symptoms but with marked mouth symptoms. Such cases have been designated "incomplete sprue."

The descriptions of the mouth symptoms in sprue are very numerous and in many instances the variations are marked. Manson[2] gave the most exact account of this group of symptoms, which may well be quoted. He said: "Tenderness, and often great soreness of the tongue, buccal mucous membrane, fauces, and sometimes of the gullet, depending on a complexity of surface lesions including (*a*) denudation of the epithelium of the mucous membrane generally; (*b*) the formation of minute herpetic vesicles, single or in groups, with an inflamed areola, which quickly rupture, leaving (*c*) small, superficial but exquisitely tender, ashen-gray ulcers; (*d*) larger inflamed, bare, slightly eroded patches, smooth on the surface usually, or with a slight muco-purulent covering where in contact with the

[1] Pellagra-sine-pellagra. New York Medical Journal.
[2] Sir Patrick Manson in Albutt's System, 1st ed., Vol. III, p. 778.

teeth, as when on the inside of the cheeks or lips; often, when on the soft palate, they are markedly granular, probably from inflamed follicles; (*e*) congestion and swelling of the fungiform papillæ, especially about the lips and edges of the tongue; (*f*) superficial cracks on the dorsum and edges of the tongue; (*g*) during complete remission of the acute symptoms, as happens occasionally in most cases, an atrophied state of the entire body of the tongue; this organ then appears pale and almost cartilaginous, with a smooth, glazed surface as if coated with varnish, and completely denuded of papillæ."

Castellani and Chalmers[1] say: "On examining the mouth, the dorsum of the tongue will be seen to have a whitish fur, through which the swollen fungiform papillæ are projecting. The sides and tip of the tongue are red and inflamed, with often small vesicles, small ulcers, and bare patches, which are very tender. Similar patches may be noted under the tongue near the frenum, on the inside of the cheeks, on the palate, and on the pillars of the fauces. A little ulcer, called Crombie's molar ulcer, may be seen near the two last upper or lower molar teeth."

The tongue in pellagra differs markedly from the tongue in sprue. It is to be regretted that the published descriptions can not be made more helpful for learning the points of differentiation. One who has observed even a few cases of the two diseases soon feels a degree of confidence in deciding the diagnosis at a glance by the tongue alone, but to put the mental process which led to this conclusion on paper is a very different matter. I have now under observation a patient with diarrhea and sore mouth and tongue. The case was diagnosed sprue, but owing to the appearance of the mouth I made the tentative diagnosis of pellagra and subsequent developments confirm this opinion. In this case the color of the tongue approached a carmine tint in contradistinction to the color in sprue, which is a much lighter shade. In sprue the tongue is more flabby and less pointed. Ulceration occurs in both diseases. I have seen the two edges of the tongue in pellagra a continuous ulcerated area. In sprue Crombie's molar ulcers are counted distinctive, but good observers have recorded the same condition in pellagra. There is much more marked salivation in pellagra than in sprue. Thin was of the opinion that salivation did not occur in sprue, but others have recorded it. Certainly salivation is not the conspicuous symptom in sprue that it is in pellagra. In the latter disease there is often a continuous flow of saliva and the patient sits with a cup beneath the chin collecting remarkable amounts of saliva. The odor of a pellagra mouth is often very offensive and this I have not noted in

[1] Manual of Tropical Medicine, 2d ed.

sprue. The suffering of the pellagrin from mouth symptoms is often very great. The taking of food is almost an impossibility. I have never seen this degree of suffering approached in sprue. The only two points in this differentiation about which I am confident are the shape of the tongue and the tint of the tongue. The diagnosis, if it must be made on the tongue alone, can best be decided on these two points. It must not be lost sight of, however, that in both sprue and pellagra the mouth symptoms are frequently very inconspicuous. Often tongue changes are noted in both diseases when the patient makes no complaint and the condition is found only by the routine examination. It must be recalled that tongue and mouth symptoms may be entirely absent throughout the whole course of pellagra and that there are cases of sprue reported without tongue lesions. Again, it must be noted that the mouth symptoms of pellagra, as well as of sprue, may occupy only a small portion of the time period of the attack.

In the transactions of the Pan American Medical Congress for 1893, Cuthbert Bowen, of the General Hospital in Barbadoes, draws a good distinction between the mouth condition in "psilosis linguæ et intestinæ," which is tropical sprue, and "psilosis pigmentosa," which is pellagra. There are two colored plates which bring out very nicely the two points of distinction mentioned above. Anyone interested will get more help from this than in any other way except the study of the actual cases.

The diarrhea in sprue has been mentioned above. Just what part the pancreas plays in the production of the sprue stool is still an unsettled point. Certainly the sprue stool is essentially similar to the pancreatic insufficiency stool. It is quite voluminous, light in color, acid in reaction, contains much gas, and shows a considerable loss of fat as well as of nitrogen in a large proportion of the cases.

In a previous communication on this subject reference was made to the report of Pratt and Spooner[1] on a case of sprue from Porto Rico. They found a fat loss of 45 per cent and a nitrogen loss of 15 per cent. There was a definite reaction for hydrobilirubin by the Schmidt test. Pancreatic insufficiency was indicated by the Einhorn-Schmidt thymus test and the Sahli glutoid capsule (salol) test. The stools were yellow and voluminous and contained many oil droplets as well as crystals and flakes of fat. P. H. Bahr[2] in his Ceylon cases found the fat absorption varying from 70 to 90 per cent, and there was an absence of all pancreatic ferments. Since this publication of Pratt and Spooner a case of Dr. Pratt's has shown a fat loss of 59 per cent without pancreatic insufficiency.

[1] Jour. Am. Med. Assn., lix, No. 3.
[2] Soc. Trop. Med. and Hyg., London, 1914.

In pellagra the utilization of fat and nitrogen is normal. This was found in my own cases[1] as well as by Myers and Fine.[2]

In pellagra the character of the diarrhea is very different from that in sprue. The stools are more liquid, usually more frequent, and occur at any hour of the day or night. In sprue, it will be recalled, the stools occur more frequently in the early hours of the day and very few after noon. There is no evidence of a deficiency of the pancreatic ferments in pellagra.

One of the most distinctive points of aid in the differential diagnosis between sprue and pellagra is the blood picture. In sprue there occurs an anemia which is counted secondary. The color index is usually 1.25, though there are no changes in the morphology of the cell suggestive of pernicious anemia. Stitt says that the poikilocytosis resembles the blood picture of an aplastic pernicious anemia. In sprue there is a marked tendency to remission which might cause confusion with pernicious anemia. I have seen the hemoglobin as low as 20 per cent, and yet with little or no treatment the attack abates and rapid improvement begins. This may be repeated many times. Anemia is, in my experience, an invariable symptom of sprue. It is an important feature of the disease because in it one finds a definite aid in differentiating it from pellagra, which is not characterized by any blood change.

Decrease in the size of the liver is frequently referred to in the literature of sprue. We find it in our cases but we feel that too much attention is paid to it as it is common to many other conditions with which the disease is confused.

It might be added that we have had opportunity to observe sprue from the Philippihes, from Porto Rico, and from the Southern States. We are convinced that there is no difference in the disease depending on the geographical occurrence. The only possible variation might be found in a milder type of mouth symptoms in the Southern States.

METHODS OF ISOLATION AND CULTIVATION OF PFEIFFER'S BACILLUS: A REVIEW.

By DEW. G. RICHEY, Lieutenant, Medical Corps, United States Naval Reserve Force.

While the exact causative agent of the recent pandemic seems to be still shrouded in mystery, it is generally conceded that the so-called Pfeiffer's bacillus has been from time to time responsible for many of the inflammatory conditions of the respiratory tract. The failure of this organism to conform to Koch's postulates, as well as the extreme variability of its incidence in the various clinics and cantonments of

[1] Am. Jour. Med. Sc., Nov., 1915, Vol. CL.
[2] First Progress Report, Thompson-McFadden Pellagra Commission.

this country and abroad, have served to cast the shadow of doubt as to its true rôle in the recent respiratory epidemic. As Park points out, in considering the etiologic factor in such a disease, one must not overlook the possibility of a filterable virus, an ordinary organism with undue virulence, or an as yet undescribed bacterium. Kruse and Foster were among the first to call attention to filterable virus as the cause of the "common cold." Nicolle and Labailly's investigation on a filterable virus as the cause of influenza has recently been supported by Gibson, Bowman, and Connor, who report transmissions of the disease to rhesus monkeys. On the other hand, Rosenau, Goldberger, Keegan, and Lake, in Boston, and simultaneously McCoy and Richey, in San Francisco, were unable to reproduce influenza in human volunteers. Nuzum experienced the same results in both monkey and human beings. In considering streptococcus hemolyticus, pneumococcus, or the "green producing" streptococcus as the causal agent of this malady one must not lose sight of the fact that the real causative factor may be crowded out by other agents or may not lend itself to detection by the laboratory facilities at our command. Even *B. influenzae* may function as a secondary invader to an unknown underlying cause. *M. catarrhalis* has its champions in Gotch and Whittingham, who report two typical cases of influenza in individuals sprayed, intranasopharyngeally, with freshly isolated strains from clinical cases of the same disease.

Whatever the cause, there is some evidence to indicate that the marked diversity in results of nasopharyngeal and sputum examinations for Pfeiffer's bacillus can be attributed to the differences in technique. For this reason it was deemed advisable to mention some of the more recent advances reported as aids to the recovery of the bacillus, so that those who are interested could avail themselves of any or all of them.

The method of obtaining the material for culture is important. Experience has taught that this organism lingers high in the vault of the nasopharynx and posterior nasal passages, just as the meningococcus seems to prefer the posterior pharyngeal wall and *B. diphtheriæ* the supratonsillar fossa. Emphasis has been laid by some authorities on recovering a portion of the mucosa. This is particularly true at the autopsy table, where material from the trachea and bronchi is collected for culture. When sputum is examined, if it be nummular in character, an effort should be made to select the small, more tenacious mass, which, after washing in physiologic salt solution, should be planted on the appropriate medium. Ecker advocates the mixing of bronchial and pharyngeal secretions with a 0.5 per cent solution of sodium taurocholate for 20 minutes, because of its dissolving action on pneumococci and inhibitory effect on other organ-

isms. By this method the author says that the tiny colonies can be more readily seen, inasmuch as they are not overgrown on the surface of the blood agar by the other organisms of the respiratory tract.

Statistics would seem to indicate that the influenza bacillus is obtained in a higher percentage of cases by microscopic examinations of direct smears than by culture. Lord reports, in his epidemic series, the finding of this bacterium in 84 per cent by microscopic examination, 78 per cent by culture, and in 36 per cent in overwhelming numbers, whereas the bacillus was encountered, in the interepidemic series, in 59 per cent by microscopic examinations, 30 per cent by culture and in 25 per cent in overwhelming numbers. The Pfeiffer bacillus is a tiny, Gram negative organism with round ends, varying in length from coccoid to filamentous forms. In direct smears some investigators lay stress on parallelism and clumping. On a fresh blood agar plate, the colonies of the influenza bacillus are tiny, round, slightly elevated, colorless, translucent, and moist. As a rule they are pin point in size, discrete, and never coalesce. They appear along the line of inoculation. In the first 24 hours of incubation at 37 C., they may be very hard to see with the naked eye. The growth can usually be seen more readily in 48 hours. On "cooked" blood agar the colonies tend to become somewhat larger. They are most frequently confused with the colonies of certain diphtheroid and leptothrix organisms. In culture, the morphological characteristics can be altered by the reaction of the medium. Dick and Murray found by reducing the acidity from 1.5 to 0.2 and neutral (phenolphthalein), the long, threadlike forms of the so-called pseudo-influenza bacillus, became as the small bacilli, which could not be distinguished from the true influenza bacillus. Strains of the small bacilli tend to grow as long, leptothrixlike forms on the more acid media. Pleomorphic and involutional forms are more common on old cultures. Polarity can be frequently demonstrated with methylene blue and dilute carbol-fuchsin.

Pfeiffer was the first to recognize the hemoglobinophilic properties of his bacterium, and so much stress has been attached to this fact that it has long been used as a differential point, to distinguish it from those morphologically similar bacteria, which will thrive on a nonhemoglobin containing medium. Human, pigeon, sheep, or rabbit's blood has been used in the form of plain or "cooked" blood agar or added to a nutrient fluid medium, such as glucose bouillon or a meat infusion broth. Some laboratories have obtained good growths by merely spreading a few drops of freshly defibrinated blood over the surface of plain agar plates, but Spooner objects to this, in that, as the organism is an obligate aerobe, the colonies only appear at the edge of the superimposed blood, and further, that they

are less distinct and less readily isolated. Probably the best medium for isolation is plain blood agar, made by adding from 3 to 10 per cent, preferably 5 per cent fresh citrated or defibrinated blood to melted 2 per cent agar (0.4 to 0.6), acid to phenolphthalein and cooled to 45 C. This can be made in bulk and poured into sterile Petri dishes, or made individually in tubes, mixed by rotating between the hands, and poured into plates. Slants are made in the same manner, save that 1.5 to 3 c.c. are introduced into a test tube, which is then slanted. It is desirable to have as smooth and dry a surface as possible. Complete melting of the agar is as essential for the former as is an agar free from bubbles after gentle agitation while mixing the blood. Dryness can be accomplished by inverting the plates or interposing filter paper between the cover and base of the Petri dish.

The so-called "cooked" blood agar is one of the simplest and most efficient of media for determining the presence of Pfeiffer's bacillus or propagating it after its isolation. Levinthal was among the first to use "cooked" blood agar. He added fresh blood, in a proportion of 1.20 to melted, sterilized, faintly alkaline agar, and after thoroughly mixing by boiling the whole for a few minutes brought it twice more to the point of ebullition and then filtered. A more practicable method of preparing "cooked blood agar" is to add 5 per cent defibrinated or citrated whole blood to plain 2 per cent agar (0.3 to 0.6 acid to phenolphthalein). Heat to 70 C. for 15 minutes and slant in sterile test tubes or pour into Petri dishes for plates. An opaque, chocolate-colored mass, with a smooth glistening surface can be thus obtained. There is but little doubt that the influenza bacillus grows more luxuriantly on this medium, and some investigators maintain that it has a certain degree of selective action, particularly within the first 18 hours of incubation.

Several attempts to arrive at a true selective medium have been made. Of these the one reported by Avery is worthy of mention. In this instance advantage is taken of the fact that sodium oleate inhibits the growth of many Gram positive organisms, notably pneumococcus and streptococcus, while the growth of *B. influenzae* seems to be enhanced by this substance. The formula for the medium is:

	c. c.
Meat infusion agar (2 per cent) (Ph. 7.3 to 7.5)	94
Solution of sodium oleate (2 per cent)	5
Suspension of red blood cells (devoid of serum)	1

The blood is added while the agar is hot.

The same principle of preventing the growth of Gram positive bacteria has led Bernstein and Loewe to employ gentian violet in a 5 per cent mixture. The agar has an H ion of 7.1 and the content of the gentian violet is 1:5,000, taking a concentrated alcoholic solution of the dye as unity.

Symbiosis has been inaugurated to facilitate the reproduction of the influenza bacillus. Robertson calls attention to the "alternate-drill method." Three straight drills are made, from bottom to top, on a smooth blood agar surface with, say, M. *catarrhalis* or pneumococcus. Between these, two drills of the culture of *B. influenzae* are inserted. This author uses sheep's blood in which the hemoglobin has been liberated by freezing and thawing. It is then poured into the agar which is at 60 C. Spooner derived good results by streaking a blood agar plate, already inoculated with *B. influenzæ*, with *Staphylococcus aureus*. Similar results were obtained with *B. subtilis*, effected by connecting with two culture tubes, separately inoculated, by a short rubber tube. Symbiosis and partial tension, no doubt, can account for the greater growth in this contrivance.

Sporadic instances of the recovery of Pfeiffer's bacillus from ante mortem blood cultures occur in the literature. Fleming reports two such cases, where 10 c. c. of blood, taken from a patient ill of influenza, were introduced into 150 c. c. of 1 per cent glucose broth (0.3 acid to phenolphthalein). After 48 hours incubation at 37 C., they were first detected. Spooner isolated it in 2 of 82 blood cultures or 2.5 per cent, while Holman found an organism closely resembling *B. influenzæ* in the heart's blood at autopsy, coexisting with a strain of pneumococcus. It is well known that the influenza bacillus will grow on a nutrient broth which is reinforced by blood.

The contents of this communication have been compiled from the more recent literature on the subject. No attempt has been made to introduce any original work into its context. The sole object is to bring before those interested a brief résumé of some of the more practicable and efficacious methods which have been utilized in the isolation and cultivation of Pfeiffer's bacillus. It is to be hoped that some of the difficulties so frequently encountered may be overcome and ultimately a standardized technique be adopted—as in the case of streptococcus hemolyticus in post-measles broncho-pneumonias and empyemas.

BIBLIOGRAPHY.

Avery: Jour. Am. Med. Assn., 1918, 71, p. 2050.
Bernstein and Loewe: Jour. Infect. Dis., 1919, 24, p. 78.
Dick and Murray: Jour. Am. Med. Assn., 1918, 71, p. 1568.
Ecker: Jour. Am. Med. Assn., 1918, 71, p. 1482.
Fleming: Ibid., p. 2137.
Foster: Ibid., 1916, 66, p. 1180.
Gibson, Bowman, and Connor: Brit. Med. Jour., 1918, 2, p. 645.
Gotch and Whittingham: Ibid., 1918, 2, p. 82.
Holman: Personal Communication.
Kruse: Munchen med. Wchnschr., 1914, 61, p. 1547.
Levinthal: Jour. Am. Med. Assn., 1918, 71, p. 1578.

Lord, Scott, and Ely: Idem, 1919, 72, p. 188.
McCoy and Richey: Bulletin No. 57, Bureau M. & S., U. S. N.
Nicolle and Labailly: C. R. Acad. Sc., 1918, p. 607. Photostatic copy to Surgeon-General, U. S. P. H. S
Nuzum: Jour. Am. Med. Assn., 1918, 71, p. 1564.
Park: New York Med. Jour., 1917, 105, p. 529.
Pfeiffer: Ztschr. f. Hyg. u. Infections-Krbnkh., 1893, 13, p. 356.
Robertson: Brit. Med. Jour., 1918, 2, p. 680.
Rosenau et al.: Bulletin No. 57, Bureau M. & S., U. S. N.
Spooner, Scott, and Heath: Jour. Am. Med. Assn., 1919, 72, p. 155.

THE NERVOUS ELEMENT IN AVIATION.

By G. U. Pillmore, Lieutenant, Medical Corps, United States Navy.

Most of the discussions concerning aviation in the medical journals have been of a very special nature. The exhaustive researches and experimental work completed by the eye and ear specialists have placed this branch of medicine in an important position. The importance of the eye and ear specialist's examination of the applicant for aviation is unquestioned. To their most thorough and diligent application we owe the present high physical standards in naval aviation. Their work has become so prominent and their study of the ear apparatus, for example, has become so thoroughly recognized that when one speaks of the medical aspect of aviation the civilian physician at once thinks of the Bárány whirling chair, and his mind turns to the eye and ear specialist.

We had at the station at Bay Shore, Long Island, about 14,000 hours of actual flying time in the air and I investigated about 100 crashes. I watched the daily routine work with deep interest. I associated as closely as possible with these young fliers and tried to understand their likes, their dislikes, and their whims. I listened to their many tales of experiences and difficulties in the air and myself experienced many of these things with them. Now I can say firmly, that the best flier is the one with the best head and the most common sense, with good judgment, and a clear, healthy intellect which he keeps that way.

As a result of my experience I believe that the importance of eye and ear tests has not diminished but that the principal place for their consideration is the recruiting station. Once a recruit is passed to the aviation training station as normal another phase of his medical recruiting begins and here the nerve specialist, using that term in its most general sense, becomes the most important examiner. Not only must functional changes in the nervous system itself be closely watched and studied but also the more subtle changes and vagaries, which frequently arise during the student's training and show themselves as emotional disturbances, should be observed.

Pilot preserving machine's balance with his weight on one wing. A bad landing; high and dry at low tide. A group of instructors; hale and hearty men, all.

458–1

My first case having a definite relation to this aspect of aviation was a student flier sent to me by the officer on the beach in charge of flying. The young man reported to me alone, and said that he had been sent to me by the flight officer for an examination. I concluded that I would phone to the flight officer for information, and soon I heard a voice saying, "Doctor, I have taken that boy whom I have just sent over to you up for a flight three times to-day, and every time I pushed the plane over the 'hump' that young fool has frozen on to the controls. The last time up he hung on so tight that both of us nearly went to Davy Jones's locker. If you want my honest opinion about the case, I will say that the fool is about scared to death. Let me know what you find, will you?"

I must confess that the information set me back a bit for a moment. But I kept the young fellow at the sick bay for nearly a half day making examinations of his eye and the ear. My report at the conclusion of the long examination was that the man, as far as I could see, was in fair physical condition. A careful questioning of the individual and a complete history of the case, however, revealed a man in a stage of nervous exhaustion, with a distinctly neurasthenic history. So I talked with the flight officer and told him all I could about the boy's nervous condition. I gained the flight officer's confidence at once, and after that he sent me every man who showed anything affecting his flying no matter what it was.

There were two classes of men to be constantly watched. First were the instructors who had been flying for a long time and were the teachers on the station. The second group included the students who were still learning how to fly. The problem was comparatively simple with the instructors, for they were permanent officers of the personnel of the station and I was in constant association with them over a period of many months. With the students, however, the problem was more difficult, for as soon as they were qualified to fly they were sent south for more advanced flying and patrol instruction at another station.

The course of instruction was essentially preliminary. It was here that we met the man who had his first trip in an aeroplane. In fact it was exceptional at Bay Shore to find an individual who had ever been in an aeroplane before. Two or three had had flights in some of the old types of the Curtiss plane.

Of course, students were coming and going as fast as the exigencies of the training school would permit. The average length of time existing between the attachment and detachment of the student at the station was a little below 40 days. All the information gathered about a man had to be collected within that length of time. As far as possible they were placed in classes in so far as my depart-

ment was concerned. There were the good fliers, the poor fliers, and, of course, all kinds of curious intermixtures of freak fliers and inconsistent ones up and down the scale.

The different cases investigated with relation to aptitude for flying were handled individually and were taken up as though the whole matter were an extremely personal affair. The failures were not advertised to the camp except in the case of a man who simply flunked out and could or would not fly, whereupon he was given the choice of reverting to the status of an enlisted man, or of leaving the naval service altogether as most of the total failures preferred. The disgrace attached to the latter occurrence affected the man very much as a rule, although several did not seem to mind such drastic measures, for their main desire was to get away from the sight of an aeroplane.

The individual after having once enlisted for actual duty involving the flying of heavier-than-air craft, and having successfully passed the final examination in the ground-school course, simply had to make good. The majority did make good and received their flying commission with the whole-hearted enthusiasm born of having enjoyed the entire course of instruction. A few completed the course and were successful because of plain grit and determination and a much less number could not make the goal at all. The latter group, practically always, did not like flying and made such failures in attempts at it that they were excluded. Several in this latter group however did like it but could not master the art of flying at all. These generally made the doctor's life miserable by crashing up machines and getting into all kinds of wrecks one after the other. But they made good ground officers in aviation and were generally commissioned as such.

The instructors at the training station were selected and assigned to the various training stations with care. Supposedly, they were the best fliers the Navy could produce, and were recommended for this kind of duty. There was very little changing about of instructors from one station to another. So month after month they went through the daily grind of teaching men to fly. Their students went across and did valuable patrol duty on the high seas, and as word came back of their excellent work over there, occasionally there would be outbursts of grumbling over the hard luck of being forced to stay in this country for training duty. But, of course, every one could not go, and duty was duty.

In considering the important work of an aviator, we become impressed with the fact that, to be successful, he must conform to a good mental and physical standard. Our physical standards are well established and in examining candidates for aviation we follow certain rules regularly. However, in regard to the mental state,

which is of great importance, there is not at this time any fixed standard of examination.

What is needed most in a flier is a high degree of mental efficiency with no departures from the normal manner of thinking, acting, and feeling. We can not imagine a good flier having a functional neurosis such as psychasthenia, showing states of pathologic fear or anxiety with tics present and feelings or inadequacy, influencing his make-up.

There are certain individuals with whom we come into casual contact daily who are not of the normal make-up, but who are not classed as having abnormal mentality. Such individuals often present an appearance of brilliancy and originality, but with this betray, as a rule, defects of judgment, their plans often resulting in failure. They do not remain at one occupation long enough to obtain a thorough knowledge of it and are forever changing from one manner of life to another. They lack the persistence or will power to complete or carry to a logical conclusion any undertaking. Slight obstacles will discourage them and often lead to radical alterations of their mode of life. They manifest but little sympathy or consideration for others. They are self-absorbed, vain, egotistical, and self-assertive. An individual of this type often impresses his friends or relatives as a kind of genius. Time passes, however, and no results are achieved. The money of this or that relative is lost in various enterprises. He lies and swindles to obtain money. He neglects his family. The true condition is only disclosed by a painstaking study of his history. Quite commonly the family will scout the idea of the young fellow not being mentally well, particularly where a rich father, long-suffering and indulgent, is concerned.

Again, an individual may inherit a tendency to nervous exhaustion. His resistance to fatigue may be very feeble. By the demands that aviation make on him, overfatigue is frequent. If he has inherited neuropathic tendencies he may be reduced to such a state that the rest or food required to restore a normal individual can not place him upon a normal base again. In time he develops a well-defined neurosis with definite symptoms. There will be a marked diminution of his capacity for sustained mental effort. He becomes chronically tired. He puts off matters requiring a decision, and finally with the development of marked uncertainty, hesitation, and habitual indecision the instructor pulls him out of flying and sends him to the doctor for examination. We will often discover cases which appear to be decidedly non-neuropathic but still experience nervous exhaustion. However, the individual does not develop a distinct psychosis.

Fully as important as the psychoses of neurasthenia are the motor, sensory, and general somatic disturbances.

We find some men whose muscles reveal fatigue and the subject appears to have become suddenly weak. The statements of the student in regard to motor symptoms are evident. He will declare that the drilling on the parade ground seems to be the last straw on the camel's back. He thinks that if he can get out of drilling he will be all right. An examination of his tendon reflexes may reveal a diminution of the same. Commonly, however, the reactions are exaggerated. A very fine tremor of the hands may be found. Placing the man on very light duty does not improve him much. We know that it is not on account of lack of rest, for he has very little liberty and goes to bed early and sleeps the sleep of exhaustion. In the morning, however, instead of feeling rested, he still retains a tired feeling.

Again, various reports at the sick bay show many mild sensory disturbances. The individual complains of obscure pains which refer to the limbs, trunk, or head. I remember one lad in particular who said that he felt as if the whole top of his head had been scooped out and a vacant space remained from just above his ears upward. A superficial examination showed stigmata of a degenerated nervous system. Complaints of dizziness are not often made. They should lead one to think of neurasthenia and not into examining the ear alone. Insomnia is very frequent, and a student will hear the constant roar of the motor for hours after going to bed. He tosses about and has difficulty in procuring rest.

A common symptom relates to the digestive tract. The individual at first feels no distress after taking food, but later he feels oppression with a sense of weight. As a result of the extremely high nervous output required, the excess stimulation of the innervation of his stomach will cause a hyperacidity.

As we look over the circulatory apparatus of these individuals who represent the neurasthenic types with an insufficient number of nervous impulses delivered throughout the body, the results of this deficient innervation become evident. We find cold extremities, for example. In marked cases, which are not common, the force and rhythm of the heart's action is not steady.

The psychic phenomena bear a definite relation to the circulatory phenomena as, for example, in fear, where the individual's pulse suddenly quickens and even palpitation of the heart may occur. But as regards aviation, transitory palpitation may affect the strongest as death stares him in the face with the machine and pilot in a precarious predicament. I have had palpitation of the heart as I watched a plane come tumbling into the water from a height of 4,000 feet.

Another physical condition noticed in two weak-nerved individuals of this type was a sexual disturbance. Of course, the strain of flying does not bring the neurasthenic to the stage of the special

phobias and marked obsessions. We get rid of him long before he completely breaks down, and I suppose upon going back to civil life he regains his normal status again.

The psychology of flying covers a vast field which an ordinary observer will find extremely difficult to traverse. In the study of the mind and mental operations of an aviator we find ourselves ranging in our observations between two positions. The first is occupied by the flier who flies along with practically no thought of danger, or, if it is present, it is such a part of his subconscious mind that he does not experience any sense of it at all. The second is occupied by the young fellow who, upon first going up and experiencing an unpleasant thrill with his pilot, immediately grabs hold of the controls and hangs on for dear life. The latter case represents a confusion of mentality both quantitative and qualitative. It is between these two positions that the doctor often has to work as a psychologist.

There are a few conditions which it would be well to note as specific contraindications to flying. For example, there should be no history of attacks of malaria. Cold in high-altitude flights might precipitate a chill.

Every man in the Flying Corps of the Navy must have a Wassermann done upon entrance. I think it would be a good thing to have the Wassermann taken every six months. Mental symptoms in the primary stage are, of course, infrequent; however, we may meet with dizziness, insomnia, headache, and depression. The psychic shock of the discovery of having contracted this disease might play some rôle.

A man with a mild beginning of pellagra could easily escape the attention of the recruiting office, especially in the North, where we see very little of it.

In alcoholism there is a depression of functions—a confused and poor mentality—if the indulgence has been carried far enough. The young man who is subject to alcoholic debauches will break down eventually in flying. One man was discovered on the verge of delirium tremens. He was an instructor who is not flying now. The degree of resistance to alcohol in some individuals may be enormous or exceedingly slight, so it is a fixed necessity that it be cut out entirely.

Any form of drug habit, disorders of metabolism, such as diabetes or gout and a vast category of visceral diseases, should exclude the individual from flying. Under visceral diseases, and particularly Bright's disease, we find any number of conditions that would contraindicate flying. Hence the value of giving fliers routine physical examinations.

Other diseases which have a definite relation to mentality in flying are diseases of the ductless glands, epilepsy, hysteria, cerebral

syphilis, multiple cerebro-spinal sclerosis, arteriosclerosis, and any pathological condition of the brain.

The English observers lay particular stress upon the medical history. They believe that a more complete medical history of the applicant should be taken along with the physical examination. This should cover inquiry into previous occupations, habits (especially as to alcohol and tobacco), and mode of life as well as previous health and family history.

The family history, especially with regard to diseases of the nervous system, might shed some light on the type of soil with which one has to deal, especially in relation to the strain of war flying. A candidate with a history of easily induced chilblains should not be allowed to fly at great heights. Inquiry should be made into the usual amount of sleep obtained, and whether this is disturbed or not. Any signs of restlessness should be noted as they might point to an unstable nervous system.

It is believed that the psychological examination is of equal value to the physical examination in the profession of flying in heavier-than-air craft.

The best examination that can be given to a prospective student for aviation is one given by a doctor having a good knowledge of special aviation tests combined with personal experience in handling the "controls" of a plane of his own. The best method of having such a doctor look over the candidate completely is to order the candidate to a flying station immediately after he has met the preliminary physical requirements; and, once there, to allow the doctor who flies himself to continue the rest of the examination at leisure.

It would not take long for the medical officer to reach a definite conclusion. This would indeed save the needless loss of many weeks to that man who, after going through a school of technology, flunks out later when the real flying begins. Send the man to technology after he has passed the medical officer's examination at a naval air station. If the student then likes the little flying he has seen and experienced with a medical officer, if he is enthusiastic to reach the goal, he will apply himself far more diligently at the technological school; and, furthermore, will have the proper attitude toward aviation, namely the selection of it as a chosen profession.

The student at the present time gets his physical examination first, and is then sent to the ground school of technology for many weeks, after which he is sent to an air station for training, and finally experiences his first flight.

Of course the above can not be accomplished if the medical officer doing duty at an aviation station is detached frequently and placed on medical duties other than aviation. A medical officer should be attached to aviation permanently. Many important and intelligent

observations of extreme value have been spoiled because suddenly after a few months of this duty the medical officer is placed on some other kind of work altogether. I have on my desk several papers written by very intelligent observers all of whom were detached from aviation after a very short time at the flying fields. I am sure that their continuance with the aviation unit would have resulted in very good and exhaustive research. Unfortunately a medical officer new to aviation has to start at the very beginning when it comes to getting experience in actual flying sensations himself. He can not begin where some one else left off.

An editorial written in the Lancet of January 12, 1918, presented the idea of a medical department for aviation duty alone. I certainly believe that this should be done so far as is possible. There are many problems that one never dreams of until after one has had certain experiences in the air. As stated in the Lancet there is not a medical man with or without special knowledge who can not see that the strain on these young men is great, and that to allow unfit persons to take the responsibility of flying, air scouting, and air fighting may be to condone suicide. Questions of blood pressure, of cardiac affections, of muscular balance, and nervous stability are alike involved, and the flyer should not only be selected from the beginning for his sound physiological and particularly psychological make-up, but he should be submitted to regular scrutiny during the whole time that he continues to discharge his duties.

A medical officer should investigate the causes of injuries in order that accidents may as quickly as possible be grouped according to their similarity in occurrence, or in other points, for in this way the existence of some common physical defect, which has led to a group of accidents, may be detected in other aviators before new tragedies have occurred from the same old cause. It is important that a medical officer should be a member of the board appointed by the commanding officer to investigate the cause of crashes. A medical officer arriving fresh on the station every few months will never help to solve the problems of flying as quickly as the medical officer who flies himself and has been with aviation for a long time.

It is believed also that the medical officer for this detail should be selected with as much care as a student flier. He should be capable of becoming engrossed in air problems and see and experience them in the air himself, for aviators do not as a rule lay particular stress upon telling all their own difficulties and defects in the air, and to ask questions about certain things will very often bring you nowhere. Fliers dissimulate well, if for no other reason than to protect their reputations as good fliers.

Aviation at this date has gone far beyond the experimental stage. Few men make a success in medicine unless they like it, and the same

holds true with aviation. Many young medical students never get beyond the first year in college, and one sight of a leg amputation is enough. One sight of an aeroplane crash or one flight with "stunts" will do up a few of those prospective candidates, who upon applying for aviation hold uppermost in their minds the tender spot some girl had in her heart for the bold aviator who after shutting off the power to his engine, as the newspapers describe it, "places his machine fearlessly into a long glide, and at last lands safely in a level 40-acre lot."

There are undesirables in naval aviation who accomplished their courses during the time the Government was working at high pressure to get fliers abroad. But they are being dispensed with. Many, at last, got in their so-called required number of hours who disliked flying, were afraid of it, and soon wanted to get out. But the thought of being a "flunk" drove them on, and rather than admit that they did not like it would crash any day. This was courage of a kind, indeed, but courage misplaced.

A certain student flier who had a few hours of solo work could not properly describe to me how to get out of a tail spin. He said the problem had not occurred to him before, and he declared that the new sensation of suddenly finding himself really in an aeroplane was so exciting and there were so many things at the air station which he had never heard of before and events were occurring so quickly one after the other that parts of it were a jumble in his head. Luckily for this boy the plane had practically flown by itself, and the air conditions were good at the time.

Major Greene, in The Military Surgeon, suggests testing ability to qualify as an aviator by giving the applicant an opportunity to fly as a passenger. He may develop certain symptoms, not discoverable in an ordinary medical examination, which would lead to prompt disqualification. On the other hand, an applicant of doubtful qualities might readily demonstrate peculiar fitness for flying. I have found this to be very true.

The so-called attitude of staleness is observed not infrequently in some of the old fliers. When this is discovered, a most thorough investigation of the man's habits should be carried out. Occasionally too much indulgence in alcohol and the night lights of a great city will bring about a certain listlessness toward flying. A man can lower his physical condition to the point of uselessness by such debauches. He can fly after his excesses, but he is decidedly not at his best. A flier should be trained as an athlete in order to bring out his best ability. Befuddled brains from "hang overs" should never direct an aeroplane.

The ear specialists and the eye specialists have long since established themselves in aviation and, it is believed, have swung the pendulum too far to the side of the eye and ear being the all-important

organs in the profession of flying. It is time that a reaction were brought about and that the neurologist occupied as strong a foothold as do the eye and ear specialists.

It is not out of order at this point to mention a few things a flier must bear in mind as you watch him gracefully playing hide and seek with the clouds way up yonder at a dizzy height. If you know him well and can have the expensive pleasure of flying about with him on some of his capers you will find him to be a very matter-of-fact individual who will wink and chuckle good-naturedly at you after he has scared you nearly to death by looping the loop a half dozen times or dropping into a tail spin.

As said before, the natural accomplishment of flying is the result of the proper following of natural laws. I will describe to you as simply as I can the method of ordinary straight flying and not attempt to discuss the fancy tricks and "stunts" that the young dare-devil performs.

The instruction given to students is not along hard and fast lines that can be studied from a textbook. The instructor does not sit at a desk distributing typewritten circulars on the subject of how to fly. The instruction is carried out while actually flying. Faults and improvements are discussed while on the beach with the pupil, to whom is given all the additional information that the instructor possesses. The pupil is checked up as his defects appear.

The individuality of the instructor affects the method of teaching. For example, one instructor believes that conservative flying is best when a student is on his first flight, and another believes that on the first flight the young fellow should be given real thrills.

STRAIGHTAWAY FLIGHT: A BEE-LINE COURSE.

While flying horizontally all fore-and-aft positions should be carefully maintained. Most attention should at first be given to the direction of the course. Considerable pressure must be applied to the right side of the rudder bar to keep the machine from sliding to the left on account of the torque of the motor. The amount necessary must be determined by watching along the side of the fuselage and adjusting the pressure until the nose of the machine holds an absolutely straight course. The importance of steering an absolutely bee-line course, is due to the fact that the machine has a dished angle. This makes the machine automatically more stable. Thus, when right rudder is applied the shifting of the forces drops the right wing and raises the left wing. The opposite is true. Conversely, if our wing drops owing to unevenness in the air stratum the machine will turn in the direction of the low wing. Hence, the importance of steering a straight course for the rudder serves two purposes, not

only steering the machine, but keeping it level. The instant the nose of the machine moves ever so slightly, to the right or left, the pressure on the opposite side of the rudder must be increased until the swinging is checked. But the pressure must be released and the rudder returned to neutral the instant the nose comes back in line with the course. If pressure is kept on too long, the machine will slide over the course to the other side and, if this is kept up, it will result in a snaky course. The best helmsman is the one who steers the straightest course and moves the wheel the least. The same is true of the pilot of a plane. Watch the nose of the machine like a hawk and stop the instant it starts. If enough attention is paid to this, it will soon become intuitive. Firm pressure should be kept on both sides of the rudder. Eventually the pilot should be able to "feel" the air on his rudder and allow for bumps as they first hit the machine. If the pressure against the right foot increases suddenly it means that the wind is pushing against the right of the rudder. If the rudder holds it place this pressure will swing the machine to the right, as it is the equivalent of right rudder. For this reason if the pilot is wide-awake and eases off on his right rudder until he feels no thrust on his right foot the machine will fool the gust and keep a steadier course. Sometimes this sort of gust is so strong that merely letting off on the right rudder will not suffice and left rudder will be necessary. If the pupil watches an experienced pilot's use of the rudder, he will see that the bar is almost never stationary in disturbed air, but is moving slightly to left and right through a very small arc. This is because the pilot is playing with his rudder to "feel" the air. The sooner this knack is acquired the better for the pupil.

LATERAL BALANCE.

We have seen that lateral balance can, under ordinary circumstances, be maintained by making use of the fact that the rudder bar is operated by the feet and manipulates the rudder on the tail of the machine, turning the plane to right or left, aiding thereby in banking the machine. The rudder is the chief agent in controlling lateral balance in fairly calm air, but in bumpy air the ailerons must sometimes be used. Rudder control of lateral balance is at best slow, and in case of very bad air sometimes insufficient. Aileron control is faster but for this reason less finally controllable. A mixture or coordination of rudder and aileron control is proper and often essential. Neither one will do alone. They will act together much more easily and quickly, as together they have more control surface and this surface is diverted between the three extremities of the machine. Thus if the right wing drops down suddenly, increase the pressure on the left rudder, and at the same time turn the wheel

to the left until the pressure on the plane lets up, when you must instantly restore the control to neutral. You can feel the neutral position of the wheel, for there will be no pressure on the ailerons as they are in a straight line with the wing. The amount you must turn the wheel varies with the severity of the gust, but it is rarely more than a very small amount, and the neutral position will naturally be found, as the wheel is turned off as much as it was turned on to neutral. The importance of correct coordination of rudder and aileron can not be overemphasized. A pilot who does this well can go through any weather with full confidence. There are several means by which you can check your lateral balance. The way you should eventually tell is by feel; that is, use of your sense of balance, but, until you acquire this, certain mechanical checks are necessary. As you steer your course by watching some two points of the nose of the machine, watch that these points do not roll down or up the horizon. At the same time watch your wings out of the corner of your eye and check any rolling that may occur. In machines with Cabaur struts (triangle), use the triangle formed by them for the same purpose. To be sure that you know what level is, look out at the furthest strut on the right wing, see how much of it shows above or below the horizon, and then check the left wing to see that the same amount shows. Here is lateral balancing of the machine as, in your steering, movements should be checked the instant they begin.

LONGITUDINAL POSITION OF PLANE.

This position is regulated and controlled by the forward and backward movement of the wheel. There is no fixed position for the wheel, as this depends on many factors, such as the balance of the machine, the power of the motor, and the kind of flight. There is one cardinal point to be remembered at all times. Disregard of this will immediately place the pilot and machine in a critical situation. The pilot must always bear in mind that the machine must have flying speed at all times. Flying speed is lost in straightaway flight by allowing the nose to ride beyond a certain elevation, or in other words by climbing too steeply. Of course, the angle of flying differs for various types of machines because of the differing power, plane surface, resistance, etc. After some experience, you can determine the critical angle of any machine, but until you acquire this "feel," you must use the experience of your instructor. He will show you the proper flying angle for the type of plane you are flying, but this, of course, is true only when the motor is performing normally. Here again you must use some check of your own guidance until you get the feel. In our training plane, use the point on the nose by which you steer a plane, and note its position on the horizon. This point

must never be raised above the horizon unless by orders of the instructor. This will insure you a conservative flying angle, and is the only correct one for you to use while under dual instruction for the first 15 hours of solo, but often you will have no horizon by which to check up your flight angle until you have acquired feel. There is one invaluable check which you must accustom yourself to use. You can always, except at night, fly so that you can see the plane of the water. This is often all that you can see, so this check makes use of this plane instead of the plane of the horizon, though when the horizon is invisible, the check may be used on either plane, as they are both perpendicular to gravity. As you look out at the wing tips, you will see that the outside struts on either wing cut the horizon or the plane of the earth at an angle dependent on the flying angle of the machine. This angle, by the forward edge of the outside strut and the plane of the horizon or earth's surface, should never exceed 90°. For really conservative flight, it should be nearer 80°. In clear weather with a good horizon, this angle will be checked more easily on the horizon, but in rain, haze, or whenever you can see no horizon, you should fly close enough to the water to check this angle on the plane of the water. As soon as you acquire "feel," you may disregard this check. This particular check is for use only with a motor that is giving its full power. With an under-power motor, the machine's climbing angle will be lowered in proportion to the loss of power. Your lift is obtained by the power given by your motor. If this decreases, you must keep your lift by nosing down and gaining your full speed. You must accustom yourself to the sound of your motor, and train yourself to recognize the slightest peculiarity in its exhaust. If your motor misses or loses vigor, you lose speed, and upon speed solely depends your safety. So keep your speed by utilizing gravity and nosing over until you can feel a good lift. If you lose all your power, you must put the machine in a glide to get flying speed, and keep this until you land. This matter of flying speed is the most important in all flying and is never to be forgotten. Play the game conservatively and always keep speed in reserve. Without speed your machine is as air worthy as a ship with its hull full of holes, because speed is so absolutely essential. Keep this always in mind.

TURNS.

If rudder alone is applied, the machine will skid away from the direction you desire to turn in the same way as does an automobile traveling in a high rate of speed on an unbanked turn. In an aeroplane a skid, if carried out far enough, will result in a complete loss of flying speed. A stall results and flying speed must be regained by a dive in a skid. Flying speed and lift are lost in proportion to

its severity. If bank alone is applied, flying speed and lift will be decreased in proportion to the amount of bank until a stall occurs, when speed must be regained through a dive. A parallel illustration may be seen in the case of an automobile taking a turn banked too much. There are several good illustrations of the theory of a turn, such as the motorcycle in the eggshell track of the circus, a bank motordrome, the chairs suspended from ropes on a pole which are swung around the pole at increasing speed. You should study the theory of the turn until you have absolutely mastered it, for until you understand it, you will never be able to turn well. From a study of the turn, you will see that for one reason there is but one correct bank. There is a straight course with no bank, a most gradual turn with a most gradual bank, and the corresponding increasing bank and radius until you get to the vertical bank and shortest radius.

The actual method of making a turn is as follows: Level your machine to an absolutely horizontal flight. Note some point on nose of machine which is on the horizon. Apply rudder and bank simultaneously, and smoothly, not too fast. Machine will start turning and banking at same time. Keep your points all steady on horizon, note your bank, and when you have reached the desired degree, neutralize your ailerons and keep enough pressure on rudder to make nose of machine travel steadily around on horizon. Adjust pressure on rudder to suit bank, not vice versa. Watch nose, not wing. Occasional glances at wing if necessary are permissible, but you should be able to judge bank by angle of nose of machine relative to horizon. Too much rudder will make you skid, and you will feel air on your outside cheek and also a tendency to lean in toward the center. Too little rudder will cause side-slip. You will feel first a tendency to lean outwards, and when slipping, a strong pressure of air on your inside cheek. In a correct turn you should feel comfortable in your seat with air on neither cheek and should end your turn, no matter how long, with the same amount of bank as you commenced with. Fully as important as the bank and radius of a turn is the elevation of the nose of the machine. The nose must be kept on the horizon, and altitude must neither be gained nor lost. You must guard against the tendency of the "torque" to raise your nose on a right turn, and pull it down on left turn. If you climb on a turn, you will gradually lose lift and stall, and you will then go into a spin. If you gradually lose altitude on a turn, you will eventually spin. In bumpy weather, use of ailerons may be necessary while turning, in order to keep bank constant, but this comes naturally.

To come out of the turn, give opposite rudder and aileron until machine is level horizontally and the desired course is assumed, being

careful to keep the nose still level. Neutralize control instantly this is attained, and check up to see that wings are level and course is true. Fly level for a few seconds before resuming climbing flight. If bank and rudder are not taken off together, the machine will skid. Coming out of a turn well is as essential as going into one. You should practice coming out of turns onto a given course so as to gain accuracy, and you should practice turning through 360°. When you feel that your turns are falling, turn steadily to 720° and the fault will be exaggerated so that you can discover where it lies, Remember your flying speed in a turn as everywhere else, and remember that as you tend to decrease your lift rapidly in a faulty turn with a bad engine, you should be well on the side of excess flying speed. It is very advisable to adopt your own standard turns; that is, one that you can always be absolutely sure of. It may often come in handy. Never bank steeply close to the water, except in case of emergency. Play it safe, for you never know at what instant your motor may quit, and when it quits in a turn, you want room and plenty of it. Except, when unavoidable, no turn should be made under 300 feet.

GLIDING.

The machine glides when it utilizes the force of gravity instead of its motor to maintain flying speed. The machine is under fully as good control in a proper glide as in motor flight, and the old notion that when an engine stops in the air the pilot is doomed has of course been exploded. The pilot's life is in danger if, when his motor quits, he does not instantly maintain flying speed by gliding. Lift is attained by the thrust of the air and the wings, and if the motor can not give you this speed, the glide will. There are all degrees of glides from the minimum when the lift is least, to the maximum or nose dive, when the machine accelerates so quickly as to be of no value near the ground. The proper gliding angle is that which gives the machine a constant speed slightly in excess of that of motor flight. You can determine the speed of the machine in a glide in two ways—first and best, by the whistle of your wires; second, by the air speed indicator. The former is better by far for it is always reliable, and no instrument is always reliable. Also the former is available at night, when you may be unable to use your instruments. The pitch of the whistle should remain constant after you once assume your glide and should be clearly audible. The instructor will show you what is the correct pitch, and you should never glide at a lower one. You must accustom yourself to glide by this sound, for it is absolutely essential and is furthermore important in spiraling. The essential fact to remember, as always in all flying, is to maintain plenty of flying speed. There is nothing so much to be

avoided as a flat glide; that is, a glide so flat that your lift is just barely sufficient to keep the machine from falling. It is not safe to approach this point. The more speed you have, the more lift, hence the more control, hence the more safety. Take for instance the two following cases: One pilot glides down for a landing with a glide so flat that he has speed and no more. Suppose he is about to land when another machine comes suddenly and unwarrantedly in his way. To avoid a collision, he either tries to zoom or turns his machine. The instant he does either, he uses all his lift and stalls. Of course he crashes, all because he has no surplus lift. Now, take the second pilot, who comes down in a good glide with plenty of excess speed. When he zooms or turns he has full control over his machine, and enough lift to last him four or five seconds, long enough to avoid a collision and regain his speed by use of the motor. If Vernon Castle had had enough speed, he never would have crashed in zooming another machine. From this it is evident that the steep glide is better than a too flat one, by all means.

RULES OF THE AIR.

1. A machine taking off "or taxying" has the right of way over a machine in the air.
2. Pass another machine approaching you as you would if you were automobiling. That is right wing to right wing.
3. Overtake another machine as if you were automobiling on his left.
4. Of two machines one above the other, the lower has the right of way.
5. A machine with a dead stick has the right of way.
6. A machine gliding or spiralling, or stunting has the right of way over one flying level.
7. Never trust the other man to do the right thing; he may be asleep.

After thinking over the above, it is not difficult to realize that a man must be on the alert and have an active, cool mind at all times.

The above outline of ordinary flying is rather crude perhaps and not meant to be sufficient knowledge for a man who intends to sit in a plane and begin to fly perfectly at once. One must overcome many difficulties. The finer points of stunt flying and tight places that a flier must get out of in order to save his life and machine, are not dwelt upon here, for in so limited a discussion the subject can not be handled properly.

It takes one some time to get over the feeling that there is a considerable space between yourself and the earth as soon as you have left it, and the realization that ever so little a thing, such as the turn of the wheel, can place you in a position out of which under certain circumstances you can not recover, surely does arouse subconscious thoughts of the Valley of Shadows from which travelers do not return. True, just ordinary motions and sensible thoughts guide your

hands and feet to control the plane, but to the beginner the new sensation really does make his heart pound in his chest.

You at first view the splendid panorama beneath you with wonder and awe, and then, as you thrust out your neck over the side of the plane and gaze at the terribly blank space directly between you and the earth, you naturally try to think of pleasant things to keep up your courage. Your pilot is a comfort. He grins good naturedly at you, and this reassures you pleasantly.

I still have very kind feelings for the pilot who first took me up. He was a student who had had only three or four hours of solo work. I have always admired him for his nerve, for he did not acquaint me with his inexperience until we had reached terra firma after a very bumpy ride.

This ride occurred during the first few days after my assignment to an air station. Of course, my confidence in aeroplanes increased thereafter, and I was not satisfied until I had hold of the controls myself. But it took me some time to get over the feeling of being up so high. I know my head was not cool enough to fly a plane right, although the instructors would tell me carefully just what should be done and I would know how to do it. I suffered from what is called in the hunting districts "buck fever." I have also experienced "buck fever" while hunting. It occurs after you have hunted for a long time without success, and then suddenly a fine buck deer rises in front of you perhaps 75 yards distant. You become so excited that as you aim your rifle you begin to shake all over and must use all your will power to make a steady aim. After you have brought the deer down with your shot you feel weak.

I believe that I had buck fever quite badly during several early flights. My mind was influenced more perhaps by some of the accident cases I picked out of the bay following crashes. During that time one poor lad in particular weighed upon my mind, for he was a friend. I assisted in removing his horribly mangled body from the wreck. He was beyond recognition. But I still kept going up as a passenger, and in time the unpleasant feeling wore off. I can say very frankly, however, that I always have possessed a subconscious feeling of impending danger while in the air. It has not hampered my sense of security, however, and I believe that I am as cool about such matters as the average person.

I lay down these facts merely to show the feelings of the average individual in his attitude toward flying heavier-than-air craft. I do not consider myself overcalm or cool while meeting the exigencies of life, and being convinced that my nerve is about the average I have used the analysis of it as a sort of basis to work out the feelings of men who have made a profession of flying.

I have found that the average number of fliers at first experience about the same sensation I felt myself. Some have more nerve and daredeviltry in them and they are the excellent fliers. They are so cool that it becomes almost a second nature in them to fly. Others are very sensitive and will never get over being afraid. I knew one instructor who, I was sure, hated the sight of an aeroplane, but he would not give up until after the armistice was signed because he did not want to be branded a quitter. Bumpy air scared him so that if he could possibly get out of it he would not fly. His students did not have the proper confidence in him. He was what is known as an inconsistent flier. One day he would fly fairly well and the next he would be porpoising all over the bay and doing other unintentional stunts. He would climb exceptionally slowly and glide down like a shot, as if in a hurry to reach mother earth again, and then away he would go flying just above the water for a much longer distance than was necessary to land, then gradually begin to feel his way down with the back of his pontoon. He talked in a strained manner and was of a neuropathic make-up. But he always turned out his students, and got in the required number of hours. Luck seemed to be with him, for his planes avoided crashes somehow.

Occasionally one finds a beginner who is hopelessly without nerve. Two men that I remember distinctly came to me and on being put through the grill broke down and cried. One lad in particular told me that if the Secretary of the Navy himself should order him out in an aeroplane he would not go. Of course, such cases were thrown out of the service as soon as discovered.

Generally several days of inconsistent flying occurred among the students after a man had been killed by a fall. It is best to not stop the flying because of a fatal accident. It takes some of the weaker ones' nerve down a bit, but brooding over possibilities during inaction is poor policy. With hands and feet on the control, confidence is regained. And this was war and not mere sport.

Students were taken temporarily from flying upon the discovery of very minor defects. For example, the slightest strain or sprain of wrist or ankle would be sufficient to place a man on the sick list. Malingerers at sick call were uncommon, but when discovered, were watched with extra care. Often they were allowed to carry on for a short time until a thorough personal investigation could be carried out. The investigation would frequently reveal something of significance in regard to the man's flying ability or nerve.

The students, during the early summer of 1918, were often worked too hard. Many of them at that time averaged only five or six hours of sleep. Their duties consisted of more than flying and ground school. They handled lumber, barrels of gasoline, cement mixers, etc., and many were played out and did not maintain the best phys-

ical standards. The system was changed, however, and the hours and amount of work was cut down considerably.

I believe that the nearer we approach the Goshport system of training, the better will be the trained fliers turned out. This system allows a student to fly only when he feels like it, and assigns only two or three men to an instructor. The old system gave 10 or 15 men to an instructor. Under this new system the instructor gets to understand his students better through more constant and personal association, and the students have time to figure out their problems at leisure.

A medical officer's position at a naval air station is somewhat different from that of the medical officer at any other station. The medical officer must know all the men who fly, and know them well. He must be what is known as a good mixer. He must possess the faculty of obtaining the most intimate confidences from these young officers, and must spend hours in informal association with them. He must be liked, and go out of his way to obtain their good will and respect, and be ever ready to sit down, for example, to a lengthy discussion of the young fellow's domestic difficulties.

By so doing you learn your man's make-up. You have an intimate idea of his caliber; so, when difficulties come up in his flying, you have a valuable stock of information to draw upon.

To illustrate the bearing that your possession of his confidence and respect for you may have upon a boy's ability to fly, a simple case of a very young fellow comes to my mind at this moment.

The lad was a very conscientious and gentlemanly young man. He had gone right from home to college and before finishing his course had taken to naval aviation. He was a delicate sort of boy and his intimacy with the hard knocks of the world was not overgreat. I began to notice that he did not eat very much and that he was dejected. He walked by himself a good bit and did not go to bed early. On the beach he seemed to have lost his former "pep." I watched him from a distance for some time and soon began to notice that he was very inconsistent in his flying. His instructor told me also that the boy had evidently lost his "pep." One day the instructor took me up and we followed the boy around the course to watch his flying. At about 10 miles from the station the lad shut off his motor and glided down for a landing, and after taxying a bit on the water we noticed that his propeller stopped its motion. We flew back to the station and reported his plane as having a "dead stick" and then again flew around the course. As we came back to the location of the boy and his plane the pilot spiraled down and landed a short distance away. I at once noticed that the boy's head was hanging to one side and resting on the fuselage. Thinking that perhaps he was ill, we taxied close in to him and began shout-

ing. He suddenly sat upright and rubbed his eyes in surprise. He had been sound asleep and had not been awakened even by the extraordinary noise of our motor. It took some shouting to awaken him, too.

I requested that the instructor say nothing about my presence to the boy. He had not recognized me in the flying costume. The next day I joined him as he was walking up the street and we had a chat for a half hour as we covered the distance to town. The chat was about nothing in particular. In a couple days, however, he was in my room smoking and telling me the most woeful tale you could imagine about how his girl, to whom he was engaged out West, had just given him the cold shoulder. He said "I am all broken up over it." Of course I had to bolster him up and help him forget it. I obtained three days' leave for him to go to New York, and gave him the names of several people to locate at different clubs. He came back a new man and went to flying like a veteran. The last time I heard of him he had a new girl, had finished his training, and had obtained his commission. He turned out to be an excellent flier.

So I learned that tact and constant association play a great part in discovering the traits essential for making up a good flier. One of course must not go too far with the intimacy. That would not be policy. The medical officer in military branches should not breed too much familiarity. He is a doctor at all times and an officer in grade and rank.

It takes the right kind of medical officer on an air station to help bring out success in flying. He must be on the job, and if he does his work properly, the sick call in the morning is not the all important event of the day. The number of flying hours can be increased markedly through the influence of the medical officer. During the days when the rush was great to turn out fliers, and time lost in getting these men abroad meant a great deal, the doctor had to be on his toes to keep up with the work. Many trips he had to make through the sleeping quarters at midnight to watch them in their sleep and see that they had proper ventilation and sufficient bed clothing and were not disturbed by unnecessary noises. He had to watch them eat, watch them as they returned from liberty, and watch over countless other little things. In short he was one of the athletic trainers, and they all knew that the doctor was working for them, for their health and welfare. They appreciated it, and there was no grumbling.

As I have gazed down upon the lifeless bodies of some of the noble men whom it has been my lot to see crash to the earth from lofty heights to meet death instantaneously, my heart has gleaned the full

meaning of patriotism, of right over might, and of the justice of a cause for which the best young blood of our land has been shed.

Those lifeless features but a moment ago were set in grim defiance, those limp hands were clutching the wheel in steady control, and with nerves alert when the unexpected came. Did the flyer try to meet it? Yes! to the very last precious inch of space allowed him he worked in frantic, grim desperation. Down swift as a shot he goes; the inevitable stares at him. He does not shut his eyes and wait. No! he clamps his teeth and works to the very last moment, and then it is over in a fraction of a second. All great fliers expect this kind of death some day, and one who knows them can never doubt the earnestness of that last grim effort before the fatal crash.

THE ADMINISTRATION OF THE U. S. HOSPITAL SHIP "SOLACE."

By E. E. H. Old, Commander, Medical Corps, United States Navy.

ROUTINE FOR MEDICAL OFFICERS.

Medical officers will stand day's duty in succession beginning at 10 a. m. The day before coming on duty as officer of the day, each medical officer will be on duty as relief officer of the day. When ship is at a navy yard, or alongside wharf at hospital, the relief officer of the day will be allowed to leave the ship after 4.30 p. m. if his services are not required. The officer of the day shall remain on board while on duty; duties requiring a medical officer to leave the ship such as visiting a patient on another ship, in charge of patients being transferred by boat, fire, and rescue party, etc., will be performed by the relief officer of the day. Whenever the officer of the day is performing some duty which will take him some time, such as an operation, etc., he shall inform his relief who will then take up the regular duties required until relieved.

RECEIVING A PATIENT ON BOARD.

1. The officer of the deck will notify the officer of the day when patients are coming alongside and have the stretcher men notified. The master-at-arms will be at the gangway, when not otherwise performing duty, to assist the officer of the day in receiving patients and, if more stretcher men are necessary, will detail extra men for that work.

2. Men, other than those sent as patients, requiring examination or treatment will report to the officer of the day. Those for whom appointments have already been made—such as eye, dental, X-ray, Wassermann, etc.—will be sent to the respective medical officers in charge of those departments. Other cases will be examined and

treated or referred to the medical officer under whose specialty their cases may fall. All cases of this class should bring their health records and a note made in same by the medical officer examining the case, and the records should then be turned in to the record office for approval by the commanding officer. Should it be considered advisable to retain a man on board as a patient, report to the executive surgeon for instruction regarding such admission.

3. Patients should wear a tag with ship, name, rate, and diagnosis.

4. Baggage should be tagged with patient's name, rate, and ship.

ADMISSION OF MEMBER OF THE CREW TO SICK LIST.

1. When it is desired to admit to the sick list a member of the crew or hospital corps of this ship, send a memorandum to the record office immediately. Later obtain health record from record office, enter diagnosis, etc., and return to record office for information and forwarding to the commanding officer.

2. When placing a member of the crew or hospital corps on the binnacle list, send name and rate to the record office and state "for binnacle list." If condition is such that the man will probably be off duty for more than 24 hours, he should be admitted to the regular sick list. Make a note in health record of any injury or other trouble which might produce symptoms or recur in the future.

ASSIGNMENT OF PATIENTS TO WARDS.

1. All medical and genito-urinary cases will be assigned to ward A (medical ward); also cases of erysipelas.

2. All surgical cases, eye, ear, nose, and throat (except tonsillitis), will be assigned to ward B (surgical ward).

3. All contagious cases will be assigned to wards C, D, E, (isolation ward).

4. All officer patients, except contagious cases, will be assigned a room in sick officers' quarters.

5. The senior medical officer of a ward will be in charge of the ward and have full charge of the management of all patients and hospital corpsmen. He will make regular inspections and be responsible for the cleanliness of the ward and the preservation of property. Ward details should be submitted to him for approval by the chief pharmacist's mate in charge. All general orders relative to ward work shall be issued through the chief pharmacist's mate or pharmacist's mate in charge of ward.

6. Officer patients shall be treated by the medical officer under whose specialty their cases fall. The management, etc., of the sick officers' quarters is a part of the second, or surgical, division.

7. The officer of the day will notify in person or by messenger the medical officer of the ward to which a patient is sent. This shall be

done immediately in a case of serious illness or one requiring immediate attention.

ROUTINE FOR HEALTH RECORDS AND OTHER PAPERS.

When a patient is received on board the officer of the day will see that the health record of each case is received. Send the health record and other papers (hospital ticket, pay accounts, etc.) to the record office. If no papers are received, take man's name, rate, and ship as a memorandum for the record office. The health records pass through the executive surgeon to the commanding officer and are then distributed to the medical officers. When health records are received by medical officers they will at the first opportunity verify them with patient and note any changes that should be made in red ink and initial.

Medical officers will examine incoming cases as soon as practicable, prescribe treatment, and enter findings in health record.

Consult with executive surgeon before making a change in diagnosis. When a diagnosis is changed the health record must be so completed and returned to the record office for necessary information.

The attention of the executive surgeon should be called to incorrect or incomplete records.

PROCEDURE IN DISCHARGING A PATIENT TO DUTY.

Whenever a patient is ready for duty the form kept in the wards, "Patient ready for duty or transfer," shall be filled out by the medical officer in charge of the case and sent to the record office for the information of the executive surgeon. As soon as possible the health record of the case will be completed and signed, leaving blank the date of discharge and the number of sick days, both in history of case and in abstract, except for a number of the crew of this ship, in which case fill in dates and number of sick days.

TRANSFER OF PATIENTS.

When patients are to be transferred the medical officers will see that full instructions are given the pharmacist's mates in charge of wards regarding the cases to be transferred correct diagnoses, which cases should go in stretchers or walk, and in case of the latter whether they should go up in ambulance. All cases transferred shall wear a tag giving name, rate, and diagnosis. If a body is transferred for preparation for burial, a tag giving full name, rate, and diagnosis shall be attached to the right great toe; a letter of transmittal shall go with the body giving necessary immediate information, and later the other necessary papers shall be sent.

The officer of the day, assisted by the master-at-arms, will have charge of transferring patients and baggage under direction of the executive surgeon.

Lists of patients with diagnosis will be made in the record office. The officer of the day will check the names as patients are turned over to the medical officer from the hospital receiving them. He will see that all patients and baggage are handled with every consideration and care.

Hospital corps details of men to handle stretchers and baggage and accompany patients to look after return of property from hospital will be made out by master-at-arms.

The executive surgeon will direct the order in which contagious cases are to be transferred and, if in boats, will make out a schedule for same.

The assistant master-at-arms in charge of the bag room will break out the bags and hammocks of men to be transferred according to list furnished and see that they are properly lashed, secured, and tagged with the patient's full name and rate. Another check up of baggage will be made when it is removed from bag room and again when placed on wharf. He will be present to check it again when delivered to representative from hospital authorized to receive same and obtain a receipt.

The pharmacist's mates in charge of wards will make a list of all stretchers, blankets, sheets, pajamas, etc., that are sent with patients and will give a list to the pharmacist's mate in charge of property who will be stationed on the wharf to receive and check up on same as returned, to be again checked up on return to ward.

The officer of the day will report to the executive surgeon when all patients and baggage have been transferred; a later report will be made regarding property.

All papers of transfer, as health records, hospital tickets, pay accounts, enlistment records, etc., will be taken direct to the hospital by the pharmacist in charge of the record office or his assistant and a receipt for same obtained after being checked.

When such a transfer is made in boats the officer of the day will have charge of loading the boats, as outlined by the executive surgeon. The relief officer of the day will accompany the patients to place to which transferred, and will then turn over patients to the medical officer receiving them in the same manner as mentioned above. Hospital corpsmen will also accompany patients in order to handle stretchers and return all property. Baggage will be handled as mentioned above.

SICK CALL AND MORNING REPORT OF CASES.

When aboard ship medical officers shall hold sick call at 9 a. m. and 6 p. m. and shall not delegate this duty to anyone else unless engaged in other official duties or absent from the ship. When a

medcal officer is to be absent from the ship at sick call he shall arrange with another medical officer to visit his cases or notify the officer of the day that he will be absent, and inform him of any cases that are seriously ill and may require some special care.

Medical officers shall report to the executive surgeon immediately when the condition of a case is considered serious. They shall report in person, or by memorandum, the condition of such cases every morning after sick call.

All orders given to pharmacist's mates relative to treatment of patients shall be *written in an order book*, kept in each ward for that purpose, and signed or initialed by the medical officer giving such orders.

MEDICAL JOURNAL.

The medical journal must be written up to date by 10 p. m. and closed and signed at 10 a. m. and turned in to the record office. It shall contain all items relative to the work of the medical department of the ship, such as inspections, drills, "mast" for members of the hospital corps and punishments, court-martial of the hospital corps, receipt of bodies for embalming and inspection of same, deaths, movement of ship, transfer of patients, hospital corps reporting for duty or transferred, medical officers reporting or detached, medical boards, boards of inquest, etc.

When the officer of the day desires to be relieved from duty he shall obtain permission from the executive surgeon, and must write up and sign the medical journal on being relieved.

When the relief officer of the day desires to be relieved he shall obtain permission in the same way.

INSPECTION OF MEALS.

The officer of the day shall inspect the meals of the hospital corps and convalescent patients to see if they are satisfactory in quality and quantity, and at same time to inspect mess gear to see if clean and in proper condition for serving food. When unsatisfactory he shall report the same to the executive surgeon, and make entry to that effect in the medical journal.

When the officer of the day is unable to inspect the meals by reason of other official duties, the relief officer of the day shall be notified and make this inspection.

Officers of the various wards shall exercise careful supervision over the diets of their patients, and see that they are getting proper food and that it is served properly.

INSPECTION OF PROVISIONS.

The officer of the day will make an inspection as to the quality of all provisions received on board ship. The inspection shall be a personal

one and a report made to the paymaster when any are condemned as unfit for use. The regular report certifying such inspection shall be signed. The chief commissary steward shall be present at such inspections. Whenever the officer of the day can not be present his relief should be notified.

Bumboats, when allowed by the commanding officer, shall be carefully inspected by the officer of the day. Care should be taken to prevent smuggling of alcoholic beverages.

PERMISSION TO LEAVE AND REPORTING RETURN TO SHIP.

Permission to leave the ship will be obtained from the executive surgeon or, in his absence, from the senior medical officer on board. Before leaving report same to the officer of the day and to the officer of the deck or to the quartermaster on watch at the gangway when going over the side.

When returning on board report to the officer of the day and executive surgeon or senior medical officer aboard. After 9.30 p. m. make such report before 8.30 a. m. the following morning.

When returning from leave of absence or other leave granted by the commanding officer report return to him as well as to the executive surgeon.

BREAKFAST HOUR.

The wardroom mess table must be cleared by 9 a. m. No breakfast will be served after 8.30 a. m.

QUARTERS.

The master-at-arms shall see that the hospital corps is mustered at 6.45 a. m. daily at their stations in wards, etc., and report hospital corps and patients present or accounted for by 8.45 a. m. daily to the executive surgeon. Any absentees will be reported to the officer of the day for entry in the medical journal.

At 9 p. m. an entry shall be made by the master-at-arms, or the chief pharmacist's mate on watch, to the officer of the day as to whether all are present or accounted for; prisoners reported (if any), lights out, No. 2 hold inspected, and any other report that might concern the security of the medical department of the ship. The officer of the day will make his report to the executive surgeon who will then report to the commanding officer.

LIBERTY PARTIES.

All men going on liberty will receive their passes at the record office and will show same at gangway as authority for leaving the ship.

On return the passes will be taken immediately to the record office and placed in the box for liberty cards.

No man will be allowed on liberty who is not wearing his identification tag properly suspended around his neck, or who is not in the prescribed uniform and neat in appearance.

Patients going on liberty will be checked out and in from a list made of same.

The officer of the day or master-at-arms will inspect all such parties of hospital corps men and patients.

When alongside the wharf the quartermaster on watch, or supervising night pharmacist's mate, will report any man returning on board under the influence of intoxicating liquor to the officer of the day who will examine him immediately and report such examination.

BOAT SCHEDULES.

The commanding officer's gig is for the use of the commanding officer, and will not be used for any other purpose except by his permission.

The boat schedule will be made out by the executive surgeon with the approval of the commanding officer. These schedules will be made to suit the convenience of all as far as possible and officers will conform to these schedules in making appointments and engagements. Special boats will be allowed if necessary, when such will not interfere with the regular duties and other demands of the ship. No other than the regular boats shall leave the ship without the knowledge of the executive surgeon.

SUMMARY OF ROUTINE DUTIES OF OFFICER OF THE DAY.

1. Inspection of meals and mess gear.
2. Inspection of medical department (wards, etc.) about 3 p. m.
3. Receiving and distributing patients.
4. Holding evening sick call on the patients of any medical officer who may be absent.
5. Inspection of provisions, bumboats, etc.
6. Examination of members of the hospital corps or crew for discharge, transfer, or enlistment.
7. Inspection, together with the executive surgeon, of bodies prepared for burial.
8. Receiving and making reports at 9 p. m.
9. Medical journal.

ABANDON SHIP.

1. Patients will be mustered on the upper deck and forecastle opposite where the boats to which they are assigned are lowered. The men

who are not able to go down a ladder, and those who have to be put in boats in stretchers, such as fractured leg, etc., will be placed in boats when on falls opposite the rail. No others will get in boat at that point, but will wait until the boat is in the water, and then go down pilot ladders or hand-lines.

2. There will be assigned to each boat four men to be lowered in it; two to attend to the falls, and two hospital corpsmen to assist in taking in helpless men and those in stretchers. Any man handled in stretcher, and who does not absolutely have to remain in one, will be immediately removed from it as soon as placed in the boat and the stretcher thrown away; medical officers will decide this point.

3. The medical officers assigned to boats will take their stations on the upper deck with patients, and when the boats are stopped at that point will have the helpless men put aboard.

4. The helpless patients in the isolation ward will be placed in the whale boats before they are lowered. The patients there can always be carried by hand; no stretcher is necessary.

5. The hospital corpsmen and supply division assigned to carry breakers, medical boat box, rations, and mess gear, will all go to boat deck to aid in lowering boats. All other hospital corpsmen will aid in looking out for the sick, carrying stretchers and helpless men, and will call on able convalescent patients to assist in this work.

6. The kapok mattresses in the ward will be brought up on deck to be thrown overboard when so ordered.

7. Boats shall not be lowered into the water, or rafts launched, until the ship loses her headway and the order is given by the master.

8. If the emergency is such that the master passes the word to abandon ship as quickly as possible, the helpless shall be placed in the first available boats, and all others shall get overboard and away from the ship as soon as possible, depending on reaching rafts or floating wreckage. The sick shall be attended to as above before medical officers and hospital corpsmen leave the ship.

9. Life jackets shall be at hand for each patient, and all patients shall be provided for first. At sea the life jackets shall be placed at each bunk, and ready to be adjusted by patients at a moment's notice. This order shall also apply to crew and officers so that no time be lost.

10. Boats as soon as filled will be pulled away from the ship and stand by to assist.

11. After boats are lowered the men assisting on boat deck will reach boats or water by way of falls or from hurricane deck by way of ladders and hand lines. First and second whaleboat crews will assist in lowering first and second cutters before leaving boat deck. Those who jump or dive over will be careful to look first and not strike some man already in the water.

12. The boats and rafts will be manned and lowered under directions of the ship's officers and petty officers. The officer or petty officer assigned to a boat shall have a list of the men in his crew, including hospital corps and supply division, and will account for absentees at drill. They shall have a list of what should be provided for each boat and see that it is actually brought up.

13. When being lowered, the first and second whaleboats and the first, second, third, and fourth cutters will be stopped at the rail of the upper deck to allow the helpless men to be put aboard. The first and second whaleboats will be stopped for only a short time, as they should be taken off the falls as soon as possible in order to allow lowering of the first and second cutters; if the ship is to be abandoned as quickly as possible, however, they will be placed in the water immediately and not stopped at rail. In the latter instance all the helpless will be mustered opposite where the second and fourth cutters are lowered and be placed in those boats when opposite the rail of upper deck.

14. The pontoon rafts will be boarded by way of hand lines, pilot ladders, or from the ship as soon as possible and stand by to assist.

15. The Carley life rafts, after being launched, will be manned and cast adrift as soon as ship loses headway, and will be paddled clear of the ship to stand by and pick up men in the water.

INSTRUCTIONS FOR HOSPITAL CORPS.

DAILY ROUTINE.

6.00 a. m.—Reveillé for hospital corpsmen and convalescent patients.
6.45 a. m.—Muster at stations. Turn to. Baths for bed patients, etc.
7.00 a. m.—Ward diets. First mess. Draw ice.
7.30 a. m.—Breakfast.
8.00 a. m.—Turn to. Report number of patients, etc., to record office.
Report any absentees to master-at-arms.
9.00 a. m.—Sick call.
10.00 a. m.—Inspection by executive surgeon.
11.30 a. m.—Ward diets. First mess.
12.00 a. m.—Dinner.
3.00 p. m.—Draw ice.
5.00 p. m.—Ward diets. First mess.
5.30 p. m.—Supper.
6.00 p. m.—Sick call.
8.50 p. m.—Muster patients.
9.00 p. m.—Taps. Report to chief pharmacist's mate on duty. Night watch report for duty.

WEEKLY ROUTINE.

Monday:		
Tuesday:		Change linen. Examine bunks for vermin.
Wednesday:	a. m.—	Air bedding. Draw cleaning supplies. General field day for wards.
	1.00 p. m.—	Bag inspection. First Wednesday in month.
Thursday:	10.00 a. m.—	Inspection of hospital corps and supply division on hurricane deck. Inspection of wards and patients by commanding officer. First Thursday in quarter muster of whole crew for reading of Articles for the Government of the Navy.
	1.00 p. m.—	Fire and collision drill. Abandon-ship drill first Thursday in month.
Friday:		Change linen. General field day, excluding wards.
Saturday:	10.00 a. m.—	Inspection of ship, including wards, by commanding officer.
	p. m.—	Holiday. Recreation parties; rowing and sailing when possible.
Sunday:		Divine service when chaplain is available. Recreation parties; rowing and sailing when possible.

DUTIES OF HOSPITAL CORPSMEN IN WARDS.

1. Every care and attention shall be given to patients.

2. Temperature, respiration, and pulse shall be taken promptly and recorded on chart. Take T. P. R. of every patient admitted to ward for medical officer's information; start chart on those cases for which ordered.

3. Medication shall be given as ordered.

4. Send to laboratory in morning a specimen of urine of every case admitted the day before. For this purpose the day watch will obtain clean bottles and turn them over to night watch with names of patients received on separate slips. Inform patients in regard to obtaining specimen.

5. Bed patients will be bathed every day. Notice skin over prominent bony parts for possible beginning bedsore; report if becoming chafed.

6. Beds are to be cleaned, sheets smoothed, and otherwise made up properly every morning, and for bed patients as often as is necessary for the comfort of patient.

7. The pharmacist's mate in charge of wards will have in his possession the keys to the poison locker, linen locker, etc., and shall be

responsible for their contents while he is on duty. When relieved he will pass the keys to his relief, to supervising night watch, etc.

8. The pharmacist's mates will see that "Instructions to patients" are called to the attention of men as admitted and that they are obeyed. They shall study said instructions and be familiar with the orders, which also apply to hospital corps in many particulars, especially Nos. 6, 7, 8, 10, and 16.

9. The other hospital corpsmen will obey orders given by the chief pharmacist's mate and senior pharmacist's mate in charge of wards.

10. When a stretcher case is admitted the chief or senior pharmacist's mate will ascertain if patient has any valuables or money he wishes given to executive surgeon or paymaster for safe keeping; if patient is unconscious or seriously ill, he will search his effects and turn such over to either of the above officers, if any are found. If stretcher case has on a uniform, or a bundle of clothes is sent with him, these shall be tagged and sent to bag room to be stowed with patient's bag.

11. Pay particular attention to all orders given in regard to patients and see that the medical officer giving same signs or initials the order book. If a verbal order is given put it in order book later and state "Verbal order of Dr. ————," and have him sign it at first opportunity.

Note carefully instructions relating to ward books and index cards.

12. When a patient is received enter name, etc., on index card of "Roster of patients"; make out "Report of patients received" and send *immediately* to record office; assign him a bunk and locker with number same as that of bunk. Each patient shall have only one locker and be allowed to stow in it only change of clothes and underclothes, toilet articles, and writing material. If ambulant, have him read "Instructions for patients" and note his bunk number.

13. In case of a death notify the medical officer in charge of case or, in his absence, the officer of the day. Cover the face and obtain stretcher for removal but do not prepare or remove body from bunk until pronounced dead by a medical officer. After a patient is pronounced dead, cleanse body if soiled, place cotton in rectum, tie a piece of tape around penis, close eyelids and mouth and secure by bandage. Tie a tag to right great toe, giving name, rate, and ship. If noncontagious case wrap body in dry sheet and cover over with blanket if moved before 9 p. m. If contagious case first soak sheet in 1:5,000 bichloride solution before wrapping around body. Close roster card giving time of death and send to record office. Notify chief master-at-arms or, in his absence, his assistant and send body to morgue. Send all his effects in locker to bag room.

When a member of crew is admitted to ward state on "Report of patients received" if admitted to sick list or to be placed on "Bin-

nacle list"; obtain this information from medical officer; also the diagnosis, which should be added to report. If only admitted to "Binnacle list" do not take up on "Roster of patients"; can make a separate card for these cases headed "Binnacle list" and keep at hand for reference.

TEMPERATURE HOURS.

Q.	4	hrs	8	12	4	8,	and during night if patient is awake.
T.	I	D	8	2		8.	
R.	I	D	8			8.	

MEDICATION HOURS.

Q.	3	hrs	8	11	2	5	8,	and during night if ordered.
T.	I	D	8		2		8.	

Medications ordered at certain specified hours shall be so given.

At 9 p. m. the master-at-arms or chief pharmacist's mate on watch shall take station in the lobby. The hospital corpsmen in charge of the several wards will report if all patients are present. The assistant master-at-arms will report inspection of alcohol chests, No. 2 hold, prisoners (if any), patients in strong room (if any), and if the keys of brigs and strong rooms have been turned over to the supervising night pharmacist's mate. The hospital corpsmen going on night watch will report for duty in wards, and the supervising night watch will report that the watch is posted.

The master-at-arms or chief pharmacist's mate on watch will then make above reports to the officer of the day, in addition reporting any member of the hospital corps or supply department if absent. The officer of the day will report to the executive surgeon, who will report to the commanding officer.

CHANGE FROM DAY TO NIGHT WATCH—DUTIES OF NIGHT WATCH.

1. At 9 p. m. the night watch will report for duty and take over charge of wards. The wards are to be thoroughly policed by the day watch before being turned over, and if the wards, dressing rooms, diet kitchen, etc., are not found in good condition, a report of same shall be made by the supervising night watch to the executive surgeon. This order also applies to the night watch before turning over to the day watch.

2. All orders to be carried out during the night, that have been given the day watch, shall be turned over to the night watch in writing, in a book provided for that purpose. Any orders given during the night, that continue during the day, shall be called to the attention of the day watch when reporting for duty. Any cases seriously ill or needing special attention will be visited and order regarding same repeated.

3. The supervising pharmacist's mate on night watch shall make rounds of the Medical Department every half hour, giving particular attention to assistants being on watch and attending to duties, store rooms, pantries, galley, alcohol chests, paymaster's office, and other offices. When there is no watch in sick officers quarters or isolation ward, he will see if any patients there need attention. If any patient or member of the crew needs attention of a medical officer he will notify the officer in charge of case or officer of day.

4. One assistant will remain in medical and one in surgical ward. The supervising watch will remain in wards when not making rounds. Special watches will be detailed when necessary.

5. In case of fire the supervising watch shall immediately sound the general alarm, notify officer of the deck or quartermaster on watch of the location of the fire and stand by to release prisoners until relieved by the master-at-arms. He will see that keys of strong rooms are turned over to him when going on duty.

6. The supervising watch shall call the ship's cook on duty at 3 or 4 a. m. as ordered, and the baker and butcher at hours ordered. He and his assistants will call all hospital corpsmen and convalescent patients at 6 a. m., and remain on duty until relieved by the day watch at 6.45 a. m.

7. The night watch will draw their lunch at 4 p. m.

8. The supervising night watch will see that his assistants perform their duties properly. He will report any disorder or any other irregularities that may be noted on rounds, thus acting in the capacity of assistant master-at-arms. He will keep a written record of time of making rounds and notes shall be made of anything unusual found, and shall turn in this book to the executive surgeon's office before 8 a. m.

WARD BOOKS AND INDEX CARDS.

1. Order book: In which shall be written all orders given by medical officers for treatment of patients and shall be signed or initialed by the medical officer. Such orders shall be checked as they are carried out by the pharmacist's mate or recorded on medication sheet, diet sheet, etc.

2. Night order book: Will contain all orders in regard to patients that are to be carried out by the night watch. Such orders shall be entered by the senior day watch before turning over to night watch. These orders, as carried out, shall be checked by the night watch.

3. Drug book: Containing list of articles drawn from dispensary. This list shall be signed by medical officer in charge of ward.

4. Property cards (two sections): ——— card index.

(*a*) Medical department: Containing a list of all nonexpendible property issued to the ward belonging to this department, such as

blankets, bed linen, pajamas, bedpans, buckets, etc. The card will show number and date received. When articles are received from store room or turned in date and number will be entered on card.

(*b*) C. & R. and supply department: Containing list of all property issued to the ward belonging to this department, such as mattresses, pillows, mattress covers, pillow covers, etc. The card will show number and date received. When articles are received or turned in to supply officer for survey, this date and number will be entered on card.

These cards will be kept up to date by the pharmacist's mate in charge of ward, directed by the chief pharmacist's mate. The pharmacist's mate or chief pharmacist's mate in charge of property will check up these cards the first of each month.

5. Roster of patients: A card index shall be kept in which the names of all patients will be entered on cards. This will give name, rate, ship, date received, diagnosis. It shall be kept up to date and ready for reference each day to check up on patients belonging to ward. When a patient is transferred, discharged, or dies the card will be closed with this information entered on it, with date, and sent to record office.

The medical officer in charge of ward will see that the above books and cards are kept properly. They will be inspected occasionally by the executive surgeon, and regularly after each inventory.

SCRUB AND WASH CLOTHES—BAGS AND HAMMOCKS.

Clothing may be scrubbed every morning except Saturdays, Sundays, and holidays, and every evening except Saturdays, Sundays, and evenings before holidays when in port. For this purpose the pumps on the forecastle should be started at 4.30 p. m. and the decks dried down at 7 p. m. or before dark. At least one-half of the forecastle will be left dry. Bags and hammocks will be scrubbed when ordered, by watches. During winter months clothes, etc., may be scrubbed during above afternoon in the wash room.

All clothing, etc., shall be hung on lines on forecastle, which will be triced up at 6 a. m. and 7 p. m. except Saturdays, Sundays, and holidays. Begin hanging clothes at head of line and not near lower end. None shall be hung in wards, bathrooms, or sleeping compartments. Bedding will be aired Wednesday and may be hung over the rail and awning lines abaft the record office and on the forecastle. Clothing and bedding will be piped down at 1 p. m. or when word is passed. All clothing shall be properly marked in accordance with Naval Regulations.

LAUNDRY.

1. Count and turn in soiled linen, etc., Tuesdays and Fridays and receive a fresh supply.

2. Whenever linen is changed examine bunks and mattresses carefully for bedbugs and if found notify the master-at-arms, who will have the necessary articles sterilized, then go over bunks thoroughly with blow torch where possible, and kerosene mixture where torch can not be used.

3. All linen from isolation ward shall be so marked, sterilized before going to laundry, and returned to that ward. Linen from beds of scarlet-fever cases and that soiled by any case in this ward shall be first soaked in 1:5000 solution of bichloride for one hour.

4. All linen belonging to operating room should be so marked and returned to that room.

FRESH WATER.

All men shall be careful in use of fresh water, and especially to see that taps are not left running to cause waste. The capacity of evaporators is not sufficient for ship's purpose, consequently the excess has to be carried in tanks, which makes economy necessary.

PASSAGEWAYS.

1. The medical and surgical wards must not be used as passageways by the hospital corps, patients, and crew.

2. Men on duty carrying diets, laundry, ice, or other articles can use the starboard wing passage to the medical ward.

3. Men from the medical ward going aft must use the hatch leading on deck or below into convalescent mess compartment.

4. Men from the surgical ward going aft must go by the way of the starboard wing passage.

5. The lobby must not be used as a general passageway except by patients from the surgical ward going to and from the deck above, or hospital corpsmen on duty.

6. No loafing or loitering will be allowed on hurricane deck except in such places aft of deck house as may be designated in emergency.

BAG ROOM.

1. An assistant master-at-arms shall be in charge of the bagroom. Hospital tickets will be sent to him for filing. He will keep a card index, giving list of baggage of each patient received and containing full name of patient, rate, ship, date received, number of bag, hammock, ditty-box, and number of rack in which stowed. All baggage received by him should have been tagged with owner's name, rate, and ship before being sent to bag room, but in case this was not done he will have such baggage identified by owner before tagging, listing, and stowing it. When a patient is discharged to duty he will be sent to bag room to stow his bag and properly lash bag and hammock, and will satisfy himself that all his property has been returned to

him; he will then be required to date and sign receipt on his index card; this will also be required of those patients being transferred to hospital who are able to go to bag room—that is, in regard to stowing bags, etc.—as a receipt will be obtained from hospital for baggage.

2. When patients are to be discharged or transferred the list of names will be given the master-at-arms for the bag room. Baggage will be broken out and delivered as stated in paragraph 1 in case of discharge. When transferred to hospital all the baggage of patients on list will be broken out, stowed, and lashed properly. A check, paying particular attention to names and rates, will be made as it is removed from the bag room, again when placed on wharf, and again when delivered to representative from hospital authorized to receive same, and a receipt obtained. All baggage shall be handled with care; none allowed to be thrown about.

The clothing list on hospital tickets will be made out by the assistant master-at-arms in charge of bag room and returned to record office.

3. Each morning a list of patients admitted and discharged during the last 24 hours will be sent to the bag room. This list will be checked with the baggage received and delivered and a report made to the executive surgeon as to whether all patients received had baggage and if such was complete, also if all patients discharged received their baggage.

4. The bag room card index will be kept at all times in the bag room. All entries shall be made promptly on admission or discharge of patients. A check on all baggage shall be made each Friday.

Hospital tickets shall be kept for at least one quarter and then destroyed.

5. The bag room shall be opened each day from 1 to 2 p. m. to allow patients access to their bags. Patients will be required to properly restow their bags and replace them, removing any trash left on deck.

6. No unauthorized person shall be allowed to enter the bag room. No loafing or smoking will be allowed.

VALUABLES OF PATIENTS.

1. Patients having money or valuables should turn them over to paymaster or executive surgeon for safe-keeping. Those who keep them on their person do so at their own risk.

2. Whenever an unconscious or seriously ill patient is received the officer of the day or pharmacist's mate in charge of ward will search his effects and take any valuables the patient may have to the paymaster or executive surgeon, with a memorandum of man's name and rate.

ICE.

Ice will be drawn at 7 a. m. and apportioned to the wards, etc., as follows: Medical ward, 5 cakes; surgical ward, 5 cakes; sick officers' quarters, 2 cakes; isolation ward, 2 cakes; commanding officer, 2 cakes; wardroom, 4 cakes; ship's officers' mess, 4 cakes; chief petty officers, 2 cakes.

No ice shall be issued to any ward or any person in excess of the above allowance except by order of the commanding officer or executive surgeon. All ice left over will be placed in the cold-storage ice box for emergency use.

When there are no patients the ward allowance will be reduced or cut off. Ice will be drawn from the cans by the deck and engineer's force and stowed in the ice box by the hospital corpsmen and messmen.

An assistant master-at-arms will be in charge of stowing and issuing ice, under direction of the master-at-arms, and will see that ice is drawn at proper time and in amounts as outlined above. He will report any infractions of this order to the executive surgeon.

MESS GEAR, REFUSE, SCULLERY.

1. Mess gear: There will be two messes for hospital corps known as first and second mess. First mess will be spread at 7 and 11.30 a. m. and 5 p. m. for those in the wards, etc., who are delegated for this mess; supplies will be drawn from galley about 10 minutes before mess. Second mess will be at 7.30 a. m., 12 m., and 5.30 p. m.; supplies will be drawn from galley about 10 minutes before mess. There will be only one mess for convalescent patients unless a large number require two; the hours will be as above. No meals will be served outside these hours without permission of the executive surgeon.

One of the messmen will always notify the officer of the day when second mess is being spread in order that it can be inspected; this should be done promptly about five minutes before second mess.

2. Refuse: All refuse from mess shall be taken to garbage cans before 9 a. m., 2, and 6.30 p. m. The buckets shall not be filled to rim as this is liable to cause spilling on decks. The contents of buckets shall first be passed through strainer in slop chute, and only solid refuse put in cans. *Always cover garbage cans after using.*

3. Scullery: Mess gear must be thoroughly scraped of refuse before being sent to scullery, and shall be taken there promptly as soon as cleaned. The scullery shall be opened one hour before each meal.

SMOKING REGULATIONS.

Smoking is allowed on the upper deck forward of the deck house; on the main deck abaft the surgical ward, except in the thwartship passage and wing passages forward of this; in seamen's quarters.

Smoking is positively forbidden in the following places: (1) Wards and toilets; (2) operating room; (3) convalescent mess hall, except when allowed in bad weather; (4) cooks and mess attendants' quarters on berth deck; (5) all storerooms and holds; (6) in or around No. 1 or 2 hatches; (7) after part of upper deck where gasoline drums are stowed; (8) on hurricane deck around alcohol and ether chests; (9) no smoking after taps; (10) there shall be no smoking in any boat at any time except steam launch when at boom, and then only in fireroom section.

LOBBY.

The benches in lobby are intended for patients awaiting examination or treatment, and hospital corpsmen on stretcher duty. No smoking, loud talking, or loitering will be allowed.

HOSPITAL CORPS QUARTERS.

1. Shall be thoroughly policed after each mess and ready for inspection by executive surgeon at 10 a. m.

2. Men must not sit on clothes bags or hammock netting.

3. Men must not throw cigarette stubs or matches or spit on deck; they shall use the regular receptacles intended for same. Smoking not allowed after 9 p. m.

GALLEYS, MESS ROOMS, ETC.

No one except the cooks, stewards, and mess boys are allowed to enter the galleys or pantries except on duty.

The galleys, scullery, and mess rooms will be closed at 9 p. m. and opened at 5 a. m., or when necessary.

Any one found in these places or storerooms by the supervising night watch or quartermaster on duty will be taken to the officer of the day, or officer of the deck, who will investigate and report to the executive surgeon if necessary.

Orders by the supervising night watch and quartermaster on duty *must* be obeyed.

DISPOSAL OF GARBAGE, ETC.

1. In dry dock: No slops, garbage, or waste of any kind shall be thrown over the side or into waste pipes, sewers, or scuppers of this ship while in dry dock. Such shall be carried to cans on dock pro-

vided for the purpose, and only solid garbage, etc., placed in cans, the liquid having been poured into the drain. All paper, boxes, etc., shall be placed in the box provided for such.

All water-closets, heads, urinals, slop basins, etc., shall be closed, locked, and posted "Do not use."

2. Alongside of dock: The same disposal shall be made as mentioned above except water-closets, etc., are allowed to be used.

3. In port: All garbage shall be strained in slop chute and the solid matter placed in garbage cans and covered to be on garbage lighter. They shall be thoroughly cleaned whenever emptied. If no lighter is available the garbage shall be burned.

All paper, trash, wood boxes, soiled dressings properly secured in paper bags, etc., shall be placed in trash cans in the thwartship passageway and forward of the fireroom uptake, and lowered into fireroom at — a. m. and 3 p. m. daily; this work will be done by convalescent patients under direction of an assistant master-at-arms.

4. At sea: All garbage that will sink will be thrown over the side through slop chute. Tin cans shall be punctured with holes before being thrown overboard. All garbage that will float shall be thrown in furnace together with the paper, wood boxes, etc., as mentioned above.

5. The chief commissary steward will be responsible for the proper disposal of garbage, and will detail a man to keep the cans, stands, etc., clean when in navy yard, and will see that the deck and garbage cans in region of galley are kept clean at all times.

DISPENSARY.

The dispensary shall be open from 8 until 11.45 a. m., 1 to 3 and 7 to 8 p. m., and at other times if necessary.

UNIFORM REGULATIONS.

1. When on liberty the prescribed uniform shall be worn and men shall be neat in appearance. The identification tag properly suspended around the neck is a part of the uniform and shall be worn at all times.

2. Hospital corpsmen on duty in wards, scullery, and mess hall shall wear whites.

3. Men appearing on deck for the purpose of recreation shall wear whites.

4. Dungarees shall not be worn by hospital corpsmen at any time.

SALUTING.

1. Men shall observe carefully regulations in regard to saluting. Salute the Commanding Officer every time he is met and other officers

at the first meeting during the day. If uncovered stand at attention. Always salute when speaking to, or spoken to by, an officer.

2. When ashore be careful to salute all officers of Navy, Army, and Marine Corps, and officers of our allies.

3. *A man's military efficiency can be estimated to a great extent by his proper observance of saluting.*

GENERAL LIBERTY REGULATIONS.

1. Liberty will be granted by watches, alternating day and day. Regular liberty will expire at 8 a. m. unless sailing orders or other conditions render another hour necessary. One watch may be granted 48 hours' liberty Saturday and Sunday; the watch entitled to the 48 hours will remain on duty the Thursday and Friday immediately preceding.

2. Men wishing to change watches or request special liberty shall make such requests at 10 a. m. on the day of going.

3. The liberty lists from the different departments will be placed in the record office before noon of the day such liberty is granted. When there are patients on board the list of those desiring liberty shall be made up in the wards before 9 a. m. and initialed by the medical officer in charge of their cases. These lists will be sent to the record office by 10 a. m. When alongside wharf the liberty of patients shall expire at 12 midnight unless special permission to remain over night is granted.

4. At navy yards requests for property passes shall be made before noon of the day on which they are to be used.

5. Whenever a man goes on liberty he will obtain his liberty card from the Chief Pharmacist's Mate on duty at the record office who will be there to hand out cards on the hour beginning at 1 p. m. on Saturdays and holidays, and at 4.30 p. m. other days. These cards will be used whether the ship is at navy yard, alongside hospital wharf, or at anchor in port. They will not be taken by men going on leave, furlough papers then taking the place of the card.

On return to ship the liberty card shall be placed immediately in the box at record office labeled "liberty cards."

6. A list will be made of patients going on liberty and they will be checked in and out from this list.

7. Every man should take the best care of his liberty card and secure it against loss. This with his identification tag and marks on clothes should prove a ready identification regarding his status in the Navy and that he is on authorized liberty, should question arise.

The loss of a liberty card means that some person may find it and impersonate the loser to the detriment of him and possibly of his

country. Consequently every man who loses his card will be deprived of three to five liberties, depending on the circumstances of the case. He will also be required to purchase another celluloid holder for his new card.

8. All men going on liberty will wear the prescribed uniform. Their clothes shall be kept neat and shoes blackened. Neatness shows pride in self and ship. They shall show the liberty card at the gangway as authority for going on liberty.

When at anchor in port or alongside a wharf at hospital or navy yard where rules require men to leave in parties, liberty parties shall be inspected before leaving the ship. Hospital corpsmen, commissary division, and patients will be inspected by the officer of the day or master-at-arms; deck and engineer's division by the officer of the deck or quartermaster. Such parties will march through the naval reservation in a body.

Those men not complying with above ship's regulations will not be allowed on liberty.

VENEREAL PROPHYLAXIS.

All men who have exposed themselves to venereal infection while on liberty shall report to the supervising night watch for venereal prophylaxis as soon as they return to the ship.

WORKING PARTIES.

General stores, etc., will be handled by the men of the division for which intended, when practicable, viz, hospital corps, all medical stores; deck division, all C. & R. and all navigation stores; engineer's division, all engineer's stores. Commissary stores will be handled by parties from all divisions. Working parties will be detailed by the heads of the several divisions, or their representatives.

SAILING PARTIES.

1. No member of the hospital corps shall be allowed to go sailing who has not qualified in swimming. Sailing parties shall not go out of sight of the ship or land without permission. A coxswain shall be in the boat if possible.

2. A list of names of all men going in such a party will be made out beforehand and given to the officer of the deck when leaving the ship.

MISCELLANEOUS.

1. Men must not loaf, loiter, or congregate in gangways of upper deck and will only be allowed there on duty or in passing forward or aft.

2. The port gangway shall be used in going forward and aft.

3. Men shall not hang over the rail or out of ports when entering port or when boats are coming alongside.

4. Profane and vulgar language shall not be used. Such language is strictly forbidden by Articles for the Government of the Navy (art. 8).

LIBRARY.

1. Shall be in charge of assistant master-at-arms under direction of a medical officer appointed to direct this work and take proper care of books. A card index will be made of all books and kept up to date at all times.

2. When a book is removed from the library the name of borrower, with date shall be entered on the card in space provided for such entries, and the card then placed in compartment marked "Books out." When such a book is returned the card, with name scratched, will be returned to regular place.

3. The library will be open every day for issue of books from 10 to 10.30 a. m., 12.30 to 1 and 5.30 to 6 p. m.

4. Due care shall be taken by all to prevent abuse of books, and books will be returned as soon as they have been read. A report shall be made to the executive surgeon of any abuse or loss of books.

INSTRUCTIONS FOR PATIENTS.

1. Orders of pharmacist's mates on duty shall be obeyed.

2. Reveillé for convalescent patients at 6 a. m. Clean and make up bunks. Not allowed to sit on bunks. If you wish to lie down always remove shoes and fold spread; bed to be properly fixed after using.

3. Report promptly at hours designated for giving medications and taking temperatures.

4. Stand by bunks at 8.45 a. m. and 5.45 p. m. for sick call; at 8.50 p. m. for muster.

5. Valuables and money should be turned over to the executive surgeon or paymaster for safe-keeping; otherwise no responsibility for loss is assumed.

6. No smoking allowed in wards and toilets.

7. Washing and drying of clothes in wards and toilets not allowed. Use forecastle and clothes lines.

8. Skylarking, loud talking, and profanity are forbidden.

9. Uniforms shall be as prescribed for the day. Dungarees are not allowed.

10. Lockers shall be kept clean and neatly stowed.

11. Patients will report in wards at fire, collision, and abandon-ship drill and take stations by bunks to await further orders. They will closely observe and obey all orders given. At sea they will wear or have close at hand a life belt for any emergency use.

116025—19——8

12. Patients will perform the detail duty as given them by the pharmacist's mate in charge of ward approved by the medical officer.

13. Bag room is open for patients to get at their bags from 1 to 2 p. m.

14. Library is open from 10 to 10.30 a. m., 12.30 to 1 and 5.30 to 6 p. m. Good care shall be taken of books.

15. Canteen open from 7.30 to 8 a. m., 12 m. to 1, and 5.30 to 6 p. m.

16. Do not use a different Lilly cup for each drink of water; keep one in locker and use the same one.

17. Patients allowed on forecastle and port side of deck forward of gangway. Not allowed in any compartments of ship occupied by ship's crew.

SUPPLY DEPARTMENT.

DAILY ROUTINE.

4.00 a. m.—Start fires in galley. Ship's cook on watch and butcher to be called by hospital corpsmen on night duty. Inform night watch if to be called earlier.
6.00 a. m.—Reveillé.
7.00 a. m.—First mess; issue stores.
7.30 a. m.—Breakfast.
11.00 a. m.—Issue stores.
11.30 a. m.—First mess.
12.00 noon.—Dinner.
4.00 p. m.—Issue stores.
5.00 p. m.—First mess.
5.30 p. m.—Supper.
9.00 p. m.—Galley closed; taps.

GENERAL ORDERS.

Canteen: To be open 7.30 a. m. to 8 a. m., 12 noon to 1 p. m., 5.30 p. m. to 6.30 p. m.

Galley to be policed after each meal; to be thoroughly cleaned after supper; that section of deck outside of galley, including garbage cans and slop chutes, to be given special attention.

WEEKLY ROUTINE.

Monday:
Tuesday:
Wednesday: a. m.—Air bedding. Examine bunks for vermin.
1.00 p. m.—Issue clothing and small stores.
Bag and locker inspection first Wednesday in month.

Thursday: 10.00 a. m.—Inspection on hurricane deck by the commanding officer.
1.00 p. m.—Fire and collision drill.
Abandon-ship drill first Thursday in month.
Friday: General field day.
Saturday: 9.00 a. m.—Inspection No. 3 hold and cold-storage rooms by the commanding officer.
10.00 a. m.—Inspection of the ship by the commanding officer.
p. m.—Holiday. Recreation parties.
Sunday: Only necessary work to be performed. Divine service when chaplain is available.

By order of the commanding officer.

CREW.

DAILY ROUTINE.

5.30 a. m.—Reveillé. Except Sundays and holidays, when it will be 6 a. m.
6.00 a. m.—Turn to. Sundays and holidays, 6.30 a. m. Trice up clothes lines.
7.15 a. m.—Knock off work.
7.30 a. m.—Breakfast.
8.05 a. m.—Muster at bunks and lockers.
8.15 a. m.—Turn to.
11.30 a. m.—Knock off work.
12.00 a. m.—Dinner.
1.00 p. m.—Turn to. Pipe down clothes lines.
4.30 p.m.—Knock off work. Start deck hose. Scrub clothes, except Saturdays, Sundays, and evenings before holidays.
5.30 p. m.—Supper.
7.00 p. m.—Stop hose. Dry down deck. Trice up clothes lines.
9.00 p. m.—Taps.
There will be no smoking during working hours.

WEEKLY ROUTINE.

Monday:
Tuesday:
Wednesday:
a. m.—Air bedding. Examine bunks for vermin. Scrub and wash bunk bottoms monthly, or every two weeks if necessary.
1.00 p. m.—Bag inspection first Wednesday in month; this includes lockers.

Thursday:

10.00 a. m.—First Thursday in quarter; muster of whole crew for reading of Articles for the Government of the Navy.

1.00 p. m.—Fire drill, collision drill, man-overboard drill (this while underway once a month). Abandon-ship drill first Thursday in month.

Friday:

General field day.

Saturday:

9.00 a. m.—Inspection of cold storage, No. 3 hold and engineer's department.

10.00 a. m.—Inspection of crew and engineer's force on hurricane deck. This followed by inspection of ship with men in quarters and lockers open.

p. m.—Holiday. Recreation parties; rowing and sailing to be encouraged.

Sunday:

Only necessary work to be performed. Divine service when chaplain is available.

By order of commanding officer.

LABORATORY.

1. All requests for laboratory work will be made on regular blanks found in wards giving (1) patient's name, (2) doctor's name, (3) nature of specimen, and (4) examination required.

2. Laboratory requests marked "emergency" will be attended to at once.

3. Routine urines will be reported twice daily. Any special examination required should be noted on blank such as for T. B., spermatozooa, etc.

4. Specimens received before 8 a. m. will be reported at 9 a. m. sick call.

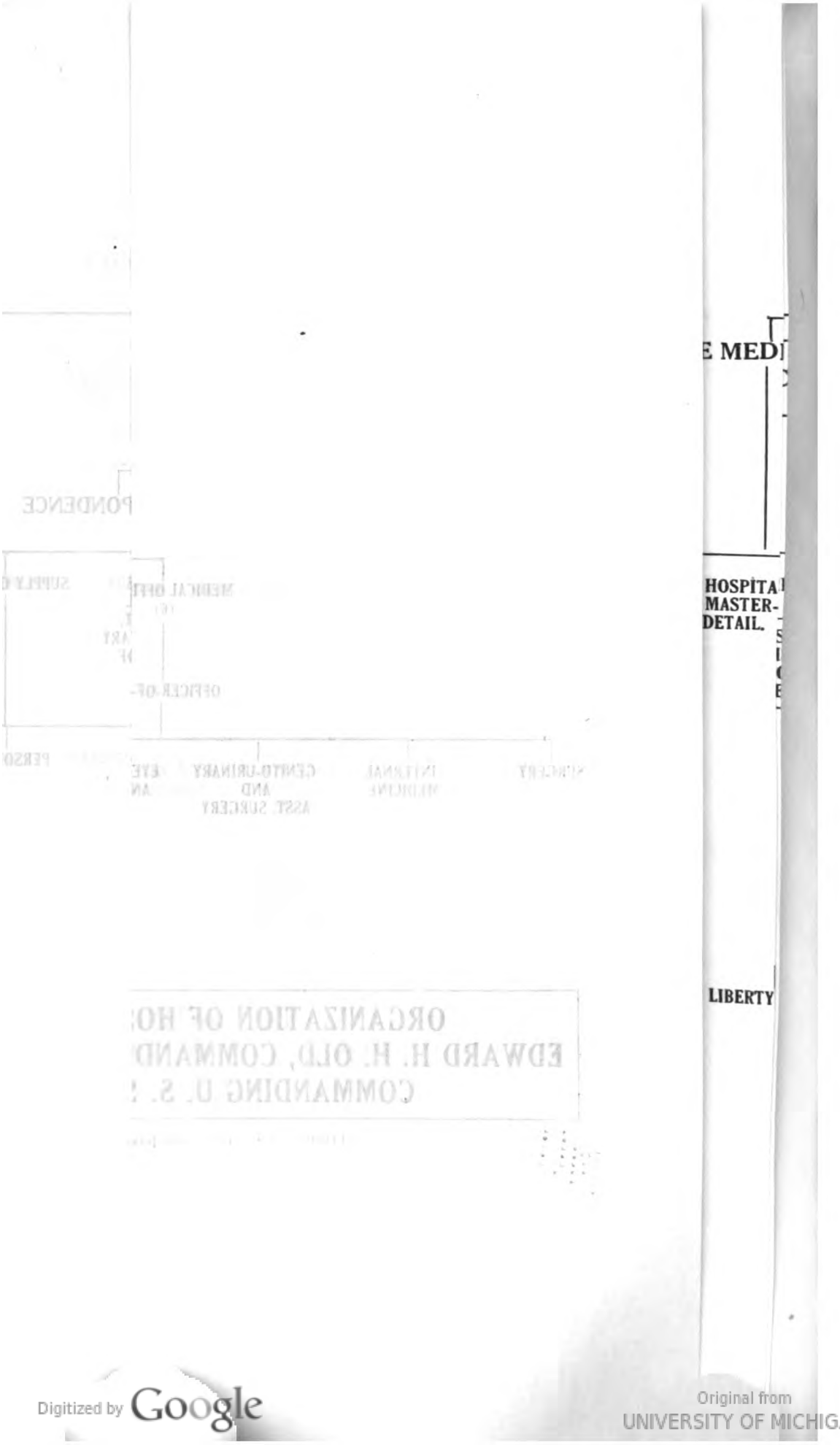
5. Specimens received after 8 a. m. will be reported at 4.30 p. m.

6. Other routine laboratory work as blood smears, gastric contents, feces, dark fields, spinal fluids, sputum, etc., received before 8 a. m. will be reported at 9 a. m. sick call.

7. Those received after 8 a. m. will be reported at 11.30 a. m.

8. Those received after 11 a. m. will be reported at 4.30 p. m.

9. Wassermann requests will be filed at laboratory before 8 a. m. Saturdays.



10. Laboratory reports will be delivered to wards or officers' quarters as desired.

SCHEDULE OF LECTURES FOR HOSPITAL CORPS.

	Time.	Subject.	Lecturers.
Monday	1 to 2 p. m.	Anatomy	Medical officer.
		First aid and minor surgery.	Do.
		Physiology	Do.
Tuesday	do	Pharmacy and materia medica.	Pharmacist, assisted by pharmacist's mate.
Wednesday	do	Nursing, diets, etc.	Medical officer.
		Hygiene and sanitation.	Do.
		Clerical work	Chief pharmacist's mate detailed in record office.
Thursday	do	Pharmacy and materia medica.	Pharmacist, assisted by pharmacist's mate.

BARBER SHOP.

1. A separate towel shall be used for each man.

2. Razors, scissors, and clippers will be disinfected daily in 2 per cent carbolic acid solution for 15 minutes and will be cleaned after each use.

3. Brushes, combs, shaving brushes, and mugs will be thoroughly cleaned after each use.

4. The room shall be carefully cleaned each day and be kept neat at all times. *No smoking* will be allowed in barber shop during working hours.

5. The barber will refuse to do any work on men with diseases of skin or scalp; all such cases should be reported to the executive surgeon.

6. The barber will not shave cases being treated for syphilis. Instruments for cutting hair of such cases shall be immediately sterilized after use, and a separate set be kept for this purpose.

7. All payments shall be made direct to the barber on the following schedule:

MEN.		OFFICERS.	
Hair cut	$0.15	Hair cut	$0.25
Shave	.10	Shave	.10
Shampoo	.15	Shampoo	.25
Massage	.15	Massage	.20
Honing razor	.15		

Hours: 8 a. m. to 11.45 a. m.; 1 to 4.30 p. m. No hair cutting after 3.30 p. m. and noon on Saturdays.

HISTORICAL.

DEVICES AND UNIFORMS OF THE NAVY MEDICAL CORPS, 1802–1905.

This being the day of change and innovation, not to say upheaval, in military tailoring it may be a matter of interest to refer to some of the frequent oscillations of fashion that have marked our naval service in the past. Each permutation has doubtless had a very definite cause, but the origin of the earlier changes is veiled in obscurity like so many of the things in history which arouse special interest.

As near as we can make out from the records on file the officers and gentlemen who frequented the quarter-decks of our men-of-war in the year of grace 1802 (at which time, by the way, the Navy ration included one-half pint of distilled spirits for each day of the week, including Sunday) wore knee breeches in conformity with the custom of the day. The breeches worn with the full dress coat were white. Gold or brass buckles adorned the knee. The stockings were white silk and the low shoes also had buckles.

The full-dress coat was blue with long lapels and a standing collar trimmed with gold lace beginning at the upper part of the collar and running along the lapels to the bottom of the coat. Gold lace was also applied to the sleeves and around the pocket flaps and down the folds. The sleeves[1] and the pocket flaps were enriched with buttons of "yellow metal with a foul anchor and American eagle surrounded with 15 stars." The buttonholes were worked with gold thread. Captains of the line had nine buttons on the lapels, and one button on the standing collar, while surgeons had nine buttons with gold frogs on the lapels and two buttons with gold frogs on each side of the collar and three Navy buttons below the pockets and three gold frogs on the pocket flaps, and the buttons on the cuffs were three with gold frogs. The vest worn with the captain's full-dress coat was a single breasted white affair with flaps and four buttons to the pockets, similar to those in the coat, but proportionately smaller. Arguing from the silence of history the surgeon's waist-

[1] Buttons on the sleeves of uniforms were originally useful as well as ornamental. The ends of the sleeves were turned back as real cuffs and buttoned in place. When the cuff of the sleeve was abolished the buttons remained. It is a pure *canard* to pretend that the buttons were there to prevent certain very young gentlemen from using the sleeve in lieu of a handkerchief.

coat had no buttons on the pockets but only the buttons required by the inherent character of the garment. The essential difference, then, of the two costumes lay in the absence of gold lace, the fewer buttons, the presence of frogs in various parts of the surgeon's uniform. The undress coat for captains was shorn of the gold lace and the gold-worked buttonholes and it is presumed that there were minor differences of corresponding degree in the surgeon's everyday apparel.

The full-dress coat of the surgeon's mate differed from his master's in lacking frogs on the collar, lapels, and pockets, but this lack was atoned for by the glory of gold-worked buttonholes. All officers wore cocked [1] hats with their full-dress coats.

Parenthetically it is to be noted that lieutenants of the line were entitled to one epaulet,[2] which was worn on the left shoulder, except when they were "in command," which position entitled them to shift the solitary shoulder embellishment to starboard. Apparently surgeons wore no epaulets at this time.

The above costumes were authorized August 27, 1802, and are set forth in the Navy Register of that period.

The Uniform Regulations, dated November 23, 1813, specify that hospital surgeons should wear a blue coat with standing collar marked by two ¼-inch stripes of gold lace and a Navy button and a laced buttonhole, the broad lapels bearing nine Navy buttons and the cuffs three Navy buttons. The cuffs also bore two ¼-inch stripes of gold lace. This year marks an advance in modesty as proved by the fuller protection from the public gaze afforded the nether parts of the officer's anatomy, for we see prescribed white pantaloons instead of breeches, or as an alternate for them since the latter were still in vogue in 1830. But long trousers are no novelty, for the monument in Trajan's Forum, Rome, has figures of men in trousers and there is extant a seal cylinder of Persian origin showing three prisoners in tight trousers. Another (Metropolitan Museum, New York) shows a victorious soldier in baggy trousers. There is another beautiful seal with two figures not of Persian nationality wearing long trousers. These seals are comparatively modern, as seals go, probably only dating back to about 500 B. C.

The Uniform Regulations specify for hospital surgeons "half boots and small swords." The hospital surgeon's undress coat had, instead of a standing collar, a "rolling cape edged with gold cord," and there was no lace on the cuffs, and this "rolling cape" also characterized the surgeon's undress coat.

[1] The cocked hat is an evolution from an earlier soft, wide-brimmed hat. First the brim was turned up on one side, then on the other. When still another portion was turned up the three-cornered hat of colonial type was produced.

[2] The epaulet is an amplification and glorification of the shoulder strap. The latter was originally a device to keep belt and bandolier from slipping off the shoulder.

The full-dress costume of the surgeon's mate had the necessary modifications in the matter of buttons and lace and for them a " dirk " was prescribed in lieu of small sword. All officers were permitted to wear blue pantaloons, round hats, and dirks in undress. In the course of these hurried researches there has not been time to investigate the subtle distinction between surgeons and hospital surgeons. The history of the Medical Corps of the Navy has never been written, and the greatest confusion prevails as to the early status of medical officers. However, there were formerly various ways of securing the services of a physician for the Navy. In the beginning a captain on being assigned to a ship would get a crew and a complement of officers together as best he could and apparently selected a civilian doctor to make a cruise with him. For duty at a naval hospital doctors were usually appointed by the hospital commissioners. Again, the Secretary of the Navy could appoint a civilian physician for any special duty or period of service. The hospital surgeon referred to in Uniform Regulations was doubtless an appointee of the hospital commissioners.

In 1806 the peace basis of the Naval Establishment was fixed at 13 captains, 9 masters, 72 lieutenants, 150 midshipmen, 925 able seamen, seamen, and boys, but the President was authorized to appoint for the vessels in actual service as many surgeons, surgeons' mates, sailing masters, chaplains, pursers, etc., as he deemed necessary and proper.

In 1821, in the pleasant month of May, the uniform of surgeons underwent certain modifications in the matter of buttons which make very difficult reading and may be passed over as not sufficiently momentous to require unraveling.

We can get an idea of the relative standing in rank of the surgeon from about 1826 to 1832 by the Appendix to Naval Laws, printed in 1832. His full dress was in all respects like that of master commandant except that no epaulets were worn by the surgeon and the embroidery of the coat was different. This consisted of a live oak leaf on the upper and front edges of the collar and around the cuffs.

The club of Æsculapius was also embroidered on the collar. The full-dress coat of the master commandant was similar in all respects to that of a captain except for the embroidery on the pocket flaps and the buttons in various places were fewer in number—three instead of four on the pocket flaps and cuffs, one instead of two in the middle of the skirt fold.

Full dress captains.—Coat of dark-blue cloth, lined with white, double-breasted, with long lapels; the width to be in proportion to the size of the coat, and cut with a swell, to be buttoned back with nine buttons on each lapel, and an equal number of blind buttonholes worked in twist, as long as the width of the lapels will allow. Standing collar to be lined with white and embroidered in gold around the upper edge and sides with a rope, and with leaves of live oak, interspersed with acorns, as per pattern. The cuffs to have four but-

tons and to open underneath with two small buttons and holes of twist and embroidered as the collar, with a rope on the upper part above the button, and with the live-oak leaf and acorn, as per pattern. The pocket flaps to be embroidered in gold, the same as the collar and cuffs, the lower part and sides to have a rope, and the flap to be embroidered in gold with the live-oak leaf and acorn, as per pattern; and the lower edge to be cut as may be prevailing in fashion, with four buttons underneath, one button on each hip, two near the middle of the folds, and one at the bottom of each skirt; the pockets to be in the folds. Two gold epaulets, one on each shoulder.

Vest: White, single-breasted, with as many small Navy buttons as are worn on the breast of the coat—standing collar coming to the edge of the breast, and sloping in a line with it—breast straight, with pocket flaps, under each of which are four small buttons.

Breeches: White, with small Navy buttons, and gold or gilt knee buckles, white silk stockings, shoes, and gold or gilt buckles, or plain white pantaloons over short boots, or with shoes and buckles.

Undress, surgeons.—Same as lieutenants, with the exception that the collar and cuffs are to be of black velvet, and a strip of gold lace half an inch wide, around the upper part of the cuffs.

Undress, lieutenants.—Same as masters commandant with the exception of one epaulet in lieu of two.

Undress, masters commandant.—The same as captains with the exception of the buttons, which will be designated for full dress.

Undress, captains.—Coat of dark-blue cloth, lined with the same, rolling collar, and made according to the prevailing fashion of citizens for the time, with nine buttons on each breast, four under the pocket flaps, and around the cuffs, and in the folds, etc., as for full dress.

Vests: Plain white or blue, single-breasted, with the same number of small Navy buttons on the front and pocket flaps as for full dress.

Pantaloons: Plain blue, or in warm weather, white. To be worn over half boots, or with shoes and stockings.

Surgeons in full dress are to wear cocked hats bound with black ribbon to show 1½ inches on each side, with gold tassels formed with five gold and five blue bullions each, a black silk cockade, with a loop formed with gold lace, and a small Navy button.

But a startling change took place after July 4, 1832. A naval general order of January 20 of that year directed that the serpent and staff be removed from the collar of the full-dress coat of surgeons and assistant surgeons (the surgeon's mate no longer exists), a branch of live oak being substituted.

It has not been possible in the time at our disposal to determine from the somewhat meager sources of information available the exact date of the adoption of the Club of Æsculapius with its entwined serpent as a collar device for the naval medical officer. It is safe to say, however, that this device was employed as early as 1826. The change made in 1832 was of doubtful propriety. The older device certainly conveyed a definite idea, had some historic justification, whereas the oak leaf was a purely conventional affair, and its origin was merely artistic or, to be exact, merely sartorial. From the remotest times the serpent has been a symbol of growth, regeneration,

rejuvenation, immortality, health. Furthermore, the serpent is the symbol of Æsculapius, the god of healing. The Æsculapius of mythology (there was a real living, breathing person of that name, too, a mortal, a physician) was the son of Apollo, and doubtless had inherited a disposition toward medicine, seeing that his father was the sender and remitter of pestilence. At any rate, Æsculapius is usually represented holding a serpent, encircled by one, or having one standing on his beam ends in the background, or else his knotted staff bears a snake twined around it. Another symbol for Æsculapius is a vase surrounded by snakes, while his daughter Hygeia, goddess of health, is represented feeding a snake from a bowl.

When we recall the venerable antiquity of serpent worship and the semi-religious character of early healers the appropriateness of the serpent as the physician's device seems established.

The further back we go in the history of man the more universal is the reverence in which the serpent was held. The Babylonian myths associated the serpent with wisdom just as the story of Genesis does. In India serpents were held to be the progenitors of kings. Serpents were emblems of immortality, owing perhaps to the shedding of their skins, and eternity was typified by a snake swallowing his own tail. Some ancient races considered that after death the human soul was reembodied in a snake. Others considered that to eat a snake was to acquire powers of healing. From Dahomey in Africa, where snake worship was active up to 1850; from India, where snake worship still survives; back to the Indians long before the discovery of America; from Babylonia to China—everywhere the most remarkable powers were ascribed to the reptile. He was connected with all sorts of mysterious religious rites, and closely associated with the healing art. We have the Biblical record of Moses causing a brazen serpent to be lifted up before the children of Israel when they were afflicted with pestilence. Even in Christian times and among Christian nations this strange influence was felt. The Ophites, a despised sect of the Gnostics, made the serpent their emblem of wisdom. In India a ring or bracelet made in the fashion of a snake with a ruby in his mouth was a common love token, and the snake is frequently found carved with an egg in his mouth.

The oak leaf and acorn were extensively and indiscriminately used for both line and staff in the earlier days of the Navy and were in no sense distinctive.[1] The full-dress coat collar of a captain in 1830 bore leaves of live oak interspersed with acorns, the pocket flaps likewise; and the full-dress coat of passed midshipmen of the same period

[1] Oak-leaf lace is a feature of a general's cap in the French Army. An oak-leaf design marks the peak of undress caps of British staff and general officers. A laurel wreath surrounding crossed batons and surmounted by a crown is the badge of a British field marshal.

was embroidered with live-oak leaf, acorns, a foul anchor, and a five-pointed star, disposed on various portions of the garment, while plain midshipmen omitted the star.[1] (Pursers at this time were dressed like the surgeons, but had a cornucopia instead of the club of Æsculapius.)

Still the club was likely to be misunderstood, and might, to those critically inclined, have suggested the punishment meted out in all ages to the unsuccessful practitioner or the rude methods of primitive barber-surgeons, and the serpent may have been objected to on the ground that it harked back to the incantations and mystifications of theurgic medicine.

The velvet of the collar and cuffs was to be removed from the undress of the surgeons and a button added to each side of the collar. The velvet from the collar and cuffs was to be removed from the undress of the assistans surgeons and a strip of gold lace, half an inch wide, added around the upper part of the cuffs and the lower part of the collar.

In 1847, beginning June 1, the surgeon's full-dress coat was to be patterned on that of a commander, except that three sprigs of live oak, bearing acorns and leaves, were to be embroidered on each side of the collar and on each cuff, the cuff having no buttons. Passed assistants and assistant surgeons had the same coat as the surgeons except for the embroidery on the cuffs. The undress coat of all medical officers was now shorn of lace on the cuffs.

Epaulets: All medical officers shall wear gold epaulets with worked edge and solid bright crescent and the letters "M. D." in Old English characters in solid silver within the crescent. The bullion shall be of silver gilt; those of surgeons of more than 12 years to be ½ inch in diameter and 3 inches long; those of surgeons of less than 12 years, ⅜ inch in diameter and 3 inches long; those of passed assistants and assistants ¼ inch in diameter and 3 inches long.

The "surgeon of the fleet" will be designated by a rosette of burnished silver (as per pattern) worn above the letters on the strap of the epaulet.

Shoulder straps: All medical officers shall wear shoulder straps of blue cloth, with gold-embroidered edge, and the letters M. D. in old English characters, in solid silver, in the center.

For surgeons of more than 12 years the embroidery to be ¼ inch wide and an embroidered acorn on each end.

For surgeons of less than 12 years the same as above, except the acorn.

For passed assistants the embroidery to be ⅛ inch wide and an embroidered bar on each end.

For assistants the same as above, except the bar (all as per pattern).

[1] One can not help wondering if this plastering of the uniforms of all ranks and corps with live oak was a reflection of the concern felt by the wise and foresighted Government of earlier days lest the supply of live oak in the country should be inadequate to meet the needs for building naval vessels. The Government bought tracts of land in Louisiana and elsewhere for the conservation of this tree. At Boston and other navy yards large numbers of oak logs for ship construction were preserved under water for many years.

"Surgeons of the fleet" will wear a small silver rosette on each end of the strap.

Chapeaux: Surgeons of more than 12 years will wear the same as directed for commanders, and all others as directed for lieutenants.

In 1852 the shoulder strap for the Chief of the Bureau of Medicine and Surgery consisted of a single star centered on dark-blue cloth surrounded by ¼-inch border of gold lace.

The shoulder straps for other medical officers were also considerably modified, and apparently it was at about this time that silver and gold were generally employed to differentiate grades and length of service, the more costly metal designating the junior. At this time the cap device for medical officers was a gold-embroidered "M. D." surrounded by a wreath of oak leaves. There is considerable difficulty in determining exactly what were the uniform devices for this period, as the various illustrative plates for 1852 do not accord. It is not clear from corrections in the accompanying text just when certain changes were made. In this year the regulations as to uniforms contained a subtle distinction suggested by the words in parentheses (sea officers) and (civil officers).

At some time between 1852 and 1865 the sprig of olive makes its appearance. Wreaths were part olive sprig and part live-oak sprig, and the shoulder strap bore an olive sprig with an acorn at each end for surgeons of over 12 years' service, without acorns for those of less than 12, while passed assistants had an olive sprig only. The earlier cap device consisted of an oak sprig surrounded by a wreath of olive and live oak.

(The year 1852 deserves a place in the annals of Navy fashions through orders issued by Will A. Graham, Secretary of the Navy, under date of March 8, prescribing that "mustaches and imperials are not to be worn by officers or men at any time whatever," and specifying that whiskers were not to extend below the tip of the ear.)

In 1866 the cap device, a silver anchor surrounded by a wreath, was the same for all officers except naval constructors, chaplains, and professor of mathematics.

In 1866 surgeons of the fleet of over 15 years' service in grade had on their shoulder straps a silver eagle in the center of a blue cloth field which was edged with gold.

Surgeons in the second five years of service in grade had a shoulder strap of blue cloth edged with gold, with a silver oak leaf on each end.

Surgeons in the first five years of service in grade had the gold oak leaf.

Passed assistant surgeons had two gold bars at each end of the strap.

Assistant surgeons had one gold bar at each end.

These descriptions appear in the Uniform Regulations for 1866 and apparently were in vogue five or six years before that.

In 1869 silver oak leaves on the shoulder straps were for surgeons ranking with lieutenant commanders of the line, and two gold bars for the rank of lieutenant.

In 1869 there was authority for officers in the Tropics or during warm seasons to wear white straw hats (the body not over 2½ inches high, the brim unlined and between 2 and 3½ inches in width, with a plain band of black ribbon) under the same restrictions as in the case of "white linen or grass jackets to be made like the cloth ones, but without straps or sleeve ornaments." These coats were allowed with hats in the Tropics, at sea and in port when the weather was, in the opinion of the commanding officer, such as to require it. They were not, however, to be worn ashore in foreign ports, nor by the officer of the deck for the time being in ports where the vessel was liable to be visited by strangers.

In 1869 a band of cobalt-blue cloth between the stripes of gold lace was placed on the sleeves of frock and full-dress coats of medical officers. This was during the incumbency of A. E. Barie as Secretary of the Navy.

The year 1883 brought to the medical officer several novelties in the matter of costume. The cobalt-blue cloth on the sleeve was abandoned and maroon velvet was put on instead. What subtle distinction, what fine shade of feeling, is reflected in the disuse of the rich blue of 1869 and the substitution of maroon is not easily divined. Was this to deprive the surgeon of so apt a suggestion of the sea or merely a display of erudition, to mark the venerable character of his calling, by substituting for the "deep and dark blue ocean" of Byron the "wine-faced deep" of Homeric language?

The specific device of the corps now became a most complicated affair grossly violating the principles of simplicity and economy if not the laws of heraldry. It consisted of a small Geneva cross of maroon velvet on a silver Maltese cross so-called, for what is commonly known as the Maltese cross is really a cross patée and the genuine one has arms so deeply indented as to give eight points with acute angles.

However, here at last was a very distinctly appropriate emblem. The Geneva or Red Cross was adopted by the Geneva Convention out of compliment to the Swiss Republic, on whose flag it appears, because it was in Geneva that the first organized international effort was made to render warfare more humane. The movement resulted largely from the philanthropic endeavor of M. Henri Dunant, who in 1862 published his telling paper, "Souvenir de Solferino." The movement was warmly supported by Queen Augusta of *Prussia* ("* * * thou shouldst be living at this hour") and the Grand Duchess Maria Pavlovna of Russia.

The cross associated with the Knights of Malta was an appropriate device for medical and sanitary officers because this order grew out of the Knights of Jerusalem, one of the many organizations that sprang up either during or after the crusades with a distinctly charitable, philanthropic, and semimedical object.

and known in a general way as hospitalers. The Knights of St. John had charge, originally, of an establishment in Jerusalem founded by citizens of Amalfi, Italy, as an asylum for pilgrims to the Holy Sepulchre. They became a rich and powerful body, including in their membership many men of exalted birth. One of the main offshoots from the Knights of St. John was the Knights of Malta, who established themselves at Rhodes, but were driven out in 1523 by the Turks and settled in Malta in 1530. Their obligations included fighting the Turks, and they did this to some purpose in 1565, defending their newly acquired island home through one of the memorable sieges of history. Soliman attacked in person, but was finally compelled to withdraw after suffering some 20,000 casualties, treble the loss he inflicted. The last grand master of the order, who resided in Malta, was a German, one Ferdinand Hompesh, elected in 1797. When Malta was seized by Napoleon the knights removed to Rome and there remained though the treaty of Amiens (1802) provided for their return to Malta. Anticipating that they would be dominated by the French the order abandoned its patrimony.

The Maltese cross did not originate with the hospitalers. They merely modified and conventionalized an emblem in vogue for thousands of years, and, like all forms of the cross, this one antedated Christianity. While the cross was traced in secret by persecuted Christians in their haunts, in catacombs, etc., it was not publicly used as an emblem of the new religion until the third century, A. D. Crosses of various patterns were used as ornaments or symbols not only by the ancient Egyptians, Syrians, Indians, Babylonians, but were almost universal in the primeval world and go back to the later Stone Age and were probably connected with some form of nature worship. It has even been claimed that the cross and more particularly the pattern from which the Maltese cross was modified was a phallic emblem, the four members represented by the arms of the cross springing from a common center. Perhaps the four arms stood for the four great Assyrian deities. Figures similar to the Maltese cross have been found on vases dug up in the plains of Troy. There are extant effigies of Assyrian kings having this cross wrought on their chests or suspended from their necks.

The Geneva cross and the Maltese cross was a strong combination so far as symbolic meaning and a venerable antiquity are concerned. It was discarded, however, in 1886 when the present device—a spread oak leaf charged with a silver acorn—came in. Alas, not so short lived was the white helmet, which flourished from 1883 to 1905. This remarkable headpiece was in form like a mold for puddings or jellies. It was a fragile, grotesque affair, that added no dignity or beauty to the wearer and left face and neck entirely unprotected from rain or sun. When exposed to prolonged inclemency of weather it became deformed and mushy like a decayed orange. In 1886 the Navy overcoat was similar in pattern to the present one except that it boasted a hood.

The present blouse, to be discarded in 1921, was adopted in 1876.

EDITORIAL.

THE REFORM OF FUNERALS.

A lady in Yokohama once gave her amah 24 hours' leave for the purpose of attending a theatrical performance. On being asked afterwards if she had enjoyed the spectacle the girl replied that she had had a lovely time and "plenty cry."

The delectation derived from paroxysmal tears and a thorough harrowing and roweling of the feelings is not to be denied to those who desire the experience. While men do not resort to an emotional debauch as a means of restoring nervous equilibrium, it is of unquestionable value to the gentler sex, which seems to get positive benefit from the periodic relaxation of tears and those manifestations which the women of French literature enjoy under the designation *crise de nerfs.*

Hemorrhage stops of itself when it has gone on long enough to weaken the force of the heart and thus slow the blood current sufficiently to permit clotting. The administration of cathartics to check diarrhea is often good practice. It may be that the lacerating barbarities of the ceremonies which mark modern sepulture have a good effect on the chief mourners by draining them dry of one form of emotion and stimulating the manufacture of a different type. *Abeste profani.*

We are far from suggesting any modification of funeral rites on æsthetic or moral grounds. The clergy is deeply intrenched in its ritual; the public holds strongly to traditional methods of testifying its grief for the departed. Sackcloth and ashes, rending the flesh, beating the breast, tearing the hair, fasting, feasting, drinking, wailing, paid mourners, noise of tom-toms have had their place at different times and among various races of men. Our catholic spirit only draws the line at suttee, because that is the immolation, forced by custom and not originating in the will of the living, of a survivor on the grave of the dead.

We only register a protest against honoring the departed at the expense of the health and life of those who remain behind. That something may be done by way of reform as a purely sanitary measure is a reasonable hope in view of the fact that the funeral of to-day is already shorn of features deemed essential 50 years ago. The funeral sermon and perfunctory eulogies have already gone by the board.

A certain wit once explained the expression a "grinning skull" by saying that the skull grinned at the lies on his tombstone. Happily, now that we do not indulge in long public panegyrics of the worthy dead, we are not subject to torture by the contrast of ominous brevity or damning with faint praise when some victim of life's malignity passes to "the silence at last, life's dissonance past, and only pure sleep in the night."

A small burying ground for foreigners, in a remote corner of Italy, has a tombstone with this among other trenchant couplets:

> What my name is it boots you not to know,
> What my deeds were the Judgement Day shall show.

Beneath this flippancy, for so our habits of thought declare it, there is a profound philosophy. A tombstone without a name, a funeral without flowers, homily, or oration, sometimes without even the presence of the corpse, represent such a breaking of the bonds of custom that one dares to suggest a quiet campaign in the interest of public health.

It would seem as though the time had come when a proper consideration for the health of the living need not be construed as disrespect for the dead; and yet what reader but can recall a score of occasions when middle-aged or elderly men have had to stand bareheaded in rain or snow while a grave was filled in or some long and painful ceremony was gone through with. Who is there that can not tell of coryza, tonsillitis, lumbago, rheumatism, pleurisy, bronchitis, pneumonia brought on or aggravated by enforced exposure at a funeral.

There is a big difference between what a man does to ruin his health voluntarily or through lack of courage to protest and what he is ordered to endure in a military service. If it is barbarous for men to endanger their lives by needless exposure out of regard for conventionalities just when the uncertainties of life are most conspicuous it is certainly criminal to condemn men by military authority to do so.

A certain medical director died once upon a time. The family attached much importance to the military features of the funeral and the full escort allowed by regulations. Well in advance of the appointed hour some 800 and odd men were marched from the navy yard to the hospital and lined up before the main building. It was a bitterly cold day with high wind and rain coming down in torrents. The services began after some delay and ran the usual tedious course, but were conducted under cover. The escort, however, remained outside in the downpour, though there was ample shelter available in sun parlors, porches, basement corridors, etc. It is remarkable that the irony of fate did not inspire the clergyman of the

occasion to make a few remarks on the text "I will have mercy and not sacrifice"! The officer in command of the funeral party was under orders to do thus and so, and nobody had the wit or temerity to suggest shelter, for there is something about these occasions which galvanizes common sense. So these 800 and odd lads stood at parade rest, then at attention, and finally marched back to barracks and ship after some hours of exposure to weather which was garnering its harvest of death in the population of the city. The officer paid for his fidelity to form by having to buy a new dress uniform, and among the men a dozen or more cases of severe tonsillitis and at least one pneumonia, that I know of, developed, while nearly every member of the escort caught a heavy cold.

Consider the grotesqueness of this performance. A man who for 40 years had ministered to the sick and inculcated the importance of caring for health was buried in such a fashion that scores of young men had to jeopardize their healths, their lives, to do him honor, a truly empty honor for a man of science.

Leaving the civilian to do as he sees fit in this connection, it is urged that something be embodied in the Navy Regulations which shall make occurrences like the one described impossible. Why not say that:

Whenever military honors are prescribed for a funeral conducted in severe or inclement weather the officer in charge of the ceremonies and the officer commanding the escort shall see that no unnecessary risks to health are incurred by the personnel under their command by uncovering or being unduly exposed to snow or rain and in the Tropics by prolonged exposure to the sun when adequate shelter is available. Before a funeral party leaves ship or barracks those in authority shall see to it that the men are suitably clothed, and if necessary provided with gloves, overcoats, or rain clothes. On returning from a funeral under such circumstances the party, before being dismissed, shall be inspected, and any who are wet or exhausted shall be given directions about shifting into dry clothing or referred to the medical officer for other necessary measures.

For many officers keenly alive to the importance of the health and welfare of the men committed to their care such specific instructions are unnecessary, but there are always some without experience or initiative who would be benefited by such injunctions and authority in black and white.

THE APOTHEOSIS OF DUNGAREES.

The random notes on the devices and uniforms of medical officers which appear in the historical section would have comparatively little interest or value if the gradual assimilation of all uniforms to a single type did not seem to show an ever-increasing recognition of the fact that all the corps are essential and integral parts of the Navy.

Bishop Wykeham, founder of the great public school at Winchester

(1378), gave to that institution the motto "Manners make the man." The motto "Clothes make the man" is considerably older, inasmuch as Adam was a sort of demigod, angel, or what not until he arrayed himself in fig leaves and left the Garden of Eden, a *man*.

The efficiency of a military body depends on something more than the courage, zeal, and technical knowledge of the essentially military members thereof. The Navy's food and equipment, the design of its ships, the pattern of marine engines, the health of the personnel, the recruiting of men and their discharge in pursuance of law (taking cognizance of physical defects, invalidity, pension claims) and the general moral welfare of the personnel may in the hour of battle be subordinate to the interpretation of a signal, the handling of the ship, the aim of the gunners. But no Navy can be permanently successful on a large scale without due attention to the features enumerated above which were once regarded as noncombatant features.

In this age of specialization no one officer or set of officers, however capable, can master the details of such a variety of subjects, yet they must be attended to or confusion, dissatisfaction, and disaffection will ensue leading perhaps to failure in the supreme test of war. To be properly handled these details must be assigned to persons as capable in their several specialties as those who direct what, in the past, have been regarded as the only military concerns. There seems to have been a disposition in the past to act as though some officers were real naval officers and others vexatious and rather compromising accessories to be stamped by their garb and designation as distinctly beyond the pale. This was a most natural position to take and had much to justify it. The military officer, in the old restricted sense, was *sui generis*. He differed essentially from the captain or first officer of a merchant ship in the range and character of his duties and obligations. With a small Navy of small ships and few shore establishments there was much truth in the contention that there was but one profession in the service essential and peculiar to it—that of the officer in command and of his direct representatives. The larger Navy of to-day with its dreadnoughts—machine shops, manned by artisans of every type—its huge plants ashore, its elaborate method of selecting and training men on scientific principles, its many forms of enterprise has made the distinctly military officer more than ever a man apart, but it is not enough for him to call to his aid men picked up at random for a cruise or a brief period of duty. He must have men especially prepared to perform special functions who, like himself, have embraced the Navy as a career for life, so that they may bring to each new task in the handling of men and things the trained judgment and practical experience of previous service and some acquaintance with Navy life and procedure outside of their own immediate sphere.

One of the essential lessons of the Great War is that a military enterprise of the first magnitude can not be conducted by a small military class alone. The whole Nation must contribute its talent, its industrial skill, its expert knowledge. This war—supposed and fondly hoped by many to be the last war—has done more than anything in our history to demonstrate the need of universal military training and to establish the idea that the Army and Navy of peace times constitute nothing more than a nucleus of men specially trained in all branches of military and naval endeavor for the leavening of the huge numbers of less-trained men who will form the mainstay of national defense. While it is not patent to all, it is nevertheless a fact that this war has also done much to break down both in America and abroad many time-honored but erroneous distinctions regarding the essential and nonessential in military life.

There was a time when engineer officers of the Navy were looked down upon as mere mechanics who got their hands dirty and had to shift into dungarees when they went on duty. This prejudice characterized the period of transition from sails to steam. To-day military officers do duty in the engine room. The executive officer puts on dungarees for the painstaking inspection of his ship, and they are worn by those all-important people, the officers in the turrets. Dungarees are as honorable as the raincoat or souwester worn on the bridge, and the operating gown and face mask are equally worthy. The strictly military officers of the Navy differ from those who follow the sea in merchant ships, but not more than the naval surgeon differs from his professional colleagues ashore—the naval surgeon concerned with the hygiene and sanitation of ships of war and of craft that cruise above and below as well as on the water; concerned with the physical and moral health of the personnel in Temperate and Tropic Zones, with the sanitary, social, and industrial problems of remote territorial possessions as well as of training stations, navy yards, ammunition plants at home.

Public sentiment has long viewed the situation from this standpoint, recognizing not only the limitations but the essential qualities and peculiar duties pertaining to the naval surgeon in his special field. And just as the public, which foots the bills, feels that courage and heroism are peculiar to no nation or class, so it considers it a matter of little moment, when defeat results from inferiority of numbers, whether the ships were prevented from engaging because of disabled engines or broken propellers or because of crews rendered useless by sickness or from lack of proper food and clothing.

IN MEMORIAM.

HENRY G. BEYER—AN APPRECIATION AND A PORTRAIT.

By P. J. WALDNER, Lieutenant (T), Medical Corps, United States Navy.

A figure, unique in the history of the Medical Corps of the Navy, passed away at Washington in mid-December last.

In the rush and business of the times, and in the early days of the armistice, his going was almost unnoticed. But he was a virile figure in his day and had times been other than they are his death would have been mourned as his life deserved. Twenty and odd years ago Dr. Beyer was one of the prominent figures in the Medical Corps of the Navy, and throughout his career his comprehensive learning in science and his accomplishments as a linguist and translator gave distinction to his corps and the service wherever duty took him. In his later years, perhaps, his earlier luster failed, but those who remember him in his forties and early fifties recall a striking personality—a short, solid, strongly knit man, glowing with good health and energy; a big, fine head, prematurely gray, with flashing eyes, and a look of almost fierce aggressiveness, which, in the presence of one in pain or trouble, could swiftly soften to the gentleness of a woman. Quick to reprimand and as prompt to forgive and forget, there were many who did not like him, but many more who loved him for the finer things they found under that austere surface. His was an arbitrary soul with a lofty mind, which often found itself in sharp and impulsively outspoken conflict with the modern more liberal way, a singularly Teutonic temperament, modified, however, and somewhat broadened by long contact with the best Americanism, found in the wardrooms of our Navy. This he showed in his relations with the enlisted men by whom, though he never yielded dignity nor station, he was regarded as a real friend by many, indeed, almost as a father; and by all, primarily, as a good physician to whom their physical as well as their moral well-being was the chief concern. As a superior he was a martinet; as an instructor, a delight to hear, radiating his enthusiasms—some of them perhaps a little visionary—to the dullest of us, while he drove his points home with vigorous speech and gesture. This be it remembered was in his best years, when he was a pioneer in the instruction of crews in his favorite subjects, hygiene and first aid to the injured. To the

youngster he was in those days an inspiration, exemplifying in himself the robust health of body and mind which he taught us were the reward of the application of his teachings.

His last years were sad. His spirited soul was torn by conflicting emotions—by his deeply rooted loyalty to America, which he served so usefully and faithfully, and his love for his wayward race.

Henry Gustav Beyer was born October 28, 1850, in Saxony, Germany. He received his preliminary education and studied pharmacy in Germany. In 1876 he graduated from Bellevue, New York, and immediately thereafter entered the Navy as an assistant surgeon. He reached the grade of medical director in 1910 and was retired at 62 years of age. Of his 36 years on active duty, 3 were passed in connection with special work at the Smithsonian Institution, Washington, and nearly 13 years were spent at sea. Dr. Beyer was for 8 years instructor in hygiene at the United States Naval Medical School and delivered several lectures at the Naval War College, Newport, R. I. He was a Ph. D. of Johns Hopkins University and an honorary member of Royal College of Surgeons of London. He was also a member of the Association of Military Surgeons of the United States, the National Society for the Study and Prevention of Tuberculosis, the American Public Health Association, and the American Association of Pathologists and Bacteriologists. Dr. Beyer was very proficient in foreign languages and contributed to the United States Naval Medical Bulletin translations of foreign articles as well as papers by his own pen.

A PERSONAL TRIBUTE TO

WASHINGTON BERRY GROVE.

By L. M. Schmidt, Lieutenant Commander, Medical Corps, United States Navy.

Shrinking from publicity and praise, modest and unassuming, ever quietly submerging himself in his duties, yet exacting from his subordinates, as from himself, the fullest service cheerfully and freely rendered, Dr. Washington B. Grove filled with conspicuous success the position of executive surgeon at the United States Naval Hospital, Norfolk, Va., one of the most important and responsible positions in the medical service of the Navy during the war.

Early in the war he requested an assignment to sea duty, but it was deemed unwise to sever his connection with a duty which he had performed so well and with which he was so familiar.

It was my rare privilege to serve with and under Dr. Grove during the last two years of his life, to have his instruction and counsel, to profit by his wide experience and to have before me his example of patience, industry, and faithfulness.

As I look back, I see more clearly now than I did then the effect of the great increase of work on our executive surgeon. The rapid expansion of the hospital from 250 patients to 1,700 put upon him a load of detail and responsibility. He keenly appreciated the necessity of meeting the emergencies, and besides satisfying the actual

needs of the patients he tried to give them all the comforts obtainable. The sick man was ever his first consideration.

I recall a marked change in the doctor in the summer of 1917. He had lost flesh, and lines of care appeared in his face. Once, when he was evidently ill, he yielded only when ordered by the commanding officer, who found him with fever, and took a few days' rest. Soon he was at his work again, protesting he was quite well. Subsequently he evaded examination into his health, protesting he was well, but I feel sure that he kept on in an endeavor to prevent his work from falling on the commanding officer and others. In this unselfishness and devotion to duty he laid the foundation of a fatal illness, but he continued his full duties to the hour of his death.

The virtues most conspicuous in the life of this officer were loyalty, patience, thoroughness, and gentleness.

He was loyal to those in authority and, while he always felt it his duty to express freely his own viewpoint, together with all the information at his command, be the orders to his liking or not he carried them out in letter and spirit. He was loyal to subordinates who were indiscreet from overzealousness or the impetuosity of youth. If convinced of the earnestness and sincerity of a younger officer he would, without his knowledge, plead his cause in time of trouble.

Dr. Grove's patience with officers and men was frequently remarked by all. His willingness to consider each one's problem or trouble, either in or out of hours, and the time he devoted to the men of the hospital in this regard was rewarded in a measure by his knowledge that all of his people were happy and satisfied. In time of stress and overwork, when many of the staff consisted of young doctors with, as yet, but little knowledge of naval regulations and procedure, he showed the greatest tolerance of errors in this connection and took time to instruct and advise.

Thoroughness in his own work taught thoroughness to all of us. A few questions from the executive surgeon brought out whether an officer had a complete or but superficial conception of the matter in hand. A remarkable memory for detail in all the work of the hospital confronted those assigned to carry out the various forms of work.

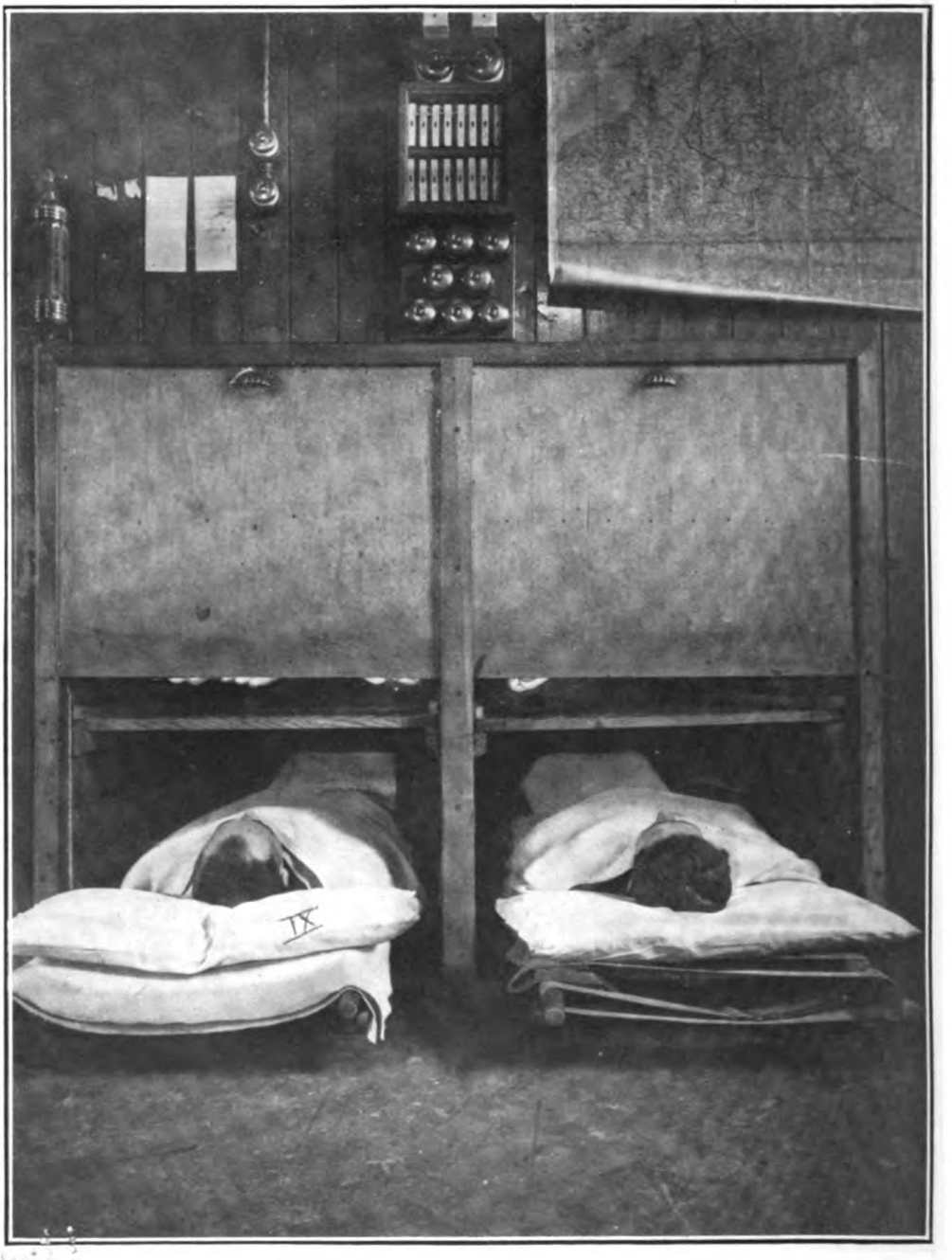
Although Dr. Grove was gentle, both in manner and conversation, I have never seen anyone try to take advantage of this. The officers appreciated it and the men loved him for it. All came to him with their troubles and found in him a sympathetic friend. Troubles capable of solution were solved and the others greatly softened by his kind words.

I know little of his previous service, for he did not talk of the past but of the present and its problems. That his professional

foundation was good and his experience broad was shown by his wise counsel and mature judgment as a physician and surgeon. He was quick to act in emergencies, conservative, conscientious and thorough in matters of doubt. As an officer he was efficient, impartial, tolerant, and kind.

Dr. Washington Berry Grove was born at Berryville, Va., June 13, 1875. He received the degree of doctor of medicine from the University of Virginia June 17, 1896. He was appointed an assistant surgeon in the United States Navy June 9, 1897, and from then until October 29, 1915, when he was ordered to duty at the United States Naval Hospital, Norfolk, Va., he served at various hospitals and stations in the United States and on different cruising vessels, among which may be mentioned the U. S. S. *Oregon*, U. S. S. *Brooklyn*, U. S. S. *San Francisco*, U. S. S. *Atlanta*, U. S. S. *Minnesota*, and the U. S. S. *Arkansas*.

On January 3, 1919, Dr. Grove, holding the rank of captain, Medical Corps, United States Navy, was ordered to command the United States Naval Hospital, Washington, D. C., where his death took place January 21, 1919. Capt. Grove's death came suddenly. Though he had been feeling badly for some time, he had not been on the sick list or missed an hour's work in the arduous task of taking over from his predecessor and then administering the command of the hospital.



Apparatus for resuscitation of submerged cases.

525-1

SUGGESTED DEVICES.

IMPROVISED MESS TABLES.

By H. C. CURL, Captain, Medical Corps, United States Navy.

The accompanying illustrations show the appearance and construction of mess tables which I saw being used with great success at the United States Naval Air Station, Pauillac, France, where 3,000 men sat down to mess at the same time in one large mess hall.

The special merit of this type of table lies in the facility with which the center board in the top can be removed to be cleaned.

The plans for these tables were made by Chief Commissary Steward James P. McSweany, United States Navy.

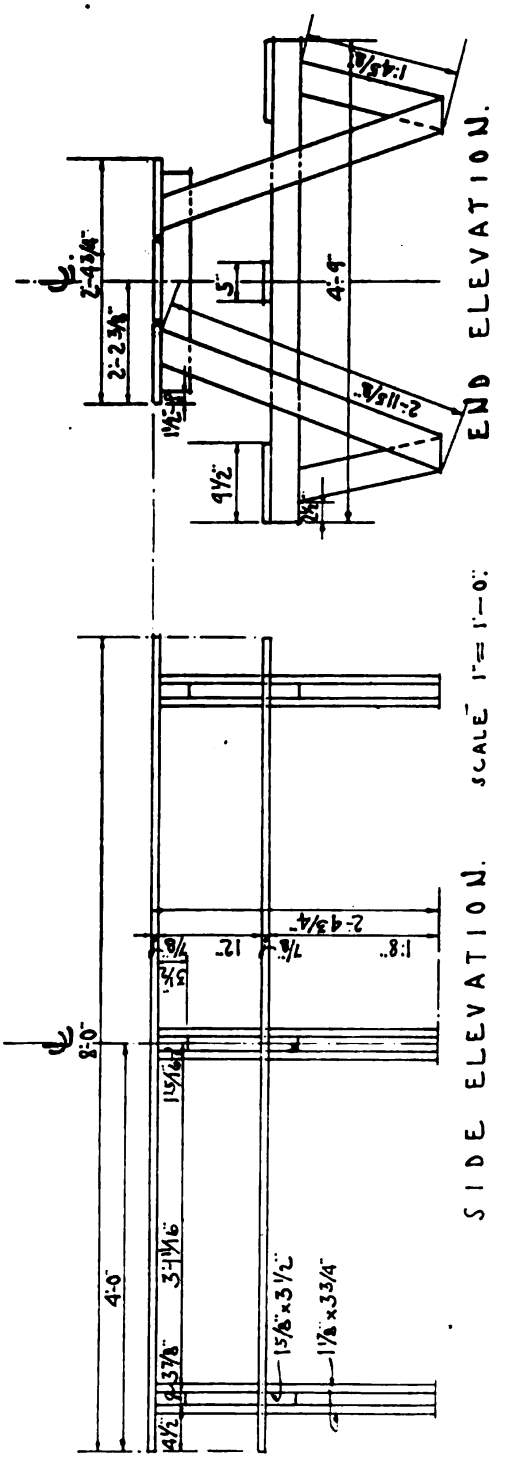
APPARATUS FOR TREATMENT OF SUBMERSION CASES.[1]

By G. F. FREEMAN, Captain, Medical Corps, United States Navy.

At stations where submersion cases are liable to require treatment—for example naval air stations—a baking oven for restoring animal warmth, such as that employed at Killingholme, England, will prove useful.

The ovens are double, each built on the plan of an ordinary house with pitch roof. Each compartment is lined with sheet iron and the sliding doors are of wood and asbestos. The dimensions of each are 30 inches wide, 25 inches high, and 5 feet 3 inches long. Thus the patient's head is outside the baker and can be kept cool if necessary. The relatively short dimension of length was necessitated by the size of the building into which the ovens were built. A galvanized-wire frame separates the patient from the lights above. The lower part of these lights can be seen just below the edge of the drop sliding shutters. The vertical height from the horizontal of eaves to what would be the ridgepole is 9 inches. Each oven has its separate roof and the wires for the lights are at the angle. Each oven is supplied with 16 lights, placed in a double row, of the carbon resistance type for developing heat, the individual globe being 10 inches long and about 2½ inches diameter. In the illustration the switchboard is seen above the ovens, its buttons, one for every 4 lights, so arranged that

[1] Extract from annual sanitary report, United States Naval Air Station, Killingholme, England, 1918.



DETAILS FOR TABLE
NOW USED IN MESSHALL AT
U.S. NAVAL AIR STATION
PAUILLAC, FRANCE.

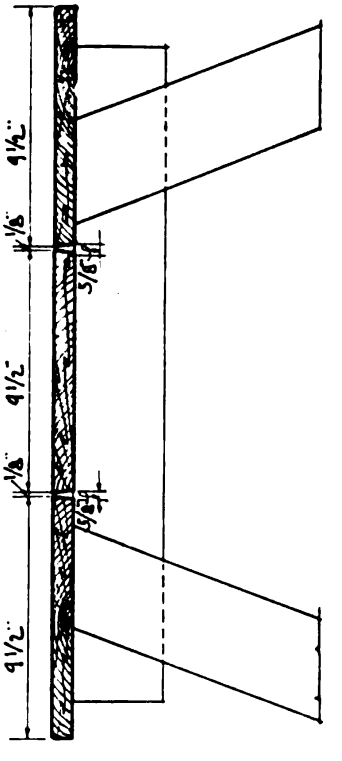
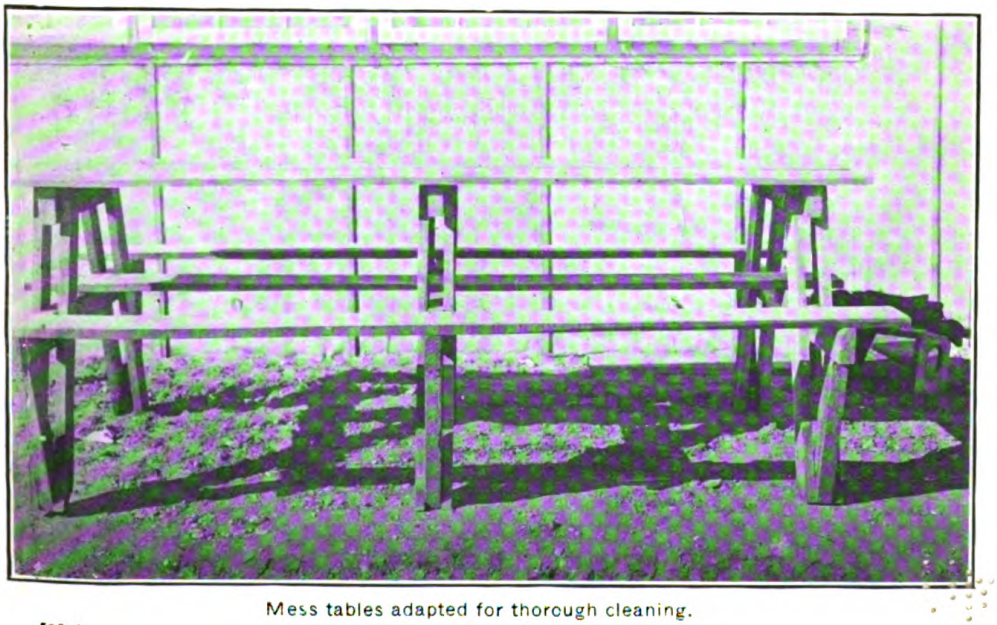


TABLE TOP SHOWING BEVELS.



Mess tables adapted for thorough cleaning.

526–1

alternate lights can be turned on. Above the switchboard is the fuse box with one fuse for each light. Above the fuse box is the current switch for turning the current into the oven circuit.

This oven will generate a heat of 200 F. and with the space around the stretcher closed the temperature will rise to 250 F.

When a person needs reviving after submersion his clothes are quickly removed, he is wrapped in blankets, placed on a stretcher, and slid into the oven. The favorable reaction after depression and loss of heat from submersion is rapid and satisfactory. The oven can also be used for "baking" a case when it is necessary to induce copious perspiration.

The current at this station is of 220 volts, direct.

METHOD FOR RECORDING DENTAL OPERATIONS AND TREATMENT.

By W. F. Murdy, Lieutenant, Dental Corps, United States Navy.

The following scheme is suggested for keeping records of dental operations and treatments. When a patient reports for treatment, or is given an appointment, his name is entered on a dental appointment book, giving the following data:

Time.	Name and rate.	Ship or station.
8.30		
9.00		
9.30		
10.00		
10.30		
11.00		
11.30		
1.00		
1.30		
2.00		
2.30		
3.00		
3.30		
4.00		
4.30		

It will be noted that the fourth and fifth columns of the Dental Appointment Book, United States Navy, have been omitted.

The first treatment and all subsequent treatments and operations are entered on a 3 by 5 inch, one-quarter-inch lined, index card of

about the same texture as M&S Form F (rough). The reverse side of the card could be used if necessary.

(Name, surname first.)	(Rank or rate.)
Date.	Record of dental operations and treatment.

During the time the patient is under treatment the above card is kept in a file box, alphabetically arranged. A 2¾-inch (inside measurement) metal or wood box will hold about 200 cards. After each visit the card is removed and the treatment or operation recorded. When the case is completed, or the man or officer transferred, the card is marked "finished" and put in a 3 by 5 inch filing cabinet, later to be used in making out Form K (dental). When the statistical form is completed, the finished cards are then placed in a "dead" file for the permanent records of the hospital, station, or ship. Should a patient report again for treatment after his case is closed and his name reported on Form K (dental), his card can be removed from the permanent file, placed in the current or live file, his work noted, and later disposed of as above mentioned.

The advantages of this card system are:

1. At the end of the month all the data for Form K (dental) is complete. To obtain the information from the column, "Services rendered" in the Dental Appointment Book, United States Navy, would require considerable turning over of pages for a case that was under treatment during the whole month or longer. When men are transferred before the end of the month, the dental record is not available, as it must accompany the health record upon transfer.
2. Ready reference for the last treatment given. It is practically impossible to recall treatment given if a patient reports a week later, especially where a dental officer has a hundred or more men who are receiving dental treatment.
3. Ready information to a dental officer relieving another dental officer.

This card could be known as Form F (dental, rough).

CLINICAL NOTES.

REPORT OF A DEATH FROM RUPTURE OF THE ESOPHAGUS.

By L. SHELDON, Jr., Lieutenant Commander, Medical Corps, United States Navy.

According to Osler, up to the year 1916 only eight cases of spontaneous rupture of the esophagus had been reported in the medical literature. Consequently, the rarity of the condition and the attending circumstances in this case make it seem sufficiently interesting to warrant the following report:

The U. S. S. *Kansas* sailed from Brest, France, February 4 with troops for the United States. Rough seas were encountered immediately after leaving port, with the usual result that many men on board became violently seasick.

At 7 o'clock on the evening of the 5th, W. R., corporal, United States Army, reported at the sick bay in a condition of partial collapse. He was sweating profusely and his skin and mucous membranes were very pale. His temperature was 96.6 F., pulse 78, and respirations 18. There was a very anxious expression on his face. He stated that he had had no bowel movement for three days, had been seasick, and had vomited several times during the day. In spite of this he had eaten a full meal at noon. His appearance was that of an intensely seasick man. About an hour before coming to the sick bay he felt a sudden sharp pain in his left chest. This had become steadily worse and on admission was very severe. There was considerable difficulty in breathing. He was put to bed immediately, heat applied, and stimulants given. Examination of his chest showed diminished breath sounds, moist râles, and increased resonance over the entire left chest. The abdomen was normal except for a very slight rigidity in the left upper quadrant. An enema was administered without result. However, the patient felt better, seemed stronger, and a serious condition was not suspected.

The patient rested comfortably until 4.30 in the morning of the 6th, when he called for a bedpan. He was unable to defecate. A medical officer was called and found the patient in partial shock. At this time his abdomen was somewhat distended and tender and intestinal obstruction was thought to be present. He was given hypodermic stimulation and preparations were made to give a high enema. While these were being made, the patient suddenly jumped

out of bed, ran to the toilet, and sat upon the stool. He had no sooner reached the stool than he collapsed. He was caught by the hospital corpsman as he was falling and was carried back to his bed, where he died in about three minutes. Just before death it was noticed that the left side of his neck became swollen. Over the swelling there was the characteristic feeling of subcutaneous emphysema.

Death occurred nine and one-half hours after the patient first reported at the sick bay.

Although it seemed certain that intestinal obstruction in some form was present, it was felt that the pain in the chest, the emphysema of the neck, and the sudden death could not be explained by this alone, so it was decided to perform an autopsy.

Autopsy was performed at 10.30 a. m., six hours after death. Upon inspecting the body, it was seen that the left side of the neck and upper chest were greatly swollen and emphysematous, the right upper chest also showing emphysema, but to a slighter degree. Upon incision over the sternum, bubbles of gas escaped. Upon opening the abdomen, the intestines appeared distended and slightly congested. In the region of the sigmoid flexure, for a distance of about 6 inches, the intestine was contracted to about one-fourth its normal size. Above this point the intestine was distended and contained hard masses of feces. No bands nor kinks were found, nor was there apparent intussusception. It is thought that volvulus was the cause of the obstruction, although no definite twisting of the intestine could be seen. When the thoracic cavity was opened, there was an escape of foul-smelling gas. The left pleural cavity contained about 1 quart of dark-brown fluid, with the odor of feces combined with that of stomach contents. In the fluid were large pieces of undigested meat, corn, and beans. The left lung was totally collapsed and was no larger than the average man's hand. The right lung was normal except for slight acute congestion. Further search revealed a *clean-cut rupture of the esophagus just above the diaphragm*, involving about one-half its circumference and extending about 1 inch upward. Through this rupture the stomach and intestinal contents had passed into the left pleural cavity.

One of the most interesting features of this case, aside from its rarity, is that the early vomiting of an acute intestinal obstruction was ascribed to seasickness, the surrounding circumstances making this seem most natural.

It seems probable that the sudden pain in the left chest, occurring an hour before the patient reported at the sick bay, was due to a small rupture of the esophagus, with the consequent escape of a small amount of gas into the pleural cavity. This would account for the patient's condition and the physical findings at the time of his ad-

mission. With rest, heat, and stimulation his condition improved slightly. In the early morning, when he had the desire to defecate and could not succeed with the bedpan, he jumped out of bed quickly, ran to the toilet, and probably strained at the stool. The exertion required by these acts, combined with the presence of a large amount of gas in the stomach, was enough to cause an extension of the rupture and the passage through the enlarged opening of large quantities of gas, liquid, and solid matter into the pleural cavity. This was followed immediately by collapse of the lung, subcutaneous emphysema, shock, and death.

The esophagus in this case, except for the rupture, was normal in appearance, there being no scars nor evidence of former disease. It was therefore a case of spontaneous rupture due to the tremendous pressure caused by straining at stool when the stomach was distended with gas which had accumulated as a result of intestinal obstruction, the symptoms of which were masked for a time by apparent seasickness.

A CASE OF ANTHRAX CURED BY VACCINE.

By J. K. LEASURE, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

A few years ago anthrax infection in man was looked for almost exclusively among hide and wool workers. Fifteen deaths were reported in 1909 from England and Wales; all were among wool and hide workers. During the period of the war the etiological source has shifted to shaving brushes. It is natural to expect that the manufacturers could not be as particular during the stringent war times about the source of the material used in brushes. However, they should have been just as particular about the process of preparing the hair.

In the United States Public Health Report of July 12, 1918, there is a review of the anthrax cases reported in England by the local government board. From June, 1915, to October, 1916, there were 19 cases reported in civilian life. Fourteen of these were proved to have come from new shaving brushes. Among the English troops in France 28 cases occurred from 1915 to February, 1917. In 23 of these cases the malignant pustule was located on the shaving area. It could not be absolutely proved, however, that the infection came from shaving brushes. There were 18 cases reported among the troops in England, 12 of these were on the shaving area and 4 were proved to be from shaving brushes. The cases all had an incubation period of from 24 hours to 6 days. Two of the cases had a fatal anthrax meningitis, with no local signs except an apparently noninfected razor cut. There were 33 cases in which the outcome was

known, and of these 21 died, making a mortality of 64 per cent. The high mortality is, no doubt, due to the location of the malignant pustule. In the first place, the face and neck contain a large number of lymphatic channels, allowing the infection a splendid opportunity to spread rapidly. Secondly, the neck is so compact that it does not require much edema, which is a characteristic symptom of anthrax infection, to cause serious conditions.

There are three general methods recognized for the treatment of external or cutaneous anthrax. These are local excision of the malignant pustule, injection of a devitalizing agent locally around the pustule, and intravenous or intramuscular injections of anti-anthrax serum. As the infection travels by the lymph stream it is logical to try and limit its spread by local treatment; but by putting a combatant agent into the blood stream it is carried to all parts of the body. In the case reported the antianthrax serum was used both locally and generally. Ten or twelve cubic centimeters were injected locally into skin around the pustule. Doses of about 25 cubic centimeters were injected intramuscularly. Powdered ipecac in lotion was used locally for a dressing. The infection was kept localized and successfully driven out. The serum used was United States Government serum derived from sheep.

CASE REPORT.

R. L. T., seaman, aged 27 years, was admitted to the United States Naval Hospital, New York, on November 21, 1918, complaining of a severe frontal headache, a burning sensation in his eyes, extreme prostration, chilliness, and a swelling on the upper right part of the right side of his neck, near the mandible, which was very sore and tender. There was no soreness upon swallowing.

His family history was irrelevant. His past history shows that he had the usual childhood diseases, including mumps. He had a gonorrheal infection three years ago. He never had typhoid fever, penumonia, smallpox, or any other acute infectious sickness during adult life.

The present illness began on the evening of November 19, 1918. He says he felt as though he had "influenza." The condition started with burning of the eyes, frontal headache, sensation of chilliness, and extreme prostration. He had what he thought was a pimple or ingrown hair on the right side of his neck 1 inch anterior to the center of the sterno-cleido-mastoid muscle. The next morning he did not feel like getting out of bed and was admitted to the sick list. He felt a little soreness on the right side of his neck that morning and had a mustard preparation applied. The same night he noticed some swelling on the right side of his neck just below the lobe of his ear. He was sent to the hospital the following morning.

When he arrived at the hospital the right side of his neck was swollen and very tender. The swelling extended from the midline anteriorly, below the jaw, to the anterior margin of the trapezius muscle posteriorly. Superiorly it reached the external auditory meatus, and inferiorly to the clavicle. The swelling did not involve the parotid gland particularly, but was located in the anterior and posterior set of lymph glands. The case might easily have been taken for mumps at first sight, but on palpation the swelling was hard, brawny and board like. There was a pustule just anterior to the middle of the sterno-cleido-mastoid muscle about the size of a dime, which had a hard brown crustlike center surrounded by a ring of yellow necrotic tissue. This was surrounded by an area of red inflamed tissue, around which were scattered many small vesicles. The pustule was elevated above the surrounding tissue and the skin was considerably indurated. His throat and tonsils looked normal and there was no pain on swallowing. The heart, lungs, and abdomen were normal.

During the second day in the hospital his temperature rose to 104.1 F, his pulse was 100 beats per minute and his respirations 28; the swelling remained localized. His voice was a little husky, but there was no dyspnea. A smear was taken from the pustule and a culture made. Both were sent to the laboratory for examination, and the next day reported to be positive for anthrax bacilli and *Staphylococcus aureus*. A urine specimen was reported normal. The patient's condition remained about the same, his temperature came down to 101 F, and the infection still remained localized. A culture was taken from the shaving brush which the patient had been using only for a short time. He reported having bought the brush on Forty-second Street, New York, 10 days before he became sick. While he was shaving one morning, seven days after buying the new brush, he cut himself at the exact spot where the present pustule is located. He brushed over the cut several times while lathering his face. The culture from the brush was reported to contain many cocci and anthrax bacilli. The urine showed many saprophytic organisms, but no anthrax bacilli. At 6 p. m. of the fourth day 10 c. c. of anthrax serum were injected into the tissue immediately surrounding the pustule. At 10 p. m. 25 c. c. of serum were injected intramuscularly into the buttock of the right side. For local dressings powdered ipecac in lotion was used. The temperature came down to 99°, and the infection was still localized. Following each intramuscular injection there was considerable soreness in the region of the injection. However, the tissue surrounding the pustule had a much better color and there was less induration. About 24 hours later a second dose of 12 c. c. of serum was injected around the pustule and into the

glands at the angle of the jaw, where the tenderness and swelling seemed greatest. At the same time 30 c. c. were injected into the buttock. Following this injection the temperature rose to 101°, but soon fell and remained between 99° and 98°, for the remainder of the time.

The sixth day after the patient entered the hospital he began to show definite signs of improvement. The swelling in his neck was noticeably smaller and was not nearly so tender. The pustule began to take on the appearance of an old vaccination, and the surrounding tissue looked healthy and normal. A third intramuscular injection of 30 c. c. was given a few days later, which was followed by a little local tenderness and enlargement of the inguinal glands on the right side.

The patient continued to improve, slowly regaining his appetite and strength. The swelling gradually subsided, and the pustule took on the appearance of a scab. He was able to get out of bed 14 days after entering the hospital and is now up and convalescing. The blood stream was never infected.

There is no doubt concerning the infecting organism or its source. The recovered organism is a characteristic Gram positive, spore-forming, nonmotile, large bacillus, which grows on agar media, producing the medusa head fringe on the margin. When injected into laboratory animals it produced death in 16 hours, and the organism was recovered from the dead animal. The laboratory differentiated the bacillus from similar ones and identified all characteristics.

A CASE OF FOREIGN BODY IN THE ANTRUM WITHOUT SYMPTOMS.

By J. B. GREENE, Lieutenant, Medical Corps, United States Naval Reserve Force.

The following case would seem of sufficient interest to be reported. Patient X, private in the United States Marine Corps, enlisted at New York in January, 1918, and was sent to Paris Island, S. C., for training. Here his marksmanship was high, and he qualified as a sharpshooter or sniper. He landed in France in May, 1918, and was soon sent to the front. It was at midnight on June 25 in the battle of Belleau Wood, now named for the American marines, that our patient received his wound from a high-explosive shell. Three marines occupied a shallow dugout, when the shell exploded over them, killing one and seriously wounding the other two. Patient was transferred to Base Hospital No. 6, where he was unconscious till July 3. While in this hospital the patient had his left eye enucleated because of shell injury. He left France October 27, arriving at the Norfolk Naval Hospital November 9, 1918.

Fragment of high-explosive shell in antrum of Highmore.

534-1

Fragment of high-explosive shell in antrum of Highmore and bullet embedded in tissues of the neck, posteriorly.

534-2

Examination showed total loss of left eye, with a linear discharging sinus of left cheek over the malar bone three-fourths inch in length. There was noted a decided deviation of the nasal septum to the right, and a hard unyielding substance could be detected in the region of the attachment of the right middle turbinate by probing under cocaine. There was very slight discharge from the right nostril. Transillumination showed a slight difference in the two antra, the right slightly darker than the left. The X-ray examination showed a foreign body lying in the upper back part of the right antrum just under the floor of the orbit. This was quite surprising, for we had expected the fragment to be near the sinus on the left cheek, the point of entrance.

There was another surprise in store for us, and the patient as well, when we discovered the shadow of a bullet in the patient's neck, slightly to the left side. The point of entrance was directly over the tip of the left mastoid. The symptom complained of was slight pain in the region of the left orbit. The patient's general condition was good and he was up and about enjoying his rest in the hospital. There was no fever.

On December 12 the operation for removal of the foreign body was performed under ether anesthesia, supplemented by injection of 2 per cent procaine with a few drops of adrenalin at the point of incision. The cheek was well retracted and a transverse incision was made through the mucous membrane over the right antrum (Caldwell-Luc) avoiding carefully the roots of the teeth. The bone was removed with a mastoid chisel, and the antrum was entered. The hemorrhage was slight, due to the injection of the procaine-adrenalin solution. The foreign body was soon found located largely in the antrum, though the end protruded into the right nasal cavity. It was so firmly embedded that its removal required the use of a curette. The mucous membrane of the antrum seemed surprisingly healthy. The cavity was packed with iodoform gauze and one suture was placed in the wound. As the bullet in the neck was embedded in the deep muscles and causing no symptons, it was not deemed advisable to remove it. Two days later the packing was removed. There was only a slight post-operative rise of temperature. The recovery was uneventful and the patient was soon discharged from the hospital. The point of special interest is the fact that such a large fragment of shell could pass through the bony structure of the face and remain in the antrum so long without causing symptoms by its presence. The only feature of the operation worthy of note was the distinct advantage in the lessening of troublesome bleeding by the use of local anesthesia in conjunction with general anesthesia.

TRAUMATIC RUPTURE OF KIDNEY: UNUSUAL COMPLICATIONS, RECOVERY.

By F. H. Bowman, Lieutenant Commander, Medical Corps, United States Navy, and H. D. Meeker, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

G. M. F., cox., aged 24 years, of previous good health, was admitted to the United States Naval Hospital, New York, N. Y., on January 11, 1919, with the diagnosis of a fractured mandible, right radius, and left forearm. He was semiconscious and in profound shock. The health record showed that he had fallen two decks through an open hatch and had then walked to the sick bay.

At the time of admission his temperature was 100 F., pulse 100, and respirations 22 per minute. Physical examination confirmed the admission diagnoses and in addition led to the suspicion of some intraabdominal complication. Palpation of the abdomen elicited tenderness in the left upper quadrant and a doughy feeling due to blood clot or confined fluid. He complained chiefly of pain in this region. There was no vomiting, no marked restlessness, and the patient answered questions sluggishly. Urine examination was negative for blood, but showed a cloud of albumin.

He was watched carefully and treated for shock. He regained full consciousness during the day and complained bitterly of pain in the region of left kidney, was unable to empty the bladder, and had to be catheterized during the day. Injury to the left kidney was suspected, although no signs of any contusion appeared on the skin of the abdomen or lumbar region. Five hundred cubic centimeters of urine were taken from him during the first day on three catheterizations. During the night he insisted upon sitting up in bed to urinate, this being the first time he voided since the accident, and passed about 15 c. c. of urine dark red in color and containing free blood.

Urinalysis for the first few days was rather interesting and as tabulated shows the appearance and disappearance of blood.

Date.	Color.	React.	Sp. gr.	Albumin.	Sugar.	Blood.	R. B. C.	Casts.
1–11–19	Amber.	Acid.	1.023	A cloud.	Neg.	Neg.	None.	Many gran.
1–12–19	Dk. red.	Acid.	1.029	A cloud.	Neg.	Pos.	Many.	Many gran. and blood.
1–14–19	Dk. amb	Alk.	1.024	Neg.	Neg.	Neg.	None.	
1–15–19	Amber.	Acid.	1.030	Heavy cloud.	Neg.	Pos.	Few.	

Roentgenograms showed a fracture of the right ulna in the middle third, fracture through the styloid process of the right radius, fracture of the left ulna and radius in the upper third, and fracture of the inferior maxilla (left) near the symphysis.

Four days after admission it became very evident, from the intensity of the symptoms and the urinary examination, that considerable damage had occurred to the left kidney and probably to other viscera. The patient's general condition had improved considerably and arrangements were made for a laparotomy.

Operation.—Gas-ether anesthesia. Left rectus incision. Peritoneum opened in the usual manner. A small amount of blood-tinged serum was found in the peritoneal cavity, but no rupture of the peritoneum. A large retro-peritoneal tumor was very evident in the region of the left kidney. The peritoneum on the posterior wall of the abdomen was opened just outside the descending colon and a large blood clot and some fresh blood turned out. The incision was carried down to the kidney, which was found completely ruptured into two separate portions. The larger and inferior portion was free in the renal fat and was lifted out. The superior and smaller portion was still attached by the pedicle to the vessels although very little circulation was going on. The pedicle was clamped and ligated with heavy silk and this portion of the kidney also removed.

Further examination of the abdominal viscera showed the liver, intestines, other kidney, bladder, etc., all uninjured. The spleen, however, showed a laceration at the lower pole about 1 inch in length.

However, since all hemorrhage had ceased, no operative procedure was deemed necessary.

Two gauze drains were placed in abdomen, one leading to the lower pole of the spleen and the other down into the bed from which the kidney had been removed. The posterior peritoneum was closed around the drain leading to the renal fossa, the peritoneum on anterior wall of abdomen was closed, the rectus returned to its bed and secured there, the fascia and skin closed around the drains.

The fractures of the upper extremities were reduced and put up in plaster and the jaw was wired with silver wire after removal of several carious teeth.

January 22, 1919: Drains removed, wound showed moderate discharge, principally serum. Patient complained of discomfort from the wire which he had worked loose and which no longer held the inferior maxilla in position. Impression taken for interdental splint.

January 29, 1919: Still some drainage from wound. Casts removed from arms. No union in right radius. Left ulna shows beginning union, but in malposition. Casts reapplied. Interdental splint applied. Since that time patient has been making a very satisfactory recovery.

SLOW OBLITERATING THROMBOSIS OF POPLITEAL VEIN.

By C. A. FRINK, Lieutenant, Medical Corps, United States Naval Reserve Force.

A. G. was admitted to the United States Naval Hospital, New York, on February 22, 1919, with a diagnosis of multiple contusions to the left leg and fracture of the lower third of the left femur. These injuries were received as the result of his having been thrown against a winch while securing gear during a storm.

Immedate examination revealed a simple fracture of the lower third of the femur with marked swelling of the entire leg, and it was thought at the time that the popliteal artery had been torn, as there was no pulsation below the knee; but after 12 hours the circulation returned to the leg. The patient was treated by extension and splints until he could be transferred to this hospital.

Upon admission patient was in poor physical condition, having suffered severe pain in the injured parts from the vibration of the ship. The examination of the left leg showed it to be twice the size of the right, and roentgenograms confirmed the clinical diagnosis of fracture of the lower third of the left femur. The circulation of the leg was good and conditions continued favorable until the fifth day after the accident when the leg below the knee was found to be blue and cold.

At no time did he have any abnormal temperature nor did the blood count suggest a septic condition.

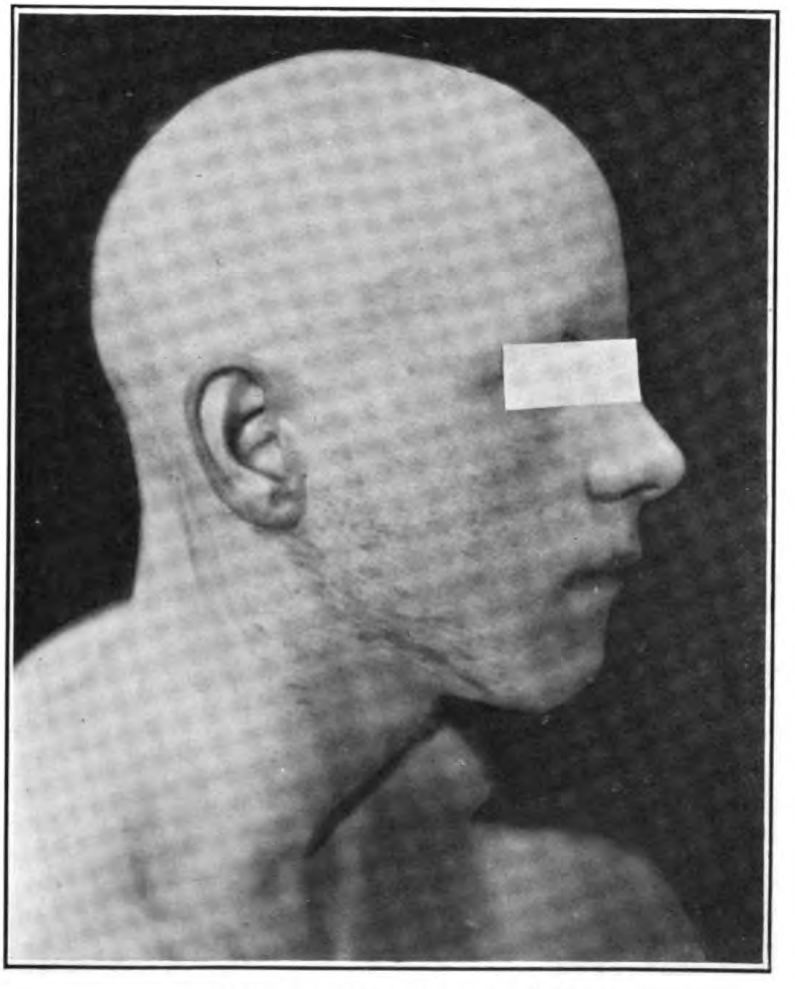
In view of the foregoing clinical findings operation was advised and then performed under gas-oxygen anesthesia. Antero-posterior flap incisions were made, and the femur amputated at the middle. A large venous blood clot was removed and two retention sutures put in to hold the flaps together; dressing applied.

The patient's condition after operation was fairly good and did not show any evidences of any abnormal amount of shock. It remained good for about 24 hours when death from pulmonary embolism suddenly occurred.

Autopsy performed by Lieutenant B. K. Thomas, Medical Corps, United States Naval Reserve Force, showed a recent embolus in the lower lobe of the left lung and collapse of this portion of the lung.

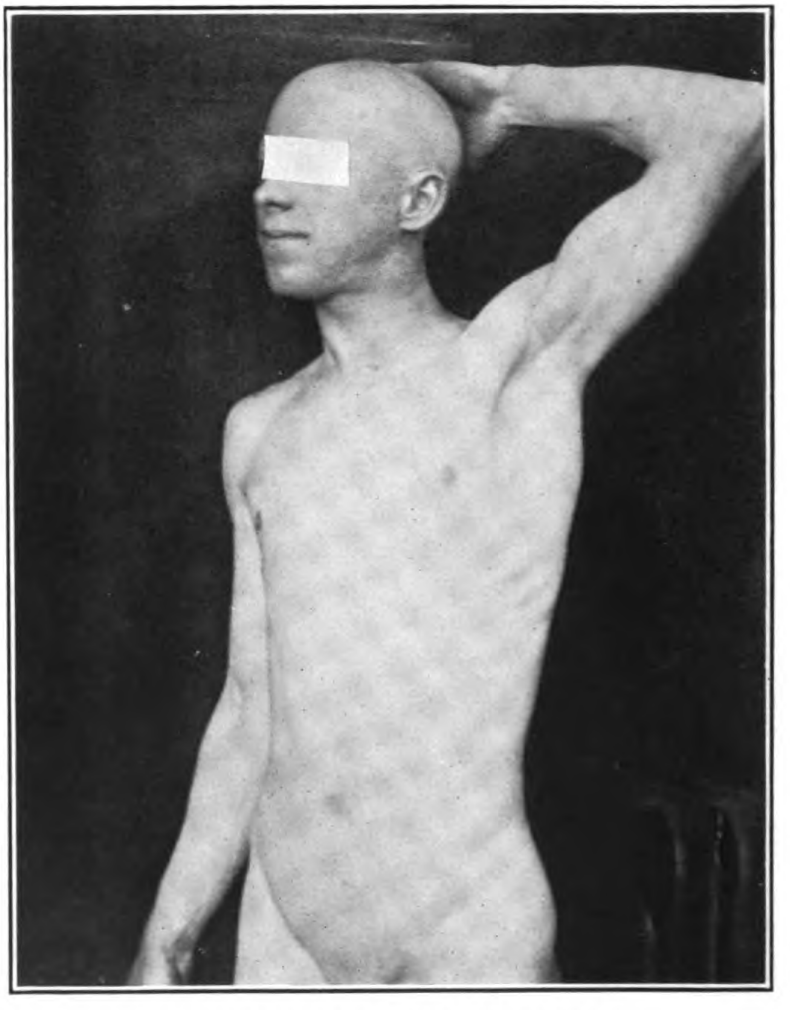
The kidneys showed acute diffuse nephritis and there was a moderate amount of cirrhosis of the liver. There was no other evidence of injury and there were no signs of sepsis.

Examination of the amputated leg showed the arteries to be normal, but the popliteal vein had been traumatized at the site of the fracture, as shown from examination of the intima of the vein. From that point downward all veins were filled with blood clot. A portion of the thrombus was of more recent origin than the rest and



Alopecia universalis following scarlet fever.

538-1



Alopecia universalis following scarlet fever.

538-2

showed that it had been forming slowly from the time of accident until the entire return flow of blood had been cut off.

The case is of interest from the causative factor and from the slowness of the obliterating thrombosis which caused complete obstruction.

ALOPECIA UNIVERSALIS.

By A. R. ALFRED, Captain, Medical Corps, United States Navy.

The accompanying pictures illustrate a case of alopecia universalis resulting from scarlet fever in early childhood. This young man was a candidate for enlistment in the United States Navy, and was rejected. Experience has proved conclusively that it is no kindness to the individual, and not for the best interests of the service, to accept an applicant having any permanent abnormality of appearance sufficiently marked to make him a constant subject of jest and ridicule for his shipmates.

REPORT OF OPERATIONS: (1) FOR RUPTURE OF SPLEEN, (2) FOR RUPTURE OF KIDNEY.

By C. O. TANNER, Lieutenant, Medical Corps, United States Navy.

On November 21, 1918, E. McC., MM-2, U. S. N., was admitted to the United States Navy Base Hospital No. 5, Brest, France, with the following history: Early on the morning of admission he had been scuffling with a shipmate at the Carola Barracks. In the course of this action he fell on a stone pavement on his back, and his comrade fell with his full weight across the patient's abdomen. The patient got up with severe abdominal pain, and walked over to the sick bay at the barracks, a distance of 200 yards. Here he was put in a bunk and placed under observation. By noon his condition was becoming worse, and he was immediately transferred to this hospital for treatment.

On admission temperature was subnormal, pulse rapid, thready and weak, and skin showed extreme pallor. He had abdominal distention, dullness in both flanks, and left side rigidity. There was great tenderness over the left upper hypochondrium, pain over the heart, and great shortness of breath.

He was immediately prepared for operation, the writer assisting Lieutenant Commander G. G. Ross, Medical Corps, United States Naval Reserve Force. A high left rectus incision was made after the patient had been surrounded with hot-water bottles, and while normal saline solution was flowing into a vein. The abdominal cavity was filled with a mixture of clotted and fresh blood. A tear about 2 inches long was found, beginning on the diaphragmatic surface of

the spleen and extending into the center of the organ. A long pack of gauze was threaded into the wound and packed in tightly. The wound was closed with deep through-and-through sutures.

For the first 24 hours following the operation he expectorated blood and had a very irritating cough, probably due to a trauma of the diaphragmatic pleura. On the fifth day after the operation the gauze pack was saturated with Hayem's solution, and was removed the following day. There was no hemorrhage, and the wound healed rapidly. On the eleventh day after the operation he was out of bed and made an uneventful recovery.

L. E. E., BM–1, age 23 years, was admitted to United States Navy Base Hospital No. 5, December 23, 1918, with the following history:

A few hours previous, while on duty on a tugboat, he was struck across the left loin by a huge hawser which snapped in two while towing another boat. He was knocked across the deck, suffered extreme pain and was immediately sent to the hospital on a stretcher.

On admission to the hospital he complained of severe pain just below the left twelfth rib, but showed no signs of hemorrhage. There was only slight pallor of the mucous membranes. Temperature was slightly subnormal but pulse normal. The skin area on the left side from the nipple line to mid thigh was ecchymotic. There was extreme tenderness along the line of the left twelfth rib. The abdomen was normal to percussion and palpation. He was placed under observation.

Three hours later he became pale, his pulse became rapid and weak, ecchymosis was more marked and the tension of the tissues over the loin area increased. The urine showed large quantities of blood and some albumen. There was marked dullness in the left flank but no abdominal tenderness. A diagnosis of ruptured kidney was made, and the patient was immediately prepared for operation.

Through an Israel incision I exposed the left kidney. The lower two thirds of the organ was a pulpy mass and the kidney space was filled with blood. After clamping the pedicle and removing the kidney the ureter and vein could be identified, but the renal artery could not be found. Evidently it had been torn off by the blow. The twelfth rib was found to be fractured. The area was packed with gauze and the wound closed. He was given 1,000 c. c. of saline intravenously on the table. The only explanation I can make for the delayed hemorrhage is that the torn renal artery might have been dislodged in transporting him to the hospital.

He made an uneventful recovery until three weeks after the operation, when he developed a left-side pleurisy, which may be attributed to the lighting up of an old lung lesion by the blow at the time of accident.

TRAUMATIC ANEURISM: REPORT OF FIVE CASES.

By F. H. Bowman, Lieutenant Commander, Medical Corps, United States Navy, and H. D. Meeker, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

Five cases of aneurism, traumatic in origin, came under the observation of the surgical division of the United States Naval Hospital, New York, during the past year. Four of these were the result of wounds received in action during the war—three on the western front and the fourth aboard a torpedoed vessel. The fifth case was the result of an explosion of a water-gauge glass in the fireroom of the U. S. S. *Blakely* in 1908.

Two patients were operated on, one will be operated on as soon as the chronic osteomyelitis of femur has been overcome, one refused operation, and in the remaining case, because of the extensive involvement, it is considered inadvisable to operate.

Two cases were of the brachial artery, one of the femoral, one of the popliteal, and one of the left common carotid.

Case I.—C. E., United States Marine Corps. Wound, gunshot, right thigh.

This patient was wounded by a high-explosive shell at Château Thierry on June 15, 1918. He had a compound comminuted fracture of the lower third of right femur, which later became infected. He was admitted to the United States Naval Hospital, New York, September 14, 1918, with firm union in the femur, but the wound still draining from a chronic osteomyelitis. Temperature 99, pulse 84, respirations 17. He was operated upon December 6, 1918, and the bone curetted and better drainage established. December 15, six months after the injury, it was noticed for the first time that he had a small swelling in the popliteal space, which upon examination showed pulsation and a bruit extending down the leg along the course of the posterior tibial artery for about 3 inches.

At the present time there is no disturbance in the circulation of the leg and no symptoms referable to the condition. It is intended to operate upon this case as soon as the chronic bone infection has been cured.

Case II.—F. W. L., United States Marine Corps. Aneurism, brachial, left arm. This patient received a machine-gun bullet wound in the left arm at Soissons on July 19, 1918. The bullet entered just above the external condyle of the humerus and passed out about the middle of the arm on the outer side. The humerus was uninjured and no infection took place. Some time in September he first noticed an enlargement just above elbow joint, which was diagnosed as an aneurism of the brachial artery. A distinct pulsation and a bruit extending down the arm as far as the division of the artery were present. There was no radial pulse, but some slight disturbance of circulation in hand and wrist.

Operation October 24, 1918. On dissecting out the mass, which was about the size of a hen's egg, the diagnosis was confirmed. The condition was an aneurysmal varix, as the brachial artery, very much reduced in size, emptied into it from above, and two branches of the venæ comites from below. The anastomotica magna, which came off above, was very much enlarged and was apparently taking care of the circulation. The aneurism was removed, and the patient made a good recovery with no disturbance of circulation.

Case III.—T. W. M., Sea. 2. Aneurism, left brachial. This patient received a wound in the antecubital space of left arm, either by a shell fragment or a piece of steel from the superstructure, at the time the U. S. S. *Ticonderoga* was sunk by a torpedo on September 13, 1918. The wound healed with apparently no complications. About three weeks after the injury he noticed a lump in this region which was diagnosed as an aneurism.

He was admitted to this hospital November 29, 1918. A distinct pulsation and bruit were present. There was no disturbance of the circulation in the arm. In order to dilate the vessels of the collateral circulation, preparatory to operation, digital pressure over the brachial artery in the antecubital fossa was made for 20 minutes every two hours until December 10, 1918.

Operation December 10, 1918. Upon dissection, the diagnosis was confirmed. The anastomotica magna came off above and was of good size. The brachial artery below the aneurism was very much reduced in size. There was no connection between the artery and veins. The aneurism was removed and the patient made a satisfactory recovery, although the circulation was considerably disturbed for some time.

Case IV.—B. J. E., United States Marine Corps. Aneurism, right femoral artery. This patient was wounded at Soissons on July 19, 1918, by a piece of shrapnel. The wound healed in about five weeks, and on admission to this hospital three months later he still complained of pain in the right inguinal region, particularly when the leg was flexed or rotated.

On examination, the circulation of the leg appeared normal. There was no visible tumor mass, but upon palpation, a small, hard lump about the size of a walnut could be made out. This mass pulsated and there was a distinct bruit and thrill which extended down along the course of the femoral artery.

This patient refused operative treatment.

Case V.—F. J., age 52, formerly chief water tender, discharged from the Navy in 1908 on medical discharge. Aneurism, left common carotid. In 1908, aboard the torpedo boat *Blakely*, this patient received a wound in the left side of the neck from the explosion of a water-gauge glass in the fireroom. Several weeks later, a swelling

developed over the left side of the neck which was diagnosed as an aneurism of the common carotid artery. He was operated upon twice in the United States Naval Hospital, Mare Island, Calif., but what was done he does not know. The operations gave but temporary relief, for the aneurism has been gradually increasing in size ever since. At the present time, the mass covers the entire left side of neck and can be made out underneath the clavicle.

Examination shows this mass to have a distinct thrill and pulsation. A bruit is heard over the area and over the upper part of the left chest. The circulation in the left arm and hand is very poor. Patient complains of headaches and dizziness and dyspnea. There is no specific history or other evidence of specific infection.

On account of the extent of the condition, the fact that he has had two previous operations and his age, it is deemed inadvisable to operate.

REPORT OF A DEATH FROM SALVARSAN (ARSENOBENZOL).

By E. F. CROFUTT, Lieutenant, Medical Corps, United States Naval Reserve Force.

Previous history.—Negative except for positive Wassermann +1 at Naval Training Station, Newport, R. I.

Present illness: The patient presented himself at the genito-urinary clinic aboard U. S. S. *Leviathan* stating that he had a "blood test" which was 1 plus at Newport and wished to have further treatment. Examination showed no objective symptoms, but in view of the patient's statement a Wassermann was ordered; November 19, 1918, laboratory report showed Wassermann 1+; November 22, 1918, patient was admitted to the sick bay for usual preliminary treatment of calomel gr. iii followed by 1 ounce saturated solution mag. sulph. the following a. m.

November 23, 1918, 0.6 gm. arsenobenzol administered intravenously in left median basilic vein at about 10.30 a. m. Arsenobenzol used was made by Dermatological Research Laboratory, 1818 Lombard Street, Philadelphia, Pa., United States of America, lot No. 956. Patient was removed to sick bay in good condition. Temperature, pulse, and respiration at 12 were 99.4°, 100, 22. Temperature, pulse, and respiration at 4 p. m. same day were 102°, 112, 24. Temperature, pulse, and respiration from this time on increased until they reached the maximum on November 24, 1918, at 4 p. m.—103°, 160, 52. The following day at 12 noon they were normal. Maximum of pulse and respiration, during this time, pulse 134, respirations 36.

From this time on his temperature ranged from normal to subnormal until November 30, 1918, 4 p. m., when last taken previous to dissolution, when it was 100° by axilla. Pulse during this time ranged

from 134 to 96, respiration during this time from 34 to 32—all according to clinical chart as recorded by the hospital corpsman.

From November 25, 1918, until November 27, 1918, there was a period of anuria. At this time strychnine sulph. grain 1/30, and solution of adrenalin, minims 10, by hypodermic, q–3–h, was prescribed; also one glass of water every half hour, high saline irrigation (2 quarts) q–4–h, hot-water bottles to the feet. The mouth was swabbed with liq. alkalinus antisepticus. Sodium citrate, gr. vii, and infusion of digitalis, dram j, were given by mouth every four hours.

During this period of anuria he was catheterized, 1 ounce of urine being obtained; on making a qualitative test for albumen, the specimen boiled solid. During this time there was constant and persistent vomiting.

On November 27, 1918, at 6.45 p. m., he passed 1,000 c. c. of urine. The laboratory report showed albumen cloud; microscopically a large amount of epithelial tissue, isolated cells, and groups of white blood cells were seen.

On November 28, 1918, he passed 775 c. c. of urine. Laboratory report showed cloud of albumen; microscopically white blood cells were seen in abundance. On this date his breathing became embarrassed. Upon examination it was found to be the result of a marked stomatitis and pharyngitis. This condition persisted and became exaggerated with the subsequent development of hemorrhage from the mouth and throat. During this time no blood was observed in the nasal passages, stools, or urine. There was no purpuric condition of the skin.

At 11 p. m. November 28, 1918, the patient involuntarily passed a large quantity of urine. On November 28, hemorrhages from mouth and pharynx became so marked that it was impossible to keep mouth, lips, and throat clean. At 8 a. m., November 29, 1918, he relapsed into a comatose condition from which it was impossible to arouse him, the breath at this time being heavy, foul, and ammoniacal. At 8.25 this date passed 550 cc. of urine as recorded, also a large amount involuntarily. This comatose condition persisted as well as the involuntary passage of urine, until dissolution occurred at 7.34 p. m., November 30, 1918.

The arsenobenzol used was of the same lot number as had been previously used in 81 cases without any complications whatsoever.

The distilled water used was subjected to a careful bacteriological and chemical analysis. No growth was found on litmus agar, and tests for poisonous metals, copper, zinc and lead were negative.

The operation throughout was conducted under generally approved aseptic conditions.

REPORT OF NECROPSY.

Clinical diagnosis, nephritis, following salvarsan for syphilis.

Pathological diagnosis: Acute nephritis secondary to syphilis and salvarsan treatment.

It is a well-nourished body of a white man, aged about 30 years. Rigor mortis had set in and there was some mottling of the skin. There is a recent scar on the left tibia; some ulceration between the toes; tattoo marks inside both forearms. In the left cubital space there is the scar of a recent puncture, the result of giving salvarsan. No chancre observed. There was a bloody discharge from the mouth and a sloughing of the mucous membrane of the mouth and lips.

The panniculus is somewhat increased in amount and is yellow in color. The muscles are dark red and firm. The heart is enlarged downward and to the left. The auricles were distended with blood and the ventricles were in systole. The heart was not opened or removed. The lungs were full of air, no adhesions were found around them. No gross foci of hardening or of consolidation were found. There was no increase of fluid around the heart or around the lungs.

Upon opening the abdomen the distended large intestine protruded from the cut and a slight odor was noticed. The small intestine also was full of gas. The appendix was in normal position, in a normal condition. The bladder was small and contained less than an ounce of urine. The liver was smooth and did not show congestion nor adhesions. The stomach was pale and contracted and contained about two ounces of fluid and a few ounces of gas. The spleen was removed after the splenic vessels were tied. The spleen was enlarged to about twice normal size. The capsule was adherent in two places. The surface showed irregular white areas about four centimeters in diameter which were somewhat depressed below the level of the surrounding parts and felt somewhat thicker to the touch. Pieces of these were removed for microscopic examination. Cross section of the spleen showed engorgement and scraping the cut surface yielded a dark bloody fluid. Both kidneys were removed and parts of them saved for microscopic examination. The capsule of the left kidney was silghtly adherent over all of the surface. It was appreciably enlarged and was definitely lobulated. The lower branch of the pelvis was thickened and somewhat sclerotic. On mid-section the differentiation between cortex and medulla was obvious. There was congestion throughout, but no infarcts were observed. The right kidney was removed. It was not as enlarged as the left one but its lower lobe was relatively larger than its upper lobe. The capsule was adherent, it was congested throughout. Inflammation of the medulla and cortex. No signs of infarcts were observed. Further examination was not made.

Pathology: The spleen showed chronic passive congestion, probable infarcts. The kidneys showed enlargement, inflammation, sclerosis, but no infarcts.

Diagnosis: Acute nephritis.

(Autopsy performed by Lieutenant H. S. Hulbert, Medical Corps, United States Naval Reserve Force.)

PERFORATION OF MECKEL'S DIVERTICULUM AND ACCOMPANYING APPENDICITIS.

By W. F. PEARCE, Lieutenant, Medical Corps, United States Navy.

The following case has been very interesting to me as being the first such case I have seen in about 11 years of experience, mostly in civil work. For this reason it is thought it might prove of sufficient interest to others to warrant reporting.

The vitelline duct persists occasionally as a band, less often as a definite pouch, as was present in the case about to be described. Unfortunately, it is impossible to present in this report data as to the frequency of occurrence of this pathological condition, as the literature is not at hand.

S., R. L., Sea.–2, United States Naval Reserve Force, aged 19, was admitted to hospital from base dispensary late in the afternoon of December 25, 1918, transported in a hospital ambulance.

History: Has had no previous illnesses save tonsillitis. States that his tonsils have been operated on three times. No history of any previous attacks similar to present one. For the past "two or three days" has noticed a slight discomfort in abdomen, which was relieved by loosening trousers.

History of present attack: About 10 a. m. on day of admission was seized with severe pain, which "doubled him up." This pain was in the region of the umbilicus. The pain shortly became less severe. It still continued, however, and about one hour after original onset again became more severe. At this time the point of greatest pain had shifted to the region of McBurney's point. Pain continued severe from that time until admission, with its greatest intensity over McBurney's point. He had vomited several times.

Findings upon admission: Temperature 98.6 F., pulse 120, regular, volume rather small. Facies; moderate pallor, "pinched expression." Abdomen; very sensitive, tenderness most marked over region of McBurney's point but pronounced over abdomen, especially lower quadrant. Marked muscular rigidity. Heart and lungs negative. Urine negative. White blood count 18,000. Blood pressure, systolic 118, diastolic 90.

Immediate operation was decided upon and performed under ether anesthesia. Upon reaching the peritoneum it was seen to be edema-

tous and upon entering the abdomen, a moderately large amount of greenish gray fluid was encountered. Plaques of fibrin were seen upon cecum. After protective packing, appendix was isolated. It was adherent and inflamed, sharply kinked about its middle portion and near the tip grayish brown in appearance. The appendix was removed, stump not inverted. While there was apparently a beginning gangrene, there was no perforation and it was decided that there must be present some other pathological condition. Further careful examination disclosed the diverticulum, definitely inflamed and with a perforation about midway between tip and base. Diverticulum was ligated near intestine and removed. Stump was inverted, two drains placed and incision closed in layers.

For a few days after the operation there was some elevation of temperature at times, but never above 101.5° and varying between that and normal. Eight days after operation temperature became normal and remained so. Drainage has been very moderate yellowish pus. Drains were gradually removed, being dispensed with after four days. About 10 days after that, drainage ceased. Patient is now up and around and wound is closed.

Description of specimen: Color congested in some portions, in others grayish, and in others still, especially about perforation, dark brown. Size; length 4 cm. Width; 2.5 cm. at top, and 3 cm. at base. Perforation 1 cm. by 5 cm. Edges clean cut and indurated.

The interior of the specimen is almost filled with a mass about the size of a cherry, which is free on all sides, but on incising side of specimen it is seen to be attached near extremity of diverticulum. This mass is moderately soft in consistency except at its attachment, where it is quite hard, of almost a cartilaginous consistency.

The features of this case that seem to be of especial interest are the following:

The presence of a tumor within the diverticulum.

The induration of edges of the perforation indicating a probable preexisting ulcer, with absence of previous history of symptoms referable to right lower quadrant.

SYPHILOMA OF THE CEREBRUM.

By A. W. Hoaglund and P. F. Prioleau, Lieutenants, Medical Corps, United States Navy.

The following case report is deemed of interest. It shows early cerebral syphilis, occurring in a young adult, beginning cerebral symptoms appearing three and one-quarter years following initial sore, rapidly progressing, with none of the usual outward clinical or laboratory manifestations of syphilis and proving fatal two and one-

half months after slight premonitory signs of mental involvement. It also amply demonstrates lack of treatment, and haphazard treatment conducted on patients transferred from place to place, particularly patients of the type who seem to think they know just when and how much treatment it is necessary for them to take, and who in this manner by failing to report and by more or less evading the medical officer, to a large extent regulate their own treatment.

J. G. F., coxswain, United States Navy, age 30 years, admitted to U. S. S. *Palos* September 24, 1918, with a sudden attack of vomiting followed by convulsions and unconsciousness for a few minutes.

A diagnosis of syphilis was made June 7, 1915. Until this date there is nothing of any interest in the patient's health record relating to the case and we can think of his illness as having originated at this time. The diagnosis was based on the presence of a chancre on the penis, a luetic rash and mucous patches in the mouth. Two intravaneous injections of salvarsan were given and mercury was administered intramuscularly. To quote from the patient's statement: "I received up to January, 1918, the following drugs; First year, mercury all the year except for short intervals not exceeding two months and two doses of salvarsan; second year, same as first year but no salvarsan; third year, protoidid of mercury and inunctions." However, referring to a previous entry of September 11, 1917, we are reminded that there is no record of treatment since November 18, 1915, other than the patient's statement, so that we can not be sure how much medication he actually received during the first three years. We also see a note to the effect that he once refused to take further treatment. This coupled with the general impression received from the patient leads us to believe that all statements made by the patient are absolutely unreliable, and his continued, at times voluntary, effort to assure us that he has had sufficient treatment, have been greatly encouraged by his present sudden realization of something wrong in his head. August 5, 1916, the patient was on the sick list two days with a diagnosis of neuritis, but this probably has no importance. On January 11, 1918, he commenced taking potassium iodide for two weeks and all treatment was then suspended. June 3, 1918, he was examined physically and found qualified for extension of enlistment. Wassermann reaction, June 26, 1918, was reported negative.

The following symptoms as they presented themselves suggested sunstroke, neurasthenia, and cerebral tumor not of syphilitic origin until the correct diagnosis was made.

It was about September 1, 1918, when the patient reported to me (P. F. P.) for the first time. He was complaining of frontal headache, symptoms of eyestrain, and dizziness. He said that a few days before he was aloft painting and the sun was so intense he had to

stop working. Rest and the usual headache remedies were successful in bringing relief. September 24, 1918, he was taken suddenly with an attack of vomiting, followed by convulsions. He remained unconscious for a few minutes, during which time he was markedly cyanotic. The pulse was rapid and full. The urine was negative for albumin and sugar. After the patient recovered somewhat an eye examination was made. Refraction as follows: O. D.=spherical+1.50; cyl.+0.50, axis 25°; O. S.=spherical+1.50; cyl.+0.25, axis 180°. The patient was warned to keep out of the sun and that glasses were to be worn. He continued to complain occasionally of nausea, and headache was a constant symptom. Tenderness was elicited on pressure over the epigastric region. Examination of the spinal fluid was impossible at this time.

October 8, 1918, the patient first commenced to show mental symptoms. He was easily excited and often hysterical. Crying spells were not uncommon. He was reluctant about taking any more syphilitic treatment, saying "he wasn't sure he had ever had syphilis and the trouble with his stomach was due to too much mercury he had taken."

Examination then revealed pupils of equal size. They reacted normally to light and accommodation. Right patella reflex was more pronounced than the left but could not be considered as exaggerated. Photophobia was marked. He kept his eyes closed and refused to read, as this made his headache worse. October 13, 1918, 0.6 gm. of salvarsan was given intravenously. Mercury was also used. No improvement was noted; there was no fever; no albumin in the urine; normal blood count. Headache, nausea, vomiting, and vertigo were now pronounced symptoms. Vomiting did not relieve the headache, and the former was independent of any food taken and might occur any time during the day or night. The vomitus was always free from blood. Bowels were usually regular, except for a period of 10 days, when diarrhea was very troublesome, and incontinence occurred.

Starch-opium enemas were required to relieve the condition. Patient was kept on a diet. Potassium iodide was repeatedly given by mouth, but even very small doses in the most palatable form seemed irritating to the stomach and had to be abandoned. It might have been wise to have attempted administering the drug by rectum.

The patient was becoming progressively worse. October 31, 1918, he was transferred to the United States Naval Hospital, Yokohama, Japan.

Upon arrival at hospital, November 14, 1918, examination revealed the general condition poor, the patient apathetic, pale, and emaciated, with eyes tightly closed and an expression of pain written on the features. The early symptoms were accentuated. The head-

ache was occipital now, as well as frontal. Pain in the abdomen was sharp and described as radiating up and down but never around the abdomen. There was no tremor or deviation of the tongue. There was slight evening rise of temperature. The left knee jerk was diminished as compared with the right but the latter could not be spoken of as increased. Babinski and Oppenheim signs were negative. There was spasm of both lids and extreme photophobia. Right pupil was slightly larger than the left. Both eyes reacted to light and accommodation. Vision was greatly reduced, right eye 8/20 and left eye 10/20. There was present homonymous hemianopsia showing that there was an interruption in the path to the central side of the chiasm and located on the left. The patient could only see objects to the left of the median line, as the right halves of the fields of vision were absent or blindness existed in the left halves of both retinæ. Ophthalmoscopic findings were; a hemorrhagic zone around a pale optic nerve, distension and tortuosity of the retinal vessels near the disk. The disk did not seem swollen. Periphery of retina appeared normal. The left eye was the least involved of the two. Patient's condition was very serious. There was continuous vomiting with inability to take even the slightest amount of food, this vomiting being always of a very characteristic cerebral type.

Blood Wassermann was negative. Hemoglobin per cent 75; R. B. C. 4,080,000; W. B. C. 10,000. Differential count: Polys. 74, S. L. 20, L. L. 3, T. 2, L. M. 1. On November 16, 1918, 25 mils of spinal fluid were withdrawn with great improvement in symptoms. Headache was relieved and nausea and vomiting disappeared for 12 hours. Arsphenamine, 0.6 gm. was given intravenously; slight reaction.

Laboratory examination of spinal fluid as follows: Slight globulin increase. A cell count of 70 cells to the centimeter. Lange's colloidal gold test was read as follows: 0012322210. Wassermann, negative. At this point a definite diagnosis of cerebral syphilis was made. By exclusion we narrowed the condition down to neurasthenia, cerebral abscess or a rapidly growing cerebral tumor, syphilitic in origin. Although the blood and spinal fluid Wassermann remained negative and the pupillary reactions remained normal, though in view of the acute and rapid onset of the entire condition, a period of two months from absolutely no symptoms to the present critical condition, nevertheless the cell count of 70 in the spinal fluid combined with the suspicious Lange curve and the past history led us to believe that the condition was syphilitic in origin. November 24, 1918, there was slight improvement. Patient was able to take food. Potassium iodide gr. xx was given t. i. d., 0.6 gm. arsphenamine was administered intravenously with the idea of following it with an intraspinal injection of arsphenaminised serum but the

patient's condition suddenly changed for the worse and the procedure was not tried. Blood Wassermann on this date was again negative. On November 26, 1918, he sank into a stupor, becoming weaker and weaker and death ensued.

Autopsy revealed the following: Evidences of increased intracranial pressure. Slight exudative meningitis along border of superior longitudinal sinus.

A gumma 5 centimeters in diameter was found filling the whole center of left occipital lobe. Microscopical specimens revealed typical syphilitic changes. Other organs negative.

This case of syphilis illustrates the importance of early consistent and continued treatment of syphilis. It aptly points out the occasional case of syphilis which travels along apparently giving no signs of even the slightest disturbance, the case in which the average patient is so quick to believe that "He didn't even have syphilis," when suddenly it crops out, fortunately not always so violently or so quickly fatal as in this report.

The case is interesting in view of the rapidity with which it involved the nervous system, although intravenous, intramuscular, and internal treatment had all been given. The persistent and continual blood and spinal fluid negative Wassermann, the absence of eye and other characteristic nerve syphilis prodromes, the rapid and absolute organic nerve tissue destruction, as evidenced by eye background and vision examination and the persistent cerebral type of vomiting, together with the high cell count and suspicious Lange's colloidal gold test, firmly convinced us that we were dealing with organic destruction of some type.

A CASE OF EXTRA-GENITAL CHANCRE.

By C. B. CAMERER, Lieutenant Commander, Medical Corps, United States Navy, and J. R. POPPEN, Lieutenant, Medical Corps, United States Navy.

S. S. S., private, United States Marine Corps, was exposed to venereal infection on July 13, 1918. Approximately four weeks later the patient noticed a small lesion on the perionychium of the index finger of the left hand, which he described as a "hangnail." It was associated with very little pain and developed gradaully until on August 27, 1918, it had assumed the proportions of a severe paronychia. On this date he was admitted to the sick list as with "cellulitis." (At this time the patient attributed the infection to an abrasion caused by the rear sight of his rifle at drill. Close questioning brings out the statement that he is "not sure" about this injury.) Practically the entire distal phalanx of the finger was involved in an indolent purulent infection. Free drainage was afforded

by liberal incisions. The patient was kept on the sick list for five days when he was "discharged to duty under treatment." The course of the process was not satisfactory, however, as is shown by the fact that nine days later (Sept. 10), 1918, he was admitted as with "Abscess unqualified." Reference to the health record shows, "Patient admitted with a well-developed felon on second (index) finger of left hand (distal extremity), resulting from a previous infection (see above). Treatment, free incision, drainage, hot soaks, and wet packs." The granulated indolent character of the lesion was noticed at this time but was attributed to the chronicity of the process. Failure to respond to prescribed treatment is shown by the fact that he remained on the sick list for eight days and was again "discharged to duty under treatment." The lesion gradually healed leaving an irregular stellate scar on the outer edge of the distal phalanx.

Three months later (Dec. 17, 1918) the patient came to the sick bay complaining that his hair was falling out. Examination disclosed the presence of a typical luetic alopecia. The entire scalp was covered with irregular incomplete patches of loss of hair, giving it the "moth-eaten" appearance so characteristic of this form of alopecia. Further examination showed a generalized, copper-colored, maculo-papular eruption and a shotty adenitis involving especially the inguinal, epitrochlear, and posterior cervical chains. There was no "primary lesion" any where, and careful questioning failed to disclose any lesion, excepting the "paronychia," which might well have been a chancre. There had been no exposure for several months prior to July 13 nor since then.

Blood was taken for Wassermann. A clinical diagnosis of syphilis was made and the patient given an intravenous injection of arsphenamine, 0.06 gram. This was followed by two subsequent administrations of the drug at seven-day intervals. Since then the patient has been receiving weekly intramuscular injections of 1 grain of mercury salicylate. The eruption cleared almost immediately and the alopecia is practically unnoticeable at present. The patient has regained weight and strength and is far less irritable. Unfortunately, no satisfactory Wassermann has been obtained, all specimens being reported on as "anticomplementary."

The interesting features of this case appear to be the following:

(*a*) History of repeated exposure to infection on July 13, at which time he admitted having handled the genitals of the prostitue; the patient's statement to the effect *that he is left-handed*, and that he recalls the presence of an abrasion on his left index finger at this time.

(*b*) The fact that he had taken careful venereal prophylaxis within eight hours following exposure.

Chancre of the thumb.

553-1

(*c*) The utter absence of a genital sore and, in fact, *any other than the "paronychia" referred to*, as appearing on the finger as stated, which doubtless was a mixed infection and the site of original inoculation.

Digital chancres are by no means uncommon. The usual history corresponds to the case described. They begin as an insignificant "hangnail," a papule or ill-defined infiltration of the matrix or nail bed, and show a tendency to ulcerate and become secondarily infected with mixed pyogenic organisms. The presence of considerable purulent discharge and unusually severe pain tend to obscure the picture of a typical primary syphilide. As in the above case, the diagnosis is often not made until the appearance of secondary symptoms arouse suspicion.

CHANCRE OF THE THUMB.

By L. HERMAN, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

Chancre of the thumb is so extremely rare that the following case is worthy of record:

M. S., ship's fitter, was referred for diagnosis to Navy Base Hospital No. 5, Brest, France, in August, 1918. He had been suffering for several weeks with a painless, indolent ulcer, situated over the terminal joint of the right thumb. This began as an insignificant scratch, which increased in size through ulceration and became rounded in outline with peripheral induration. The lesion had been treated with various cauterizing agents, but had lost none of its Hunterian characteristics. In fact, the case presented a primary lesion of syphilis with the most typical features of a true Hunterian chancre that the writer has ever seen in an extra-genital lesion. There was concomitant indolent enlargement of the associated epitrochlear and anterior pectoral lymph nodes. Treponema pallidum was found in the serum expressed from the lesion. The blood Wassermann test was positive. The sore disappeared promptly after the administration of novoarsenobenzol. It is interesting to note that among approximately 1,000 cases of syphilis observed during 14 months of foreign service, there were four in which primary sores appeared at sites other than the penis. Of these, one occurred in the midline of the anterior abdominal wall, just above the pubes; a second occurred on the lower lip, a third on the scrotum, and a fourth on the thumb, as just described. The patient with the chancre of the thumb offered the suggestion that the lesion might have been acquired while he was working as a plumber in the ship's lavatories. The chancre of the scrotum was interesting, in that the lesion was thought to be a hair-follicle infection, and was incised and curetted twice, and had entirely healed over before the patient.

a physician, had any idea of the nature of the lesion. A few papules eventually appeared on the abdominal wall. Several of these were excised and examined for the treponema, but with negative results. The blood Wassermann test, however, was strongly positive. There is no reason to doubt that the scrotal lesion was a primary luetic sore.

A CASE OF TYPHOID FEVER WITH SEVERE COMPLICATIONS.

By F. N. Martin, Lieutenant, Medical Corps, United States Naval Reserve Force.

Since the universal employment of antityphoid inoculation in military service, so well has it served its purpose, the occurrence of a single isolated case of typhoid fever becomes the subject of comment. It is hoped that the history of the following case presents sufficient points of interest to be worthy of report.

S. J. C., fireman 1, age 29; born, Hyde Park, Mass.; enlisted, Salt Lake City, Utah, June 27, 1917; served one previous enlistment.

History of present illness: Patient was admitted to sick bay, U. S. S. *Savannah*, on July 31, 1918, diagnosis undetermined, but with dysentery, probably of dietetic origin. On admission, temperature 103°, pulse 104, respirations 28. Examination of chest and abdomen negative; blood count normal. Note in health record August 4, "condition about same, temperature 104°, mucous diarrhea. Examination of stool negative." On August 6 diarrhea was marked and examination of stools showed presence of *Lamblia intestinalis*, and diagnosis changed to dysentery. Condition remained about the same. August 10, patient slightly improved, diarrhea less marked; temperature, however, remained as high as 103°. On this date patient was transferred from U. S. S. *Savannah* to a naval hospital, being admitted with diagnosis of dysentery (unclassified). History of sudden attack of diarrhea, beginning about 10 days before and marked by five to six bowel movements daily. Temperature 102° on admission; pulse and respiration in proportion. Examination otherwise negative.

Examination of patient showed enlargement of spleen and several small spots (atypical rose spots) on abdomen and lower thorax. Examination of urine and feces for typhoid bacilli was unsatisfactory. On August 30 temperature gradually dropped and reached normal for the first time. On September 2, during the day, patient seemed to be in very good condition, temperature ranging from 98° to 101.5°; bowels moved twice early in the day, small, light-formed stool, without blood; no pain. At 8.15 p. m. August 2 patient had a well-formed stool and during the movement he experienced sharp, stabbing pain in abdomen, which passed off in a short time. He slept for about 45 minutes and was awakened by sharp paroxysmal

pain in the abdomen, which was very severe, but would pass off in a minute or so and return in about 5 minutes. At 10 p. m. temperature 101.2°, pulse 90, distention slight, no tenderness or rigidity of abdomen. At 11 p. m. pulse had climbed to 105, temperature 104°. Patient had a chill. Examination showed tenderness in lower left inguinal region and some rigidity of left side. At midnight temperature 104°, pulse 112, pain severe, and of same paroxysmal type. Distention slightly increased; slight tenderness and rigidity extending to right iliac region. W. B. C. 8,000. Taken to the operating room at 3 a. m. September 3.

Past medical history: Typhoid prophylaxis complete on September 27, 1917; first inoculation given on September 7; second inoculation given on September 18; third inoculation given on September 27.

Receiving ship, Puget Sound, Wash.: No other admission on health record since enlistment.

LABORATORY EXAMINATION.

August 13.—Feces: Amoeba coli (encysted stage), negative for typhoid bacilli. Positive. *Lamblia intestinalis*, R. B. C., & W. B. C. present.

August 20.—Blood:

W. B. C.	7,500
Polys	55
Small lymph	38
Large mono	4
Transitional	3
	100

August 21.—Blood culture negative for typhoid bacilli. Feces: *Lamblia intestinalis* (very few).

August 24.—Widal:

S. Dil.	Typhoid.	Para-T, "A."	Para-T, "B."
1–10	++++	++++	+++
1–20	0	+++	0
1–40	0	++	0
1–80	0	0	0

August 29.—Feces: Culture for typhoid, negative.

September 3, 1918.—Postoperative. Urine: Sp. g. 1.025, albumen trace, few fine granular casts and few R. B. C.

September 4, 1918.—Urine: Sp. g. 1.030, albumen and a few granular and hyaline casts. Gram negative bacilli present.

September 4, 1918.—Blood.

W. B. C.	12,000
Polys	81
Large lymph	16
Large mono	1
Transitional	2
	100

September 9, 1918.—Urine: Sp. g. 1.030, albumen negative, casts negative.

September 24, 1918.—Blood for typhoid agglutination. Report from Phipps Institute.

	Typhoid.	Para "A."	Para "B."
1/20	++++	0	0
1/40	++++	0	0
1/80	++++	0	0
1/160	++++	0	0
1/640	++	0	0
1/1280	0	0	0

Cultures from urine: Typhoid −; para "A," −; para "B," −.
Cultures from feces: Typhoid, −; para "A," −; para "B," −.

Operation.—Incision 10 cm. long, through right rectus; caecum lifted up and ileum examined from this point. The entire terminal ileum for about 20 inches was dilated, the bowel wall edematous, red, and covered with pale points of ulceration. The bowel was covered with lymph and at a point about 18 inches from ileocecal valve, a perforated ulcer was found. The omentum was attached to this area, but not over the perforation. Considerable fluid lay between the intestinal coils in the left lower quadrant. The perforation was closed by two layers of Lembert sutures, the fluid wiped up and the peritoneal cavity washed out with warm normal salt solution. One cigarette drain leading to left side at site of perforation and one over pubes, leading to pelvis, were left in place and the wound closed. The patient reacted well after operation. Hypodermatoclysis employed, giving about 1,000 c. c. of warm salt solution every 24 hours for four days.

On day following operation temperature dropped to 97 F. and ranged between this and 102 F. for three weeks, gradually approaching normal. The wound drained a colon bacillus pus for 10 days, when all drainage was removed. Patient has normal bowel movements daily and now, at the end of four weeks after operation, is on regular diet. Wound has healed and he is sitting up for a few hours each day.

At noon on October 20, 1918, patient complained of cramps in the abdomen, which grew progressively worse. He vomited a large amount of yellow fluid and was continuously nauseated. Peristaltic waves could be seen through the abdominal walls, mostly over right side of abdomen. Complete obstipation took place and distention of upper abdomen gradually increased, pulse grew weaker and more frequent until rate was 150 per minute. Diagnosis: Intestinal obstruction.

Patient was taken to operating room at midnight. Under ether anesthesia median incision was made below the umbilicus. Some

free clear fluid found in peritoneal cavity. The omentum was rolled up on itself and adherent to the abdominal wall at site of old incision. The entire terminal ileum was involved in a mass of adhesions and the obstructing band found and divided about 8 inches proximal to the site of the old perforation. The ileum was still very friable and a slight longitudinal tear, made during the separation of adhesions, was repaired with Lembert sutures of silk. Two cigarette drains were left in the region from which this mass of intestines was separated and the incision closed down to the drains. Patient suffered a moderate degree of shock, but reacted well to treatment on second day after operation. The wound drained for about a week, when the drains were removed. The wound promptly closed and the patient sat up on twenty-sixth day. He has a normal bowel movement daily without use of cathartics and feels perfectly well. December 20, 1918, patient left hospital on leave to his home, apparently completely recovered.

The interesting points in this case were:

First. The occurrence of a typical typhoid after prophylactic typhoid inoculation.

Second. The relapse of typhoid following operation for perforation.

Third. The friable condition of the bowel, as disclosed at second operation, so long after the typhoid had ended.

Fourth. Normal bowel function after such extensive peritonitis as existed.

ACUTE CHOLANGITIS FOLLOWING INFLUENZA.

By R. S. REEVES, Lieutenant, Medical Corps, United States Naval Reserve Force.

In view of the fact that a review of articles in the recent influenza epidemic fails to make mention of an acute cholangitis immediately following an attack of influenza, the following case is deemed worthy of record.

E. C. I., ensign, Pay Corps, United States Naval Reserve Force, was taken sick February 9, 1919, with severe headache, backache, and general bone aching, pain in back of his eyes, accompanied by lacrimation and feeling of malaise. His temperature was 101°; pulse, 108; respirations, 22. His throat was slightly injected. Chest examination was negative save for slight harshness of breath sounds. Heart outline was normal and sounds good. Abdomen was negative. He was given calomel grs. ii followed by magnesium sulphate 1½ ounces. His medication consisted of aspirin grs. v, quinine sulphate grs. iii every fourth hour for two days when the quinine was stopped. He received liquid diet every third hour with all the

water he wished and an ice cap. On the 11th he had a nose bleed and vomited. The following day he had another attack of epistaxis and his temperature reached its height, 103°; he complained of continuous epigastric soreness and of vomiting all nourishment. His chest was negative but an abdominal examination showed soreness in the epigastrium one-half inch to the right of the midline and 3 inches above the umbilicus. There were no symptoms in the right iliac fossa. The aspirin was stopped and he was given sodium bicarbonate grs. v; tr. nux vomica m. v; tr. gentian compound fluid dram i; t. i. d. On the 14th his temperature was only 99.4° in the evening, his pulse 52 and respirations 18, but his gastrointestinal symptoms continued. His medication was changed to sodium bicarbonate grs. v; pepsin grs. v; and tr. belladonna m. v; t. i. d. On the 15th jaundice in the conjunctivæ was noticed. His urine was very highly colored, but was normal save for strongly positive urobilin test. His stool was clay colored. His temperature became normal and remained so or subnormal throughout the remainder of his sickness. The following day he was markedly jaundiced with the slow pulse typical of gall-bladder disease. His gastrointestinal symptoms did not bother him, improvement having been marked when he was given tr. nux vomica m. x in aquæ menthæ piperitæ, t. i. d. On the 17th he had only 4,600 W. B. C., while the differential count showed polynuclears, 69; small lymphocytes, 21; large mononuclears, 3; eosinophiles, 3; large lymphocytes, 1. The slide also showed a slight poikilocytosis. His urine was negative save for urobilin. From this date on his improvement continued, the bowel movement being normal in color. Convalescence was uneventful. On the 24th jaundice had entirely disappeared save for a slight icteric tinge of the conjunctivæ, W. B. C. count 7,200, urine normal. He relished full diet with extra feeding between meals. He was discharged to duty February 28 in good condition, blood pressure, pulse, and temperature all being normal.

His previous medical history was not of interest save for the fact that he had malaria four months ago. His social and family history were negative.

The interesting features of this case are: First, that the gall bladder became infected just as the symptoms of influenza were disappearing; and, secondly, that it was undoubtedly a sporadic influenza of epidemic type with severe headache, body pains, lacrimation, epistaxis, and high fever. We are of the opinion that this was a hematogenous infection of virulent type, as shown by the blood count and the urobilin: hence care should be used to isolate such cases.

A CASE OF COMPOUND FRACTURE OF THE MANDIBLE COMPLICATED BY DIPHTHERIA.

By J. B. GOODALL, Lieutenant (J. G.), Dental Corps, United States Naval Reserve Force.

G. B. W., Ph. M. 2, United States Navy, was admitted to the United States Naval Hospital, New York, N. Y., on February 1, 1919, from the U. S. S. *Siboney* with a diagnosis of fractured mandible. Eight days before admission, while at sea, he had his jaw injured during a fistic encounter. The emergency treatment consisted of a wire frame made to fit the chin and supported in position by a Barton bandage.

Roentgenograms showed a compound, comminuted fracture between the lower right second and third molars. The third molar was impacted and there was an overriding of the mandible.

Examination also showed a very large area of inflammation, both internally and externally, and the patient complained of pain on swallowing and sore throat. There was considerable diphtheritic membrane present. There was no severe pain, but the temperature was 102 F.

Treatment consisted of extracting the teeth in the line of fracture. A large abscess had developed and an external incision was made to establish drainage. On the day following the temperature was about normal, but the pharynx had a diphtheroid appearance. Cultures from the throat were positive for diphtheria, and 15,000 units of antitoxion were given. The wound was irrigated with a 4 per cent solution of boric acid and a drain placed in it.

When the throat showed a negative culture and all symptoms had disappeared the teeth were wired. The patient made an uneventful recovery.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Captain J. S. TAYLOR, Medical Corps, United States Navy.
Lieutenant Commander G. B. TRIBLE, Medical Corps, United States Navy.
Lieutenant Commander M. E. HIGGINS, Medical Corps, United States Navy.
Lieutenant Commander R. B. HENRY, Medical Corps, United States Navy.
Lieutenant Commander W. A. BLOEDORN, Medical Corps, United States Navy.
Lieutenant Commander J. HARPER, Medical Corps, United States Navy.
Lieutenant (J. G.) DE W. G. RICHEY, Medical Corps, United States Naval Reserve Force.

GENERAL MEDICINE.

FLACK, M. **Simple tests of physical efficiency.** The Lancet, London. February 8. 1919.

The first endeavor in testing physical efficiency for aviation was to establish, at least temporarily and subject to revision, a standard. This was done by using as controls officers of the R. A. F. who had made good and been selected by their commanding officers for efficiency in flying and fighting. Others who had broken down physically were compared with them. Following the physiological tests, if candidates are not up to the mark, psychologists, neurologists, etc., are to be called in. The tests give the indications for this prolonged overhaul.

The technique of the tests is essential, as they must be applied in the same way on all occasions. They should be periodically reapplied to the men chosen as a preventive measure.

Response of pulse to exercise.—Candidate lifts his body weight through a definite height five times in 15 seconds. Note rate of increase in pulse and rate of return to normal as shown before test, seated. If the rate is unsteady count in periods of 5 seconds until a steady rate is obtained. Standing before a chair he places one foot on the seat and raises his body to the height of the chair five times in 15 seconds. The examiner regulates the speed of the movements by swinging his arm backward and forward. At the same time he counts the pulse. Then count the pulse in 5-second intervals and note acceleration and time required to return to normal. In a good subject the increase is 20 and the return time 15 to 25 seconds. If more than 30 seconds are required, cardio-vascular inefficiency is suggested.

Breath-holding test.—The candidate is directed to hold his breath without any preliminary deep breathing. A deep expiration is followed by the deepest possible inspiration, then pinch the nose and hold the breath as long as possible. At the end of the test ask the subject what sensations he experienced. Candidates liable to experience "oxygen want" will hold their breath but a short time and say they "had to give up" or felt that they "would burst," that the "blood all rushed to the head," or that "things became blurred."

As the power to hold one's breath is greatly diminished at high altitudes, the man who can hold it longest at ground level has the best chance, other things being equal, to endure diminution of air when up high. Forty successful pilots were tested in this way and their time of breath holding averaged 69 seconds, and none had unusual sensations. The vital capacity averaged 3,800 c. cm., with a minimum of 3,400 c. cm. in good fliers. Where the breath was held less than 45 seconds the answers recorded were not normal.

Combined test.—This is a breathing test applied after the exercise of the first test. In the unfit the breath-holding time comes down to 30 seconds. The fit can do almost as well as when no exercise is taken, but will not drop more than 20 seconds. The standard was fixed at 45 seconds, and those who did not attain it were subjects of suspicion and were graded as to the height they should reach in flying.

Vital capacity of pilots.—This is put at 3,400 c. cm. It is best measured by a modified gas meter. Among officers who had broken down many were found to have less than 3,400 c. cm. The respiration rate multiplied by the ventilation per minute and divided by the vital capacity gives a good indication of flying power. A figure below 30 is good; one above that is poor.

U-*tube test.*—Use a U-tube manometer filled with mercury, with the scale movable. This tests the tone of the abdominal walls. The subject is told to blow up the mercury column as high as he can, steadily. Record the mm. of Hg. raised. If he is suspected of not trying, repeat the test with the scale turned away. The readings should be about the same, and with encouragement he may surpass the original effort. He now repeats the effort while looking at the column. If he had not been trying, he will now exceed his first performance.

U-*tube manometer test.*—The candidate is to empty the lungs, fill up, blow the Hg. up to 40 mm., and hold it there as long as possible. The nose should be clipped. Note the pulse while the test is under way. It is counted during each 5 seconds that the height of the mercury is maintained. Starting at the fifth second, there is a slow, steady rise from 72 to 96 or 108 and stay up. A large rise.

e. g., 72 to 132 or 144, is unsatisfactory. In case of flying stress a characteristic response is a jump to a quick rate at fifth, tenth, or fifteenth second and then a quick drop to normal or below. Thus, if normal at start is 84, at fifth to tenth second it becomes 144 (sometimes impalpable) and at twentieth to twenty-fifth second drops to 72 or 60, such a subject should not be allowed to continue flying.

The average in this test from a number of selected officers was:

Expiratory force, 112 mm. Hg.
Mercury held, 52 seconds.

The tests should all be used in combination, not one by itself. Grading should be by the results obtained. The case is cited of an officer with 250 hours' flying experience picked out by the medical officer as being badly off color, and it was suggested that he be not allowed to fly. He went for a flight soon after, lost control of the machine—there was nothing wrong with it—crashed, and was killed. His tests just previous to flight were:

Breath holding, 35 seconds.
Expiratory force, 95 mm. Hg.
Sustaining 40 mm. Hg., 22 seconds.

After this tests were regularly made before flying, and if an officer did not come up to the standard he was not allowed to go up. He received directions for making himself fit and was told that if he could not work up to the standard in a fortnight he would be sent before a board and possibly be permanently disqualified.

Flack suggests that these tests might be used to advantage in measuring fatigue in industrial pursuits, for mine rescue teams, special motor drivers, etc., and when modified for age could be extended to school children, etc.

Table I gives a synopsis of results obtained from various sources:

Table I.

Subjects.	Number examined.	Breath held.	Vital capacity.	Supplemental air.	Expiratory force.	Sustaining 40 mm. Hg.
		Sec.	*C. cm.*	*C. cm.*	*Mm. Hg.*	*Sec.*
Fit instructors	22	[1] 67	4,062	1,620	112	52
Do	.....	[2] 46	3,300	1,000	80	43
Home defense pilots	24	72	3,940	1,496	119	50
British candidates	23	69	3,823	1,590	106	52
United States candidates	7	66	3,814	1,386	116.4	53.5
Delivery and test pilots	10	57	3,620	1,050	108	40
Pilots returned for rest	17	57	3,897	1,423	95	40
Pilots training for scouts	15	62	3,820	1,433	96	49
Pilots taken off flying through stress	27	49	3,480	1,134	74	25

[1] Average. [2] Minimum.

Table II.

No.	Age.	Breath held.	Vital capacity.	Supplemental air.	Expiratory force.	Sustaining 40 mm. Hg.	Remarks.
		Sec.	*C. cm.*	*C. cm.*	*Mm. Hg.*	*Sec.*	
1	17 11/12	55	4,200	1,300	80	42	Rejected.
2	17 11/12	84	4,300	1,800	60	25	Do.
3	18	53	3,700	1,700	55	32	Do.
4	18	66	3,800	1,650	130	30	Do.
5	17 11/12	53	2,800	1,000	60	25	Do.
6	18	48	3,600	1,650	70	27	Do.
7	17 11/12	44	3,400	1,600	120	35	Do.
8	18	85	2,750	900	100	28	Do.
9	17 11/12	71	2,400	1,050	100	50	Unfit by vital capacity standard.
10	19	50	3,100	1,000	60	20	Rejected.
11	19	63	.....	.....	60	40	Do.
12	19	42	3,800	.....	40	33	Do.
13	23	42	4,200	.....	60	25	Do.
14	18 1/12	64	.....	.....	60	33	Medical officer says fit, but does not like him. Referred by assessor.
15	22	61	4,100	.....	100	30	Assessor did not like the look of him.
16	23 2/12	63	4,300	1,800	60	35	Do.
17	21 6/12	55	4,100	1,700	80	37	History of migraine; referred by assessor.
18	18 2/12	48	3,800	1,700	100	35	Do.
Average	.....	58	3,650	1,450	77	32	

(J. S. T.)

HAUGWOUT, F. G. **Endemic malaria as a military problem.** Philippine Jour. Sc. November, 1918.

This is one of the most interesting papers that has recently come to the reviewer's table, the topic being one of vital importance and the handling of it most complete. The author's first contention is that in the Philippines, as in other tropical or subtropical countries, contrary to popular ideas on the subject, malaria plays the protagonist's rôle in undermining health and causing death, and is a consideration of prime importance from a military standpoint.

In the last decade the deaths in the Philippines from five diseases of serious import were as follows:

Smallpox	21,978
Beriberi	47,052
Cholera	52,804
Tuberculosis	192,841
Malaria	247,675

While campaigns against tuberculosis or beriberi find ready support and the appearance of cholera throws a community into a

state of panic, the disease which carries off a quarter of a million people in a decade performs its ravages so unostentatiously as to excite neither anxiety nor effort. A study of the causes of death in a single year (1916) shows that while cholera was responsible for 7,193, tuberculosis for 17,605, malaria occasioned 23,745 deaths. The author admits the necessity for caution in interpreting these figures, but holds that they are significant even if mistakes in diagnosis and incompleteness of reports vitiate their accuracy to some extent. A point to be remembered in estimating the decimating effect of malaria is its well-known proclivity to cause abortion. In this connection very suggestive figures are afforded by sanitary reports from Burma. Seven malarious districts are contrasted with six districts relatively free from malaria. In the former the children under 10 years of age per 100 married females of child-bearing age (15 to 40 years) range from 186 to 218, four of the Provinces giving a figure below 200. In the less malarious Provinces the number of children ranges from 223 to 245, four of the six Provinces having 240 as the minimum figure.

In forming a military unit out of men drawn to Manila and vicinity from various islands of the archipelago there is clearly a menace to that locality through possible carriers, since malaria-transmitting mosquitoes are plentiful there. Wherever these men are camped they become a menace to their camp mates. Should these men come into contact with the troops from other countries the latter are put in danger of acquiring new and malignant strains of parasites. In war intestinal parasites are incomparably easier to deal with by appropriate camp sanitation than is malaria, every water-filled shell hole and surface inequality in the trenches being an ideal breeding place for mosquitoes. The author quotes Gill as authority for the statement that the bulk of the sickness in the native army of India is directly or indirectly due to malaria. In the Punjab, one of the main recruiting sections, a large proportion of the men, recruits and old soldiers, have enlarged spleens. In India the recruiting staff found the blood positive in 178 out of 463 examinations made of Britishers, while the Indian and Egyptian Labor Corps yielded 192 positives out of 374 examinations. Among the British infections 37 per cent were malignant tertian, but among the Egyptians and Indians 79.7 per cent were malignant. Crescents were never found in the British cases, as nearly all were new infections.

Studies of the wounded at Salonika show that the deleterious effects of malarial infection are to be found in the surgical as well as in the medical wards. Even slight wounds provoke malarial recurrences and they are prone to follow chloroform or even ether anesthesia. Hemorrhagic phenomena are also common in malarious subjects—epistaxis, hematuria, ecchymotic patches, hemoptysis.

Conditions in Macedonia seem to prove that the customary development of malarial symptoms within a fortnight of infection does not always appear. Infected persons may continue in perfect health until, after a more or less definite period, some fortuitous circumstance causes the latent infection to become active and manifest. This variable and partial immunity may be natural or the result of quinine administration. Wounds, surgical operations, fatigue, overexposure to the sun, even typhoid inoculations, may excite the malarial explosion. Malarial parasites have been found in the blood of healthy persons—at least they felt well, except for headache and lassitude—that had no fever.

Malaria in troops has to be considered in regard to its active manifestations, then in regard to relapses, and lastly with reference to carriers. It is particularly with the latter that the author is concerned, and he gives methods of detection apart from any clinical data.

The ordinary blood film is not to be relied on wholly. It will lead to the detection of but a limited proportion of the carriers. The Ross thick-film method is to be preferred, but its results are also unsatisfactory. A differential leucocyte count has auxiliary value. Fever and parasites may be absent, but a high mononuclear count and an occasional transient high leucocyte count without fever should lead to careful observation of the subject.

The concentration and culture methods of Bass and Johns, modified by Row and the Thompsons, should be employed. Certain provocative methods have given good results—the use of drugs, biological products, and the quartz lamp. The object is to force the parasites out of the spleen, bone marrow, and elsewhere, and into the peripheral circulation, where they can be detected by the ordinary methods. Relapses are most common among those who have had a so-called spontaneous cure or who have had insufficient treatment. The importance of vigorous treatment at the start is very great. In time, of course, if there is no reinfection, the tendency is for malaria in the system to die out.

Parenthetically it is interesting to consider the numerical magnitude of an invasion of parasites necessary to produce fever. In benign tertian fever 100 adults per cubic millimeter of blood are necessary for a temperature of 99 F. and 300 or more adults are required to produce a fever of 100 F. or more. In malignant tertian fever 3,000 young rings per cubic millimeter are required for 99 F. and 5,000 to 30,000 young rings per cubic millimeter will give fever from 99° to 106 F. It has been claimed that in true malaria other than malignant tertian the microscope will invariably suffice for diagnosis provided the blood to be studied is taken at the time

of the paroxysm or at least this instrument will establish the mildness of the infection. This is not absolutely true. Patients may die of malaria who show no parasites in the circulating blood, and only a few in splenic smears. In cases dying after 3 to 5 days of treatment parasites were more frequent in the spleen and bone marrow when the quinine had been given orally, less frequently when the quinine was given hypodermically, least when given in three to four doses of 22.5 grains intravenously. Apparently the parasites in the spleen and marrow escape the full effects of quinine, so while those in the peripheral circulation are killed some still survive in spleen and marrow. When these multiply above a certain number they appear in the peripheral circulation and if numerous lead to febrile relapse.

Adrenalin has been tried by the author and others to dislodge parasites from the capillaries of the spleen and other internal organs with interesting results. Some investigators have tried to cause contraction of the spleen by adrenalin, ergot, pituitary extract, nitrate of strychnia, and berberin salts.

Latent infection has been disclosed by the injection of sterilized milk. In Albania injections of horse serum have been used with success, bringing about an increase of schizonts and gametocytes in tropical cases. Irradiation of the spleen with the quartz lamp has also been favorably reported on.

The author adverts to the theory that quinine fails because the parasites are not in the circulation and so, except in relapses, are beyond the reach of medication. In relapses, a heightened blood pressure has swept them from sinuses and capillaries into the active stream. The author has long held, and announced in 1914, the belief that transient hyperglycemia might cause relapses, and the view has been confirmed by his labors and those of others. Finally the Wassermann test may be utilized; but a positive reaction is not usual after the tenth day.

The examination of recruits may therefore be summed up thus:

First stage: Thick smears and leucocyte and differential count. Positives are sent to hospital. Negatives are passed on to the

Second stage: Provocative methods, as ergot, adrenalin pituitary extract, strychnine, berberine, quinine. Positives are sent to hospital; negatives pass to

Third stage: Injections of milk, horse serum, exposure to quartz lamp. Positives go to hospital. Negatives should be kept under medical surveillance for a definite period and watched for symptoms after fatigue or exposure.

Experiments in India in 1911 on cases of severe malarial infection with splenomegaly and temperature above 104° show that the X-ray can relieve splenic pain and engorgement and reduce fever—usually permanently. The usual sequel of anemia did not appear and no quinine was employed with this treatment. This treatment

has been used more recently by other investigators with partial or entire success.

Reports have been received from a German military hospital in Turkey, which show the failure of quinine as a prophylactic both in benign and subtertian fever. Those patients who had not previously taken quinine responded readily to the regular treatment, while those who had taken it developed the parasites when the drug was discontinued or else showed no diminution in parasites during the therapeutic administration. A certain concentration of quinine is deemed necessary in order to accomplish any useful purpose and they prefer the intermittent use of quinine.

In conclusion the author reiterates the menace of associating infected troops or those from malarial areas with healthy nonmalarial soldiers as the work of military training involves the sort of strain best calculated to cause relapses and render these cases dangerous carriers. These carriers must be sought for with great care by the methods described. If they are rebellious to treatment they should be honorably discharged from the service. (J. S. T.)

SOLLMAN, T. **Anthelmintics: Their efficiency as tested on earthworms.** Jour. Pharmacol. and Exper. Therap. October, 1918.

The war has created a shortage in the supply of the usual anthelmintics, which makes it advisable to utilize the available drugs to the best advantage. Trustworthy and convenient tests of efficiency will therefore be especially useful. Several methods of bio-assay have indeed been employed.

The direct therapeutic test on man is not always feasible; it is not altogether reliable, because conditions are not easily controlled in human patients; it therefore requires a large statistical material.

Earthworms resemble intestinal worms in their reactions toward anthelmintics, and have been used qualitatively for investigating the nature of the action of anthelmintics; for instance, by Straub and by Trendelenburg. Yagi proposed the liquefaction of malefern as a specific quantitative test for this drug.

The general similarity of the reactions of earthworms suggested the hope that simple toxicity experiments would furnish valuable data, with certain limitations. This hope has been realized by the results of the following investigations. They show that all anthelmintics are toxic to earthworms. A substance that is not toxic to these worms is therefore scarcely worth further trial, and a substance that is toxic to earthworms is worthy of consideration as an anthelmintic.

It will, of course, require very extensive investigation before its value as a clinical anthelmintic is established, for that involves also

other considerations, such as the specific efficiency for human parasites in the intestinal tract; and the absence of excessive toxicity or irritation to the patient.

It is not possible, therefore, to deduce the clinical availability or even the clinical efficiency from the order of toxicity to earthworms, except in the sense that drugs that are not toxic to earthworms in fairly high dilutions are probably not anthelmintics, whilst those that are effective on earthworms will likely be useful clinically, provided that the conditions of absorption, irritation, and toxicity are favorable. This is illustrated by the confirmation of the time-honored pumpkin-seed treatment.

The worms (species not determined) are kept in the laboratory in small crocks, partly filled with leaf mold. When experiments are to be made the crock is inverted and the worms, which are mostly at the bottom of the mold, are picked up in mass and dropped in a conical urine glass filled with tap-water and placed in urine glasses, 100 cc. in each, and five of the worms are introduced. The size of the worms makes remarkably little difference, but if they differ widely it is advisable to have several sizes in each glass. When only five worms are put into 100 cc. of water they keep alive and normally active for more than a week. Much larger quantities, however, become asphyxiated.

In the experimental glasses the activity of the worm is examined for a few minutes. Irritants generally cause more or less agitation, increased movement, often "whipping." They are again examined after one or two hours, and again on the next day.

The author has used a large number of substances in experimenting on the earthworm and shows the fatal concentration and time necessary for each drug used.

He calls particular attention to the following:

1. The high toxicity of mustard oil, explaining the anthelmintic use of the closely related onion and garlic.

2. The high toxicity of copper sulphate; suggests its use in enemas against oxyuris.

3. The anthelmintics that are most efficient clinically also stand high in their toxicity for earthworms.

4. Anthelmintics of doubtful clinical efficiency stand low in their toxicity for earthworms.

5. Substances that are practically nontoxic to earthworms are not used as anthelmintics clinically.

The following is a general summary of the results obtained and shows very interesting conclusions:

All clinical anthelmintics are markedly toxic to earthworms. This simple test may therefore be used for determining whether a

given substance has any anthelmintic properties. It may also be used to determine the relative activity of different samples of a given drug. It could not be used to compare the clinical value of different anthelmintics, since this often involved factors other than simple vermicidal efficiency; such, for instance, as absorption, local and general toxicity, etc. For instance, the highest vermicidal efficiency is possessed by substitutes that are not clinically available for this purpose, viz, mercuric chloride, cupric sulphate, and mustard oil.

Aspidium, chenopodium, pelletierin, thymol, betanaphthol, and chloroform are highly effective. So is santonin in the presence of an appropriate solvent (bile salts and sodium bicarbonate, simulating the intestinal fluid).

Somewhat less effective, but still quite toxic, are kamala, kousso, and granatum. Spigelium is rather feeble.

Fresh (germinable) pumpkin seeds and squash seeds are highly efficient, the active principle being soluble in water and destroyed by boiling. In view of their cheapness, availability, and presumably low toxicity to man, renewed clinical interest in these is indicated.

Spices and sharp substances, including mustard, pepper, onions, and cantharidin are quite toxic. Their use in the preparatory treatment is therefore well justified (except, of course, cantharidin). Indeed, pepper potentiates or synergizes the effects of the more active anthelmintics.

Mixtures of the active anthelmintics give simple summation of efficiency. This may be useful for decreasing their toxic effects on the hosts. It would need to be determined by further animal experiments and clinical trial.

Oleoresin of aspidium appears to be quite stable, although the dry rhizone deteriorates. Different samples agree fairly in activity. The deposit that occurs in some oleoresins appears to have little, if any, influence on the activity.

Different samples of pelletierin tannate are also of fairly uniform activity. The "pelletierine tanret" is a secret preparation without any advantage. Most substances that are toxic to earthworms produce a primary irritation or agitation that results in the withdrawal of the worm from the neighborhood of the poison. This is observed with santonin, but is no more marked with this than with the other anthelmintics.

By virtue of this effect, anthelmintics doubtless often "expel" the parasites when the concentration does not rise sufficiently high to kill the worms. (W. E. B.)

ROSENBLOOM, J. **Newer methods in the treatment of bichloride poisoning.** Am. Jour. Med. Sc. March, 1919.

After review of the literature and discussion of the principles involved the author gives the following summary of treatment:

"1. Administer the whites of three eggs beaten up in a quart of milk and then empty the stomach by siphonage.

"2. Give 300 cc. of fresh calcium sulphide solution, containing 1 grain to 1 ounce of water by mouth.

"3. Wash out the stomach with fresh calcium sulphide solution, 1 grain to 1 ounce of water.

"4. Administer in powder or tablet 0.36 gram of sodium phosphite and 0.24 gram of sodium acetate. If this is not available, give the following:

Sodium hypophosphite	1. gram
Water	10. mils
Hydrogen peroxide	5. mils

"Use ten times as much of the hypophosphite as poison taken. Give a copious lavage of stomach with the above antidote diluted twenty times. Give the above undiluted antidote every eight hours for two days.

"5. Pour through the stomach tube after the above lavage a solution of 3 ounces of sodium sulphate and 6 ounces of water containing 5 grains of calcium sulphide. Let these solutions remain in the stomach.

"6. Give intravenously after withdrawing 600 cc. of blood, 800 cc. of Fischer's solution or of bicarbonate-glucose solution.

"7. Wash out the stomach morning and night, giving by the mouth after each washing 5 grains calcium sulphide dissolved in 3 ounces of water. Continue this lavage until the stomach washings are free from mercury when tested by Elliott's method and until the urine is free from mercury.

"8. Give high colon irrigations of warm water morning and night, using 8 gallons of the water for each treatment.

"9. Give a hot pack twice daily.

"10. Give 8 ounces of milk every second hour.

"11. Give every second hour 8 ounces of the following solution, by mouth, alternating with the milk:

Potassium bitartrate	dr. j
Sodium citrate	dr. j
Sucrose	dr. j
Lactose	dr. iv
Lemon juice	oz. j
Boiled water	oz. xvj

"12. Force the patient to drink large quantities of the alkaline waters, such as Celestin Vichy or Kalak water.

"13. Give a low fat and low protein or high carbohydrate diet for four weeks. Avoid salt in food, as it increases the absorption of the mercury.

"14. Give by continuous proctoclysis a solution containing 1 dram potassium acetate, 4 drams glucose, and 3 drams sodium bicarbonate to the pint.

"15. Keep the urine alkaline to methyl red.

"16. Continue rest of treatment until recovery, usually a period of three weeks." (J. S. T.)

HIRST, J. C. **Corpeus luteum to control nausea and vomiting of pregnancy.** Am. Jour. Obst. March, 1919.

The report covers a series of 111 cases in the author's private practice. Of this number, 99, or 89.2 per cent, were favorably influenced by the intramuscular injection of corpus luteum extract, the relief being often marked and prompt. The employment of this agent is based on the fact that during the period of sexual activity every woman is constantly absorbing corpus luteum. No sooner is the corpus luteum of one menstruation disposed of than another takes its place. With the onset of pregnancy this absorption ceases. The nausea of pregnancy beginning during the period of nonabsorption disappears about the time that the corpus luteum begins to decrease in size.

The employment of the remedy by hypodermic prevents the alteration incident to digestion and guarantees absorption in spite of gastric disturbance. The dose in mild cases is 1 mil every other day for five or six times. In severer cases 1 mil is given daily up to 12 or 15 doses. In pernicious vomiting 1 mil may be given twice daily, the patient being confined to bed.

The site of the injection is the deltoid muscle after cleansing of the skin with tincture of green soap and alcohol. A glass syringe is used. It and the needle should be boiled and allowed to cool. Alcohol is not available to sterilize the apparatus when animal extracts are to be administered. The injection should be deep into the muscle. Follow by gentle massage. The extract used has been derived from various animals, as the cow, sheep, and sow. The latter source is the best, but no very marked difference was noted in the effects. Human corpus luteum, if easily procurable, would give the best results.

The author reports many hundred injections without abscess formation, though there may be an area of redness and slight tenderness. Analysis of the 111 cases show 65 entirely relieved and 34 so much benefited that after 12 doses the patients professed themselves

so comfortable that further treatment was not desired. In 8 cases there was no beneficial effect of any kind and in 4 the nausea was alarmingly increased. Each of these four women had a marked goitre, and such a complication is considered a distinct contra-indication to the treatment. Of the 111 patients, 4 aborted and 2 had distinct anaphylactic reaction. Of the total number, 11 were cases of pernicious vomiting, of which 6 were completely relieved by the treatment and 5 gave no response. In all the cases successfully treated corpus luteum was the only remedy employed and may be legitimately credited with the results. In favorable cases relief is usually apparent after the fourth or fifth dose. If no benefit is noted after 12 injections, it is useless to continue them.

Cases of failure: (1) Large goitre present. (2) Dysuria at tenth week. Retroversion. Replacement relieved all symptoms. (3) Nothing noteworthy. (4) Nothing noteworthy. (5) Anaphylaxis. (6) Large goitre. (7) Vomiting continued after emptying of the uterus. Had two tapeworms. (8) Large goitre with exophthalmus. (9) Large goitre with exophthalmus. (10) Previous transperitoneal hysterotomy. (11) Adhesions from previous gallstone operation. (12) Nothing noteworthy.

The writer closes with the statement: "I would not willingly be without this means of treating a condition which resists most other forms of treatment—a means which to me has given such satisfactory results." (J. S. T.)

SURGERY.

DEAVER, J. B. **Post-operative parotitis.** Ann. Surg. February, 1919.

Parotitis secondary to surgical intervention has come into notice mainly in connection with the increase of abdominal operations. In 1886 Paget reported 101 cases of secondary parotitis, of which 50 per cent followed operations on the upper abdomen and 50 per cent followed operations on female generative organs.

Deaver holds that the organ operated on is not the chief factor in causing secondary parotitis. He considers this complication due to post-operative wound infection, local conditions, or some peculiarity of the pathology encountered. A physiological explanation might be found in the absence of mucin from the salivary secretions of the parotoid. In other glands this constituent of the secretions is supposed to have decided bactericidal power. But physiologists are not agreed on this point.

The three types of secondary parotitis are (1) metastatic, occurring only in pyemic conditions; (2) due to ascending infection by

way of the excretory ducts; (3) traumatic, as from forcible manipulation of the lower jaw in connection with anesthetization.

The trauma incident to anesthetization is common and can be readily appreciated. Infection by way of the lymphatics or blood stream is due to disease of neighboring parts. Infection through Stenson's duct is easily understood if we remember the many bacteria harbored by the mouth.

In recent times the majority of cases of secondary parotitis after operation occurred in connection with surgical interference with appendix, peritoneum, perforating gastric ulcer, etc. The latter is the commonest cause next to ovarian cyst. This may be due to absorption of intestinal contents where infection has resided for some time and become active; where secondary infection has taken place owing to defective surgical technique. The trauma already referred to may determine the parotid gland as the point of least resistance in such cases.

Cases which develop within a couple of days of the operation may have been induced by the post-operative dryness of the mouth, but usually the parotitis develops between the third and seventh day after operation. Withdrawal of food by the mouth may have a bearing on the matter, since parotitis has been reported in connection with gastric cases treated by starvation instead of operation.

Deaver disclaims having made an exhaustive discussion of the subject, having written mainly to invite attention to and stimulate study of the phenomenon. (J. S. T.)

BECK, E. G. **The Empyema Problem.** Surg. Gynec. and Obst. April, 1919.

Previous to recent influenza epidemics empyema was less common than lung abscess as a complication of pneumonia. The type of empyema then occurring often only developed and sometimes was not diagnosed until the patient had apparently recovered. Reports from Army camps suggest the wisdom of adopting a definite uniform procedure where a great many cases of the same type occur.

The two essentials for diagnosing influenza empyema are (1) puncture and (2) stereorentgenograms. The differential diagnosis involves excluding unresolved pneumonia, broncho-pneumonia fluid in pleural cavity, lung abscess, pneumothorax, advanced pulmonary tuberculosis.

The roentgenogram should precede puncture in order to determine the best site for the latter. Indiscriminate probatory puncture is dangerous. It should not be made more than three times without returning to other methods of investigation. The character of the pus obtained is of great diagnostic value.

Nonoperative treatment of empyema consists in an attempt to sterilize the fluid without withdrawing it, repeated punctures and partial withdrawal of small quantities of fluid, vaccine therapy.

The operative methods should not be resorted to too early. When the fluid is still serous, when the patient is still suffering from an acutely inflamed lung, the operation, however well conducted, is in itself a real strain on the patient's reduced vitality and there is danger from pneumothorax; furthermore, the wound surfaces are liable to serious secondary infection. Distressing pressure symptoms may be relieved early by withdrawing small quantities of fluid by cannula, but an attempt at cure should be deferred.

The simplest operative interference is best and, therefore, the method of McKenna, of Chicago, has much to recommend it. It consists in perforating the thoracic wall by trocar and cannula and introducing through the latter a small catheter. Withdraw the cannula (which should be just large enough for the catheter) and leave in the tube. When the pus appears aspirate with a glass syringe. If the pus is too thick to flow readily run in a little dilute neutral chlorinated soda. (Dakin's solution.)

For five years the author has used at the North Chicago Hospital the counterdrainage method of Dohrmann. This consists of making a posterior resection of 1 inch of the eighth or ninth rib under local anesthesia. The pleura is exposed and incised for half an inch. Before pus can escape, block the aperture with the index finger and introduce beside it a curved artery clamp directed forward and downward to the lowest point of the empyema cavity. The tip of the instrument is pressed, between two ribs, against the chest wall, raising the skin and indicating the site of the counterincision, which is made by an assistant. From front to back carry through a No. 12 to 14 rubber catheter. A larger rubber tube is slipped over the catheter introduced into the resection opening and sewed to the skin, making it air-tight. Fit a glass tube to the rubber one to drain the pus by suction or gravity into a flask. In four or five days remove the rubber tube, leaving the catheter in place for a fortnight. The next step is to draw a tape one-fourth inch wide through the cavity by fastening one end by a silk thread to the catheter and slowly pulling out the latter. The tape now serves as a drain. It is to be soaked in 20 per cent argyrol.

Beck is strongly in favor of a posterior resection, as then both the recumbent and sitting positions permit better drainage. Care should be taken not to carry the large tube too far. The preliminary incision over the rib should be curved, not straight.

The next consideration is the promotion of disinfection and closure. The flushing of empyema cavities was given up 15 years ago but has been revived by the good results from the use of the Carrel-Dakin

methods. Certainly the solvent action on fibrinous adhesions of Dakin's solution is a strong point in its favor. As it has been customary in the past to expect closure of the cavity in 19 out of 20 cases, the irrigation plan must yield that proportion of closures or be given up in favor of other methods.

Cases which do not yield to flushing should be injected with bismuth paste. Bismuth paste has great diagnostic value, since it gives a clear and accurate picture of the shape and extent of the cavity and its ultimate pockets. Exploration with a catheter does not do this.

The pus should be studied by culturing and, if necessary, by injecting it into guinea pigs. While the tubercle bacillus is rarely found in pus from empyema cavities, it has been Beck's experience during the last 10 years that following injection of bismuth paste this organism, though slightly modified in appearance and staining qualities, would promptly appear in the discharge, to diminish in numbers and finally disappear in the course of a few weeks. The author has only a theory to explain the phenomenon. He supposes that the paste, by stimulating leucocytosis of the walls of the cavity, leads to the extrusion of tubercle bacilli living in them. Beck holds strongly to the therapeutic value of bismuth paste, not only from 150 cases treated by him but from data collected from various sources. In the author's 150 cases 80 per cent were cured by the bismuth treatment alone.

The paste must be prepared and used judiciously. It is a mixture of one part bismuth subnitrate and 10 parts vaseline, with a little white wax added (2 ounces to 10 pounds). The vaseline requires sterilization for 20 minutes in an autoclave, and all containers must be sterile and perfectly dry. Before pouring one part of heated, fluid vaseline on the bismuth the latter must be smooth and free from lumps. The stiff paste is stirred for half an hour until the mass is smooth, bright yellow, homogeneous. Liquified white wax is added to the nine parts of vaseline, which is then added to the other portion.

The bismuth paste is not to be permanently retained. If it does not flow away little by little in the course of two to five days, it is to be gently drawn out by catheter and suction syringe. With the patient in the recumbent position and without previous irrigation of the cavity the paste is injected cautiously by means of a 2-ounce syringe, permitting the air to escape. Several full syringes may be required to fill the cavity. No plugging of the opening is attempted. Merely apply a simple sterile dressing and a snug binder. Most of the paste will escape in 24 hours.

The filling of the cavity may have to be repeated during the course of several months. If the cavity have a greater capacity than 200 grams of paste, treatment is not so likely to be effective.

When closing is persistently delayed the pleural space must be obliterated, and the author prefers his skin-sliding method to the procedures of Estlander and others.

Muscles, ribs, and pleura over the dead space are removed down to the retracted lung surface and a carefully planned skin flap is utilized as a starting point for regeneration of skin along the edges until the whole denuded surface is covered by epithelial growth. The favorite flap is made by a Y-shaped incision yielding three sections.

Before making the skin incision a catheter is introduced into the sinus as a guide. Fat and muscle are left in the flap until the moment of attachment for nutritional purposes. Three to five ribs usually need resection and the greater part of the pectorals must be divided or dissected to give full exposure of the lung. The pleura is now incised along the catheter, going as high as the second rib. Parietal pleura is now dissected away up to the second rib level but the visceral pleura is not disturbed. The flap is now freed of muscle and fat. Now carry the tip of the skin flap by an artery forceps to the deepest part of the cavity and hold there by rather tight gauze packing, which may be left in place 24 hours. A further measure for insuring coaptation of the raw undersurface of the flap to the parietal pleura is to pass a stitch through the base of the skin flaps and the tissues over the second or third rib. The whole operation takes from 1 hour to 1 hour and 40 minutes.

The packing is removed in 48 hours, keeping a spatula pressed upon the flap to prevent detachment as the gauze is being abstracted. This is sometimes a painful step, calling for gas anesthesia, hence the gauze for the second dressing consists of strips soaked in vaseline. Within a week begin the application of adhesive straps for skin regeneration. The strips are cut one-half to three-fourths inch wide and fastened so as to cover margin of skin and granulating surface. At the next dressing use gauze only, at the third reapply zinc oxide plaster strips, thereafter alternating the two at 48-hour intervals. (J. S. T.)

GIBSON, C. L. **Skin disinfection by picric acid.** Ann. Surg. February, 1919.

In 1910 the author advocated the use of skin disinfection by tincture of iodine, but occasionally in his surgical practice had cases in which iodine produced very disagreeable caustic effects.

While stationed at a British casualty clearing station in 1917 he became familiar with the use of 5 per cent picric-acid solution in alcohol, which was as efficient as iodine without the occasional irritation due to the latter. A distinct advantage of picric acid is that its action is not interfered with by previous scrubbing of the operation

area with soap and water. The only precaution necessary is to permit the treated surface to dry thoroughly before operation.

The author has now employed the method in 100 consecutive operations at the New York Hospital with entire satisfaction. (J. S. T.)

GILL, A. B. **Reconstructive surgery of the hand and forearm.** Ann. Surg January, 1918.

The author, in discussing the above subject, emphasizes the great importance of this branch of orthopedics in connection with industrial surgery and lays stress upon the necessity of thoughtful planning and careful execution in undertaking any work of this character. Much can be accomplished toward restoring a crippled member to usefulness, even though a long period has elapsed following injury, but patience in conducting the aftertreatment (massage, electricity, hydrotherapy, active and passive movements, and the use of special splints) is essential to success, and a slight infection may destroy the finest work. Eleven cases are described and discussed, and the procedure, in general, has been to expose and free from adhesions the involved nerves and tendons, lengthening and suturing these when necessary, and to then surround the tendons with transplants of fat from the thigh, to guard against future adhesions. The author's opinion is "that in any operation, primary or secondary, which requires a dissection of the structures of the forearm measures should be employed to prevent adhesions of these structures to one another and to the skin. The simplest and probably the best means of prevention is the free fat transplant." Most of the injuries described were the result of wounds from knives, steel shavings. etc., and no case of this character should be considered hopeless, as marked improvement can usually be brought about, even in the most unpromising. (R. B. H.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

SPOONER, L. H. **The Bacteriology of Tuberculous Kidneys.** Jour. Med. Research, 1918, 39, p. 59.

For years popular belief has held that the septic manifestations of tuberculosis were due to a mixed infection with pyogenic organisms; that cavities containing caseous and purulent material resulted from the action of such organisms. The positive proof of the existence or nonexistence of mixed infection in tuberculous processes can be obtained only by bacteriological examination of such lesions. Inasmuch as the lungs lend themselves very poorly to investigation, because

all such procedures must be conducted after death, and since the abscess cavities, in most instances, communicate with the upper and outer respiratory passages, which are normally the habitat of a large bacteriological flora, Spooner has elected the kidney as the most favorable organ for these researches. Ten kidneys, all of which were removed at operation, have been investigated. Cultures were made, under aseptic precautions, from the contents of the renal pelves, cavities, and cysts, from the tissue of the cavity walls and isolated tuberculous lesions. The cultures were inoculated, aerobically, on plain nutrient agar, Loeffler's blood serum and Dorset's egg medium, and, anaerobically, on dextrose bouillon in fermentation tubes, with and without sterile animal tissue, and sealed dextrose agar. The tubercle bacillus was cultivated in 50 per cent of cases. Dorset's egg medium was the most satisfactory for primary growth, while 5 per cent glycerin agar was best for the secondary cultivation of the organism. Growth was obtained in from two to five weeks. In no instance was there any evidence, in the kidney or ureteral urine, of mixed infection. Twenty-three cultures were made from four kidneys, three with nephrolithiasis and one with pyelonephrosis. Of these, streptococcus was isolated in one and *B. coli communis* in the other three. The author concludes from this that nontuberculous infection of the kidney is produced by one or more organisms which are always isolated from the renal tissue or ureteral urine on simple culture media. He goes on to say that the clinical diagnosis of renal tuberculosis is suggested by the presence of acid-fast bacilli in the urine. If a pus containing urine, obtained from the ureter, shows no growth upon simple culture media after 48 hours' incubation, another and very important link is added to the chain of diagnosis of tuberculosis of the kidney. (DE W. G. R.)

FAIRER, J. A. The Hermann-Perutz reaction in syphilis. Jour. Roy. Nav. Med. Service. London. October, 1918.

This is a chemical reaction, and the following is a brief summary of the technique:

To 0.5 mil of blood serum in a small test tube, which has been inactivated at 60 C for 10 minutes, add 0.5 mil of an alcoholic sodium glycocholate and cholesterin solution. Shake and keep in water bath at 21 C for 14 hours. A positive reaction gives a white deposit and if negative the solution remains clear. A positive and a negative control are used to check the reaction.

The sodium glycocholate solution is prepared by mixing equal parts of the following:

(*a*) A fresh 2 per cent aqueous solution of sodium glycocholate.

(*b*) Glycocholate of soda ..... 2.0 gms.
Cholesterin ..... .4 gm.
Alcohol (95 per cent) ..... 100.0 mils

The author performed 500 tests and summarized his results as follows:

The result of this investigation has been to confirm Jensen and Feilberg's statement that "the Hermann-Perutz test never gives a positive with a negative-to-Wassermann serum," for in 500 tests performed no such case was recorded.

The test can be performed with the greatest ease and simplicity on board ship. The apparatus can be constructed on board ship and is completed with one dozen agglutination tubes.

It requires but three drugs—glycocholate of soda, cholesterin, and alcohol 95 per cent; ½ ounce of glycocholate of soda, ¼ ounce of cholesterin, and ½ liter of 95 per cent alcohol will be sufficient for more than 500 tests.

The result of this test can be obtained in 14 hours. In contrast to this, the time elapsing from the withdrawal of the patient's serum to the receipt of the communication of the Wassermann test is frequently from 10 to 12 days; hence a delay of 9 to 11 days is obviated.

It is acknowledged that early commencement of treatment gives the greatest chance of successful treatment.

It follows that this test would be of the greatest value on board ship, and that when a positive result is obtained treatment could be immediately commenced without waiting for the confirmation of the Wassermann test.

Information is requested as to whether any experiments have been made with this reaction in our laboratories; and if so, the results obtained. (J. H.)

NICOLLE, C., AND LEBAILLY, C. **Some experiments with the virus of grippe.** Comptes Rendus des séances de L'Academie des Sciences, Paris, No. 17, October 21, 1918.

The extension of the present epidemic of grippe to Tunis has enabled us to conduct the following experiments:

Experiment 1.—The patient became ill with grippe after three members of his family had been infected. On September 1 (the third day of the disease) we inoculated with his sputum, which was albuminous and contained many varieties of bacteria; first, without filtration, a "bonnet chinois" monkey, under the conjunctivæ of the two lower lids and by nasal instillation; secondly, after filtration two voluntary subjects: A subcutaneously, B intravenously.

In order to carry out the filtration the sputum was mixed with 10 times its volume of normal salt solution and agitated for five minutes in a flask containing glass beads in order to obtain a homogeneous mixture. It was then centrifuged at a slow speed for one minute and a half. The supernatant fluid was then decanted and filtered through a Chamberland filter L 2, under pressure of 30 to 40 cm. of mercury.

The "bonnet chinois" monkey (whole virus) became ill on the sixth day; he did not eat and appeared depressed; the temperature rose to 40 Centigrade and remained elevated for three days; on the following days there was loss of weight and general malaise.

A (filtered virus subcutaneously) became ill on the same day as the monkey with headache, stiffness of the back and limbs, and conjunctival injection. The morning temperatures were: September 8, 39 C, 9 and 10, 38°, 38.5°. The evening temperatures were not taken. The course of the disease manifested the classical characteristics of grippe; on September 12, recovery was complete.

B (filtered virus intravenously) was not affected.

The impermeability of the filter was demonstrated by negative cultures of the filtrate.

An individual (C) inoculated subcutaneously with 3 cc. of blood taken from the "bonnet chinois" on the first day of the fever was not affected.

Experiment 2.—Patient 2 presented the characteristic symptoms of grippe. On the second day of the disease, September 3, 3 cc. of his blood after defibration was injected intravenously into (D) without results.

Experiment 3.—On September 15, experiment 1 was repeated with the bronchial expectoration of patient 3 (family epidemic), on the third day of the disease.

A monkey (Macaccus cynomolgus) having received the whole virus under the conjunctivæ and on the nasal mucous membrane presented on September 19 (fifth day) an elevation of temperature above 40 C. The fever persisted for three days, reaching 41.4 C., and then fell to normal. The general symptoms were not marked.

A person (E) having been given the filtered virus under the skin became ill on September 20 (sixth day). We did not see her again until September 23; the symptoms were those of a mild grippe; the morning temperature was 37.5 C.; on the day following, 37.3 C. Complete recovery followed a convalescence of eight days.

Experiment 4.—With the sputum of patient 4 in the acute stage of grippe the experiment of filtration was repeated.

The inoculation of the filtrate intravenously into a subject (F) did not cause any symptoms.

NOTE.—One must not consider that A and E contracted grippe through epidemic contamination. They lived in separate houses: A with a companion,

E with three; none of them had been infected at the end of the febrile period. Moreover, A and E inoculated in the same manner (subcutaneous injection of filtrate) were the only persons infected in our experiments (B, C, D, and F inoculated differently remained well); lastly the monkeys inoculated at the same time as A and E became ill on the same day as the subjects.

Conclusions.—1. The bronchial expectoration of individuals suffering from grippe, collected in the acute period, is virulent.

2. The monkeys ("bonnet chinois," M. cynomolgus) are susceptible to infection by subconjunctival and nasal inoculation with the virus.

3. The causative agent of grippe is a filterable virus. The inoculation of the filtrate has actually produced the disease in two persons when injected subcutaneously; intravenous inoculation appears, on the contrary, to be incapable of producing infection (two failures in two cases).

4. It is possible that the virus of grippe does not occur in the blood of the infected individual. The blood of a monkey having grippe failed to infect a man when inoculated subcutaneously; the negative result of the injection of the blood of patient 2 is not, on the contrary, conclusive, the intravenous inoculation apparently not being efficacious in the transmission of the virus of grippe. (M. E. H.)

EYE, EAR, NOSE AND THROAT.

GATEWOOD, L. **Technique of perineural anesthesia for radical surgery of the maxillary sinus.** Laryngoscope, 1918, XXVIII.

The infra-orbital and the posterior superior dental nerves are injected, with 2 per cent novocaine solution. To inject the infra-orbital nerve insert the needle in the buccal fold, distal to the apex of the canine teeth, passing the needle upward and inward for three-fifths of an inch, infiltrating the tissues slowly. This is the region of the infra-orbital canal. Here the remainder of the solution is injected and the tissues gently massaged to hasten absorption.

In injecting the posterior superior dental nerve the condyle of the palate process of the maxilla is used as a guide. The needle is inserted from the buccal fold corresponding to the disto-buccal route of the second last tooth from the condyle, and passed upward, backward, and slightly inward at an angle of about 45° to the occlusal plane of the teeth. Tissues are infiltrated slowly as the needle is inserted, and the remainder deposited after the needle has disappeared for four-fifths of an inch. The author reports several advantages of this method over conductive anesthesia. (G. B. T.)

McLEAN, W. **Experimental studies in intraocular pressure and tonometry.** Arch. Ophth., Vol. XLVIII, No. 1.

After reviewing the experiments of the early observers of intraocular pressure, commencing with C. Weber in 1850 and the reference of McKenzie, who in 1830 noted that hardness of the eyeball occurred in glaucoma, the author discusses the two types of instruments devised—one the impression type, which records the amount of indentation by a known pressure, and the applanation type, which records the amount of flattening of the eyeball to a known pressure.

In the author's tonometer the calibrations on the scale are in millimeters of mercury as determined by actual manometer readings. In his experiments it is noted that the tonometer gave a marked difference in intraocular pressure under local and immediately after deep general anesthesia. (G. B. T.)

NOTES AND COMMENTS.

The Journal of the Medical Society of New Jersey (February, 1919) reports an interesting decision in the case of State *v.* Lankford (Del.; 102 Atl. R., 63). The Court of General Session of Delaware holds that a husband may commit an assault and battery on his wife, notwithstanding the marriage relation. The suit in question related to the transmission from husband to wife of a loathsome disease, of whose existence the husband was well aware, and the which he concealed. In the charge to the jury it was pointed out that the guilt of inflicting upon the wife physical abuse and injury resulting in great bodily harm turned on the defendant's knowledge of his condition and concealment of the same. The jury brought in a verdict of guilty.

The United States Interdepartmental Social Hygiene Board has begun the expenditure of the sum of $100,000 appropriated by Congress for scientific research connected with the prevention and cure of venereal disease by assigning certain sums to educational institutions undertaking work of this character and able to meet the board's requirements.

The sum of $7,200 has been allotted to the Medical School of Leland Stanford Junior University and $6,000 to the College of Medicine and Surgery, University of Michigan.

For a statement of the conditions entitling a laboratory or college to financial support from this source, application should be made to the executive secretary, Dr. T. A. Storey, 1800 Virginia Avenue NW., Washington, D. C.

It may not be generally known to those readers of the BULLETIN who in the past found recreation and relief from the daily round of duties by attending a performance participated in by the late Sir Charles Wyndham, brilliant English comedian, that before going on the stage he was for eight years a successful surgeon. He was a son of a Dr. Culverwell, a London practitioner. Charles hankered for the stage from early boyhood but studied medicine out of deference to his father's wishes, and passed the examinations for membership in the Royal College of Surgeons in 1857. At the outbreak of the Civil War he came to America and served as a surgeon

in the Federal Army, being present at the battles of Chancellorsville, Fredericksburg, and Gettysburg. At the conclusion of the war he returned to England and went upon the stage, and in the short period of four years had secured such a position in the theatrical profession that he was able to make a second visit to America and delight large and enthusiastic audiences by playing *Surface* in the School for Scandal. He was knighted by King Edward VII in 1902. Sir Charles Wyndham died January 12, 1919, at the age of 82.

The British Medical Journal, January 18, 1919, contained a brief but appreciative synopsis of the work of the Harvard Surgical Unit, which functioned abroad from July 16, 1915, to January 16, 1919. During this period 175,000 sick and wounded British soldiers received treatment by the unit.

The Harvard Surgical Unit, located at Camiers, France, was under the leadership of Dr. E. H. Nichols, who was succeeded by Dr. David Cheever, Dr. W. E. Faulkner, Dr. Hugh Cabot, and Dr. D. F. Jones.

Up to the end of 1916 the unit had the status of a neutral medical unit under the terms of the Geneva Convention. After that, on the request of the authorities of Harvard University, it was carried on as a belligerent medical unit. Upon the entry of the United States into the war the status was again altered.

The bed capacity, as officially stated, was 2,370, but as many as 4,000 patients were sometimes under treatment at Camiers at one time.

According to the Social Hygiene Bulletin (New York), Volume VI, No. 3, by February 1, 1919, "fully 24,000 retail druggists, approximately 50 per cent of the total number in this country, had pledged themselves not to sell nostrums and quack remedies for the treatment of venereal diseases, and had signed the card furnished by the Public Health Service indicating such an agreement."

The first session of the School of Hygiene and Public Health of Johns Hopkins University began October 1, 1918. This school offers classes of instruction leading to the degrees of Doctor of Public Health, Doctor of Science in Hygiene, and Bachelor of Science in Hygiene. (It is not a matter of prime importance but, except the first mentioned, the titles seem clumsy and to contain an antithesis. However, it is difficult to suggest good substitutes and Master of

Hygiene and Bachelor of Hygiene may be no better than those adopted.)

There are definite requirements for admission of candidates for these degrees and for the special courses. A number of public and special lectures are provided for the scholastic year. Among the speakers scheduled for 1919 are Rear Admiral E. R. Stitt, Medical Corps, United States Navy, and Captain J. C. Pryor, Medical Corps, United States Navy.

The right to temporarily exclude unvaccinated pupils from school while smallpox is unduly prevalent in a community is upheld in a recent decision of the Supreme Court of Illinois. (Hagler et al. *v.* Larner et al., 120 N. E., 575.)

According to official reprints published by the United States Shipping Board "between June 30, 1914, and December 31, 1918, the total gross tonnage of the American merchant marine increased more than 30 per cent, and that engaged in overseas and foreign service probably increased not far from four or five fold."

Observations on the presence of meningococcus in the blood.— In recent months evidence has been produced emphasizing the importance of blood cultures in the incipient stages of epidemic meningitis. Glowing accounts have been received from time to time of the very gratifying treatment of these cases by the early administration of antimeningococcus serum intravenously as well as intraspinally. Maxcy (Jour. Infect. Dis., 1918, 23, p. 470) reports the blood culture findings of 27 cases of possible meningococcus infection, selected from a large number of admissions at the base hospital, Camp Beauregard, in January and February, 1918. All had fever, malaise, headache, and a history of contact with actual cases of epidemic meningitis. The results were entirely negative and it was concluded that the "abortive type" of meningococcic infection was not of frequent occurrence, and, if it occurred at all during the epidemic, could not be considered a factor in the spread of the disease. The technique consisted in planting 10–20 cc. of blood in 100 cc. of 1 per cent glucose, salt-free broth, enriched with a small amount of sheep serum water. The reaction was slightly acid, as finally determined by addition of solutions of phosphates of known H-ion concentration and titrating with cresol purple as an indicator. Attention is called to keeping the cultures warm until the incubator is

reached. In 48 and 72 hours, 2 cc. of the supernatant fluid of the culture were pipetted off and poured over the surface of laked sheep blood dextrose agar plates. Cultures, if sterile, were discarded in 5 days. Two interesting cases are cited. One showed a meningococcemia within 18 hours after the onset, which disappeared in 24 hours. The organism was also isolated from the turbid spinal fluid. Both showed agglutination with the normal and polyvalent serum (1:400). Antimeningococcic serum was given intraspinally and intravenously. Having apparently recovered on the fifth day, the patient suddenly died, and, at necropsy, death was found to have occurred from a vascular accident. The second case was one of persistent fever, nausea, and malaise after the spinal fluid, which had previously yielded the meningococcus, had been rendered negative by intraspinal injections of serum. Four weeks subsequent to the onset, an eruption occurred and a blood culture revealed the presence of meningococci. After desensitization with horse serum, 490 cc. of antimeningococcic serum were given intravenously over a period of 10 days. The blood culture became sterile after the sixth injection and remained so. The patient was well in a month after the intravenous treatments were instituted. The author points out that such a case is the exception rather than the rule. Experience has taught us that transient meningococcemias are more frequent than persistent ones. Positive blood cultures are rarely obtained late in the course of the disease. Large quantities of blood should be used in the culture. There is a possibility that the organism never gains a foothold in the blood stream in some cases, localizing directly in the meninges. The question of mode of transmission from the posterior nasopharynx is still an open one. (De W. G. Richey.)

Aeroplanes are fitted with numerous dials rendered luminous by a paint containing radium. In time the paint loses its value but not the radium which can be recovered and utilized with profit. The discarding of a worn-out dial should therefore not lead to its being destroyed as valueless. Here is one more opportunity to practice that thrift and economy which many of us hoped would be acquired as a result of war. The inspiration to save radium is to be found in a consideration of some of the facts about this substance. One of the principal firms handling this element reports that it takes from 500 to 700 tons of carnotite ore, and as many tons of chemicals, not counting water employed, to yield one grain of radium whose market value is in the neighborhood of $100,000. A good firm does well to extract 18 to 20 grains of radium in a year and 50 milligrams, worth $5,000, is an ample supply for a surgeon's work through a lifetime.

La Presse Médicale for March 10, 1919, contains a feeling tribute from F. Widal to the memory of Prof. André Chantemesse who died suddenly a few weeks ago, the immediate cause of death being too early to return to work after an attack of influenza.

Widal and Chantemesse were friends of long standing and associated in many professional tasks, more particularly their invaluable researches on typhoid fever.

Chantemesse was a native of LePuy and possessed many of the characteristics of the typical *auvergnat*—vigor of mind and body, sound common sense, combativeness, perseverance. With these traits he combined a sense of humor, cordiality, sympathy, and kindness. Emile Roux was one of his closest friends, their intimacy dating from boyhood. Pasteur admired and trusted him. It was through Pasteur that, in 1893, Chantemesse was chosen to devise measures for combating infectious diseases in the Ottoman Empire when assistance was requested by Abdul Hamid, and his stay in Constantinople resulted in the founding of the Institute of Bacteriology there.

Chantemesse began the study of medicine at an age when others receive their diplomas, his family having destined him for a business career, and he became a hospital interne just as he reached the prescribed age limit, but his capacity for work, his talent, his enthusiasm speedily brought him to the front. Four years later his advanced work won him a gold medal and he entered the laboratories of Bouchard and Cornil. Recognition of his varied talents lead to his appointment on the staff of various hospitals, and as professor first of experimental medicine, then of hygiene. In 1901 he was elected member of the section of hygiene of the Académie de Médecine.

Widal became acquainted with Chantemesse in Cornil's laboratory. He says: "He initiated me in bacteriology and for years we were intimately associated in our work."

Chantemesse's bacteriological researches and especially his original work on typhoid fever had a marked influence on the reforms in medical teaching which were introduced in 1886 following the developments due to Pasteur. His laboratory courses were thronged by students from abroad and by men of his own country, not only undergraduates, but professors and practitioners of advanced years, who, recognizing the far-reaching effect of new ideas and new methods, felt the necessity of sitting at the feet of this brilliant leader in the modern school of investigation. Chantemesse alone or in collaboration with others wrote voluminously on topics connected with bacteriology and hygiene and he was singularly successful as a teacher, but he had also a remarkable clinical sense and but for his absorption in a special field would have been eminently successful as an internist. Typhoid fever was his special subject and it is in this connection

that he will be chiefly remembered. He early recognized it as a peculiarly water-borne disease and was among the first to go deeply into the question of its prevention. The results of his experimental vaccination of animals against typhoid were published in 1888, and it was at his suggestion that in 1909 the Academy of Medicine appointed a commission to determine the value of the procedure for man. Chantemesse carried out the necessary experiments on the army personnel in Morocco and on the personnel of the French Navy. For years he was associated with the work of the Pasteur Institute.

During the war Chantemesse labored with feverish devotion at the École Polytechnique and the Hôtel Dieu and in countless medico-military enterprises essential to the health of the troops and of the civil population. The strain of his labors during the war and his prompt return to duty after but a few days of illness hastened his death.

REPORTS.

THE HOSPITAL SHIP "COMFORT."[1]

By A. W. DUNBAR, Captain, Medical Corps, United States Navy.

This ship, formerly the S. S. *Havana*, of the Ward Line, was commissioned as a hospital ship on March 18, 1918. The displacement of the ship is 10,000 tons; net tonnage 3,963; length over all 429 feet 10 inches; beam 50 feet 2 inches; draft when loaded 22 feet forward and 23 feet aft. The motive power consists of two triple-expansion engines of 10,000 horsepower. The maximum speed of the ship is 18 knots, and the coal consumption at this speed is about 175 tons per day. The economical speed is 14 knots at 100 tons of coal a day. The coal capacity of the ship is 1,060 tons in the permanent bunkers. Since coming into the naval service hold No. 2 has been used for a reserve supply. It holds 608 tons, giving a total capacity of 1,668 tons. The supply of coal at an economical speed in good weather conditions gives a steaming radius of 5,376 miles with a margin of 68 tons remaining. This radius of action is in practice materially reduced by head winds and seas, and on two west-bound trips it has been necessary to coal at the Azores in order to have a safe margin left.

The complement of the ship is as follows:

Medical officers	10
Pharmacists	2
Pay officers	1
Paymaster's clerk	1
Dental officer	1
Chaplain	1
Deck officers	6
Engineer officers	5
Total officers	27
Crew: Deck, engineer, and Hospital Corps	365
Total	392

Ten life boats are provided, calculated to hold 490 persons. In addition there are two ambulance boats holding 120 persons, one motor gig holding 27 persons, and life rafts sufficient to sustain 700 additional. These figures represent the maximum capacity of these

[1] Extract from Annual Sanitary Report, 1918.

boats and rafts and in all probability would be greatly reduced in actual emergency.

Normal capacity for patients is as follows:

Sick officers	14
Isolation wards	44
Surgical ward	56
Medical ward	36
General ward	142
Convalescent ward	28
Total normal capacity	320

The accommodation for patients in an emergency and for a short run of from 24 to 48 hours could easily be extended to 700 cases. As an ambulance ship for bringing home the wounded from abroad, 410 patients, of which 290 may be bedridden cases, can be carried by putting 50 cots in the solarium and additional cots in the convalescent ward, hospital corps quarters and the mess rooms on the promenade deck. It is always necessary to leave some place to accommodate the sick of the ship's complement and also to allow for the isolation of infectious cases which may develop during a trip.

At first sight it would appear that the normal capacity of this ship for the patients is small, but by comparing it with that of the *Drina*, of the British Navy, it is found that while the *Comfort* carries one patient for each 12 tons of the net tonnage, the *Drina* carries one for 38 tons, so it seems that the space has been comparatively well utilized.

The ship was commissioned March 18, 1918. She left the Navy Yard, New York, April 22, 1918, and reported to the commander in chief, Atlantic Fleet, Base 2, April 24, 1918, for duty in connection with the fleet.

On May 19, 1918, orders were received to proceed to the Navy Yard, New York, and fit out for special foreign duty. Arrived at the navy yard May 21, and on June 20, all necessary preparations having been made for distant service, the ship anchored off Staten Island, N. Y., awaiting orders. On July 24 the ship was assigned to the third naval district for temporary service, to take the overflow of patients from the U. S. Naval Hospital, New York.

On October 5, orders were received to prepare for distant service. Under these orders, all marks identifying the ship as a hospital ship were removed and it was given the status of a troopship.

On October 10 the medical officer commanding was relieved by a line officer, and the former was ordered to the ship as a passenger. The ship left the navy yard on October 21, and in convoy sailed for Brest, France, arriving at that port on November 3. On November 4, in accordance with orders, the writer resumed command and hoisted the Red Cross flag.

The *Comfort* left Brest, France, on November 20 and arrived at St. Nazaire, France, on November 22, under orders to proceed to New York. Heavy seas and adverse winds were encountered, and it was found that the coal taken on board at Brest was of poor quality; so it was necessary to put in at the Azores for coal. The ship arrived at Ponta Delgada, Azores, November 27, where 11 additional patients were received, and left on November 29, arriving at Hoboken, N. J., on December 9, where the patients were disembarked.

On arrival at Hoboken orders were received assigning the *Comfort* temporarily to the transport force. While at Hoboken the ship was repainted as a hospital ship, in accordance with orders. The ship left Hoboken December 21 and arrived at Plymouth, England, on December 31.

During the period of this report, 1,269 cases were admitted or readmitted. Of these, 494 were discharged to duty, 28 died, 2 were invalided from the service, 699 transferred, 1 deserted, and 39 changes of diagnosis were made and readmitted; remaining, 3. The total number of sick days is 16,475. Seventy-seven surgical operations were performed. The dental treatments and operations numbered 1,536.

SHIP'S COMPLEMENT.

With the exception of the time this ship had the status of a troopship she has been commanded by a naval medical officer. Up to December 18, 1918, the officers other than those belonging to the medical corps, pay corps, dental corps, and the chaplain were in the status of naval auxiliary officers, and in most instances these officers were members of the Naval Reserve Force but placed on an inactive status while assigned to this ship. On the above date orders were received by the supervisor, Naval Auxiliary Reserve, at New York to change the status of all auxiliary officers on this ship to Naval Reserves, which was done, the master being given the rank of lieutenant commander and directed to report to the commanding officer for duty.

From the first, the members of the crew, other than those belonging to the hospital corps, consisted of regular service men and Naval Reserves. This combination of naval auxiliary officers with a naval crew was, from a disciplinary point of view, an undesirable mixture, as there was some evidence that certain members of the crew felt that "civilian officers," as they termed the auxiliary officers, had no authority over them.

The change of status of the auxiliary officers to that of Naval Reserves is a great improvement. Under the former status the officers felt a loss of prestige. There was, in the case of married men, a

loss of pay; and as the auxiliary service is maintained only for two hospital ships, there was little or no chance for promotion, with the ultimate result that hospital ships would lose their best officers.

ORGANIZATION.

Under the existing conditions, with the deck and engineer officers in the Naval Reserve service, the crew consisting of regular service men and Naval Reserves, there are no Naval Instructions or Regulations directly applicable to the administration of hospital ships.

The organization of the ship's company, the administration of discipline, and the assignment of responsibility has been in comformity with the spirit of the instructions relative to hospital ships with such naval regulations and instructions as may be applicable.

On the hospital ship the interests and duties of the medical department take precedence, except that the master must be unfettered in the discharge of his duty as relates to the navigation and safety of the ship.

It may be stated that the nonmedical part of the organization occupies on the hospital ship a position analogous to that of the medical department on a combatant vessel. In each case while occupying a subordinate position the navigator or medical officer is left free to carry out his specialized duties, and we have yet to hear of a line officer who would direct the medical officer how to operate or of a medical officer who would seek to instruct the navigator as to the measures to take in an emergency affecting the safety of the vessel.

The organization of this ship is regarded as consisting of two departments, a medical department and a nautical department. The former, directly under the executive surgeon, is divided into (1) hospital division, under the medical officer (nonspecializing), next in rank, having charge of the medical, surgical, and other activities directly concerned with the care and treatment of the sick and injured; (2) dental division; (3) medical supply division; (4) supply division; (5) record division, religious, recreational division (chaplain).

The nautical department is divided into the deck and engineer divisions, under the senior reserve officer acting as master.

It has been desired to avoid any tendency on the part of any one to feel that the organization is divided into two, but rather that, as stated, it consists of two departments with but a single duty—to relieve the sick and wounded. To promote a feeling of unity and to remove any possible imputation of a discrimination, the separate messes for the wardroom and for the deck and engineer officers have been amalgamated.

The mess room on the boat deck, formerly used by the auxiliary officers' mess, should be converted into staterooms for deck officers, and the rooms vacated by these officers should be assigned to the junior engineer officers who now occupy uncomfortable rooms on the main deck among the enlisted personnel, which is somewhat detrimental to discipline.

The personnel and material records are kept by the medical department.

The liberty list, approved by the head of the deck and engineering divisions, is combined in the executive officer's office with that of the hospital division. There is always a deck officer (officer of the deck) and an officer of the day (medical) on watch, each doing duty in accordance with regulations as far as practicable on a hospital ship. Reports of offenses are brought by the heads of departments to the executive surgeon who investigates each case and if such action is required brings the man to mast.

During the year there were committed 170 minor offenses; 17 summary courts-martial and 39 deck courts have been awarded.

In the medical department the executive surgeon is assisted by the junior pharmacist who, in addition to being in charge of the medical supply division and of the special-diet kitchen, acts as a first lieutenant in making inspections and in the general upkeep of the spaces assigned to the medical department.

The medical officer immediately junior to the executive acts as a staff director, giving his attention to the supervision of the care of patients and of their health records in addition to his duty in his particular service. This officer keeps the executive and commanding officers constantly informed as to the condition of patients, their readiness for duty, recommends changes in diagnosis and medical surveys and serves to coordinate the work of the various members of the medical staff.

The supply division, under the paymaster, is conducted in accordance with regulations. Under the commissary the food has been served in an appetizing condition, the bread and pastry being particularly good. The ship's store is a great convenience to all hands.

The medical supply division is under a pharmacist. Issues have been made to ships urgently in need of certain supplies and to Naval Base Hospitals 1 and 5, to the U. S. Medical Supply Depot, Brest, France, and also to the naval medical officer at St. Nazaire.

The chaplain, in addition to his regular duties, has been active in securing musical instruments, a moving-picture machine, films, books, and periodicals, and has assisted the patients in communicating with their next of kin.

116025—19——14

ADAPTABILITY OF THE SHIP FOR THE DUTY ASSIGNED.

It is desired to preface the following remarks by stating that it is recognized that an ideal hospital ship is with difficulty made out of one built for other purposes. In the case of the *Comfort* it may be said that the transformation has been very effectively done. This vessel is probably as good as any of her tonnage and, properly handled, is entirely seaworthy, as has been shown by her behavior in a succession of gales recently encountered. Built primarily for coastwise trade, the construction, particularly of the deck house, is not as strong as in the regular trans-Atlantic steamers, and should be strengthened.

On the first trip to Europe some concern was felt over the four cargo ports, which open on the lower deck and are much of the time submerged. Being held in place by "dogs," and owing to the absence of three frames in each, these ports constituted weak points. The working of the doors was excessive, permitting a certain amount of leakage, which could not be stopped, as there was no way of calking these doors effectively. This defect was partially removed by building in the missing frames and riveting the doors to them. This, however, still leaves the projecting hinges, which are liable to be shorn off by craft coming alongside.

The deck house works considerably; much more, it is stated, than when the ship was in the merchant service. This is more noticeable forward where it is attributed to the heavy elevator and its equipment and particularly to the elevator motor which is placed above the chart house. Additional weights carried high up, such as lift rafts and boats, two large sterilizers, aft, and the equipment of the operating suite, forward, all have added extra weights to the deck house.

Between-decks space, which as a merchant ship was occupied by cargo, is now used for living spaces, representing little or no weight. To insure stability, extra water tanks, more bunker space (662 tons of coal), and additional ballast amounting in all to 550 tons has been added. This places the weights at the end of the vertical diameter and to it is probably attributable the increased working of the deck house. This condition shows the desirability, in planning a hospital ship, of avoiding the ever present inclination of building it up in the air and adding heavy weights on the upper decks.

A considerable saving of weight could have been effected by installing a less massive laundry chute than the present one which runs from the promenade deck to the laundry. The elevator could easily have been omitted and a hand lift or inclined plane substituted. An elevator about one-half the size would have been ample.

Carrying the two ambulance boats forward on the hurricane deck has been found to be impracticable and these boats were left behind at New York when last in port. The position of these boats forward makes it impossible to maintain speed with a head sea without endangering the boats and possibly the water-tight integrity of the ship. It is understood that the *Mercy* on her first trip to Europe had one of these ambulance boats wrecked by a heavy sea coming over the bow. With the present arrangement of handling by means of booms, these boats would be of little or no service in abandoning ship in a seaway. The massive booms required to launch them have to be carried partially lowered and constitute a considerable menace to the safety of the ship. I have been informed by seafaring men that the marine underwriters would not permit a ship to go to sea with booms carried in such a manner. At least one of these ambulance boats is necessary, and it has been suggested that it be carried aft of the hurricane deck abreast of the medical ward.

All of the power boats are gasoline driven, consequently should the supply of gasoline fail the ship would be dependent on pulling boats. For this reason a small steamer to replace one of the gasoline-driven ambulance boats would be a desirable addition.

Ten hundred and sixty tons of coal are carried in the permanent bunkers, sufficient under ordinary weather conditions for 10 days' steaming at 14 knots, which equals 3,360 miles. A reserve supply of coal amounting to 608 tons is carried forward in No. 2 hold. This space is filled by dumping the coal through all decks in the vicinity of the forward convalescent ward, convalescent mess hall, crew's quarters and medical storeroom, which is extremely disadvantageous. The coal then has to be passed aft by hand a distance of about 50 feet to the wing passages above referred to. The closing in of the cargo hatches is recommended, being desirable for several reasons. First it would add to the water-tight integrity of the ship and to its structural strength. Upon the hurricane deck this hatch, at present, is secured by heavy timbers covered by a tarpaulin, which allows a certain amount of leakage below when seas are shipped over the bow. Secondly, by decking over this hatch on the main, lower, and orlop decks 1,200 square feet of deck space would be rendered available for some useful purpose, such as an increase in size of the forward convalescent ward, of the convalescent mess hall. This would provide for stowage space for deck gear and be useful in other ways.

The storeroom spaces are ample and, in general, well arranged. It is to be regretted that the medical stores are not placed aft and the general supplies forward instead of the reverse, as now obtains. All supplies from the after storerooms have to be removed through

the after convalescent ward, which is disturbing to the patients, tends to keep the ward in an untidy condition, and subjects the crew to contact with the patients. The supplies handled by the pay officer have to be drawn daily, while access to the medical storerooms is infrequent.

Access to the deck from the living space for the engineer's force is through the after convalescent ward and there is no other route available. It is recommended that the ladders from this space to the hurricane deck be inclosed by diamond-mesh partitions with a door which can be opened from the ward side, the latter being desirable in case of emergency when it is necessary to evacuate the ward quickly. This arrangement, while permitting the ward to utilize these hatches for ventilation, would prevent the use of the ward as a passage for men going on and coming off duty.

The hurricane deck outside of the deck house, as well as in the crew's space and after convalescent ward have numerous cargo hatches with high coamings, which materially reduce the available floor area. As these hatches serve no useful purpose, it is recommended that they be removed, leaving openings for ladders and ordinary supplies. This would allow considerably more room for bunks for the sick or for other purposes.

The location of the insane and brig cells is inconvenient, in that they are accessible only by means of doors through a water-tight bulkhead, which should not be opened at sea, and in the case of accident involving the hull, might render it impossible to release the occupants of the cells. The construction of the cells is very light, as was demonstrated recently when an intoxicated man was confined. He not only broke out of one cell, but into another. These cells will have to be strengthened, and when this is done they should be made accessible from the space abaft of the water-tight bulkhead. It is believed, however, that except for the occasional use of these cells as a punitive measure, there is little need for them. As a matter of fact but few insane patients require solitary confinement and in most cases it is undesirable. If violent they are much better controlled with hot water baths and sedatives. What is required is that a small ward, such as the forward convalescent ward or a portion of it, be prepared for the insane by means of diamond-mesh partitions and doors, for most of the mental cases simply need sufficient restraint to prevent them from wandering about the ship, with the possibility of doing damage to it or themselves.

The laundry occupies a position which is well adapted for ward purposes. The laundry could be placed on the lower deck immediately below its present situation, in which case it would be necessary to make some provision for drainage other than into the bilges. This could be accomplished by means of a tank and a motor-driven

pump to carry the wash water overboard. The space now occupied by the laundry could be assigned for ward space, which would add approximately 30 bunks. As the after convalescent ward now has 142 bunks, to add 30 additional would make it rather unwieldy, so it would be better to divide this entire space into two wards of about 86 beds each, installing additional toilets and lavatories in the after part of the space now occupied by the laundry where there is now a single water-closet.

The facilities for handling patients in stretchers from boats and from one deck to another are very poor; in fact, the use of the Army stretcher in which the Army sick are received is impracticable, requiring transfer to the Navy wire stretcher. While the gangway ladders are broad and easy of ascent, the passageways abreast of them are too narrow for a stretcher to turn in conveniently. The ladders should be placed so that the upper platform is abreast of the lobby, which, aside from being the station of the officer of the day and officer of the deck, is the most convenient place from which to distribute patients to the wards. The surgical ward is near by and the elevator can be utilized to transfer stretcher cases to wards on the promenade deck; in fact, this is the only way in which patients can be transferred to the promenade deck without great discomfort and inconvenience. When alongside a dock and tidal conditions permitting, the patients may be passed directly into the after convalescent ward through a cargo port; otherwise it is necessary to carry them by hand down the ladders or by the stairway amidship just forward of the wardroom space.

The fore and aft passageways inside the deck houses on the hurricane deck are too narrow to allow the passage of an Army stretcher, and barely permit the use of a Navy wire stretcher; but, by having removable rails replace the present fixed wooden rails to the stairway, it would be possible to carry the patients down the stairway in the splint stretcher. There is no special contrivance for handling patients in boats at sea as was installed on the *Solace*, nor is it known how practical this arrangement has proved. If required, cargo booms or boat davits could be utilized for this purpose.

The toilet facilities are generally adequate and satisfactory except in the two convalescent wards. If the proposed changes are made in utilizing the space now occupied by the laundry and the installation of toilets, the situation in the after ward would be relieved. The forward convalescent ward of 28 beds has to share toilets and water-closets with 105 hospital corpsmen, and the facilities are insufficient.

From practical experience it is believed that the bathtubs aboard this ship are undesirable. A tub requires space sufficient for three shower baths, and uses at least 10 times the fresh water, and serves

comparatively few men in a given time. Tubs are difficult to keep clean, and the shower is preferred by most men. It would be well to reserve one or two tubs for mental and other cases. If a patient is too weak to take a shower bath he is given a sponge bath. No matter how liberal the output of distillers may be there is always on board a cruising hospital ship the necessity for a reasonable economy in the use of fresh water. All fresh water faucets, with the exception of certain ones, as about the galley, scullery, and laundry, should be of a compression type.

The white tiling in various lavatories, galley, and pantries is very effective from an esthetic point of view. It is certainly conducive to cleanliness, but in parts of the ship where there is much working, as in the deck house, these tiles are already rapidly becoming loosened and falling out. The use of sheet zinc and white enamel paint for the walls appears to be preferable and certainly very much less expensive. Tiled floors in the galley and pantries are undesirable. When the ship is rolling and pitching, it is impossible to keep these floors free from grease, particles of food, and soapy water which render them so slippery as to be hazardous. At times during heavy weather it has become necessary to stretch lines across the galley to prevent the cooks from being thrown across the range and to permit them to get about. Concrete or brick flooring would be much better.

SERVICE PERFORMED.

The service of this vessel has been one of comparative inaction, alternating with periods of marked activity under adverse conditions. While assigned temporarily to the third naval district the ship served to relieve the congestion of patients at the United States Naval Hospital, New York. During the epidemic of influenza 262 cases were admitted. Of these 24 died, giving a mortality rate of over 9 per cent. The course of the disease was similar to that reported elsewhere. Prior to receipt of the first case, screens had been prepared separating contiguous bunks. When the patients came aboard the cases were treated as highly contagious. The attendants were required to wear gauze masks, coats, and gowns and the hands were required to be sterilized after handling patients. The hospital corpsmen and the crew were instructed in the prevention of infection. It is of interest to note that, although liberty was given, very few of the ship's company contracted the disease. There were no deaths or serious cases among them. It is particularly worthy of note that there was almost no evidence of the transmission of the disease to those directly in attendance upon the sick.

With the assignment of this ship to trans-Atlantic service to bring home the sick and wounded abroad, its duty as a hospital ship has

been succeeded by that of an ambulance ship. As such, with its complete equipment and large medical staff, it is clearly the function of this ship to carry the most seriously injured who require frequent and expert surgical attention. With this point in view, every effort has been made to impress upon the embarkation officers that the 300 bunks available for serious cases should not be utilized to carry patients who could equally well be carried by the regular transports, and from this number, up to 400 should be ambulant cases capable of climbing ladders and going to the mess room. It has been found difficult to convince some of the Army officials that the term ambulant with reference to a ship and the ability to climb ladders is not applicable to one-legged men, of which class some 50 were sent to the ship at St. Nazaire who had to be assigned to accommodations intended for strictly bed-ridden patients.

The majority of the cases received on this trip were such as could not have been properly attended to with the facilities usually afforded on transports. In order to take 400 patients, cots were placed in the solarium, forward convalescent ward and hospital corps quarters.

The patients (Army wounded) were brought to St. Nazaire from base hospital No. 8, at Savenay, by ambulance train, from which they were transferred to the ship in ambulances. The embarkation up to the gangway was by the Army embarkation officer and was well conducted.

In order to avoid confusion, through assigning patients to the wrong ward or to overfilling any one ward, and to be able to quickly locate any patient, the following system was inaugurated. A Dennison tag was prepared, having the ward letter and bunk or cot number entered on it in duplicate. These tags corresponded to the number of accommodations available. A medical officer was stationed at the gangway to make an assignment for each patient. The patient's name was checked off on the list furnished by the embarkation officer and was entered on the lower part of the tag designating his billet. This lower portion was then detached for the record office and files and the remaining portion was attached to the patient. In this way it was impossible for a patient to get lost by being sent to the wrong ward and there was no possibility of any one ward receiving more patients than there were billets. In the record office, the files were then arranged to show the patients' names alphabetically.

It is important in placing patients in bunks which are accessible on one side only that the cases be assigned so that the injured part will be most accessible and at the same time it is desirable to alternate the head and feet in reference to the near neighbors in the same level as well as those above and below.

The necessity for taking every precaution against droplet infection was shown by an outbreak of diphtheria in three widely separated wards within two days after embarkation. Contacts were immediately isolated and the personnel of the infected wards were cultured for diphtheria. In all, 12 positive cultures were discovered, of which 10 were clinically diphtheria. The death of 1 patient, found to have nasal involvement, occurred in spite of the use of antitoxin in large amount. There was practically no spread of the disease after the primary outbreak. Upon inquiry some of the patients stated that several patients who were suffering from "throat trouble" had been removed from beds adjacent to their own in the base hospital.

Among the most seriously injured were 50 cases of gunshot fracture of the femur. Extension was maintained by the Thomas splint and where indicated the Carrell-Dakin treatment was carried out. Over 350 daily dressings were made. Dichloramine-T was used to a considerable extent and with very satisfactory results. In spite of the excessive motion of the ship the fracture cases suffered no serious inconvenience and were disembarked markedly improved.

No radical procedures were carried out, such as the removal of the dead bone, or fixation of bones because of the unfavorable weather conditions for operative work and the comparatively short time that the patients were to be aboard.

On the second trip over, to Plymouth, England, the ship received 95 Navy cases and 238 Army wounded, a total of 333, which is 67 under the number desirable to take. Of these cases about one-half were in such a condition as to have been able to travel via transport.

It is understood that at this time practically all of the serious cases had been evacuated from the English hospitals.

A WESTBOUND VOYAGE OF THE U. S. S. "LEVIATHAN."

By F. A. Asserson, Commander, Medical Corps, United States Navy.

During the westbound voyage from Brest, France, to Hoboken, N. J., February 26 to March 6, about 10,200 troops, including sick and wounded, were transported home. The passage was marked by an epidemic of influenza, during which 2 per cent of the Army personnel were treated for this disease. Two enlisted men were admitted to the sick bay on February 25, a few hours after embarking, with undoubted symptoms of pneumonia. Another enlisted man embarked on February 26 with frank signs of consolidation in his left lower lobe and typical symptoms of pneumonia. One of the above had the preliminary chill on February 21 and another on February 22. The third had a temperature before leaving the Army camp and was advised by a medical officer not to make the trip. All

but one of these cases recovered after a severe illness. A large number of the troops were coughing when brought aboard ship, but their great desire to return home with their commands prevented them from reporting at sick call for treatment. There were no cases of influenza aboard ship when the troops embarked.

The following is a daily list of admissions to the sick list of the Army:

Feb. 25	8	Mar. 3	35
Feb. 26	11	Mar. 4	26
Feb. 27	9	Mar. 5	9
Feb. 28	10	Mar. 6	11
Mar. 1	50		
Mar. 2	41	Total	210

Of this number 43 developed pneumonia, the majority similar to the type occurring during the influenza pandemic of the fall of 1918. Ten of these (23 per cent) died aboard ship, seven after reaching Hoboken. Thirty-eight cases were retained aboard after reaching port awaiting crisis before transfer to an Army hospital. Those sent to the hospitals were later reported, with two exceptions, as doing well. Report of the death of one other patient was received after sailing.

The surgical ward of the sick bay (84 beds) was used for the first admissions and when this ward was filled 77 cots were placed on the starboard side of B deck, in the vicinity of the sick bay, for the additional cases. One hundred and ten patients were treated in the sick bay and 100 on the outside on B deck. Of those developing pneumonia, 35 (81 per cent) were in the sick bay and 8 (19 per cent) on the outboard deck. Only 1 death (11 per cent) occurred among the patients treated on the outboard deck and 9 (89 per cent) among those treated in the sick bay.

Practically all of the patients admitted to the sick bay were given aspirin and codein for the control of the severe general pains. This resulted in profuse perspiration with many sharp drops in temperature, in one case 7° in 12 hours.

The patients were clad in the regulation light Navy nightshirts, which give but little protection and are soaked by even a moderate amount of perspiration. In many of our cases the nightshirts were literally "wringing wet." Warm pajamas were substituted for the nightshirts as soon as possible after this was noticed. As it has been proved that direct draft playing upon the chests of healthy perspiring men can cause pleural reaction, with effusion into the pleural sac, it would not seem unreasonable to assume that similar conditions when applied to patients infected with the causative organism of influenza might result in changes that affect not only the pleura but the underlying lung tissue. With this in mind it was decided to discon-

tinue the administration of drugs causing perspiration and to require all men treated on the outboard deck to wear their underclothing, top shirts, and socks. Investigation proved that the headaches, which in many cases were very severe, were due to marked congestion of the vessels supplying the scalp. This headache was readily controlled without the use of drugs, by a tight bandage (2-inch) applied around the head from directly above the eyebrows to the occipital region. This failed to control the symptom in only one instance, possibly due to faulty bandaging.

One hundred and ten cases of tuberculosis, including 40 stretcher cases, were embarked on February 24. Four of these patients were in a very serious condition when brought aboard ship, and two died, one on February 27 and the other on February 28.

In compartment E. R. S. 1, in standees, there were 1,002 sick and wounded transported home. Of this number there were 177 dressing cases. There were in all 963 dressings done during the voyage as follows:

60 cases daily for 9 days	540
55 cases every second day for 5 dressings	275
24 cases every third day for 4 dressings	96

In addition there were 52 cases that were dressed but once or twice, simply entailing changing or readjustment of splints, strapping of weakened arches, etc.

The majority of these cases were lacerations of arms and legs occasioned by high explosives, shrapnel, or machine-gun bullets; compound fractures of arms and legs from machine-gun bullets and shrapnel; and a number of amputations of arms and legs and fingers due to extensive wounds and from accidental causes as motorcycle, truck, and railroad injuries. There were a few cases of unrecovered appendectomy wounds, mastoid, resections for empyema, two eye enucleations, and two chronic otitis medias requiring dressing. One of the appendectomy cases had a fecal fistula still active.

All of these cases were ambulatory; all were well advanced in their convalescence, the majority having received their wounds not later than October, 1918; and most of them showed marked improvement during the time they were aboard. In a number of instances among the compound fracture cases bone sequestra were removed, and in a few small pieces of shrapnel spontaneously worked to the surface of wounds that were still open, and in some cases causing wounds that had been healed for a time to reopen. The difficulty also of healing wounds that had been subjected to the influence of gas, either at the time they were received or very shortly afterwards, before receiving first-aid dressing, was very obvious.

CONCLUSIONS.

(*a*) That patients suffering from influenza should be treated when possible on a protected outboard deck, and should be well protected by clothing as well as bed clothing.

(*b*) Medicines causing perspiration should not be administered.

(*c*) Tight bandaging of the head for controlling headache, with local measures for general pains should be tried before administering drugs for relieving these symptoms.

(*d*) In obstinate, severe cough, nasal insufflation of heroin deserves a trial.

(*e*) Men with symptoms of an acute respiratory disease or who are running temperatures should be retained at the Army camp until cured. The danger of the spreading of acute respiratory disorders aboard ship is too great to permit the embarking of any of these cases.

(*f*) Cases of tuberculosis with only a poor chance of completing the voyage home should be retained at the hospital. The death of patients aboard ship, where there is practically no chance to isolate the dying cases, has a very bad effect upon the morale of the other patients.

SHIP LIFE IN CONSTANTINOPLE.[1]

By E. P. Huff, Lieutenant Commander, Medical Corps, United States Navy.

During the year the ship has, with the exception of a period of about 10 days, remained continuously at anchor in the Golden Horn, on the Stamboul side of the harbor just below the inner bridge. The water at this point is badly polluted by a large sewer which empties into the stream immediately above the ship. Permission having been obtained to use one of the Government graving docks in the navy yard on the opposite side of the Golden Horn a short distance above the inner bridge, the ship was accordingly placed in dry dock on October 19, when some much-needed overhauling was done. During this four-day period, some 25 tons of marine growth were removed from the bottom, zincs were renewed, and paint applied. Several badly pitted areas were found, at which points borings were made. On October 28 the ship left for a two-days' cruise to Mudania, in the sea of Marmora, at which place the ambassador took train for a one-day's visit to Broussa, the ancient capital of the Empire. About 40 of the crew were given liberty and a special train was provided to convey them to Broussa. Those remaining on board enjoyed the time fishing, and the entire ship's

[1] Extract from Annual Sanitary Report U. S. S. *Scorpion*, 1916. (Through some mystery of the war this report was nearly two years in reaching Washington.)

company profited materially by the outing. At the time of this trip the entire Marmora coast was reported free from quarantinable disease.

The health conditions of the city have remained good during the year. A few local epidemics of cholera and typhoid have occurred, but these have been satisfactorily controlled by enforced vaccination and quarantine and by proper sanitary supervision. Several sporadic cases of typhus have occurred in Constantinople, but these have in most cases been traced from the interior of the country, in some parts of which the disease has been very prevalent. In the treatment of and prophylaxis against this disease some success has been claimed by the German workers in Constantinople by the employment of injections of immune serum. The Plotz vaccine has not been tried here.

Food of good quality has been abundant in the city during the year, but the extremely high price of the necessities and the lack of wherewithal to buy, especially among the poorer Greeks who are largely without work or municipal assistance, has resulted in extreme hardship, and in many cases death from actual starvation. Several soup kitchens have been established by foreign philanthropic organizations and these, working to the full limit of their endowments, have accomplished great good.

The work of the Turkish Red Crescent organization has flourished and this institution has maintained, in excellent condition, a number of military hospitals in the city. A Red Crescent exhibition, along the lines of those held by the Red Cross in other countries, is soon to be opened in the city and promises to be of great public interest and benefit.

Many military patients, both sick and wounded, have been brought into the city during the year, principally from the Balkan fronts, but the exodus from the hospitals has been much greater than the influx, the result being that there are many vacant beds in the city. Many British (from Kut-el-Amara), Roumanian, and Russian prisoners have passed through the city, a number of the sick and wounded among them remaining to be cared for in the hospitals.

Early in the year two American Red Cross hospitals (formerly the French and British hospitals) were commandeered by the Turkish authorities and have since been in their hands. The Bulgarian and German hospitals have remained open to foreigners so that the loss of the two former has not been felt by the ship.

The sanitary condition of the city has remained good. The streets have been well cleaned and, during the summer, well sprinkled. The police force, as usual, has been most efficient and has maintained good order. While a curfew law exists for the belligerents (they must be in their homes by 9 p. m.) there have

been no other restrictions on personal liberty. Music halls are obliged to close at midnight, and recently a law has been passed forbidding the sale of intoxicating liquors in public places after 9 p. m. Cinema shows and all public meetings are rigidly supervised. Prostitutes are subjected to periodical examinations, and many of them have been deported to the interior of the country. Venereal disease is still very prevalent, however, in spite of the efforts of the authorities to protect the soldiers, many of whom, from the interior, are enjoying for the first time the doubtful benefits of city civilization.

The climate of Constantinople, always an uncertain quantity, has been particularly mild and open during the winter months passed and the result has been a large number of cases of rheumatism and respiratory troubles. It has been well said that there are no seasons in Constantinople, but that there are two climates, that of the north wind and that of the south wind. The changes are often so sudden and so severe that one is seldom dressed appropriately to meet them, and the results are frequently disastrous. Overcoats, umbrellas, and overshoes are always justifiable encumbrances here during the fall and winter months. In this country, where smoking (especially of cigarettes) is universal, it seems rather strange that any regulation controlling it should be instituted. However, an order has recently been issued forbidding smoking in the cabins of boats plying the Bosphorus, and it is the intention to extend this also to include the tram cars. The native's intense fear of a draft of air results in these and other public places forever being closed, and as most of the people suffer from catarrh or colds, the condition of the air and floors can be imagined. The native's personal habits leave much to be desired, and even with the recent establishment of public urinals throughout the city, the condition of many of the streets, in the evening especially, is disgusting. However, in a country where toilet paper is unknown among the natives and the individual employs the same fingers in eating out of the common dish, little better can be expected, and the great prevalence of filth-born diseases is not to be wondered at.

There have been 17 reenlistments on board during the year, and 13 men are now doing overtime. Five men have agreed to pay their way home during the year. Ten members of the crew have married native Greek girls during the year, making a total of 22 who have married on this station during the past three years. Five of those recently married were under treatment for syphilis, and two contracted gonorrhea shortly after marriage. Nine babies have been born to the wives of men on the *Scorpion* during the year, and there are four prospects for the near future.

Sixty men have been immunized against typhoid fever during the year and 86 for cholera, the latter measure being considered advisable owing to the presence of cholera in the city. The cholera vaccine used was from the Sachsisches Serum and Bacteriotherapy Institute, Dresden, and was in every way very satisfactory. No vaccinations against smallpox were indicated, the entire ship's company having been vaccinated the preceding year.

The water used on board at present is brought from the Beicos Springs, about 12 miles up the Bosphorous. Several specimens of other waters have been tested, but only this one was found satisfactory. As heretofore, all water used for drinking purposes is first passed through Berkefeld filters. Food has been sufficient in quantity and of good quality. There is at present no threatened shortage, but the cost of all food has increased enormously and is still going up, the present average price of all foodstuffs being about 500 per cent above normal.

Owing to the scarcity and high cost of coal, steam has been on the boilers but 145.8 days during the year. In consequence heating stoves have been installed one each in the crew's space, chief petty officer's quarters, engine-room, cabin and wardroom. These have proved satisfactory, but have added an element of danger from fire which has, however, been well guarded against. The wardroom stove being situated over the magazine, all fixed ammunition was broken down and the smokeless powder (of uncertain stability) thrown overboard. In the absence of a flushing system, tanks have been provided for the heads and are giving satisfaction.

There have been no epidemics among the crew. There were, however, several cases of infective jaundice, this disease having been quite prevalent on shore during recent months. One case of typhoid fever occurred in a member of the crew early in the year, the source of infection not having been ascertained. The disease ran a mild course and while a bacteriological examination was not made there was no doubt about the diagnosis clinically. This man had received typhoid prophylaxis about 14 months prior to the onset of the disease. A special report was made of this case at the time, with the recommendation that a mixed T. A. B. vaccine be adopted and that the injections be made at more frequent intervals than the present four-year period. The present German plan is to renew the immunity by administering a small amount of vaccine at intervals of six months.

The crew has suffered from a lamentable lack of athletics during the year. During the earlier months parties of men were conducted on daily walks about the city and these were much enjoyed by both the men and the accompanying officers. Many sites of historical interest were visited and an interest in local history stimulated. Dur-

ing the months of July and August about three-fourths of the crew was given an outing at Robert College on the Bosphorus, where they were comfortably accommodated in one of the dormitories vacated during the summer holidays. Baseball, gymnasium exercises and walks were freely indulged in to the great physical betterment of all those who participated. The morale of the crew has not been of the best during their long isolation and the desire to get home of the many overtime men resulted in much discontent. There have been seven courts-martial (two summary and five deck) during the year, one for assault, two for drunkenness, two for neglect of duty, and two for unauthorized absence.

The embassy guard of eight men has been continued during the year, these men being housed and subsisted in the Scorpion Club, an institution maintained for and largely by the members of the ship's company. Separate guards have also been posted on the barge and the steamer which during the greater part of the year, have been moored alongside the old bridge, about 50 yards from the ship.

A RECORD SHIP.[1]

By A. E. LEE, Lieutenant Commander, Medical Corps, United States Navy.

The ship left Bremerton Navy Yard for New York January 17, 1918, stopping at San Francisco, where 435 German refugees and 1,506 sailors were taken aboard for delivery to the east coast. The ship arrived in New York February 9, 1918, where additional repairs and changes were made at the New York Navy Yard, completely equipping her for the transport service. She left New York March 12, 1918, for Brest, France, on her first trip, with 2,787 troops and 124 officers, arriving in Brest March 20, 1918. Since then she has made nine more round trips to France, carrying in all 28,166 troops. She arrived in New York November 19, 1918, from her last trip. Since then she has been at Flecher's shipyard undergoing engine overhaul and other repairs. The ship bears the following record:

(*a*) More men per day per thousand tons than any other ship.

(*b*) Fastest round trip from New York to Brest, France, namely, 14 days, 3½ hours.

(*c*) Economical run, round trip, taking no oil or water on the other side.

The health of the personnel has been excellent; average complement, 615; average percentage of sick, 2.5. Measles and mumps in the draft of sailors brought from San Francisco, sick and wounded from the *President Lincoln*, and wounded marines returned from overseas are mainly responsible for this high percentage. The

[1] Extract from the Annual Sanitary Report of the U. S. S. *Great Northern*, 1918.

living quarters were found to be somewhat crowded, so additional space was allotted to the engineer's quarters with an enlarged ventilating system. Also a section of the troop space was bulkheaded off for the supply division, with various other minor changes, all of which has given very satisfactory results and contentment to the crew.

Sanitary drinking spigots were installed throughout the ship, and a careful search was made to find any break in the system. The engineer's force were occasioning most of the mumps cases aboard, and in searching for the cause a common spigot was found in the shaft alley. When this was remedied, no more mumps developed in the division.

Messing for the troops has been by the cafeteria system. It has given excellent satisfaction. The system has been so well regulated that it is quite easy to feed 3,000 troops three times a day, taking about an hour and a half to a meal. The crew is fed on "A" deck by the old Navy system. The engineers have their own mess in part of their sleeping space. By this means the crew is kept separated from the troops, especially below decks, and this is considered an important point.

It was on the ninth trip, about 500 miles off the coast of France, that the British ship *Brinkburn* struck the U. S. S. *Great Northern* at 2.30 a. m., October 3, 1918, killing seven of the Army contingent and wounding about 15 soldiers. The hospital corps responded quickly to meet the emergency. There was no confusion, no panic, no lost motion; the wounded were quickly removed from the compartment below on "C" deck and taken to the dressing and operating rooms, where everything possible was done to relieve their suffering and attend to them surgically.

On November 18, 1918, while returning from our last trip, recommendation was made to the commanding officer that the troop space 7–B be changed to accommodate stretcher cases, thus increasing the bed-carrying capacity of this ship for wounded from 38 to 312. Since our arrival in New York this change has been made. The standees were removed and hospital bunks installed. An ample dressing room, built in the after part of the compartment, and an increased lighting system has been installed. It has made an excellent surgical ward and given us an increase of 274 beds. Ample store room space was obtained by using two large wash rooms already in this compartment; a linen room was built in.[1]

[1] The commanding officer in forwarding the report from which this extract is taken made the following comment:

"Too much credit can not be given to the medical officer, Lieut. Commander A. E. Lee, Medical Corps, United States Navy, and his assistants for the excellent sanitary condition of the *Great Northern*, as this condition is due primarily to the execution of the suggestions of Lieut. Commander Lee. Attention is invited to the small number of fatalities during the recent influenza epidemic; also to the action of the officers and men of the medical department at the time this vessel was struck by the *Brinkburn*."

THE UNITED STATES NAVAL AIR STATION, PAUILLAC, GIRONDE, FRANCE.[1]

By H. A. Garrison, Lieutenant Commander, Medical Corps, United States Navy.

The station is called Pauillac but is about a mile from that town, in a village called Trompeloup. It is about 30 miles from the mouth of the Gironde River, or a little more than halfway from the mouth to Bordeaux. Trompeloup grew up around the docks which were installed here many years ago to save the wait for the tide to get to Bordeaux but political and financial influence at Bordeaux prevented their being used to any extent.

The climate here is a very disagreeable one especially in winter. The thermometer never gets very low but the humidity is so high that the cold is felt very keenly. The rain is cold and disagreeable and occurs almost every day. There are also very heavy fogs.

The camp site is not at all good from a sanitary point of view but it had to be here from an industrial and transportation standpoint. It had docks which would take six large ships and also fairly good railway connections and side tracks, as well as some warehouses.

The purpose of the station was that of a receiving station for material and personnel for aviation and to be an assembly and repair plant for planes and motors.

The station really commenced its existence on December 1, 1917, with a personnel of 2 officers and 26 enlisted men who occupied an old stone building now used as administration offices. This was built originally as a steam laundry to cater to the trade of the trans-Atlantic liners which never came. The station did not begin to grow very rapidly for some months. On January 30, 1918, the station had less than 1,000 men. From then on to May the increase was gradual and reached about 2,000. It then took a quick jump by the arrival of large drafts and ran up to around 5,000 by July 1.

Many of these men stayed only a short time, as they were being distributed to flying stations up and down the coast. As they were distributed and our own construction became lighter we ran down to about 3,500 when the armistice was signed, November 11, 1918. About 800 men were shipped home December 1, 1918, and a few hundred were sent through from outlying stations, so that we ended the year with about 3,000.

The great difficulty in the early part of the year was to get adequate shelter. The camp was in the middle of a typical water-front village with all the usual undesirable qualities. Some of the houses were rented, some bought, and some commandeered later. We did not get all of them out until October 1, 1918. The buildings erected were barracks (fabricated) known as Dixie huts, measuring 20 by

[1] Extract from Annual Sanitary Report, 1918.

106 feet. Their delivery was slow and they were not really adequate until about August 1, 1918. Before this there had been more or less unavoidable crowding. Hammock stays were put up and men slept in hammocks. The mess halls were completed about the middle of July and feed at one sitting 3,300. The assembly shops and hangars were well built, with concrete floors, and were entirely sanitary. By August 1 we had barracks in sufficient number to give each man between 45 and 50 feet of space, and stoves were ready to be put up for the winter.

The messing at first was in the building intended for the garage, and while all concerned did their very best it necessitated practically continuous serving from daylight to dark—at one time 14 messes per day. The food has been plentiful and reasonably varied and, since the large mess hall and kitchen were installed, very well cooked and served. The supply department has done all that could be done at all times in this regard. The fresh-meat ration was gotten from the United States Army and consisted almost entirely of beef, as that seemed to be all the Army carried over here.

Abundant water for the station has been gotten entirely from a fourteen hundred foot well. This water showed a bacterial count just a little above that considered safe, although no surface contamination could be located, such as cracks in casing, etc. It has been chlorinated with liquid chlorine. Capt. H. P. Letton, Engineer Corps, United States Army (loaned to the Army by the United States Public Health Service), gave us invaluable help in this work.

The distribution was at first unsatisfactory because of inability to get piping, but by July this was remedied. The toilets and showers are in separate buildings with concrete floors. These buildings had toilet seats and showers for 4 per cent of the personnel and ample urinal and scrubbing troughs.

All sewage and bath water went through septic tanks (four in number, of the three-chamber variety) and emptied into the river through a small creek. The sewage came out thoroughly liquefied, but had a slight odor. The system was very satisfactory. The lighting of the station has been by electric lights entirely. The heating of necessity has been by stoves.

Miles of board walks have been put down and have been a great comfort and of great value in promoting cleanliness. An energetic antifly campaign was carried out during the summer with screening for mess hall and sickbay. Mosquitoes were not very bad, and we had no malaria.

The health of the station has been exceptionally good. The percentage of sick days may seem at first to be rather high, but the policy of putting mild cases to bed has been amply justified by the low mortality rates. There have been several isolated cases of mumps,

measles, scarlet fever, diphtheria, and cerebro-spinal meningitis, but no deaths from these. Despite the fact that we had little confidence in the antimeningococcic serum because of the far from ideal way in which it had to be sent to us, it acted perfectly.

We had one death from undoubted typhoid in a civilian employee (American), who had no clear history of prophylaxis, and no other cases.

The epidemic of influenza struck us about the middle of September, and we had fewer deaths and less severe cases than any other organization on the coast. We had about 4,500 personnel at the time and lost only 1 officer and 10 men. Since then we have had four deaths from pneumonia, which should be charged up to influenza.

Because of the size of the station and the imperative industrial demands of war it was impossible to do any wholesale spraying of noses and throats or masking. The small percentage of deaths, I feel sure, is due to putting every case to bed as soon as he complained of feeling badly, thorough purging and absolutely no moving or transfer.

Our percentage of venereal disease has been moderately high. There are two reasons for this: First, liberty was given in Bordeaux the only near-by city of any size, and there is a great deal of venereal disease there; secondly, while the United States Army placed at our disposal their prophylactic stations in Bordeaux, there was a lack of really trained men for such stations and the results were poor in consequence. Another cause was that while on the whole our men were very orderly and well behaved, still plenty of alcoholic drinks could be secured in Bordeaux, and it is an axiom that no matter how much a man may know as to the value of prophylaxis, a little alcohol makes him careless of promptly carrying it out.

The near-by villages while surely high in percentage of prostitution and venereal diseases, furnished very few cases because we were able to carry out thorough prophylaxis within a few hours.

The drafts from Philadelphia were noticeably high in venereal percentages on arrival here. Some had primary sores and there were a goodly number of secondaries.

A most striking feature of the venereal sores was that nearly all showed treponemata on smears (we always treated with salt solution) and were later checked up by Wassermann.

Our treatment was by the usual methods and carried out very thoroughly. We used the French manufacture of neosalvarsan and it was very satisfactory and practically took no time off from work, as there was little or no reaction, and we had no bad results whatever.

There was never at any time a lack of sufficient medical personnel but there has been at times a lack of sufficiently trained (in the real

sense of the word) hospital corpsmen. We have been able, however, to get plenty of good bright men who were excellent material. All supplies asked for were given without question, but the actual delivery often left much to be desired. But in this the medical department was no worse off than the other departments.

The Red Cross secured the Château Beaucaillon, six miles away, and prepared it for a hundred beds about February 1. They furnished material, and housekeeping, and managing staff. The medical staff and hospital corps (4 and an average of 14 respectively) were furnished by the Navy. The Navy also furnished free coal and gasoline and gave the privilege of commissary purchases at issue prices and paid a money ration.

The Red Cross deserves much credit for its work but it was hampered by several things, the most marked being the owner's restrictions. No contagious disease, no erection of barracks, or tentage on grounds and no increase of kitchen facilities being permitted.

A small sick bay and dispensary were established in the old stone building originally occupied and were used until June for the milder cases and for sick call.

Major surgery was sent to the United States Army Base Hospital at Bordeaux until May when the Red Cross Hospital installed an operating room in which about 100 operations have been done very satisfactorily without a single infection.

By June two barracks 20 by 106 feet had been constructed for use as a yard dispensary. These were very well laid out with partitions, baths, toilets, washbowls, etc. They furnished offices, bed room for officer of the day, pharmacy, two sick rooms, eye, ear, nose, and throat room, sanitary office, and beds for 20 patients. Another barracks next to them was asked for in July and this gave 40 more beds. During the influenza epidemic two more barracks alongside were given us and all cases were treated here. This worked out very well as we were within a hundred feet of the mess hall so that feeding was easy.

The equipment could have been made to suffice but it left much to be desired. In June, the Red Cross offered to rent another château, about three miles distant, and install there a hospital of 300 beds but for many reasons this was declined after being carefully considered. It was decided in August to install large sick quarters of our own and the French Government gave us for this purpose five stone buildings adjoining our own camp in what was known as the lazaret. This is the French quarantine station. Due to unavoidable delays and to the great amount of work needed (there was no lighting, water, plumbing, or sewerage) the buildings were not ready to occupy until about the time the armistice was signed. They were completed as we left, since the United States Army would want this as an embarkation camp. In the first few days of Decem-

ber, the Red Cross hospital was closed and all patients were cared for on the station, several major operations being performed in the new place. It has a capacity of about 200 beds and is very well appointed. It seems now as though the United States Army would take over the camp as an embarkation camp. We have orders to ship all material (medical) to Bassens, which is the large dock for Bordeaux. There is a dispensary there now being expanded to 75 beds. Some of the personnel has already gone home and more will soon go.

Our flying here is only by experienced men, and while we had a few falls no one was injured, except one man who received a slight scalp wound from getting too close to the propeller. The docks have furnished a few accidents, with only two deaths. It is interesting to note that death in three cases in drafts coming to this station by rail was due to men riding on the tops of cars and being swept off by low bridges and tunnels. Our Army lost scores and scores of men in this way.

Our dead are buried in Pauillac Cemetery, in a plot assigned us. We had 38, which included about 18 from ships, etc., the U. S. S. *Marietta* losing 14 from influenza. We had one officer and one man buried at the United States Army hospital at Talence. The graves are marked with crosses. In addition there are brass plates on the coffins and bottles with names inside. Blue prints are now being prepared of the plot.

The medical department has rendered medical and surgical assistance to many of our own ships in the river, as well as to many ships of friendly powers, especially during the epidemic of influenza; also to United States Army men in attached camps near us. It also assisted them in the burial of the dead. Owing to the mobilization of the French medical profession in its entirety, the medical officers here have treated many French people as a matter of common humanity. We have furnished a great many expendable medical supplies to our own ships stopping here and have received patients from them.

Captain F. T. Evans, United States Navy, who took command in July, has been an inspiration. He is himself a sanitarian of no mean ability and has gone out of his way to lend a hand. His two executive officers, Lieut. Commander S. L. H. Hazard and later Lieut. Commander C. E. Battle, have both joined most heartily in carrying out sanitary and medical work.

While I do not feel that my work here has been without value I consider that the real credit for having by energy and hard work, coupled with excellent training and abundant common sense, worked out the discouraging problems of the early days of construction should go to my very able assistant, Lieutenant Arthur C. Sinton, Medical

Corps, United States Navy. His was a real nerve-racking and discouraging task, performed in a manner meriting the highest praise.

January 15, 1919: The United States Army officially took over the camp on this day and we are sending out men and material as fast as possible, half the station having left on January 12. Maj. F. M. Browne, Medical Corps, United States Army, reported on January 3 as camp surgeon and his personnel and nearly all of his material are here. We turned over all of the buildings occupied by the Medical Department yesterday. Our material is all packed and the last was shipped to Bassens yesterday. Microscopes, scales, shelf bottles, etc., go to the United States Naval Medical Supply Depot, Brest.

The medical and dental personnel, including enlisted force, have been reported ready for transfer with the exception of two medical officers, a pharmacist, and a few hospital corpsmen to look after records until transportation is secured to send out the remainder of the station's personnel. A great deal of credit is due to Pharmacist A. L. Crowder, United States Navy, not only for his care of records, etc., during the existence of the station, but for the masterly way in which things were inventoried and packed for shipment.

THE UNITED STATES NAVAL AIR STATION, ROCKAWAY BEACH, LONG ISLAND, N. Y.[1]

By A. A. SHADDAY, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

The United States Naval Air Station, Rockaway Beach, Long Island, N. Y., was commissioned on October 15, 1917, with 2 officers and 20 men. The station is located on the extreme west of Long Island. on the south shore of Jamaica Bay. The site is 15 feet above sea level, surfaced with coarse white sand which has been washed from the bay.

The general health on this station has been excellent, except during the month of October and the first part of November, when the epidemic of influenza was flourishing.

On September 26 the recreation room was taken over by the medical officer and put in order for a hospital ward. An emergency requisition was rushed through and a truck sent to the medical supply depot at Brooklyn, N. Y., on the same day for bedding to fit out this room. It has an area of 13,499 cubic feet; 25 beds were fitted out completely and the influenza patients isolated. Never at any time were there more than 25 patients, so we were able to handle them very nicely in the above room. The cases of pneumonia were isolated in the sick bay.

[1] Extract from Annual Sanitary Report, 1918.

The men were urged not to take their liberty and forbidden to ride in the subway trains or to attend public gatherings. No meetings or general assemblies were permitted on the station. Every man was forced to wear a gauze mask over the nose and mouth at all times, and every patient was isolated as soon as he showed any signs of coryza.

Overcrowding in barracks was not permitted, the extra men being quartered in tents, and bedding was put out in the sunshine every day when the weather permitted.

The barracks were scrubbed thoroughly each week with cresol. The duties of the crew were made as light as possible compatible with the upkeep of the station.

Venereal disease.—The proximity of the station to Rockaway Beach, which is a summer resort, and to New York City renders it particularly liable to diseases of a venereal type. Considering that the complement is composed chiefly of raw recruits, who have had very little, if any, training along the lines of venereal prophylaxis in the Navy, preventing venereal infection, presents rather difficult obstacles.

Frequent venereal inspections have been held. We have found that 67 per cent of the gonorrheal infections have come in with the drafts from other stations over which we have no jurisdiction. There has been a tendency among a few medical officers in this district during the past year to permit men to be transferred with acute venereal diseases.

A special effort has been made by the medical officer to apprehend all women afflicted with venereal disease (who associate with the men) according to the laws of the State of New York. This effort has met with only one satisfactory result, i. e., that these people now refuse to associate with the sailor.

One room in the sick bay is set aside and equipped as a venereal room, which is kept open at all times for men who wish venereal prophylaxis. Printed instructions relative to the use of different agents are posted in said room. It is my opinion that, while the training should be done in the home and public school, time spent on this subject is not spent in vain.

Diphtheria.—The Schick test was given to 1,180 men in November to determine their susceptibility to diphtheria. Three hundred and six men, 27 per cent, showed a positive reaction. (The doubtful cases were counted positive.) To these men a prophylactic dose of diphtheria toxin-antitoxin was administered in two doses intramuscularly; 1 c.c. for the first dose, 1½ c.c. for the second dose. The reaction was quite severe in some cases, but no serious results were observed. We do not expect to obtain any degree of immunity before

six weeks from the date of administration. This step was taken to preclude any epidemic of diphtheria.

Athletics.—Athletics have been somewhat neglected here, due largely to the fact that the soil is not suitable for courts or baseball fields. No gymnasium has been provided. During the summer months a baseball team was organized, which played several games with neighboring stations. A basket-ball team was organized in season, which has played several games at different places away from the station. No contest can be held on the station, as there is no gymnasium. Games, boxing matches, and track sports have been held on such occasions as July 4, Thanksgiving, Christmas, etc. The equipment has been supplied by the American Red Cross Society and the Y. M. C. A. Swimming instruction was given during the summer months in Jamaica Bay. The men who could not swim were encouraged to avail themselves of this instruction.

Sanitation.—The southern quarter of the field is taken up by a swamp which is rather difficult to drain. During the summer months the surface of the water is covered with kerosene every 13 days, which serves to kill the larvæ of the culex mosquito. This mosquito is the only type found here. Small ditches are dug through the marsh in which the water collects; this saves oil by lessening the amount of surface; the marsh should be drained.

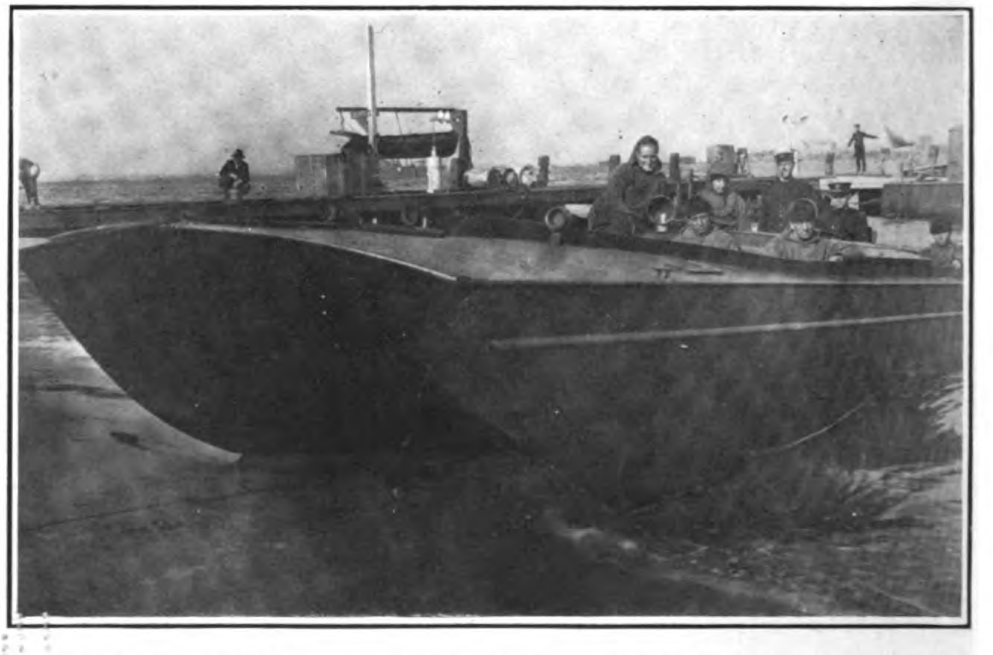
The total capacity of the various barracks, permitting 450 cubic feet per man, is 810 men. On December 31, 1918, there were 1,019 men, showing that the barracks were overcrowded by 209 men. These men were quartered in tents as long as the weather permitted.

A very strenuous effort has been made throughout the year by the medical officer to prevent more men being quartered in the barracks than what was intended, but he met with only partial success except during the influenza epidemic.

The tendency throughout the year has been to send more men here than could be properly quartered. A daily sanitary report in writing has been made to the commanding officer showing the cubic area, capacity, complement, and condition of each barracks. It is recommended that the station complement be limited to 800 men.

The men are well supplied with clothing suitable for the functions which the various details perform. The men that are flying have fur-lined suits, gloves, shoes, etc., sufficient to protect them from exposure. The men on the beach who are in the water are supplied with rubber boots. All other details are equipped accordingly. The texture and durability is apparently satisfactory. There is no ship's laundry provided as yet, but there is one contracted for. A wash room is provided that will accommodate 100 men at a time. It is supplied with both hot and cold fresh water.

Ford automobile converted into ambulance for four patients in litters.



Sea sled held in readiness for rescue work when flying machines are in the air. A hospital corpsman is on board with first-aid equipment.

Sick bay.—This building is situated on the east side of the main street near the central part of the station yet far enough from the shops and hangars to avoid annoyance to the patients by the noise caused by the machinery. The building is a one-story frame structure. It is well equipped with windows and doors and heated by hot-water radiators supplied by the main station plant. This is sufficient and well regulated. Light, both natural and artificial, is sufficient. The electric light is supplied by the main plant. Ventilation is ample. The building is finished with yellow pine which is kept in a neat condition by frequent applications of varnish. The laboratory, toilets, bathrooms, and diet kitchens are finished with white enamel.

There is no dental surgeon attached to the station. During the first half of the year the men requiring such attention were sent to the navy yard at Brooklyn, N. Y., for treatment, a practice which consumed a lot of time and was expensive. For the past few months a hospital apprentice, first class, who is a graduate dental surgeon, has done most of this work. We have no dental supplies and are unable to requisition for any, which forces him to use his own instruments. He has no other duties. The plan has worked out very nicely.

The present sick bay would be quite adequate to take care of the sick on a station with a complement of 120 men for which the one in question was constructed; but to care for the sick among 1,200 men is almost impossible. It is evident that isolation is next to impossible with only two wards. The men are isolated by means of screens at present. We have so far found some way around this difficulty, but we realize the pressing need of more room to isolate patients.

Patients who can not be cared for in the sick bay are transferred to the United States Naval Hospital, Brooklyn, N. Y., which is 32 miles distant, for treatment. This is done by means of an ambulance which was presented to the medical department of the station in July by the American Red Cross Society. This ambulance is of the Ford type; it is equipped, in a way, to carry four patients. The patients are placed on litters of Army style, which fit this type of ambulance. The machine is heated by an apparatus connected with the exhaust from the motor.

When there is any aircraft flying a boat is held in readiness to put to sea. This boat is a sea sled which is quite rapid.

A hospital apprentice is assigned to this boat with first-aid equipment at all times when the operations demand. Every flying machine is equipped with a first-aid and emergency box, and each aviator is supplied with a life-saving jacket.

The pilots of seaplanes are required to pass a special physical examination upon taking up this work. They are closely observed by the medical officer and any man showing signs of "staleness" is asked to refrain from flying until such condition is relieved. Special clothing is issued which serves to protect them from the cold and other unfavorable conditions.

Much complaint was made by these men at the time the Liberty motor came into use about the tremendous noise made by the exhaust, as tinnitus aurum, headaches, vertigo, and other symptoms were experienced. A preparation of absorbent cotton, wool fat, and powdered acacia, was used to occlude the external auditory canal. This relieved the annoyance.

General hygienic conditions.—The grounds are covered with a white sand, which is very disagreeable when there is any wind, as it blows in the face and eyes, and into the barracks and mess hall. This is being partially overcome now by coating the sand with 6 inches of cinders in the vicinity of the buildings. At different times during the year the grounds have become littered with rubbish, which condition was of a temporary nature.

Sewer system.—Most of the buildings, all of those, in fact, which have been constructed since July, including the mess hall and three barracks, are without sewer connections. This results in a very unsatisfactory condition, as the water closets, baths, or washrooms must not be used, causing a dire shortage of the above necessities.

Water.—The water is that supplied by the city of New York, which is satisfactory from a sanitary consideration.

EXAMINATION OF 1,000 MEN TO DETERMINE CHANGES IN WEIGHT UNDER SERVICE CONDITIONS.[1]

By H. HALSTEAD, Lieutenant, and E. A. MALLON, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

While examining men for release from the Navy and placing them on inactive service we noticed that, taken as a whole, they were in much better physical condition than were the recruits we examined some months or a year or two ago.

This led us to question a number of them, and we found that a very large percentage had gained weight and were in better physical condition than on enlistment. This interested us greatly, so we resolved to weigh the men at the time of final examination and compare this weight with their respective weights on their entrance into service. The gain or loss of weight was used as the index of their gain or loss in well being, because it was the only accurate index we

[1] Conducted at U. S. Naval Training Station, Pelham Bay Park, N. Y.

had. On entry into service only the weight and chest measurements are recorded, and the chest measurements taken by any two men differ so widely that they are of practically no value for comparison.

We decided to weigh carefully 1,000 men in order, and base our averages on this number, although some 11,000 men have been released from this station. We felt that a thousand taken in order would be a fair index of the whole. The results of this experiment were so interesting to us that we felt that they might be interesting to others, so we submit our results.

As will be seen from reading the averages given below, nearly all the men (81.6 per cent) gained in weight, the gains running up as high as 33 pounds per individual. We feel that even this gain in the average weight does not fairly indicate the enormous benefit that the regular life and wholesome food of the Navy has done these men physically. A great many of the men who lost the most in weight were thereby benefited physically. For instance, there was one man, a heavy-weight prize fighter, who had lost 23 pounds in weight (from 190 to 167 pounds). When asked about this great loss, he said that it had done him a great deal of good, and that he had never been in better condition, which statement was borne out by subsequent events, for one week later we read in one of the morning papers that he had won a professional prize fight. A number of men who came in soft and flabby went out hard and in good condition, although weighing less. Many others who had lost weight gave the history of just recovering from influenza, sometimes complicated by pneumonia.

Other impressions that we gained by simply questioning the men who had gained or lost weight, was that those whose time had been largely spent in stations in England, Ireland, and Scotland, gained less than those in France, and those in France less than those stationed in this country, or on our ships, but this is only an impression as no statistics were kept on this point. A large majority of these men had been stationed overseas.

As was to be expected, a greater percentage of the younger men gained weight, and they gained a greater amount per man. This is largely due to the fact that quite a number of the older men were overweight on enlistment. We divided our figures into the various age periods because we thought it would add interest. One of the most surprising things to us was that there were so few older men—only one man over 45 years of age in a thousand; one-half the men were between 21 and 25 years of age.

All of these men were weighed on or between February 7 and 11, 1919. In the Bulletin No. 64 (Division of Sanitation) of Notes on Preventive Medicine for Medical Officers, United States Navy, dated February 15, 1919, there is a quotation from an article by

Lieutenant F. I. Ridge, Medical Corps, United States Navy, from the Great Lakes Bulletin, on the "Gain in health shown by men leaving service," in which he reports a series of 500 men examined on leaving service. Their average gain in weight was 5.3 pounds, which is 0.533 pound less than the average gain in our series. The greatest single gain was 33 pounds. This man was between 21 and 25 years of age. Thirty-nine men gained over 20 pounds apiece.

Our figures are appended.

Ages.	Gained.	Lost.	Stationary.	Total.
Under 21	136	7	1	144
21 to 25	427	63	22	512
25 to 30	195	45	16	256
30 to 35	44	24	2	70
35 to 45	14	4	.....	18
Total	816	143	41	1,000

Percentage of men gaining weight	81.6
Percentage of men losing weight	14.4
Percentage of men maintaining stationary weight	4.1
Total	100.0

Average gain in weight of all men, 5.833 pounds.
Average length of time in service, 9 months 10 days.
Average gain in weight of all men who gained, 8.2 pounds.
Average loss in weight of all men who lost, 6 pounds.

Under 21 years.

Men examined.	Pounds.	Average, pounds.
136 men gained weight	1,427	10.49
7 men lost weight	35	5.00
1 man maintained stationary weight	.....	.....
144		

Average length of time in service, 7 months 29 days.
Average gain of weight of all men, 9.972 pounds.

Percentage of men gaining weight	94.44
Percentage of men losing weight	4.86
Percentage of men maintaining stationary weight	.69
Total	99.99

Ages 21 to 25 years.

Men examined.	Pounds.	Average, pounds.
427 men gained weight	3,504	8.25
63 men lost weight	265	4.20
22 men maintained stationary weight	.....	.....
512		

Average length of time in service, 7 months 18 days.
Average gain of weight of all men, 6.32 pounds.

Percentage of men gaining weight	83.4
Percentage of men losing weight	12.3
Percentage of men maintaining stationary weight	4.3
Total	100.0

Ages 25 to 30 years.

Men examined.	Pounds.	Average, pounds.
195 men gained weight	1,412	8.2
45 men lost weight	394	8.7
16 men maintained stationary weight	.....	.....
256		

Average length of time in service, 11 months 3 days.
Average gain in weight of all men, 3.97 pounds.

Percentage of men gaining weight	76.17
Percentage of men losing weight	17.57
Percentage of men maintaining stationary weight	6.24
Total	99.98

Ages 30 to 35 years.

Men examined.	Pounds.	Average, pounds.
44 men gained weight	237	5.38
24 men lost weight	150	6.25
2 men maintained stationary weight	.....	.....
70		

Average length of time in service, 9 months 27 days.
Average gain of weight of all men, 2.67 pounds.

Percentage of men gaining weight	62.8
Percentage of men losing weight	34.2
Percentage of men maintaining stationary weight	2.85
Total	99.85

Ages 35 to 45 years.

Men examined.	Pounds.	Average, pounds.
14 men gained weight	123	8.7
4 men lost weight	14	3.5
18		

Average length of time in service, 11 months 10 days.
Average gain in weight of all men, 6.04 pounds.

Percentage of men gaining weight	78
Percentage of men losing weight	22
Total	100

MEASURES TO PREVENT POISONING BY TRINITROTOLUOL.[1]

By A. SASKA, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

Approximately 80 men were engaged in the T. N. T. plant at this depot during the war, the number having now decreased to about 60 men.

The T. N. T. plant is a one-story building. It is well lighted, clean, and naturally well ventilated. The T. N. T. dust occurs in negligible quantities. A sanitary wash room and shower baths with an abundance of soap and clean towels are provided and the men are strongly advised to avail themselves of them. Gloves, masks, and "casein" hand varnish are at their disposal. The wearing of gloves is condemned, for gloves induce perspiration of the hands, permit the entrance of the T. N. T. underneath, and promote absorption. Only men handling hot T. N. T. are permitted to wear gloves. The wearing of masks is permissible. Protective hand varnish, "casein," which is a mixture of fat-free casein, borax, and water is always available, and the workmen are required to varnish their hands before starting to work. The present medical officer "patrols" the plant every week with a view to observing the condition of the men. Whenever there is the slightest suspicion of ill effects of T. N. T. on the workmen they are at once ordered up for a thorough examination at the dispensary. The practice of the present medical officer is to remove all men from the T. N. T. plant who present the slightest evidence of T. N. T. intoxication. A typical mild case presents the following symptoms: Bitter taste in mouth, slight frontal headache, perverted appetite, and "red" urine. Objectively slight pallor of the lips is observed. In more severe cases there is

[1] Extract from the Annual Sanitary Report of the United States Naval Ammunition Depot, Fort Mifflin, Philadelphia, Pa.

general weakness, shortness of breath, nausea, lack of appetite, cramps in the calves, moderate pallor of face, cyanosis of lips and fingers. Only two cases have been seen of the latter class. There have been no cases here approaching "toxic jaundice" or "aplastic anemia," because the men are closely watched and are not permitted to remain in the T. N. T. plant until that stage of poisoning is attained.

The men removed from the T. N. T. plant are transferred to some other work at this post, preferably in the open air, and are required to report to the medical officer after the lapse of one month. At this time they are again examined and if deemed fit they are permitted to return to the T. N. T. plant, otherwise they are kept out until their condition as determined by repeated monthly examinations warrant their return to the T. N. T. plant.

Most of the cases usually clear up in a month if the men are transferred to outdoor work and are not permitted to handle T. N. T. In August 23 men were taken out of the T. N. T. plant, and of these 17 were permitted to return to work one month later, while the remaining six were permitted to resume their work two months later.

There is no definite period of T. N. T. tolerance or intolerance. It varies with each individual workman. The period depends upon his use or neglect of the hygienic measures offered for his protection and upon his susceptibility. Persons who were engaged in the T. N. T. plant but two weeks had to be taken out by reason of rapid development of symptoms characteristic of T. N. T. poisoning, while others have been continually at work in the plant without manifesting any deleterious effects of the poison. Race does not seem to play any part as a predisposing cause.

SUGGESTED MODIFICATIONS OF THE MARINE SHOE.[1]

By W. L. MANN, Lieutenant Commander, Medical Corps, United States Navy.

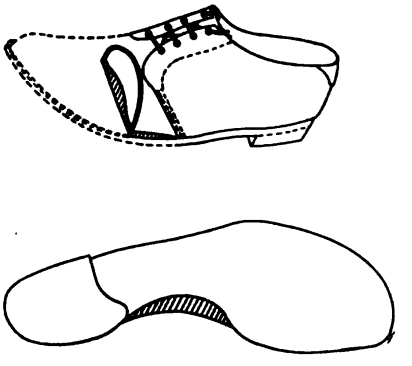
The fitting of shoes for the enlisted man and the care of his feet is a very important matter and should be seriously considered by the officers of the Marine Corps. All the men going overseas were carefully fitted with shoes at the marine barracks, Quantico, Va., and foot measurements were carefully entered in their service records until the advent of the influenza epidemic made it necessary, temporarily, to discontinue this work. Plans were made, however, to resume it and one building has been devoted exclusively to this purpose and an elaborate fool-proof system of fitting shoes inaugurated.

In order to illustrate the importance of this subject it may be mentioned that experience justifies the belief that if the entire present

[1] Extract from Annual Sanitary Report, Marine Barracks, Quantico, Va., 1918.

personnel of this post were required to make a forced march to the firing line, for three days in heavy marching order, at least 1,000 men would probably be incapacitated by foot injuries. Parenthetically it may be remarked that observations at this post indicate that a certain percentage of foot disorders, particularly abrasions near the tendo Achillis, are due to the leggings.

A tentative outline of the features desirable in the military shoe includes (*a*) that the heel of the foot rest in a concavity; (*b*) that the transverse arch be supported by a convexity; (*c*) that the inner border of the foot be better fitted; (*d*) that the inner aspect of the heel be thicker; (*e*) that the sole of the shoe be canted outward; (*f*) that the inner border of the heel extend forward for the increased support of the instep. The big toe, the ball of the foot, and the heel must be in one straight line. The shoe must be roomy in front and fit snugly at the back. The heel of the shoe should contain a concave rubber pad as a shock absorber. The toe should be plain without tip or box. The shoe should be unlined and laced up through eyelets and not over hooklets. The wearing parts of the shoe should be protected by hobnails and heel cap. The uppers should be designed to minimize friction.



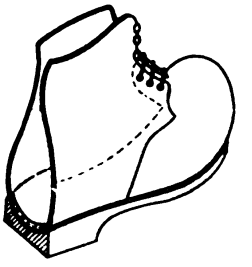
Convexity of sole; indentation of inner border.

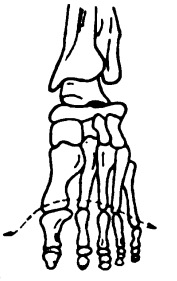
It is generally admitted that the present garrison shoe of the Marine Corps has many commendable features, but certain defects warrant an attempt to improve the type.

The modern tendency is to specialize in types and provide a garrison shoe, a trench shoe, and a field shoe, etc.; consequently two styles are suggested: (1) Semi-dress cantonment style of relatively light weight for use on parade or on liberty. In this shoe the smooth side should be exposed; (2) heavier field shoe intended for rough use as on extended marches. The rough side of the leather should be exposed.

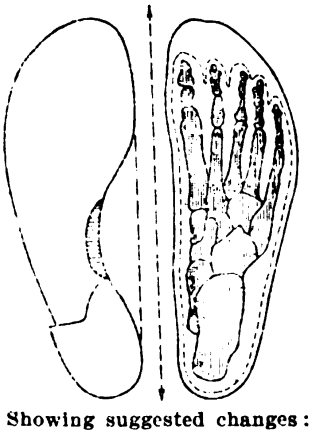
The human foot is distinctly asymmetrical, no two sides or surfaces being at all similar, so that in the average shoe the irregular surface of the foot rests directly on the plain surface. By putting the hand inside of an old shoe one can feel how the upper surface of the sole has in a measure adapted itself to the bottom of the foot. With the average shoe the weight of the body is supported as on a tripod at three points of contact—the heel, the ball of the big toe, and the outer aspect of the foot. A judicious increase in the number of points of contact will manifestly reduce the pounds pressure per

square inch and lessen the danger of foot injuries. With the idea of making the upper surface of the sole conform as nearly as possible to the irregularities of the under surface of the foot the inner surface of the shoe at the heel should be concave instead of plain. The tension of the of the uppers inclines to convert the plain surface of the sole, where it supports the transverse arch of the foot, into a concavity. The shoe should therefore be built with a slight convexity at this point. Such an alteration should minimize the tendency to metatarsalgia. The indentation of the sole at the instep should be considerably deepened and the heel of the shoe should be thickened along the inner edge and carried slightly forward. The sole of the shoe should be slightly canted outward. These changes will increase the support of the instep and weight-bearing area. The shoe constructed with these modifications will favor the unhampered use of the muscles of the foot, the weakening of which is one of the causes of flat feet. The human foot is not a passive means of support but an assemblage of muscles, ligaments, and bones having a definite function. The intricate muscles of the foot are designed to expand and contract at each step. The last of this shoe is really a modified "Munson last;" the hinder portion of the shoe is made thinner to give a snug fit. On the march the heel of the booted foot strikes the hard ground at a rate of nearly 7,000 times per hour, each step causing some jar to the spine. This repeated concussion of the spinal column is not without influence in the production of fatigue. To reduce it a concave rubber inset in the heel of the shoe is recommended. The use of some plastic composition in the sole, as a substitute for cork filling, will automatically help to adapt it to the irregularities of the bottom of the foot. The flexibility of the shank should be increased.





1. Concavity for heel with rubber inset. 2. Transverse arch of foot.



Showing suggested changes: 1. Heel carried forward, inner side. 2. Greater indentation of inner border. 3. Sole canted out.

It is needless to remark that this improvement could with propriety be applied to the Navy shoe. The men who have to stand long watches at sea and move about on the hard iron decks of a

ship; who have to march in parades over cobblestones and who do a very considerable amount of walking when on liberty require as good a shoe as the marines.

TEN MONTHS OF X-RAY WORK AT A NAVAL HOSPITAL.

By C. H. JENNINGS, Lieutenant, Medical Corps, United States Naval Reserve Force.

The X-ray equipment of this hospital was found to consist of an excellent transformer, a table with tube stand attached, a vertical fluoroscope, and a stereoscopic viewing apparatus. Plates were kept on the floor above, and the dark room was in the cellar directly under the X-ray room. Working on three floors entailed considerable lost motion, and the tube could not be safely excited when undeveloped plates were in the dark room. To overcome these drawbacks a door was cut from the X-ray room to a small adjoining areaway, which provided a dark room. An illuminating panel was built on one of the side walls. This arrangement has fulfilled all requirements except for the study of cases which could not be transported to the X-ray room. Portable apparatus is especially desirable for the study of chest cases and of fractures requiring sustained traction.

During the 10 months, including April, 1918, and January, 1919, 3,072 roentgenograms were made of 1,036 patients, 154 cases were examined fluoroscopically, and 20 were given therapeutic roentgenizations. The 684 dental films and 176 dental plates furnished convincing evidence of the prime importance of intelligent care of the teeth. Many apical and marginal abscesses were found. Numerous cases, varying from slightly troublesome pains to grave rheumatoid conditions, have cleared up after these sources of absorption had been remedied. One man whose health record showed 52 sick days with a diagnosis of frontal sinusitis was promptly relieved by the extraction of an impacted third molar. This was the worst of three similar cases, none of which showed any cloudiness in the sinuses. It is evident that frequent dental inspections and the prompt remedy of beginning dental troubles would be a great benefit to the Navy.

The X-ray was frequently used to determine the presence or absence of fractures and to verify the position of fragments within the permanent dressing. Perhaps the most interesting case was a fracture dislocation of the fourth and fifth cervical vertibrae.

Fracture of the carpal scaphoid is an injury very troublesome to a medical officer and can be positively recognized only by means of the X-ray. Early fixation offers the only hope of bony union. They are too frequently treated as sprains, with resulting nonunion and permanent disability of varying degrees. Eight cases have been demonstrated at this station.

Tuberculosis of the hip was demonstrated five times, and of the wrist and ankle, one each. The lungs should always be examined in such cases. Three of the above-mentioned cases showed active pulmonary tuberculosis. An extensive syphilitic osteitis of the humerus nearly escaped detection. This man was referred for X-ray to remove the last doubt before ordering him back to duty.

Painful backs are a continuous source of annoyance and uncertainty to medical officers. It is often impossible to distinguish the malingerer from the real sufferer. Severe myalgias may disappear without treatment. They usually react promptly when energetically baked. Sacro-iliac strain may be very painful, but if proper strapping does not relieve this condition may be ruled out. Sacro-iliac luxations are easily demonstrated by X-rays; however, this is hardly necessary, as the pain is too severe and the luxation too apparent. Lumbo-sacral luxations and dislocations occur more frequently than was formerly supposed. These conditions may be indicated in antero-posterior views, but good lateral X-rays are needed for a positive diagnosis. Anomalies in the bony structure are fairly frequent in this region and much uncertainty exists as to their accountability for the symptoms. Can any significance be attached to the fact that they are most frequently recognized incidental to examination of the urinary tract? Urinary calculi, displaced kidneys and kinked ureters, may be eliminated by means of X-rays. The appendix was the cause in one case. After elimination of the urinary tract and osseous system, and failure to discover any possible source for absorption, the gastro-intestinal tract was investigated. A long appendix was found adherent high up behind the caecum. The young man said he had had no trouble with his back five months after appendectomy.

Hypertrophic arthritis of the spine demands a careful search for a focus of absorption. This is also true whenever there is no visible cause for pain. No man should be labeled a malingerer until all possible sources of absorption have been eliminated. In this connection it has been customary at this hospital to examine the teeth, tonsils, accessory sinuses, lungs, genito-urinary tract, and alimentary tract.

Fracture dislocations are usually accompanied by deformity and marked symptoms. Compression fractures, may, however, be unsuspected until the patient has been on his feet for some weeks, when a spinous process is noticed, and a lateral X-ray shows a wedge-shaped body. Fracture of transverse processes of the lumbar spine occurs more frequently than is generally supposed, and several such cases have been found at this hospital. Obviously no crepitus can be elicited; there is no ecchymosis and little or no limitation of motion. There are no symptoms, save pain, intensified by motion, and points tender to deep pressure. X-rays are obviously necessary for a diag-

nosis. That these fractures are all caused by muscle stress of the ilio-psoas is well illustrated by the following histories. A gunner was catapulted about 4 feet in the air by a heavy safe landing on the opposite end of a skid. A seaman was thrown about 50 feet by the sudden straightening of a hawser. One man hurt at a railroad crossing lost a leg and a finger and at the same time sustained fractures of the frontal bone, a rib, third and fourth left lumbar transverse processes, and a compression fracture of the twelfth dorsal. There was no evidence of direct violence to the spine. The most significant case was that of a fireman trying to break out a large chunk of coal. He said he was standing in rather an awkward position, one hand on the handle, the other near the blade of the shovel, pulling from the side and front, when something snapped in the back. Another fireman, with a very similar story, presented a distinct tender point elicited by deep pressure just below the last rib on the right side, and complained of acute pain when he tried to bend to the lower spine. On the X-ray plates the ilio-psoas muscles were sharply defined, save that portion above the right first transverse process, which was apparently ruptured. No fracture was demonstrated.

Late plates of three of the above cases, treated by early fixation, show complete bony union.

X-rays of sinuses and mastoids have been helpful in establishing a diagnosis and in determining landmarks for operations. Foreign bodies were scarce, only 12 being localized, four being in eyes. One calculus was located in a ureter. One case sent in as an enlarged prostate proved to be a vesical calculus the size of an ostrich egg!

No one save an experienced roentgenologist should be trusted to give authoritative opinions on X-ray findings. This is especially true regarding investigations of the alimentary tract and of the heart and lungs.

Complete gastro-intestinal investigations of 45 cases were conducted. No pathology was demonstrated in 23 of these. Of the pathological cases, one was carcinoma at the pylorus, and three were duodenal ulcers (all accompanied by pathological appendices). Twelve appendices were operated on and the X-ray findings verified. In two cases a pronounced visceroptosis probably accounted for the constipation and gastric symptoms. Two cases had a marked blocking due to post-operative adhesions. One case, also post-operative, showed a marked delay in the terminal ilium, and caused a sharp kink near the ilio-cecal valve.

Hearts were studied both fluoroscopically and by means of the 6-foot plate. A marine who had lost his voice was referred for a possible mediastinal growth. Fluoroscopically could be seen a large pulsating aneurysm of the aorta. Wassermann plus 3.

It was very interesting to compare clinical findings with Roentgen findings on lungs. One case was particularly interesting. This man came in with a running ear of long duration, and the mastoid involved. His tonsils were removed; the discharge from the ear ceased, and the mastoid was much improved. Subsequently a slight rise in temperature, accompanied by a cough, caused him to be referred to the X-ray department. No chest signs were found by the several men who examined him clinically. It was surprising to find an extensive left pneumothorax displacing the heart well into the right chest, the left diaphragm being 4 inches lower than the right. Laboratory report on sputum the next day showed many acid-fast bacilli. A few weeks later, respiration became very much embarrassed. Air pressure was reduced by means of a small needle. A few days later a rib was resected and a large quantity of pus evacuated.

I shall always remember with pleasure the work at this hospital. The Navy spirit of cooperation, so ably instilled by the commanding officer, will, I hope, always remain with, and be a great help to, all the members of Unit No. 9.

DENTAL WORK AT THE NAVY YARD, NEW YORK.

By R. Barber, Lieutenant Commander, Dental Corps, United States Navy.

The Form K dental report for the first quarter of 1919 embraces a greater amount of work than was ever reported before—1,637 cases of all classes—for this station.

Besides these 1,637 cases there were 104 additional patients who were examined but not treated, making a total of 1,741 different patients handled during the quarter. The small proportion not treated—just 6 per cent—is particularly gratifying. Of this 6 per cent probably one-half did not require any treatment. The remainder either refused treatment or failed to keep their appointments due to being transferred, the sailing of their ship, or through indifference.

The patients during the quarter came from 213 ships and stations. Attention has been paid to the sailing dates of ships, and patients of ships preparing for extended cruises have been given particularly expeditious treatment.

This excellent record has been made possible by the organization of the dental department which permitted the dental officers to attain a high degree of efficiency, and which permitted an even distribution of patients, and by the excellent spirit of willingness and cooperation shown at all times by every officer and enlisted person. Sickness of officers and enlisted men and shortage of enlisted personnel were factors which prevented further accomplishments.

DENTAL WORK AT THE NAVY YARD, MARE ISLAND, CALIF.

By J. L. BROWN, Lieutenant, Dental Corps, United States Navy.

The accompanying statistical table shows the character and the amount of the dental work done at this station during the year 1918.

Statistical table, 1918.

Item.	Navy personnel.				Marine personnel.				Naval prison, average complement, 200.		Visiting ships.	Total station personnel, average complement, 7,454.	
	Naval training camp, average complement, 3,197.		Other Navy personnel, average complement, 1,541.		Recruit depot, average complement, 1,640.		Other Marine personnel, average complement, 876.						
	Number.	Rate per 1,000.	Number.	Rate per 1,000.	Number.	Rate per 1,000.	Number.	Rate per 1,000.	Number.	Rate per 1,000.	Number.	Number.	Rate per 1,000.
Cases completed	1,829	572.10	283	183.64	623	379.87	235	268.26	69	345.00	361	3,039	407.70
Total operations	16,126	5,044.10	2,939	1,907.20	7,714	4,703.65	2,446	2,792.23	1,007	5,035.00	3,186	30,232	4,055.80
Extractions	1,792	560.52	290	188.18	2,013	1,227.43	327	373.28	188	940.00	457	4,610	618.45
Restorations	9,316	2,913.98	1,650	1,070.73	3,328	2,029.26	1,250	1,426.94	501	2,505.00	1,797	16,045	2,152.53
Treatments	5,018	1,569.59	999	648.28	2,373	1,446.95	869	992.00	318	1,590.00	932	9,577	1,284.81
Examinations	4,965	1,553.00	281	182.34	7,355	4,484.75	1,025	1,170.09	35	175.00	454	13,661	1,832.70

BOOK NOTICES.

LANDMARKS AND SURFACE MARKINGS OF THE HUMAN BODY, by *L. Bathe Rawling, M. B., B. C., F. R. C. S.* Fifth Edition, reprinted. Paul B. Hoeber, 67–69 East Fifty-ninth Street, New York, 1918.

This little volume of ninety odd pages, though it has passed through five editions in England, is perhaps not as well known as it deserves in this country. The text is simply explanatory for a series of very well made anatomical plates. Taken together they afford an extremely handy, rapid method of readily determining some important point.

QUARTERLY MEDICAL CLINICS, issued by Medicine & Surgery Publishing Co. (Inc.), St. Louis, Volume 1, No. 1.

The first number of this new publication appeared in January and is devoted to a series of clinical demonstrations and lectures by Frank Smithies, of the staff of the Augustana Hospital, Chicago. The material is good. The clinical method of teaching is particularly valuable for the practitioner because it follows the course he must pursue in unravelling from symptoms often obscure, scant or confusing the diagnosis which the standard textbook gives at the start in the form of a definition followed by a long and complete list of all the symptoms likely to appear in a large number of cases. A publication such as this has little or no permanent value to the physician who did not attend the given clinic in person unless it is supplied with a most elaborate and carefully compiled cross index. It remains to be seen whether the fourth number will contain anything of this kind. The ordinary table of contents is useless.

TECHNIC OF THE CARREL METHOD, by *J. Dumas and Anne Carrel*, translated by A. V. S. Lambert, M. D. Paul B. Hoeber, 67–69 East Fifty-ninth Street, New York, 1917.

The method is fully and conscientiously set forth in 77 small pages of large type elucidated by 11 plates. The little book should be of special service in teaching one's assistants and nurses the details of the method.

ESSENTIALS OF SURGERY, by *A. L. McDonald, M. D.* J. B. Lippincott Co., Philadelphia, Pa., 1919.

This is intended as a textbook for use in the instruction of surgical nurses.

ESSENTIALS OF MEDICINE, by *C. P. Emerson, M. D.* Third Edition. J. B. Lippincott Co., Philadelphia, Pa., 1919.

Also a teaching manual very carefully gotten up.

BEVERAGES AND THEIR ADULTERATION, by *Harvey W. Wiley, M. D.* Illustrated. P. Blakiston's Son & Co., Philadelphia, Pa., 1919.

The author has fully succeeded in his avowed purpose of preparing a treatise for the "average, sober-minded, reasonably well-educa-

ted American citizen who is daily taking a greater and deeper interest in what he eats and drinks," but the book contains a great deal of valuable information that will be new to the most highly educated person anywhere and is thoroughly readable from cover to cover, being enlivened with bits of history, quotations, anecdotes, and comments. These and personal observations of the writer impart a "bouquet" like that of some of the wines described. Of the four hundred-odd pages some 65 are devoted to "waters," 27 to "mineral waters," 77 to "soft drinks," and 223 to various types of "alcoholic beverages"—much of the latter having now mainly a historic interest for this country. For the next edition the following minor corrections are suggested. On page 130 write St. André des Arts for St. Abdre des Ares; on page 233 change "is" to "are" in the sentence "is found the vineyards." The French word Pouilles, page 224, to refer to an Italian province, Puglie, is deprecated. Emilia (p. 223) is commonly spelled with one "l" and Charente without a terminal "s" (p. 346).

GUYNEMER, KNIGHT OF THE AIR, by *Henry Bordeaux*. Yale University Press. 1919.

THE ADVENTURE OF LIFE, by *R. W. MacKenna, M. A., M. D.* The Macmillan Co., New York, 1919.

Dr. MacKenna wrote this book while serving with British troops in France. Its purpose is to set forth the author's opinion that the goal of nature is life; the aim of life is the development of intelligence, and the object of intelligence is a knowledge of God. Without preaching, without laying down set rules for thought or conduct, without setting up the confining limits of a definite creed, the author has sought, by marshaling the scientific principles temporarily accepted to-day as a working basis, to inspire the reader to look within and without and to think and feel with new intensity. There are no technical minutiæ which would unfit his little volume for the general reader, yet the author has summarized the researches of Darwin, Lamarck, Haeckel, Huxley, and others and combined them with suggestive quotations from philosophers and poets into an unformulated argument for hope and endeavor—an argument all the more cogent from being tinged with the emotions inspired by his surroundings in trench and hospital. The first chapter is the least inviting and the opening sentence trite, but the book gains in interest with each page; and the sketches on the origin of life, the dominant rôle of intelligence, heredity, and environment, man's freedom of action, etc., compel attention. The little volume should make a special appeal to the physician who desires to abstract himself for the nonce from the busy daily routine and work out from his experiences and observations a philosophy of life.

NOTICE TO SERVICE CONTRIBUTORS.

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

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

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

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

Only the names of actual reviewers for a current number appear.

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

VOL. XIII 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
CAPTAIN J. S TAYLOR, MEDICAL CORPS, U. S. NAVY
IN CHARGE

OCTOBER, 1919

(QUARTERLY)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

NAVY DEPARTMENT,
Washington, March 20, 1919.

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.

NOTE.

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

Volume VII, No. 2, April, 1913.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
Volume XI, No. 4, October, 1917.
Volume XII, No. 1, January, 1918.
Volume XII, No. 3, July, 1918.

SUBSCRIPTION PRICE OF THE BULLETIN.

Subscriptions should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C.

Yearly subscription, beginning January 1, $1; for foreign subscription add 25 cents for postage.

Single numbers, domestic, 25 cents; foreign, 31 cents, which includes foreign postage.

Exchange of publications will be extended to medical and scientific organizations, societies, laboratories, and journals. Communications on this subject should be addressed to the Surgeon General, United States Navy, Washington, D. C.

TABLE OF CONTENTS.

REPORTS—Continued.

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, 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.

U. S. NAVAL MEDICAL BULLETIN

VOL. XIII. OCTOBER, 1919. No. 4.

SPECIAL ARTICLES.

REPORT ON INFLUENZA BY THE STAFF, U. S. NAVAL HOSPITAL, PHILADELPHIA, PA.

SECTION I. GENERAL STATISTICAL STANDPOINT.

By A. B. CLIFFORD, Commander, Medical Corps, United States Navy, and T. C. KELLY and B. A. THOMAS, Lieutenants, Medical Corps, United States Naval Reserve Force.

This report is based on an analysis of 900 cases of influenza admitted to the U. S. Naval Hospital, Philadelphia, during the recent epidemic of that disease. The date of the first admission was September 16, the majority being admitted prior to October 15, with a few scattered cases with subsequent admission dates to November 15. This does not include the whole number of cases admitted during the epidemic, but comprises the first 900 men to be discharged from this hospital, and the percentage mortality, while accurate for the series under discussion, is somewhat high for the whole number admitted during the epidemic, as we have of necessity included most of the deaths which occurred during the period mentioned, but have left out many cases which recovered, which have been on leave and consequently were not discharged from the hospital.

For purposes of critical study, it has been deemed advisable to divide our cases into four groups: Group I, including those cases which were admitted to the hospital within 24 hours of the onset of their illness; Group II, those admitted within 48 hours; Group III, those admitted within 72 hours; and Group IV, all those admitted at a later period of their infection. We have felt that by this means we would be able to show conclusively the great desirability of the early institution of rest and proper medical treatment in this disease, and the fallacy, which is more or less prevalent, of underestimating the seriousness of the possible consequences of delayed rest in bed under

proper supervision. The longer treatment was delayed, the more severe was the illness and the greater the liability to a subsequent pneumonia with probably fatal termination. Practically the whole number of deaths occurring in Group I were in those cases which came in during the beginning of the epidemic, when great numbers of practically moribund patients were admitted and when seemingly the virulence of the epidemic was at its height. These cases gave a history (whenever it was possible to obtain one) of being sick probably only 24 hours, and were accordingly placed in their proper grouping; but they showed no evidence, even from the beginning, of being in the slightest degree amenable to treatment, and pursued a rapid and progressive course toward death. This virulence of the epidemic occurring at its beginning accounted for a greater proportion of the deaths in all the groups as, after the first three weeks, there was a marked diminution both in the number of patients and the severity of their illness.

In the total number of 900 cases there were 885 whites, 11 negroes, and 4 Filipinos, about the average proportion of races among the enlisted personnel of the Navy in this district. Taking the cases up serially, it was found in Group I that the most frequently mentioned chief complaint was headache, which occurred in 52.2 per cent of the cases. Next in order of frequency were chills, general muscular pains, cough, backache, sore throat, weakness, and coryza. In Group II, headache was again the most frequently mentioned chief complaint, occurring in 34 per cent of the cases, and followed by general muscular pains, cough, chills, backache, coryza, sore throat, and weakness. In Group III, headache occurred in 32.7 per cent of the cases, followed by chills, general muscular pains, cough, coryza, backache, sore throat, weakness, and nausea. In Group IV, headache was again the most common chief complaint, occurring in 30.6 per cent, followed by cough, chills, general muscular pains, backache, weakness, coryza, sore throat, nausea and vomiting, and dyspnea.

Of the symptoms in Group I headache predominated, being mentioned in 82.6 per cent of the cases, followed in order of frequency by cough, general muscular pains, chills, backache, weakness, sore throat, coryza, nausea, dyspnea, vertigo, vomiting, and earache. In Group II, headache still predominated, being mentioned in 78 per cent; then cough, general muscular pains, chills, backache, weakness, coryza, sore throat, dyspnea, nausea, vomiting, vertigo, and earache. In Group III, headache and cough were about equally mentioned, occurring, respectively, in 76 per cent and 75.8 per cent of the cases. They were followed in order by general muscular pains, chills, backache, dyspnea, weakness, coryza, sore throat, nausea,

vomiting, vertigo, and earache. In Group IV, cough occurred the most frequently in 83.4 per cent of the cases, followed by headache, general muscular pains, chills, weakness, backache, dyspnea, nausea. coryza, sore throat, vomiting, vertigo, and earache.

On examination the physical sign most frequently encountered in Group I was râles, which occurred in 51.9 per cent of the cases, followed by congestion of the throat and eyes and nose, and in a relatively small number of the cases by cyanosis, toxemia, enlargement of the superficial lymphatic glands, pleuritic friction, herpes, and erythema. Delirium occurred in 23.3 per cent of the cases of pneumonia in this group, and 21 per cent of the cases in this group showed negative physical signs. In Group II râles occurred in 55.8 per cent of the cases, followed in order of frequency by congestion of the throat and eyes and nose, and in a smaller number of cases by toxemia, cyanosis, delirium, pleuritic friction, enlargement of the superfiicial lymphatic glands, erythema, and hiccough. In 15 per cent of the cases physical signs were negative and delirium occurred in 54.8 per cent of the cases of pneumonia. In Group III râles were still the most frequently found physical sign, occurring in 74.4 per cent of the cases, followed by congestion of the throat, toxemia, congestion of eyes, cyanosis, delirium, congestion of nose, pleuritic friction, enlargement of the superficial lymphatic glands, herpes, and jaundice, and erythema. Four per cent of the cases showed negative physical signs, and delirium occurred in 57.1 per cent of the cases of pneumonia. In Group IV râles occured in 74 per cent of the cases, followed by toxemia, cyanosis, congestion of the throat, eyes and nose, delirium, pleuritic friction, herpes, enlargement of the superficial lymphatic glands, jaundice, erythema, and hiccoughs. In this group 59.4 per cent of the cases of pneumonia showed delirium and 9.8 per cent of all the cases were negative on examination.

COMPLICATIONS.

The complication most frequently encountered in Group I was bronchitis, which occurred in 43.4 per cent of the cases, followed by pneumonia, which occurred in 8.5 per cent. Of the pneumonias, broncho-pneumonia was found in all the cases except one, and was almost distributed between right or left sides and both sides. The one case of lobar pneumonia occurred on the left side, and in both types the lower lobe posteriorly was the site selected. Of the other complications, epistaxis was the most frequent, occurring in 5.6 per cent of the cases. Myocarditis was a constant accompaniment of the fatal pneumonias. Pleurisy occurred in the same percentage as myocarditis (2.8 per cent), but in no case in this group was empyema found. Six cases showed a true nephritis and five an otitis media.

There were two cases each of endocarditis, sinusitis, and marked abdominal distention, and one case each of meningitis and pulmonary hemorrhage.

In Group II bronchitis was still the most frequent complication, occurring in 40 per cent of the cases, followed by pneumonia in 15.7 per cent. Of these 14.3 per cent were broncho-pneumonias and 1.4 per cent lobar pneumonias. The distribution of the broncho-pneumonias was about equally divided between right and left sides, with a smaller percentage of double, and in the lobar pneumonias two were right sided and one left. Of the other complications, epistaxis was next in frequency, followed by myocarditis, nephritis, pleurisy, otitis media, and abdominal distention.

In Group III pneumonia was the most frequent complication, occurring in 42.2 per cent of the cases, and of these 39.5 per cent were broncho-pneumonias and 2.7 per cent lobar pneumonias. Of the broncho-pneumonias there was an almost equal distribution between right and left sides and double. The lobar pneumonia occurred twice on the right side and once on the left. The next most frequent complication was bronchitis, occurring in 31 per cent, followed by myocarditis, epistaxis, nephritis, pleurisy, otitis media, and abdominal distention. There was one case each of retention of urine, endocarditis, and epididymo-orchitis.

In Group IV the most frequent complication was pneumonia, which occurred in 42.8 per cent of the cases, of which 40.4 per cent were bronchial in type and 2.4 per cent lobar. Of the broncho-pneumonias 8.1 per cent were right sided, 16.6 per cent left sided, and in 15.7 per cent both sides were involved. The lobar pneumonias showed an equal distribution between right or left side and both. The next most frequent complication was bronchitis, found in 31.1 per cent of the cases, followed by myocarditis, nephritis, epistaxis, pleurisy, endocarditis, otitis media, abdominal distention, and two cases each of cholecystitis and retention of urine, and one case of typhoid fever.

LABORATORY FINDINGS.

The detailed report from the laboratory will be considered elsewhere. However, as regards the gross appearance of the sputum, it may be said that in Group I 56.2 per cent cases were muco-purulent and 43.8 per cent bloody in character. In Group II 52.6 per cent were muco-purulent and 47.4 per cent bloody. In Group III 8.7 per cent were watery, 17.3 per cent muco-purulent, and 74 per cent bloody. In Group IV 3.6 per cent were watery, 41 per cent muco-purulent, and 55.4 per cent bloody. It was frequently observed that in many cases of true influenza before the development of a mixed infection, the sputum was watery and became muco-purulent or

bloody on the appearance of the complicating infection. In many cases the absence of the true tenacious bloody sputum of lobar pneumonia was observed, and it was noted that even when the sputum was blood tinged it still retained its watery characteristics.

As regards the blood findings, it was almost the universal rule that in the uncomplicated influenza cases a leucopenia was present, and that upon the appearance of the complicating pneumonia a leucocytosis appeared which rose in many cases to 30,000 cells per mm.

In the urine it was noted that in the true uncomplicated influenza a trace of albumen without casts was often found, but that almost constantly a true nephritis was found in cases which developed pneumonia.

FEVER AND SICK DAYS.

It should be observed, in comparing the number of sick days in the various groups, that the higher number of sick days was due in most instances to the fact that 30 days' sick leave, which was granted to the convalescent pneumonias, was included in the total of days in the hospital, and that in the groups which had a greater percentage of deaths there were consequently fewer cases to take advantage of such leave, and their stay in the hospital was necessarily much shorter.

In Group I, the average number of fever days was 3.4 days, with the lowest 0 and the highest 19; the average number of sick days was 22.1, with the lowest 3 and the highest 75 days.

In Group II, the average number of fever days was 4 days, with the lowest 0 and the highest 21; the average number of sick days was 21.5, with the lowest 3 and the highest 72 days.

In Group III, the average number of fever days was 4.8 days, with the lowest 0 and the highest 21; the average number of sick days was 18.4 with the lowest 2 and the highest 71 days.

In Group IV, the average number of fever days was 4.1 days, with the lowest 0 and the highest 25; the average number of sick days was 19.9 days, with the lowest 1 and the highest 72 days.

TREATMENT.

As regards treatment in the various groups, it is to be noted that the mild cases, which number approximately two-thirds of the total number, require no stimulation and that almost without exception they recovered. This should be borne in mind in comparing the results of routine treatment with and without stimulation, as the higher percentage of deaths among the stimulated cases were among those which were most severe, which required stimulation and who very often died in spite of it.

In Group I, which included 352 cases, 82 per cent recovered without stimulation and 0.3 per cent died; of those requiring stimulation 13.9 per cent recovered and 2.5 per cent died. There were 10 cases (2.8 per cent) treated with vaccine with recovery and no deaths. Five cases (1.4 per cent) were treated with salvarsan. with recovery and no deaths. There were 30 pneumonias in this group, with a mortality rate of 33.3 per cent. The mortality rate of all the cases in this group was 2.8 per cent.

In Group II, comprising 197 cases, 73 per cent recovered without stimulation and 1 per cent died. Of those requiring stimulation, 17.2 per cent recovered and 7 per cent died. There was one case treated with salvarsan which died. In this group there were 31 pneumonias, with a mortality rate of 54.8 per cent, and the mortality rate for all the cases in this group was 8.6 per cent.

In Group III, which included 116 cases, 47.5 per cent recovered without stimulation with no deaths. Of those requiring stimulation, 21.5 per cent recovered and 27.5 per cent died. Six cases received vaccine, of whom three recovered. There were 49 cases of pneumonia in this group, with a death rate of 72.9 per cent, and the total death rate for all cases in this group was 30.2 per cent.

In Group IV, which included 235 cases, 48.1 per cent recovered without stimulation and none died. Of those requiring stimulation, 20 per cent recovered and 29.8 per cent died. Six cases received vaccine, all recovering, and one case received salvarsan with recovery. There were 101 cases of pneumonia in this group, with a death rate of 70.2 per cent, and the total mortality rate for this group was 30.2 per cent.

SUMMARY.

In summarizing all the cases, irrespective of their groups, it was found that the chief complaint was headache; the most common symptoms were headache and cough; and the most constant sign found on examination was râles, either as an expression of bronchitis or pneumonia. Of the complications, bronchitis was found in 37.8 per cent of the cases and pneumonia in 23.3 per cent, of which 21.9 per cent were broncho-pneumonia and 1.4 per cent lobar pneumonia. Myocarditis occurred in 14.4 per cent of the cases, epistaxis in 9.6 per cent, nephritis in 7.3 per cent, and pleurisy in 4.1 per cent. There were eight cases each of endocarditis and abdominal distention, two cases each of cholecystitis, sinusitis, retention of urine, and meningitis, and one case each of typhoid fever and epididymo-orchitis. The death rate for the cases of pneumonia was 63.3 per cent, and the total death rate, irrespective of the complications, was 14.7 per cent.

The total number of cases admitted during this period, including many whose records were not completed, and consequently not in this series, were 1,217. Of these 297 developed pneumonia, a percentage of 24.4 per cent. Of the pneumonias 141 died, a mortality rate of 47.5 per cent, and the total mortality for the whole number of cases admitted during the period under discussion was 11.6 per cent.

Chief complaint.

Group I.	Per cent.	Group II.	Per cent.	Group III.	Per cent.	Group IV.	Per cent.
Headache	52.2	Headache	34.0	Headache	32.7	Headache	30.6
Chills	12.5	General muscular pains	15.3	Chills	18.1	Cough	23.4
General muscular pains	10.2	Cough	13.7	General muscular pains	15.5	Chills	16.4
Cough	8.5	Chills	11.6	Cough	12.0	General muscular pains	9.8
Backache	6.2	Backache	9.6	Coryza	9.5	Backache	5.5
Sore throat	4.2	Coryza	6.6	Backache	6.0	Weakness	4.7
Weakness	3.1	Sore throat	5.1	Sore throat	3.4	Coryza	4.3
Coryza	2.8	Weakness	4.1	Weakness	1.7	Sore throat	3.0
				Nausea	.8	Nausea and vomiting	1.7
						Dyspnea	.8

Symptoms.

Group I.	Per cent.	Group II.	Per cent.	Group III.	Per cent.	Group IV.	Per cent.
Headache	82.6	Headache	78.0	Headache	76.0	Cough	83.4
Cough	67.6	Cough	69.0	Cough	75.8	Headache	77.0
General muscular pains	53.9	General muscular pains	55.3	General muscular pains	58.6	General muscular pains	63.0
Chills	48.8	Chills	46.2	Chills	52.5	Chills	48.5
Backache	34.6	Backache	42.6	Backache	46.5	Weakness	43.8
Weakness	24.4	Weakness	30.5	Dyspnea	42.2	Backache	40.0
Sore throat	20.1	Coryza	22.8	Weakness	37.0	Dyspnea	32.8
Coryza	18.4	Sore throat	20.3	Coryza	24.1	Nausea	20.8
Nausea	10.5	Dyspnea	15.7	Sore throat	19.8	Coryza	19.6
Dyspnea	8.5	Nausea	13.7	Nausea	18.1	Sore throat	17.4
Vertigo	7.9	Vomiting	10.2	Vomiting	15.5	Vomiting	15.6
Vomiting	5.9	Vertigo	5.6	Vertigo	6.8	Vertigo	9.8
Earache	2.8	Earache	3.0	Earache	3.4	Earache	2.6

Physical signs.

Group I.	Per cent.	Group II.	Per cent.	Group III.	Per cent.	Group IV.	Per cent.
Râles	51.9	Râles	55.8	Râles	74.4	Râles	74.0
Congestion of throat	30.9	Congestion of throat	30.5	Congestion of throat	35.3	Toxemia	35.3
Congestion of eyes	22.7	Congestion of eyes	27.4	Toxemia	31.8	Cyanosis	34.0
Congestion of nose	11.6	Congestion of nose	14.2	Congestion of eyes	28.4	Congestion of throat	31.1
Cyanosis	5.3	Toxemia	11.2	Cyanosis	27.5	Delirium	25.5
Toxemia	4.8	Cyanosis	8.6	Delirium	24.1	Congestion of eyes	22.6
Enlargement of supralachrymal gland	3.4	Delirium	8.6	Congestion of nose	12.0	Congestion of nose	11.2
Pleuritic friction	2.8	Pleuritic friction	3.0	Pleuritic friction	8.5	Pleuritic friction	4.7
Herpes	1.7	Enlargement of supralachrymal gland	1.5	Enlargement of supralachrymal gland	7.7	Herpes	3.4
Delirium	1.9	Erythema	1.5	Herpes	2.5	Enlargement of supralachrymal gland	3.0
Erythema	1.4	Hiccough	1.0	Jaundice	.8	Jaundice	2.6
				Erythema	.8	Erythema	2.1
						Hiccough	.8

Complications.

Group I.		Group II.		Group III.		Group IV.	
	Per cent.		*Per cent.*		*Per cent.*		*Per cent.*
Bronchitis	43.4	Bronchitis	40.0	Pneumonia	42.2	Pneumonia	42.8
Pneumonia	8.5	Pneumonia	15.7	Broncho:		Broncho:	
Broncho:		Broncho:		Right 12.0		Right 8.1	
Right 3.4		Right 5.1		Left 14.6		Left 16.6	
Left 2.5		Left 5.6		Both 12.9		Both 15.7	
Both 2.2		Both 3.6			39.5		40.4
	8.1		14.3	Lobar:		Lobar:	
Lobar, left	.4	Lobar:		Right 1.7		Right 0.8	
Epistaxis	5.6	Right 1.0		Left 1.0		Left .8	
Myocarditis	2.8	Left .4			2.7	Both .8	
Pleurisy	2.8		1.4	Bronchitis	31.0		2.4
Nephritis	1.7	Epistaxis	11.1	Myocarditis	30.2	Bronchitis	31.1
Otitis media	1.4	Myocarditis	8.6	Epistaxis	12.9	Myocarditis	28.5
Endocarditis	.6	Nephritis	6.0	Nephritis	10.3	Nephritis	15.3
Sinusitis	.6	Pleurisy	.3	Pleurisy	8.6	Epistaxis	13.2
Abdominal distention	.6	Otitis media	1.0	Otitis media	2.5	Pleurisy	4.7
Meningitis	.3	Abdominal distention	.5	Abdominal distention	1.7	Endocarditis	2.1
Pulmonary hemorrhage	.3			Retention of urine	.8	Otitis media	1.7
				Endocarditis	.8	Abdominal distention	1.3
				Epididymo-orchitis	.8	Cholecystitis	.8
						Retention of urine	.4
						Typhoid fever	.4

SUMMARY.

900 cases.

	Per cent.
Complications:	
Bronchitis	37.8
Pneumonia	23.3
Bronchial—	
Right-sided	6.1
Left-sided	8.4
Both sides	7.4
	21.9
Lobar—	
Right-sided	.66
Left-sided	.55
Both sides	.22
	1.4
Myocarditis	14.3
Epistaxis	9.6
Nephritis	7.3
Pleurisy	4.1
Otitis media	1.5
Endocarditis	.8
Abdominal distention	.8
Cholecystitis	.2
Sinusitis	.2
Retention of urine	.2
Meningitis	.2
Typhoid fever	.1
Epididymo-orchitis	.1
Incidence of pneumonia (210 cases)	23.3
Mortality of penumonia	63.3
Total mortality of all cases	14.7

Total of 1,217 cases.

	Per cent.
Incidence of penumonia (297 cases)	24.4
Mortality of penumonia	47.5
Total mortality of all cases	11.6

SECTION II (*a*). THE CLINICAL AND THERAPEUTIC STANDPOINT.

By H. A. HARE, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

As statistical data concerning the epidemic of so-called influenza in the fall of 1918 are given elsewhere, this section does not attempt to deal with that aspect of the subject.

The dominant fact is that in the vast majority of cases the illness was not the result of infection by one pathogenic organism, but was a multiple infection in which one of several organisms was the chief agent or in which all were approximately equally responsible. If the word "influenza" is used to indicate that this epidemic was simply due to the bacillus of Pfeiffer it is misapplied, for the symptoms were not those produced heretofore by this organism, and in many instances it was present in such small numbers as to be fairly considered a collateral infection of secondary importance. While the pneumococcus was constantly present, as it is in most human beings at all times, it did not, except in very rare instances, produce its characteristic pulmonary lesion or physical signs, nor did it produce the sputum of croupous pneumonia. The great number of cases suddenly taken ill prevented, to a great extent, the "typing" of this organism, but here again it may be said that if the pneumococcus was a predominant factor in any case it produced results widely different from any heretofore seen.

The physical signs of disease, the symptoms, and the lesions recognized at autopsy were much more those of the streptococcus hemolyticus than of any of the other associated organisms.

The breaking down of the blood, its discharge from any orifice of the body in a state of hemolysis, the extravasations, *not* exudations, into the pulmonary parenchyma and smaller bronchial tubes closely resembled the changes caused by those poisons which, when introduced into the body, cause hemolysis, such as snake venom or potassium chlorate. My belief as a clinician, rather than as a laboratory worker, is that more of the fulminant cases, characterized by the putty-colored face and hands with mulberry-colored lips, were due to this germ with the others acting as secondary invaders.

In some instances the smears of the sputum were almost entirely made up of the spirillum of Vincent, generally without lesions in

the mouth, and it is interesting to note that when such was the case the daily use of 0.3 arsphenamin intravenously produced remarkably favorable results, as it did in other cases in which this spirillum was not demonstrated, although possibly present.

I will not discuss the physical signs commonly found, except to say that the most characteristic pulmonary sign was an area, usually posteriorly, in the middle area of the chest, of remarkably well-defined tubular breathing without râles, which area often speedily spread over a wide portion of the lungs, so that at autopsy it looked and felt as if filled with melted currant jelly rather than a croupous exudate.

It is a subject for regret that therapy seemed in many instances perfectly useless, probably because the poison of the disease so rapidly attacked the heart muscle and the muscular coats of the vessels that they were incapable of responding to stimulation. A large, voluminous, low-tension pulse in an artery so relaxed as to feel to the finger more like a pulsating vein was commonly met with, and in these cases it often happened that the heart seemed to beat vigorously for a time in an endeavor to fill relaxed vessels. Indeed, I saw many cases in which the apex beat was still forcible on palpation and the heart sounds loud, yet in which the patient was pulseless at the wrist.

The complete failure of digitalis in these cases led us at first to think that the preparation used was impotent, but subsequent trials showed that no form or preparation of the drug possessed any of its ordinary powers. Indeed, I saw many cases in which the end seemed to be hurried by its use. This is in accord with general experience in the sense that digitalis acts best for a tired heart in valvular disease, but often fails in the weak heart of acute infectious processes, particularly if associated with fever. The same statement is also true of strophanthus.

The drug which seemed to act best as a stimulant was caffeine alkaloid in doses of 2 grains three or four times a day as a rule. Whisky also seemed to do good, provided it was not pushed too hard and did not upset the stomach. Caffeine by unlocking reserve energy, and alcohol by being burnt up in the body, probably acted indirectly in those cases.

For the relief of the pains in the limbs and back, 2 grains of cinchidin with 5 to 10 grains of aspirin seemed most useful, but they had no specific effect and in the fulminant cases was not used or had no chance to do good.

Proctoclysis with normal saline, or with glucose solution, was useful to provide fluid to the tissues but had no definite effect otherwise.

The great rapidity of the respiration, the great restlessness and delirium of many of the severe cases indicated the use of easily

assimilated food. This was provided chiefly by the use of semi-liquid breakfast foods, diluted with milk, to which taka-diastase or pancreatin was added to hurry the first stage of carbohydrate digestion. I believe this is a valuable measure.

None of the ordinary hypnotics possessed power for good in my observation in any safe dose. Delirium or excessive cough were best controlled by morphine or codeine in full doses.

Finally, the following observations made by me I believe to be correct. In addition to the great incidence of the disease in those between 20 or 30 years of age, red-haired or sandy-haired patients seemed to suffer the most, particularly if they were of the lymphatic type. Next to them came the very blond man, while negroes seemed partially immune. Of course, there were marked exceptions to this in the sense that dark-haired men sometimes suffered severely.

Another point of interest is that some cases were stricken and died in a few hours or in two days; others began moderately and then without any apparent cause became fulminant after 48 hours or more; still others with temperatures as high as 105° on entrance speedily came to normal with little systemic symptoms or local lesions.

Section II (*b*). THE CLINICAL AND THERAPEUTIC STANDPOINT.

By F. T. Billings, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

The severe cases were beginning to be much diminished in number, although still very ill patients were being admitted. The majority of the patients under consideration were young adults, seemingly in the height of physical fitness. Therefore, the general impression was the presence of large reserve force for resistance. On being admitted to this hospital many of the patients had been sick two or three days or longer. The examination revealed generally some cyanosis of the lips and fingers, extending to body in the bad cases, so that there was often a bluish color to the whole skin. In the large majority, either when coming to the hospital or later during the course of the disease, a papular eruption was observed on the back and to a lesser extent the front of the body. These papulars were frequently capped with minute pustules, varying in size from a pin point to a pinhead. In a few instances we observed a moderate jaundice, coloring the conjunctiva and the skin. In one case this occurred during a severe pneumonia in a colored man, and in my opinion was probably of the hemolytic type. The sclera was generally injected and there was some complaint of coryza. In our cases there were only a few nasopharyngeal infections. In one instance a frontal sinus infection occurred, with extensions to the frontal lobe.

meningitis, and death. Otitis media was practically absent. The tongue usually showed signs of the toxemia, and in the bad cases was dry and leathery. The pharynx and tonsils were generally a dark red, but sore throat was not usually complained of. Hemorrhages from the nose to a lesser or greater degree were more or less common, and in one instance it was necessary to resort to packing and the injection, intramuscularly, of serum. In nearly every case a general adenitis was discovered upon examination. This often included the whole chain of external glands—cervical, axillary, epitrochlear, and inguinal. These persisted during the course of the disease, but never became larger than a pea or a bean.

In this epidemic the brunt of the invasion seemed to have been borne by the respiratory tract. Cough was probably the most general symptom, and this was usually dry and unproductive at first, but later in the course of the disease the sputum became remarkably untenacious and fluid, ranging in color from rusty to red. This sputum was somewhat remarkable in that the amount for 24 hours was generally more than was customary and that the blood seemed to have undergone hemolysis. Pain in one or both sides of the chest was common and at times was most prominent. Physical signs discovered in the chest were restricted respiratory excursions, hyperresonance, hyporesonance to dullness or flatness, restricted, feeble, or absent breath sounds, patches, of bronchial or bronchovesicular breathing, moist râles, crepitant and subcrepitant râles, pleural friction rub, with later pleural creak. Therefore the findings of the typical cases of influenza (broncho-pneumonia, for the great majority of patients seen by us later developed broncho-pneumonia) showed at first at one or both bases in back, hyporesonance, very feeble breath sounds, and often on deep inspiration fine moist crepitant râles. Later these signs might develop into an impaired resonance, patches of bronchovesicular or bronchial breathing, limited to a greater or less extent, moist râles becoming larger and more pronounced. At times portions of whole lobes were involved, consolidated. Particularly noticeable were the feeble or diminished breath sounds, frequently nearly absent. This in the early stages was in many instances the only sign on the first physical examination. In 24 or 48 hours, however, crepitant râles would appear. Mild cases did not go beyond these, while others showed those classical signs of patches of pulmonary consolidation. Pleural effusions were relatively uncommon, although undoubtedly in many cases there was an accumulation of 100 to 300 c. c. not recognizable by physical signs. In two instances large effusions were found at autopsy which had not been clinically discovered. One case was gone over three days before death as carefully as possible, considering the desperate condition of the patient.

I believe there was rapid accumulation of fluid in the intervening days. The other patient died on the day after admission.

Fortunately, we were able to secure many X-ray plates of the chests of our patients. These corroborated the physical signs and are reported upon in full in Section III.

In the great majority of cases the lower lobes were the portions involved. Seldom did the process commence or extend to the upper lobes. Where this did occur we were always suspicious of a tubercular infection, and the sputum was examined regularly. In this series of cases there were but few complications of this character. There were observed by me no instances of lung abscess or gangrene.

As a rule, the respiratory rate was not markedly raised. Of course, there were many exceptions to this, particularly in the extremely toxic. The temperature was not at all characteristic, sometimes remaining at a high point for several days consecutively, suddenly dropping, remaining approximately normal for a few days, and then rising again. Relapses—that is to say, true relapses—were uncommon, but lighting up of new areas in the lungs where the old were subsiding was frequent. In fact, in this respect the picture was that of the ordinary broncho-pneumonic infections. It was surprising the length of time marked pulmonary lesions, consolidations, feeble breath sounds, etc., persisted after the patients were seemingly on the straight convalescent road. At times these physical signs took weeks to clear up.

In the examination of the respiratory apparatus and in classifying these patients, all those in which were found at the bases showers of fine crepitant râles were diagnosed as influenza with bronchopneumonia. The general picture of a mixed infection and the sputum showed various organisms, streptococci, pneumococci, micrococcus, catarrhalis, influenza bacilli. A few spirochaetes were found, particularly in those cases in which there was a noticeable amount of blood in the sputum. Later, lung punctures were made and frequently pure cultures of influenza bacilli were obtained from these.

The cardio-vascular findings were interesting. No pericardial involvements were found, but undoubtedly the heart muscle suffered at least temporary impairment in many instances, as shown by the poor quality of the sound at the apex and the loss of the muscular component. Murmurs were not frequent. At autopsy the valves were found intact. A rather remarkable and frequent observation was the relative slowness of the pulse compared to the temperature range and evident illness of the patient.

The blood pressure was generally low—110 systolic or lower. The leucocyte count was also in the majority of cases low—10,000 or less; polys predominating, but showing granular changes. Blood cultures

were generally negative, although a few were positive for the pneumococcus and streptococcus.

The digestive apparatus was not materially affected. There was some nausea and vomiting. In a few cases, perhaps a dozen, there was diarrhea. In the majority of instances there was some abdominal distention and pain on palpation, particularly in the right iliac fossa. This latter symptom cleared up rapidly, however, but during its presence markedly simulated appendicitis. The former frequently persisted, particularly in the toxic cases, and was extremely difficult to overcome. There was great distaste for food, and one of the most encouraging signs was the gradually increasing appetite. The spleen and liver were seldom palpated—probably in not more than three or four cases.

In nearly all the patients who were seriously ill the urine showed albumen and occasionally casts, but there was never an acute involvement or any evidence of serious renal changes. In about 15 individuals the functional kidney tests were made with pheno-sulphopthalein. These were particularly unsatisfactory and did not give us any information of importance. There were a number of cases of retention, necessitating catheterization a few times. In most of those seriously ill delirium was common, but definite involvement of the central nervous system was rare. This did occur, however, in three cases. In these undoubtedly we were dealing with a nervous type of influenza. The general examination was negative except for positive Koenig, Bruzinski, and stiff neck, somnolence, and complaint of headache. In all these patients punctures (spinal) were made, with negative results, and they all cleared up in a few days. Post-influenza psychoses were observed in about six patients of this series.

All cases were given a thorough physical examination. The latter includes a routine Wassermann, leucocyte count, urine and bacteriological cultures. Concerning the latter, sputum, lung puncture, and blood culture were instituted, and are reported in detail under Section IV. All cases of consolidation were typed for pneumococcus. One case was of Type I. The majority of cases were of Type II. Serum was only given in one instance where the classification was uncertain (either Type I or Type II) without benefit, and in the one definite case with immediate turn for the better.

D. G. S. This patient developed a right-sided encapsulated empyema, which was needled. On the third needling 50 c. c. of Type I serum was injected into pleural cavity and 50 c. c. given intravenously. Following these injections elevation of temperature and other clinical evidences of pus disappeared and patient went on to an uneventful recovery.

During the routine examination of sputum of a number of patients a spirochaete was found. This seemed particularly the case where

the blood in the sputum was marked. The use of salvarsan was begun. This was done at first only on those cases and later, particularly after the middle of October, 1918, on practically all, with broncho-pneumonia. During the period covered by this report 75 patients received arsenobenzol, a majority two or more times. In 24 hours after being admitted 0.2 gram was administered intravenously, followed by urinary test and leucocyte count. If the patient did not show marked improvement and the kidney irritation was not pronounced, 0.3 gram was given the second day. If necessary, two more injections of the same dosage were given provided there was no particular complication. Many cases seemed to do extremely well under this treatment. There was in the majority a drop in temperature, and the patients themselves declared they felt easier, could breathe more freely, were better in every way, seemingly less toxic. For some weeks we seemed to have had uniformly successful results. Even those cases which at times appeared almost hopeless reacted well and recovered. However, later we had quite a few failures—patients whom nothing seemed to benefit and who progressively became more and more toxic and eventually died. It is possible, however, and highly probable that there are groups of cases which salvarsan can not influence. In my opinion, use of this drug from the time of its administration, October 14, 1918, up to the present, has been of decided benefit to a comparatively large number. Of this series of 74 patients to whom this treatment was given 9 died, a mortality of a little more than 12 per cent.

In a few of our cases quinine was given in large doses, intravenously or intramuscularly. These were so few, however, that we were unable to draw conclusions. Further treatment consisted of stimulation, elimination, and symptomatic measures.

Section II (c). THE CLINICAL AND THERAPEUTIC STANDPOINT.

By J. Daland, Lieutenant Commander, Medical Corps, United States Naval Reserve Force.

These observations are based upon a study of the more serious of about 3,000 cases of influenza occurring among the officers and men in the United States Navy in Philadelphia. Most of the patients were between the ages of 20 and 26 years and were in unusually good physical condition.

Influenza appeared in the British Army in May, 1918, and was brought to Philadelphia by ship. The first case of influenza was diagnosed on September 12, 1918, at the United States Naval Hospital, League Island, Pa., unrecognized cases having occurred earlier. At first the epidemic resembled that of 1889–90, but marked differences were quickly observed, such as a greater toxicity and mortality, sus-

ceptibility of young adults, and partial or complete immunity of those past middle age.

The epidemic was characterized by extreme contagiousness, rapid onset, early and rapidly developing adynamia, cyanosis, and a high rate of mortality. The period of incubation averaged from 1 to 4 days.

The U. S. S. *West Gaylock* sailed from an uninfected port in California, arriving at the Philadelphia Navy Yard on November 19, 1918. Although the epidemic was subsiding, 35 men were admitted to the United States Naval Hospital with influenza differing in no respects from cases observed during the height of the epidemic in October. This observation disposes of the theory that the virulence of influenza diminished at the end of an epidemic and supports the idea that the disease disappears because most nonimmunes have been infected.

Influenza may be clinically classified as mild, ordinary, severe, or toxic. The toxic variety may be subdivided into pulmonary, circulatory, nervous, gastrointestinal, and renal.

A typical example of mild influenza occurred in a 16-year-old girl, who was suddenly seized with headache, backache, pains in the extremities, malaise, and attacks of slight or moderate perspiration, occurring daily for two or three days. In the beginning the cough was slight, infrequent, dry, later becoming more frequent and accompanied by a small amount of muco-purulent sputum, containing many influenza bacilli. Auscultation revealed a few dry bronchitic râles in both lungs and an extremely feeble respiratory murmur at both bases. The muscular element of the first sound of the heart was extremely weak, and this organ did not react to the stimulating effect of fever. The pulse was easily extinguished by slight pressure and was less frequent than the fever would indicate; the systolic and diastolic pressures were low and the pulse pressure large. The fever lasted but a day, coryza and sneezing were absent, the eyes unusually brilliant, and the vessels of the ocular conjunctivæ injected. During the first four or five days the only symptoms complained of were headache, backache, weakness, frequent attacks of moderate perspiration, diminished appetite, and constipation. The urine showed no important change. Despite these few symptoms and the brief duration of fever, weakness continued, necessitating rest in bed for 10 days. On the 10th day extreme fatigue was caused by sitting up for 30 minutes. Two weeks later the patient was improved, but weak, and required two weeks' rest at the seashore before complete recovery was secured. This case typifies an extremely mild influenzal infection, with ephemeral fever ocurring in one previously healthy, and illustrates the severity of the toxemia in a mild case of influenza.

Ordinary influenza presented the same symptoms and signs as mild influenza, excepting that the fever, usually remittent in type. continues for four or more days, the pain in the head and extremities is more severe, cheeks are more flushed, conjunctival vessels more injected, eyes brilliant, exhaustion more pronounced, lips cyanotic, and the few dry râles later become numerous and moist.

The urine showed occasionally a trace of albumin and a few granular and hyaline tube casts. The sputum usually contained not only the influenza bacillus but also the pneumococcus., streptococcus, staphylococcus, and the micrococcus catarrhalis. The leukocyte count usually showed a moderate leucopenia.

Severe influenza was characterized by an exaggeration of the symptons, and signs of ordinary influenza and complications were frequent.

The following incident illustrates the onset: Two well-developed unusually strong coal-passers who were in the best of health on a Thursday and when admitted to the U. S. Naval Hospital, League Island, were so weak the following morning that one fell on the floor and the other had scarcely sufficient strength to remain sitting on a chair. The lips, lobes of the ears, and finger nails showed cyanosis, varying in degree from blueness to blue-black, and occasionally extending to the extremities, trunk, and the mucous membranes of the pharynx and larynx.

In many cases adynamia was so profound that normal breathing was impossible. When the patient was commanded to take a deep breath he would make an obvious effort and breathe slightly more deeply, but each succeeding breath was feebler than its predecessor, evidencing weakness and rapid exhaustion. It is probable that feeble or absent breath sounds, when no pulmonary disease exists, excepting a moderate bronchitis, is due to the excessive weakness of the intercostal muscles and diaphragm, due to deficient innervation and toxic myositis. Occasionally breath sounds were masked by numerous loud, sibilent, sonorous, and mucous râles.

Auscultation in bronchitis revealed an extremely weak respiratory murmur, and in many cases the breath sounds in one or both of the lower lobes were absent. Vocal fremitus and resonance was diminished and bronchitis râles were few and scattered.

Lobular pneumonia was very common and usually began in small areas disseminated throughout one or both lungs, frequently locating in the lower spinal half or the apex of one of the lower lobes and usually undiagnosable at first because of the feeble or absent breath sounds and emphysema. During ordinary respiration subcrepitant râles may be absent but may be induced because of cough or deep inspiration. Those râles are easily overlooked because of their small volume and low pitch or may be masked by loud, dry râles. Even when small areas of lobular pneumonia become larger, the phonen-

doscope reveals scarcely audible low-pitched bronchovesicular breathing and percussion dullness may be absent if these areas are located in the central portion of the lung or the surrounding tissue is emphysematous. When areas of lobular pneumonia coalesce and occupy the periphery or a considerable part or the whole lobe of a lung, the percussion note is dull, the breath sound bronchovesicular or bronchial and vocal resonance and fremitus is increased. Respiration is superficial in all forms of this disease, but in severe influenza the respiratory murmur is not only feeble but remains feeble, even though one or both lower lobes of the lungs become congested or pneumonic. The unaffected parts show no compensatory overaction so uniformly observed in lobular pneumonia. Passive venous congestion of the base of the lungs was common. Occasionally dullness on percussion and feeble breathing, lending to the diagnosis of broncho-pneumonia, would vanish overnight, due to the disappearance of pulmonary congestion and collapse following the expulsion of a plug of tenacious muco-pus blocking one of the large bronchial tubes. The cough was frequent and paraxysmal and often interfered with sleep. The sputum was at first mucoid and later muco-purulent, moderate in amount, and frequently blood stained. The bloody sputum was usually at first sight bright red and later dark brown and occasionally salmon colored or rusty. When the sputum was thin and watery, resembling diluted red paint, the streptococcus hemolyticus was usually present and death ensued. In mild and moderate influenza the respiratory rate was ordinarily normal. Whenever the respirations exceeded 24 per minute pneumonia was suspected, and this suspicion was strengthened if the sputum was blood stained, excepting when pleuritis caused the increased respiratory rate. Polymorphonuclear leucocytosis usually accompanies broncho-pneumonia. The combination of normal percussion resonance, vocal fremitus, and resonance with absence of breath sounds occurred so frequently that at first the author believed that his hearing was impaired or that the stethoscope or phonendoscope was defective, but repeated observations corroborated the first observation, and in describing this frequently recurrent group of signs the term "silent lungs" was employed. In the beginning it was difficult to ascertain the causes of these "silent lungs," but soon the following were recognized:

1. The lung failed to function because of adynamia and extreme weakness of the muscles of respiration.
2. Extreme pulmonary engorgement.
3. Obstruction of the lumen of the bronchial tubes by:
   (*a*) Inflammatory swelling of the mucosa.
   (*b*) Tenacious and muco-purulent or hemorrhagic exudate.

4. Collapse and congestion of an area of the lung, secondary to complete obstruction of the bronchus.

5. Areas of lobular pneumonia surrounded by emphysema.

Lobular pneumonia frequently exists unrecognized or may later develop in condition described under 1, 2, 3, and 4.

Pleurisy almost always occurs as a complication of influenzal broncho-pneumonia, and may be serous, sero-fibrinous, or purulent, frequently occurs in the physical signs and symptoms, and may be general, interlobar, or diaphragmatic.

The characteristic superficial friction rub was usually inaudible because of feeble respiration or because the exudate was butterlike in consistency. A crumpling or subcrepitant-like sound occurring at intervals during the early part of the inspiratory phase of respiration, simulating the crepitant râle of pneumonia or the subcrepitant râle of capillary bronchitis, at times replaces the characteristic friction rub. Pleural friction sounds may be masked by loud bronchitic râles. Frequently pleural friction crepitant and subcrepitant râles were simultaneously present. Large serous effusion seldom occurred. In a few cases the quantity of soft gelatinous exudate was so large that the physical signs simulated those of a serous effusion, but the aspirating needle revealed no fluid. In many cases the pleuritis remained plastic throughout, but was usually accompanied by a serous exudate, small in amount, light brown in color, of high specific gravity, markedly albuminous, and occasionally containing the pneumococcus or streptococcus. Serum exudates usually occur without recognizable symptoms, but if not too small in amount were easily diagnosed by the physical examination. In many cases of pleurisy the severe pain caused diminished pulmonary expansion, feeble breath sounds, an increased rate of respiration, and these same signs were occasionally observed in plastic pleurisy without pain, probably due to reflex action. Reflex pleuritic pains have been erroneously diagnosed as cholecystitis or appendicitis. Physical signs of a large serous effusion appeared overnight in a few cases of broncho-pneumonia without causing a marked increase in dyspnea, polypnea, or displacement of the apex beat of the heart. This combination of signs and symptoms lead to the inference that although the physical signs indicate a large effusion the absence of pressure signs was best explained by assuming that the effusion was moderate in amount and was located between layers of the pleura, having a thickness of about 2 inches, held in position by a noncollapsible broncho-pneumonic lung. This clinical interpretation was confirmed later by a case that came to autopsy. In one case 200 c. c. of serum exudate was removed and a small pyo-pneumothorax developed, as the broncho-pneumonic lung could not expand. As a rule, pleural exudates were absorbed

and when respiration was embarrassed paracentesis was not performed. At short intervals a small quantity of the liquid was removed to determine whether it remained serous or had become purulent. Extensive adhesions are common after pleurisy and frequently the X-ray reveals complete adhesion of the lung to the diaphragm. Usually interlobar and diaphragmatic sero-plastic or purulent pleurisy are not diagnosed, but the latter may be suspected when friction sounds are heard over the borders of the lung or when referred pain occurs in the upper abdominal, gall bladder, or appendix regions, or when the fluoroscope shows adhesions. Circumscribed, interlobar, or diaphragmatic pleural effusions are usually overlooked but should be diagnosed by the aspirating needle, physical signs, and X-ray. Pyothorax was diagnosed with difficulty excepting when the amount of pus was large. Sacculated, interlobar, and diaphragmatic empyema sometimes evaded diagnosis and was revealed by the sudden discharge through the lung of a pint or more of pus. After spontaneous rupture of an empyema into the lung the signs of pyo-pneumothorax often developed and recovery usually followed, but occasionally drainage through the chest wall became necessary. Circumscribed interlobar empyema is more apt to evacuate through the lung than any other variety. In one case following a severe paroxysm of cough an emphysematous bleb over an area of broncho-pneumonic lung ruptured into the pleural cavity, infected the pleura and caused a pyo-pneumothorax. In one case two sacculated empyemas were observed in one pleural sac.

During the epidemic of pneumonia occurring in the U. S. Naval Hospital, Philadelphia, in the winter of 1917, empyema occurred in 25 per cent of the cases. Consequently this complication was expected in this epidemic. Contrary to this expectation, however, empyema was of rare occurrence during the height of the epidemic, and relatively few cases occurred later. When empyema appeared the streptococcus or pneumococcus was usually present. Antistreptococcus serum was of unquestioned value in a case of influenzal streptococcus empyema, and one case of influenza complicated by pneumonia followed by empyema, due to pneumococcus Type I, was greatly benefited by antipneumococus serum, injected subcutaneously and also into the empyema cavity, which had been partially evacuated by paracentesis.

In severe influenza circulatory disorders were almost as common as pulmonary disorders. Varying degrees of weakness of the heart muscle were usually present, and in most cases the muscular element of the first sound was remarkably weak and at times valvelike. Frequently the apex beat could not be seen or felt. The cardiac neuromuscular mechanism was usually disturbed, as shown by the frequency of the alteration in the pulse-temperature ratio, as, for

example: Temperature 104 F., pulse 80. As a rule the pulse was hypotensive and weak but regular in force and rhythm. Occasionally the cardiac rhythm was transitorily disturbed during a paroxysm of cough or by exertion. Arythmia from neuro-myocardial disease was rare, and in one case sudden and unexpected death occurred. The systolic and diastolic pressure was low, the pulse pressure high, and in a typical case the systolic pressure was 85 mm. and the diastolic 45 mm. The frequency of this blood-pressure picture in association with marked adynamia closely simulated that of advanced Addison's disease and suggests a diminution or loss of the functions of the adrenals. Although cardiac murmurs were usually absent, nevertheless it is possible that in certain cases sufficient ventricular dilatation occurs to permit of tricuspid or mitral regurgitation, the absence of the murmur being due to myocardial weakness.

Pericarditis was conspicuous by its absence and hydropericardium was only occasionally observed. The superficial and deep veins were frequently overdistended and the arteries seemed less full than normal, indicating a partial emptying of the arterial blood into the venous system.

Cyanosis was a frequent, striking, and serious complication of the epidemic. In mild cases the lips, ears, and finger nails were slightly bluish; in ordinary cases the cyanosis of the lips and ears increased and also extended to the cheeks and hands; the color became more distinctly blue. In severe toxic influenza cyanosis may extend over the entire body and include the mucous membrane of the mouth and the color may deepen to a bluish black. All the factors concerned with the cause of cyanosis could not be fully determined, but it was evident that the chief and perhaps the sole cause was a toxemia acting upon various organs and tissues of the body. There was evidently a disturbance of the function of the vasomotor mechanism and a diminution or loss of the function of the adrenals, due to inflammation.

Toxic myocarditis caused pulmonary and venous congestion, which was increased by the partial emptying of the arterial blood into the venous system, which with toxic broncho-pneumonia favors suboxidation of the blood. Digitalis, atropine, and alcohol usually failed to produce their physiological effect and venesection was useless or harmful.

In the nervous form of severe influenza the mind was usually dull. Somnolence was common and the patient slept most of the time, but was easily awakened. When toxemia is more marked somnolency is replaced by slight, moderate, or marked stupor or coma. Delirium may occur similar to that seen in typhoid fever, or may become maniacal and require physical restraint. In a few cases delirium

continued for days, accompanied by photophobia and slight retraction of the head, simulating meningitis, evidently due to a toxic irritation of the mininges and cerebral cortex as the spinal fluid showed no evidence of inflammation. Frequently, lethargic or mildly stuporous patients with extensive broncho-pneumonia, obviously critically ill and within 24 to 48 hours of death, nevertheless stated that they felt well and requested permission to leave the bed and return to duty. This strange inability to appreciate the seriousness of their condition is probably due to a marked distubance of the perceptive centers. Marked mental depression was not uncommon and was sometimes associated with the fixed idea that recovery was impossible and that death must follow.

Delusional insanity of the mild, melancholic, or suicidal variety occasionally occurred. A convalescent from influenza while working about the hospital wards, apparently improving, was suddenly seized with a suicidal impulse, secured a razor and cut his throat, but fortunately recovered; a second patient was foiled in an attempt to commit suicide by jumping from a height; and a third patient had a series of epileptiform convulsions, preceded and followed by melancholic or depressive delusions, from which he ultimately recovered. Adynamia is marked and the decubitus indicates extreme muscular relaxation. Involuntary evacuation of the urine and feces is common, and the patient may unconsciously expectorate anywhere at any time.

In the gastrointestinal form of influenza the most common symptoms are coated tongue, foul breath, aversion to foods and drinks, unwillingness to swallow, anorexia, nausea, and vomiting. The vomitus is usually free from blood; the abdomen may or may not be tympanitic and is not painful upon palpation. Blood appeared in the feces of three cases of influenza, one of which was complicated by typhoid fever. Diarrhea occasionally occurred when there was no evidence of gastrointestinal ulceration. This form of influenza was frequently fatal.

The renal form occurs in three-fourths of the cases of severe influenza. The urine usually showed a trace or a moderate amount of albumin, a high specific gravity, granular and hyaline casts, and not infrequently a number of erythrocytes, interpreted as indicating acute toxic nephritis. The volume of urine excreted was usually diminished and clinically it was impossible to recognize evidences of uremia which if present were merged into the clinical picture of toxemia. In a few instances the phenolsulphonphthalein test for the functional activity of the kidneys was made, but the results were so contradictory that deductions were impossible. One would expect varying degrees of diminution of the renal function and in severe toxemia the renal

function should be almost abolished. Passive congestion of the kidneys was common.

Jaundice occurred infrequently and was due to toxic hepatitis, and no case of catarrhal hepatitis or cholecystitis was observed. Several cases of severe pain referred to the gall-bladder region, due to pleurisy, were diagnosed cholecystitis. In one case, a negro, the jaundice was so intense that the sputum was canary yellow in color, due to bile. About 50 per cent of cases of jaundice terminated fatally. Primary sinusitis and otitis were rare, but occasionally latent sinusitis and otitis became acute during influenza. Paracentesis in acute otitis media usually yielded a bloody serum, but seldom pus. Epitaxis was very common and was usually associated with venous engorgement and passive swelling without evidence of inflammation. The blood seemed to ooze from the mucous membrane and usually no ulceration could be detected.

Hoarseness and aphonia occasionally occurred, and the laryngoscope showed positive congestion and swelling.

Complications and sequelae.—Toxemia dominates the clinical picture of influenza and is not only the chief complication but also the chief cause of death. Young men possessed of unusual strength and vitality succumbed without resistance, due to the virulency of the toxemia.

The usual pulmonary, circulatory, nervous, gastrointestinal, and renal complications and cyanosis have all been sufficiently discussed. Hyposthenia and pulmonary edema are a frequently fatal terminal complication of pneumonia. Uncommon complications are phlebitis, thrombosis, neuritis, parotitis, sinusitis, aphonia, herpes, purpura, and subcutaneous emphysema. Relapses are not uncommon, but many so-called relapses occurring in convalescents are due to the recrudescence of existing bronchitis, pneumonia, or pleurisy, or the conversion of a serous into a purulent pleural effusion. Any preexisting disease, as, for example, pulmonary tuberculosis or chronic Bright's disease, may become a serious or fatal complication or sequel by becoming active and progessive during an attack of influenza. Five cases of influenza were complicated by meningococcic cerebrospinal meningitis. One case of influenza developed diphtheria and broncho-pneumonia, involving the middle and lower lobe of the lung and another typhoid fever, and it is probable that all were carriers. Many carriers of the pneumococcus, streptococcus, and staphylococcus became infected with the influenza bacillus.

Influenza occurring in carriers of various microorganisms is the cause of many obvious or obscure complications.

The most common sequal of influenza is well-marked weakness, continuing many weeks, due to the effect of the toxemia upon the

nervous system, or myocardium, causing well-marked symptoms of neurasthenia, circulatory weakness, anginoid pain or angina pectoris, or the weakness may be circulatory and myocardial in origin.

Chronic bronchitis, chronic pleuritis, empyema (sacculated or general), pyopneumothorax, chronic broncho-pneumonia, chronic sinusitis, and chronic otitis may occur as complications or sequelæ.

Section III (*a*). Roentgenological Standpoint.

By R. H. Boggs, Lieutenant, Medical Corps, United States Naval Reserve Force.

The complications of influenza were studied by the Roentgen rays at the U. S. Naval Hospital, Philadelphia, all the plates being taken stereoscopically with a few exceptions, when the patients were too sick to be moved. The plates were studied in conjunction with the various staff officers, and the shadows shown were accounted for clinically by operation or autopsy. Many of the patients were examined repeatedly, which made the series of cases examined extremely interesting. The picture of the pneumonic process was a lobular broncho-pneumonia and usually appeared anatomically in a disseminated form. The foci were very near together and confluent in certain parts of the lungs and in others obscure and far apart. The stereoscopic picture showed the image to be made up of a series of distinct shadows more or less confluent and in most cases separated one from another by clear spaces. In some cases the appearance of certain forms of chronic tuberculosis was simulated.

It is evident that an influenza broncho-pneumonia may give a stereoscopic picture analogous to certain forms of tuberculosis, and that it is only by care and by knowing the clinical side of the case that the true nature of the pulmonary process may be ascertained. When examining by a single radiogram these influenza pneumonias, one would get the impression that the lung cast a rather dense shadow in certain regions; but when a stereoscopic pair of plates were examined the apparent densities seen on a single plate were shown to be caused by added shadows throughout the lung tissue, and this was the reason that in so many cases so little was obtained by percussion. After studying a series of cases by the Roentgen rays it was interesting to note the accuracy with which we could tell the kind of breathing the lung densities would produce, namely, bronchial, bronchovesicular, etc.

The influenza chest of a very sick patient would usually give a rather characteristic picture. The glands varied in size from a grain of shot to a pea or even larger, and had a clear-cut edge as though each were injected with a rather dense material. This,

together with prominent hilus shadows and increased linear markings of the lung fields, was called an influenza chest. If the glands were very prominent with some confluent areas of consolidation, the patient was always found to be very sick. The difference in the linear markings from those found in the tuberculous lung was that they were more general and usually throughout both lungs. These lines continue plus for some time after influenza, and a differential diagnosis from tuberculosis is going to be extremely difficult. This is bound to be a source of error during the next two or three months. Some of these influenza chests, having prominent linear markings, have been examined repeatedly since their recovery, and the plates showed that these markings were slow in disappearing. Influenza frequently caused the so-called fan-shaped markings described by Dunham, which is supposed to be diagnostic of tuberculosis. Influenza seemed to make a tuberculous process more active, this being particularly true in latent cases. Thickened pleura or effusions are clearly shown by roentgenogram. The layers of the pleura are only visible in the pathological state when inflammation has produced a thickened pleura or a serofibrinous deposit on its walls.

During the recent influenza epidemic large pleural effusions were not very common, but small collections of circumscribed effusions or thickened pleura were frequently seen. The large pleural effusions presented the usual X-ray findings and offered no difficulty in interpretation. There were a few instances in which extensive thickened pleura with a plastic exudate of the lower lobe simulated a large pleural effusion, except that there was no displacement of the heart or change of level of the density with position. The diaphragm shadow was lost and it was fixed by pleural adhesions. To further confuse the findings a partly solidified lung was often present. Then the differential diagnosis required all the skill of the internist and the roentgenologist. Several such cases were confusing to all, and in one case in particular the patient was not referred to the X-ray laboratory until his temperature was running a normal course.

In many of these thickened pleuras, with a small amount of effusion, the temperature was the most diagnostic sympton because the patient's degree of sickness was too acute to be accounted for by the physical findings alone. By hasty interpretation in many of these cases a large pleural effusion would have been diagnosed when only thickened pleura with a plastic exudate was the cause of the extensive shadow. As a rule, the diagnosis of pleural effusions belongs to the clinician and is only confirmed by the X-ray. However, under certain circumstances, the Roentgen method plays an important part, not only in the diagnosis, but also in determining the treatment that is advisable. The pleural effusion may be of small amount, but asso-

ciated with more or less pulmonary consolidation. This will modify considerably the physical findings as well as the Roentgen image.

Sometimes after pneumonia the temperature returns and symptoms are aggravated. Then the question arises whether it is a pneumonic process with slow resolution and the symptoms aggravated or whether it is pleurisy. The clinician is often unable to state what positively exists, and auscultation reveals such miscellaneous pleural and pulmonary signs that they are difficult to interpret. Some dullness persists and it is almost impossible to draw positive conclusions. The question of interlobular or a roentgenologically circumscribed pleurisy arises and the Roentgen study carefully considered with the clinical symptoms has been found to be of extreme value. Here the interpretation of the plate is not easy, and the roentgenologist must be a physician and one who can interpret his findings in conjunction with the clinical findings presented by the internist. In fact, the roentgenological examination is not conclusive; it is necessary to interpret what is seen and draw conclusions for a useful diagnosis. The difficulty of interpreting chest plates demands an accurate knowledge of anatomy, physiology, and pathology, and consequently can not be done by anyone but a physician who knows the normal and what abnormal shadows are cast by the various pathological lesions. Roentgenology has become a science, but there is need of greater collaboration between the physician and the roentgenologist.

As before stated, the clinical diagnosis of circumscribed pleurisy is difficult and the Roentgen method therefore becomes of the greatest use in detecting small effusions, but it is not limited to that alone, because many of these small purulent effusions need immediate intervention. The exact location of the effusion can be determined and the plates will show from what point it should be approached. The Roentgen image of interlobar pleurisy with effusion is quite characteristic, consisting of a transverse band which entirely crosses the pulmonary field and divides the lung into three zones. If the pleural effusion is limited to the interlobular space and is slight the respiratory movements of the diaphragm may only be slightly interfered with. Interlobular pleurisy with effusion was found to be rare; the circumscribed was more common and often found in the axillary region.

In studying the chest of these influenza cases I was struck very forcefully by the fact that we really had no standard normal lung roentgenogram any more than we had a standard normal Roentgen picture of the stomach. It is well known that an examination of healthy individuals without any lung infection of any type will reveal a widely different picture as to the character and thickness of the bronchial trees, and also a vast difference in the general

density of the lung fields. Therefore before we are able to interpret chest findings roentgenologically we must always study the history of the case and know what changes have occurred in the lungs prior to the condition under examination. This study should include the various diseases that the patient may have had and the changes due to inhalation of various particles of dust, such as result from patients having worked in mines, cement works, or even having lived in some cities.

Again, the study of a series of chest plates of healthy individuals, without any history of disease whatever and having lived under favorable conditions, will show the hilus and parenchyma to vary considerably. The diagnosis of tuberculosis is always considered in the study of any chest, since a patient may have had a latent affection without any history of the disease. A study of the various changes of the lungs which is likely to take place during life without the history of any pulmonary diseases or those which are so minor as to escape detection must be studied carefully. We all know that the bronchial tree and the lung fields give a different appearance in a healthy child 5 or 10 years of age as compared with a person of 60 or 70 years of age, depending on many conditions. Possibly the lungs might be compared to the skin, being in childhood firm and elastic and in old people wrinkled, atrophic, etc., both conditions being normal for the individual.

In conclusion, the Roentgen ray as a means of diagnosing and recording the changes in the lungs and pleura are not directly diagnostic, but when compared with inspection, palpitation, percussion, and auscultation yield much more accurate information than can be obtained by physical signs alone. It is a more accurate method than percussion alone, because even deep percussion is not accurate more than 2½ inches below the surface, and the density in the lungs and pleura can be better compared to the normal and surrounding or adjacent organs and tissue. Stereoscopic plates taken anteriorly and posteriorly show the density and thickness of a pneumonic lung or a layer of fluid in the pleural cavity. By knowing the thickness and density of the pathologic lesion in the lung or pleura or both together, with its position, one can usually tell what kind of breathing is heard by the stethoscope. The fluoroscope is a valuable aid to the roentgenologist in chest examinations in showing that much of the function of the lungs is disturbed by the pulmonary disease, but it can not take the place of a good pair of stereoscopic plates taken posteriorly and anteriorly. The value of taking plates both stereoscopically, anteriorly, and posteriorly must not be neglected, because an image of density nearest the plate is always copied the most accurately and distinctly. By taking anterior and posterior plates we were able to determine the situation of the lesion, which could not

be done by anterior or posterior plates alone. It therefore follows that one who makes his diagnosis by the fluoroscope alone is never making a complete examination of the chest by roentgenology. Less dependence should be placed on a fluoroscope and more on stereoscopic plates taken before and after. Unfortunately, we have strong advocates of both methods, when the fact is that it is only by a combination of both, together with a careful history, symptoms, familiarity with different lung pathology, and by careful physical examination that a diagnosis should be made. Without having these, a dagnosis should never be attempted.

Section III (*b*). THE ROENTGENOLOGIC STANDPOINT.

By H. K. Pancoast, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

The recent epidemic of influenza has furnished the roentgenologist with a wealth of material for the study of the chest, and he who has not taken this unusual occasion to enrich his experience in thoracic diagnosis has missed an unusual opportunity. A roentgenological study of this epidemic resolves itself into the application of this means of diagnosis in the following groups of cases—those of uncomplicated influenza; the so-called fulminating cases, in which death has occurred in a short period of time; the cases passing on to a more or less diffuse broncho-pneumonia without massive or conglomerate consolidations; those presenting clinical evidences of consolidation; cardiac complications, pericardial effusions, pleural effusions, and the more remote results such as empyema and thickened pleura; lung abscess; certain accidents connected with pleural involvement, as rupture of empyema into a bronchus; spontaneous pneumothorax and rupture of an abscess into the pleura cavity; and extra-thoracic complications.

The last group is unimportant and may be dismissed at the outset with a few remarks, in order that this report may give place of paramount importance to the intrathoracic manifestations of the infecting agents. The only conditions outside the chest with which the roetgenologist has had to deal have been infections of the accessory nasal sinuses, mastoiditis, and arthritic conditions. Accessory sinus complications have been comparatively uncommon, especially as compared to the number of cases that have been referred for sinus trouble during many of the minor influenza epidemics of recent years. The mastoid cells have apparently claimed a greater share of involvement, and on numerous occasions we have been called upon to examine cases of subacute or chronic mastoiditis. Arthritic complications or sequelae have been rare.

There has been no greater proof of the value of cooperation between the clinician and surgeon and the roentgenologist than in the study

of the cases of thoracic manifestations of the infection and the complications. In many instances, appearances were so unusual or puzzling that a combined clinical and roentgenological study of the cases was essential for an accurate interpretation of findings, and on most occasions this was of mutual benefit. On so many occasions the disease seemed to break up all combinations of physical signs whereby the lesions could be detected, but the Roentgen-ray examination served to solve the problem. Hence the surgeon was greatly aided by the Roentgen-ray study in very many instances. It must be said, however, that without cooperation with the clinician a large part of the roentgenological work would have been inaccurate, especially early in our experience, before the peculiarities of the disease were understood.

Our study of uncomplicated influenza cases yielded practically the same findings as those of other roentgenologists in this country and abroad. In practically all cases there was a very definite increase in the size and density of the hilus shadows and an undue prominence of the linear markings and increased thickness of the coarser ones. It is too soon to state how soon those changes will disappear. The hilus shadow seems to disappear first—in two or three months or longer. The decrease in prominence of linear markings is likely to take a much longer time. There is undoubtedly more or less of a glandular element in the increased hilus shadow and in some cases irregular bronchial and mediastinal glandular shadows were observed of such proportions as to simulate mediastinal growths. These extreme cases usually had broncho-pneumonia, however. The increased prominence of linear markings has already imposed a decided difficulty upon the diagnosis of other pulmonary affections, especially tuberculosis. Unfortunately, this difficulty will continue, and numerous errors in the Roentgen-ray diagnosis of tuberculosis are bound to occur in the near future. A clinical history of the case with regard to the presence or absence of influenza in the past few months is very essential in connection with every request for a Roentgen-ray study of a chest for tuberculosis.

Our experience does not, unfortunately, include a study of the roentgenologic features of the fulminating types of influenza. During the early weeks of the epidemic when the patients were dying in such large numbers any exertion on the part of the patient or any unnecessary movements were carefully guarded against, and the slight manipulation attending Roentgen-ray examinations were looked upon as dangerous. Any possible advantages of an examination did not seem commensurate with the risks entailed. The use of portable bedside units, if they had been obtainable, would, of course, have solved the problem.

There has been sufficient evidence to prove that broncho-pneumonia was present in many instances when its presence could not be detected or proved clinically because of the absence of any conglomerate consolidation. These cases were always profoundly ill, but in all of them a diffuse mottling could be readily shown by the roentgenogram in addition to the increased hilus shadows and prominent linear markings. The mottling varied in extent from a localized area, possibly a single lobe, to an entire lung or both lungs. The appearance was frequently in no way different from that of a diffuse broncho-pneumonic type of tuberculosis, but the acute broncho-pneumonia case would rapidly progress to actual consolidation or clear up, whereas there would be but little or no change in the appearance of the tuberculosis in one to three weeks. Frequently the mottled appearance would show signs of becoming conglomerate in one or more areas where possibly physical signs would be suspicious. These areas would then either show signs of clearing up or become densely consolidated.

There was nothing unusual in the appearance of the actual consolidations presenting clinical evidence of such. As most of them formed by a conglomeration of small areas, at least from the roentgenologic standpoint, as just described, there was usually more or less mottling beyond the limits of the consolidation, unless the latter was sharply defined by an interlobar fissure. In such instances one might have some difficulty in differentiating such an appearance from that of a localized collection of fluid. Very often, however, such a consolidation did not present the perfectly homogeneous shadow characteristic of a pleural effusion.

Unresolved pneumonias have been comparatively common, but the duration of the delayed resolution is uncertain, as no cases of this kind were examined serially. The appearance was quite similar to a forming consolidation. In a few instances a delayed resolution would be found in one area and a forming or frank consolidation in another. These were cases which required a clinical study as well in order to determine that there was a reinfection. In many cases of supposed delayed resolution fluid was found in the pleural cavity, either localized or free at the base. In others there was a combination of delaying resolution and fluid.

The only cardiac complication of interest roentgenologically was dilatation. So far as we were able to determine exactly, this was uniform in most instances.

Pericardial effusion was found in only two cases, and as its presence was always doubted to a certain extent clinically, paracentesis was not performed. The very rapid and enormous enlargement of the heart shadow and its comparatively rapid subsidence were very strongly positive evidences of effusion. No double shadow was ob-

served, and the cardiohepatic angle was not obliterated. There was a coincident empyema in this case, which presents some interesting features.

Male, age 18, admitted with pneumonia following influenza. Referred for Roentgen-ray examination October 16, 1918, with the following clinical notes: Left side—consolidation at base with partial pleural exudate, either interlobar or diaphragmatic; right side, suspected pleural exudate, but negative to aspiration. Heart displaced to right and upward, rapid feeble impulse.

Roentgen-ray examination.

October 16.—Recumbent posture, plate posterior; probable pericardial effusion, the heart shadow being too large for dilatation. Right side, localized collection of fluid, axillary region. Left side, thin collection of fluid in axillary region high up.

October 20.—Erect posture, plate anterior. Heart shadow somewhat smaller, as would be expected, but still large enough to suggest a pericardial effusion. Right side, the effusion found high up in the recumbent posture has now descended to the diaphragm. Left side, nc change.

November 2.—Recumbent posture, plate posterior, after aspiration of pus right side up in posterior axillary line. Heart and pericardial shadow has decreased somewhat. Right side, the empyema shadow has resumed its previous high level of the recumbent posture and has increased in extent. Left side, the effusion has cleared slightly.

November 10.—Erect posture, plate anterior, after aspiration of 1½ ounces of thick pus from the right axillary region. Heart shadow much smaller. Right side, the lower pocket is again filled in the erect posture and very dense. By fluoroscope the right diaphragm was fixed. Left side, effusion decreased, thickened pleura at base.

November 16.—Patient lying on left side, plate posterior, after aspiration of 1½ ounces of pus from right axillary region. Thickened pleura and pneumothorax at right base. This probably explains the change in level of fluid in the erect and recumbent postures, the pneumothorax having been obscured until the patient assumed the laterial position. Complete collapse of the lung was prevented by adhesions.

November 18.—Erect posture, plate anterior. The small right pneumothorax is now shown between the empyema and heart shadow.

December 4.—Recumbent posture, plate posterior. Heart and pericardial shadows have diminished 2⅝ inches in width. Right side, the empyemic shadow has diminished considerably in width but now descends to the diaphragm in the recumbent posture. The shadow was largely thickened pleura, but fluid still evident by an increase in the lower part of the shadow in erect plates. Left side, no evidence of fluid remains.

December 17.—Recumbent posture, plate posterior. Heart shadow still abnormally large, especially to the left. Right side, thickened pleura showing at base. Left side, slightly thickened pleura showing at base. Fluoroscope showed very much restricted diaphragmatic excursion each side, but equal on the two sides. Patient apyretic, nontoxic, and gaining weight and strength.

Pleural effusions yielded the most interesting study of any of the complications or sequelae of the infection. They were probably little or no more frequent than the proportion usually accompanying pneumonia cases, but, because of the large number of pneumonia cases, pleural complications were generously provided. The epidemic did, however, yield many rather unusual phenomena in the pleural cavity. The majority of the effusions were thin and spread out, even in the erect posture, and frequently were not of sufficient thickness to noticeably influence breath sounds or percussion note. Naturally most of them were posterior or in the axillary region from the position of the patient, but it was frequently difficult to decide from the roentgenogram whether they were posterior or anterior. This sometimes could be decided by making plates both back and front and comparing density of shadow when it was not possible to detect the effusion by a lateral view.

The effusions seemed to have a tendency to become plastic rapidly, and hence to become localized in single or multiple areas, usually regular but sometimes somewhat irregular in outline. Small effusions of this kind would either dry up and disappear, organize into thickened pleura, or become infected as localized empyemas.

The basal pleural thickening is worthy of special mention because of its effect upon diaphragmatic movements. All cases of pneumonia with pleural complications should be carefully studied fluoroscopically, especially before discharge, to determine the extent of diaphragm excursion. It was almost invariably found that pleural complications at the base caused a subsequent lessening of diaphragm movement and sometimes complete fixation. This would frequently be the finding in patients complaining of shortness of breath. It is likely that the impaired movement will be noted for a long time and will embarrass respiration as long as it is noticeable, or at least until increased movement of the ribs and of the diaphragm on the other side compensates for it.

Empyemas, like simple effusions, were found general or localized, and the number of localized collections was unusually large for the same reasons as given in connection with serous effusions. A large number of empyemas were examined, but this would be expected from the prevalence of severe pneumonia cases and the nature of the infection. Of the possible or likely locations for localized empyemas, posterior, axillary region, interlobar, diaphragmatic, and

hilus or vertebral, we found them in all of these places with the exception of the diaphragmatic, so far as could be determined. Most posterior localized collections were at or near the base. This was probably the most frequent location and the axilliary region next in frequency. Only one well-defined vertebral collection was observed.

Abscess of the lung was found in only one case, which will be further discussed under accidents connected with pleural complications.

Spontaneous discharge of empyema through a bronchus was not an infrequent accident. This happened in at least four cases, two of which recovered without operation.

Pneumothorax was found in a number of cases. It, of course, occurred in some of those in which the empyema ruptured into a bronchus. Definite spontaneous pneumothorax without discharge through a bronchus happened in one instance in which fluid was present and was followed by complete recovery. Small partial pneumothorax was noted in several instances in which it seemed likely that efforts at aspiration had been responsible for the presence of air. In one case already referred to pneumothorax followed what seemed to be rupture of an abscess into the pleural cavity, and the findings in this instance are worthy of special mention.

P. —— H. ——, Sea., 2c., U. S. N. R. F., admitted with pneumonia following influenza; had been sick for four or five weeks; clinical signs of consolidation in right lower lobe; emaciated and cyanosed.

Roentgen-ray examination.

October 18, 1918.—Right side, consolidation at the base and a general mottling of broncho-pneumonia throughout the remaining portion of the lung. The appearance around the consolidation suggested a small localized area of pneumothorax at the base, but there was no clinical evidence of this. Left side, general mottling of broncho-pneumonia throughout the entire lung, becoming conglomerate at the apex. Four days later the patient suddenly developed a severe attack of dyspnea and a pneumothorax was found clinically on the right side. The patient had had a less severe attack the night before.

October 24.—Left side, lung considerably cleared. Right side, almost complete collapse of the lung from pneumothorax. Two adhesions at the base and one toward the angle of the scapula were still holding the lung out slightly. The base of the lung was very dense. Later observations were very suggestive of this area having been an abscess that had ruptured into the pleural cavity. Heart and mediastinal structures displaced to the left.

October 30.—The pneumothorax had increased, notwithstanding the attempted removal of air. The mediastinal structures were pushed

farther to the left, and there was a partial collapse of the left lung, It seemed likely that there was some valvelike action at the seat of rupture of the lung, and during coughing more air was forced into the pleural cavity and was unable to get out again, thus increasing the intrapleural tension.

November 14, following operation, at which time considerable pus was evacuated and a drainage tube inserted, and the wound closed, the right lung had expanded to nearly one-half its normal size. The visceral pleura was thickened. The continuance of an apparent consolidation at the base, the great prostration of the patient, the continued discharge of a large amount of pus, and the comparatively little pleural thickening for this type of case suggested that the consolidated area had been an abscess which had ruptured into the pleural cavity. The continued discharge of pus into a pleural cavity not the seat primarily of an empyema and with resulting thickened walls would, of course, favor toxic absorption and tend to combat all attempts to bring about sterilization of the cavity. The plates showed a general subcutaneous emphysema of the thorax and neck. This was no doubt the result of an emphysema working upward through the mediastinum. The patient died subsequently and the Roentgen-ray findings were verified at autopsy.

Emphysema was found in the subcutaneous tissues in two cases, one of which has just been described. In this one it was not due to closure of the wound. In the other case the patient developed a pyopneumothorax and the empyema was partly discharged through a bronchus. Following this, a rib was resected, two tubes were inserted, and the wound was closed. In this case the emphysema was entirely on the affected side and made its appearance after operation. No cases of interstitial emphysema of the lung were observed.

In the few instances in which pneumonia developed in patients with tubercular lesions the tubercular process was undoubtedly aggravated, and rather suddenly.

Section IV. THE LABORATORY STANDPOINT.

By J. T. Borden, Lieutenant Commander, Medical Corps, United States Navy, and R. S. Leopold, Lieutenant, Medical Corps, United States Naval Reserve Force.

This report covers the period from September 12, 1918, to January 29, 1919. In the first six weeks during the rise and crisis of the epidemic, 1,724 cases were admitted, with an incidence of pneumonia of 459 cases, or 26.6 per cent, and a mortality in these of 41.2 per cent.

For the entire period of the report 2,124 cases were admitted with an incidence of pneumonia of 23 per cent and a pneumonia mortality of 41 per cent.

Blood.—Following an intensive study of selected cases, we were able to establish a blood picture in uncomplicated influenza of an absolute and relative leucopenia with, in many cases, a relative lymphocytosis.

The white count varied between 3,500 and 8,000, the polynuclears between 50 and 80 per cent, lymphocytes between 20 and 42 per cent.

In post-influenzal pneumonia the blood picture was usually quite different. In these cases, the white count varied between 14,000 and 20,000, polynuclears from 75 to 98 per cent and lymphocytes from 1 to 20 per cent. There seemed also to be a relative lowering or absence of large mononuclears. Those cases progressing favorably maintained a high or rising white count, although a falling count, while indicating an unfavorable clinical state, seemed not necessarily to define a fatal issue. Many cases while maintaining a slowly decreasing white count for many days eventually recovered. Occasionally a slight eosinophilia in those cases with splanchnic insufficiency was noted.

An interesting and valuable observation in the daily blood pictures was the gradual or hurried change from the blood picture of uncomplicated influenza to that of the blood findings of pneumonia, and we were able hereby, noting the rising white count and falling lymphocytes, to anticipate the clinical findings of broncho-pneumonia by several days.

In a series of over 600 blood counts we have selected 100 cases of verified uncomplicated influenza and 100 cases of post-influenzal pneumonia from which to construct a composite white blood picture.

Composite picture of complete white blood counts of 100 cases of uncomplicated influenza and of 100 cases of pneumonia, at the crest of the epidemic is shown in the following table:

Table 1.

	White blood counts.	Polynuclear.	Small lymph.	Large lymph.	Mononuclear.	Transitional.	Eosinophile.	Basophile.
Influenza.....	6,950	67.5	21.2	3.8	4.4	2.1	0.7	0.3
Pneumonia.....	17,680	82.8	8.3	2.1	2.6	3.8	.3	.1

In four differentials a neutrophilic degeneration of polynuclears was noted; marked granulation of the protoplasm of the lymphocytes was noted in one case.

Table 2 represents the average blood picture from several daily examinations of 25 cases each of typical influenza and of post-influenzal pneumonia, studies from a clinical and laboratory standpoint during a parallel period of the epidemic.

Table 2.

AVERAGE BLOOD PICTURE OF 25 CASES OF TYPICAL INFLUENZA SEPT. 26 TO OCT. 26, 1918.

White blood counts.	Polynuclear.	Small lymph.	Large lymph.	Mononuclear.	Transitional.	Eosinophile.	Basophile.
5,600	58	36	2	3	1	.....	.....
4,800	65	30	4	1	.....	.....	.....
6,300	62	20	7	3	1	1	.....
8,400	80	15	2	2	1	.....	.....
5,100	77	12	0	6	5	.....	.....
8,000	65	15	5	10	5	.....	.....
8,000	77	10	0	11	2	.....	.....
6,800	55	28	4	10	2	.....	.....
7,900	58	27	0	12	0	3	.....
3,500	80	8	6	4	2	.....	.....
6,300	80	20	.....	.....	.....	.....	.....
4,900	71	26	1	0	2	.....	.....
7,000	79	12	6	3	.....	.....	.....
8,000	76	15	4	2	3	.....	.....
6,700	61	21	10	7	1	.....	.....
5,800	79	10	5	2	3	.....	.....
3,600	67	23	0	7	3	.....	.....
6,500	63	29	0	5	3	.....	.....
5,800	77	18	1	3	0	1	.....
7,200	71	20	6	0	2	0	1
6,900	71	19	4	0	3	2	1
7,100	73	22	3	1	1	1	.....
5,900	69	22	4	0	3	2	.....
6,900	71	19	4	0	3	2	1
5,400	65	25	2	6	2	.....	.....

AVERAGE BLOOD PICTURE OF 25 CASES OF PNEUMONIA, SEPT. 26 TO OCT. 26, 1918.

White blood counts.	Polynuclear.	Small lymph.	Large lymph.	Mononuclear.	Transitional.	Eosinophile.	Basophile.
22,600	95	2	1	.....	2	.....	.....
13,600	88	6	1	2	3	.....	.....
12,100	75	3	3	9	6	2	2
16,000	77	12	4	1	3	2	.....
16,500	85	10	0	1	4	.....	.....
12,000	89	3	0	4	4	.....	.....
15,600	90	1	1	2	6	.....	.....
49,900	86	0	1	1	12	.....	.....
69,600	92	2	0	1	5	.....	.....
24,300	87	2	2	4	5	.....	.....
22,800	88	12	.....	.....	.....	.....	.....
14,000	86	7	0	2	5	.....	.....
20,200	84	2	4	4	5	.....	.....
19,000	91	2	1	1	5	.....	.....
43,000	98	1	0	1	.....	.....	.....
25,600	82	10	0	2	5	.....	.....
25,000	82	2	2	9	5	.....	.....
28,600	92	3	0	0	5	.....	.....
20,900	86	5	0	4	5	.....	.....
17,500	77	20	1	1	1	.....	.....
18,900	81	13	0	4	1	.....	.....
19,600	79	12	5	1	3	1	.....
15,600	78	10	5	4	2	1	.....
23,800	82	16	0	0	2	.....	.....
13,600	82	17	0	0	1	.....	.....

Sputum.—Early in the epidemic a cultural study of the sputa was attempted, but because of unfamiliarity with the peculiar cultural requirements of the B. influenzae, as later referred to in detail, as well as the pressure incident to the epidemic, this detail we find untrustworthy and is omitted.

While a report of a morphological study of sputa unsupported by cultural verification is inconclusive, we have selected 200 cases from over 600 examined for statistical classification.

These were freshly collected, using every possible precaution against mouth and postnasal contamination and assuring ourselves of fresh bronchial secretions. It was quite surprising in those cases with a productive cough to note the very low incidence of extraneous contamination, and especially in those fulminating epidemic types, to find the high percentage of sputa showing a pure B. influenzae.

TABLE 3.—*Classification of two hundred specimens of sputa (influenza cases) Sept. 28, 1918, to Oct. 28. 1918.*

	Per cent.
1. B. influenzae (pure)	18
2. B. influenzae and streptococci	14
3. B. influenzae and pneumococci	12
4. B. influenzae, streptococci and pneumococci	12
5. Pneumococci	10
6. Streptococci	15
7. Pneumococci and streptococci	18
8. Total B. influenzae present	62

In sputum of patients convalescent two to three weeks B. influenzae were still present in appreciable numbers in 36 per cent of cases examined, thus demonstrating the possibility of a high percentage of carriers, with the concomitant flarebacks, amongst the nonimmunes in subsequent months or years.

An especial point of interest in the sputa of cases gravely ill with pneumonia, especially those with bloody sputa, was the presence of a definite spirillum. This spirillum seemed constant in its morphology as a relatively short one, with curved ends, even and regular convolutions, about six to eight in number and staining faintly with strong fuchsin. It was imbedded in the muco-purulent exudate apparently from the lower respiratory tract.

We were perfectly cognizant of the usual mouth types and on the alert to eliminate these, but several points impressed us as to their possible importance:

1. In nearly every case it was associated with bloody sputum.

2. In nearly every case where spirilla were found fatal termination was early and rapid.

3. The associated organism was that of a predominating B. influenzae.

From lung punctures we have not been able to absolutely identify this organism either in stained or dark-field examinations. Several theories occur to us:

1. That it might be related to the pulmonary hemorrhagic spirochaete of Castellani, recently observed in France by Barbary, Wolf, and others.

2. That in the extreme toxic asthenias due to the B. influenzae, certain inoffensive buccal spirochaetes might become pathogenic in a manner quite similar to the pneumococcus and streptococcus, and invading the bronchi set up a specific infection.

3. Spirochaetes are associated with war nephritis, trench fever, and jaundice, and if the first two theories are tenable, then with immense grouping of military men with the unavoidable exposures, imperfect sanitation, generalized "barrack catarrh," and rapid group transportation, it is not inconceivable that an unrecognized strain might thus suddenly light up amongst a world of nonimmunes as a specific lung invader.

This spirillum suggested the advisability of arsenic therapy in a group of these pneumonias with the spirochaete and later those without spirochaete. In all cases this spirillum disappeared after salvarsan therapy, and at no time were we able to demonstrate it again during their convalescence.

Table 4.

Sputa of 91 cases were typed with the following result:	Per cent.
Type I	1.1
Type II	12.3
Type II (*a*)	14.6
Type III	5.6
Type IV	25.8
Negative	40.6

In a group of 20 negatives six returned B. influenzae in pure culture at white mouse necropsy.

Vaccines—(*a*) *Therapeutic.*—About 60 cases of typical influenza have been vaccinated, the majority receiving no other treatment, with apparently little immediate effect on the course of the disease, except a fall of temperature probably 24 hours earlier than control cases. (See composite chart.)

Of the vaccinated influenzas, three developed broncho-pneumonia—one three days after last injection and two five days after last injection. Of these cases, two had very mild infections and recovered rapidly. One had very severe type, with a sinus complications, but recovered.

(*b*) *Prophylactic.*—About 280 of the personnel in contact with the sick have been vaccinated with varying doses and methods. All

cases exhibited mild local and general reactions. A number developed within three to five hours varying degrees of sharp general reaction, chill, headache, injected eyes, nausea, anorexia, backache, joint and bone pains, fever, etc., lasting 8 to 20 hours, but all returned to normal in 24 hours.

In substantiation of the local and general reactions, blood pictures made in several cases showed a fairly constant but mild, absolute, and relative leucopenia, this appearing about three hours after injection but returning to normal in 24 hours.

In vaccinating therapeutically our aim was to develop a technic allowing as early and rapid vaccinations as possible. With the suspension used, we were able to introduce three doses in the following manner: The first 0.1 c. c. intravenously; 12 hours later a subcutaneous dose of 1 c. c.; a third like dose 24 hours later. This rapid method was attended, in proper doses, by very little or no uncomfortable reaction.

In no case did any vaccinated influenza case develop pneumonia later than the third day. Prophylactically, where speed was not essential, our routine vaccination consisted of a subcutaneous injection of 1 c. c. on each day for three consecutive days.

Since the period of voluntary vaccinations was instituted in a group of 50 unvaccinated contacts, 16 per cent have developed influenza, while of the larger group of 280, although remaining constantly in contact, none has developed influenza.

The vaccine used was prepared by Lieutenant P. A. Lewis, Medical Corps, U. S. N. R. F., and was a suspension of pure B. influenzae, and the technique and preparation and injection were all carried on under his direction.

TABLE 5.—*Comparative data on vaccinated and unvaccinated cases, Oct. 6 to 26, 1918, inclusive.*

Number unvaccinated influenza cases	221
Number pneumonia cases developing	78
Proportion influenza developing pneumonia—per cent	35.3
Total deaths from pneumonia cases	56
Number vaccinated influenza cases	60
Number developing pneumonia	3
Proportion influenza developing pneumonia—per cent	5
Number of deaths resulting from pneumonia	0

TABLE 6.—*Urinalysis report.*

Number of specimens examined	2,130
Albumin present	614
Albumin present—per cent	28.8
Pus cells present (9.6 per cent)	204
Casts present (8.6 per cent)	182

In a series of 25 phthalein functional tests, a marked irregularity of renal efficiency was noted.

Bacteriology.—The striking feature of this epidemic has been the extreme difference of bacteriological opinions. Some claim a high percentage of B. influenzae, while others support ridiculously low or even negative findings.

The very character of the reports, which have been so numerous and varied, mean either that the virus of this epidemic remains as as yet absolutely unrecognized, or that the cultural vagaries and pathogenic properties of the B. influenzae have been so incompletely developed as to mask the entire etiological picture. In spite of many discouraging features of the literature, as well as those of our own observations, unless some entirely new agent is finally found, we feel that perfection of cultural requirements and especially intensive investigation of the pathogenicity and immune factors will finally determine the B. influenzae and some definite strain as the true causative factor. We also feel that our findings would have been of greater value had our technic been identical from the origin of the epidemic.

Our final technic, many suggestions for which we owe to Lieutenant P. A. Lewis, Medical Corps, U. S. N. R. F., was to plate on blood agar (0.4 per cent acid, glucose agar with 1 per cent defibrinated human cells), incubate for 24 hours at 37 C., and subsequently at room temperature.

Repeated inspection with lens, in reflected and transmitted light twice daily, for several days before discarding, has been our rule, as we have repeatedly discovered colonies four to five days later. Suspicious colonies were then cut out, planted for 24 hours in blood bouillon, and replated in blood agar for 24 hours, or until abundant growth is returned.

On the liquid medium many vague involution forms are seen, from long filamentous to broad convoluted bodies, very much resembling contamination or anything but B. influenzae, but on replating on agar these forms disappear and the characteristic minute glistening transparent colonies of a Gram-negative cocco-bacillus appear.

We feel that many of our failures in early attempts were due to a failure to recognize the following sources of error:

1. Reincubation after the first 24 hours, instead of room temperature.
2. Unsatisfactory culture media.
3. Subculturing in solid media without interposing a liquid medium.
4. Failure to recognize young colonies.

For this reason we have discarded many of our earliest efforts and confined our report to a period during which our technic was sufficiently exacting to satisfy ourselves.

Several attempts at complement fixation were unsatisfactory in our hands, owing to an extremely narrow margin between the antigenic and anticomplementary units of the suspensions used.

Necropsies.—Of 15 necropsies performed only 9 were studied completely, pathologically and bacteriologically, to warrant a report in full. These cases were all classical post-influenzal broncho-pneumonias.

A composite necropsy picture of these would present a report somewhat after the following:

A robust, well-developed young man with extreme cyanosis of the entire body, amounting in most cases to a deep purplish black and a characteristic foul odor. This gross appearance and odor was a constant characteristic of our morgue for the entire period, during which only epidemic cases were admitted to our hospital.

Anatomically an extreme engorgement of the venous circulation, such as is seldom seen, was likewise constant. All subcutaneous veins are distended and disgorge freely a thin black fluid, watery in consistency and staining everything a dark mahogany color. The cavæ and right heart are enormously engorged and overdistended and are filled with a blackish jellylike clot, while the abdominal veins are so extremely distended as to graphically demonstrate the extent of the venous slump into which the circulation is constantly overflowing.

The heart muscles are all well developed, but have a glazed or scalded appearance, the pectoral and recti muscles presenting the same appearance.

Few of the earlier cases showed pleural involvement beyond an occasional serous effusion. After the crest of the epidemic a few cases of sero-purulent pleuritis were seen.

The lungs exhibited a constantly varying picture of broncho-pneumonia from a peppering of discrete lobular areas well scattered throughout all lobes to large and ofttimes massive confluent broncho-pneumonia areas involving approximately 75 per cent of the lungs.

In the discrete type distinct areas of lobular pneumonia in various stages of development are seen, well defined, elevated, and firm, of a reddish brown, varying to a bluish gray color and surrounded by normal or collapsed lobules. The shades of color of the bulging pneumonia lobules, surrounded by the red congested uninvolved and pale collapsed areas, giving the whole a mosaic appearance.

In this type often from 25 to 50 per cent of the lungs were involved, usually as single or at most two or three confluent lobules.

The involved areas of a bluish-gray color were varied here and there by paler patches of later involvement or by dark streaks of subpleural hemorrhagic extravasation.

In all types areas of extreme emphysema of a most marked degree are present in portions of the uninvolved lobes.

On cross section the larger areas exude a thin black-stained watery fluid in great quantities, and the cut surface seems smooth, of a dark slate color, and with no mucous or fibrinous characteristics.

The discrete areas are a mahogany or bluish-brown color, have a distinct granular appearance, and seem almost to bulge or pop out of their restraining alveolar capsule.

The bronchi and larger roots contained a thin brownish mucoid membrane of a tenacious character and minute petechial hemorrhages are peppered in and apparently beneath the mucosa.

Quite a nest of very hard and firm peribronchial glands are often found about the lung roots.

The spleen, liver, and especially the kidneys, exhibit varying degrees of congestion. The spleen is somewhat enlarged and of a very deep purplish hue, while the cortex of the kidneys has a deep brown color and a glazed bulging surface. The adrenals are distinctly enlarged, very friable, and of a deep bronze shade.

Microscopical.—Sections taken through smaller lobular areas and larger confluent masses reveal a fairly uniform picture of broncho-pneumonia, the findings varying only in proportion to the degree of involvement.

Everywhere the interlobular capillaries are intensely congested, in spots becoming broad hemorrhagic extravasations. The alveoli are packed with red cells, leucocytes, fixed cells, and débris, but no fibrin. Where the involvement is less extensive fewer cells, probably coagulated serum, and larger mononuclear cells are found. Peribronchial and perivascular round-cell infiltration is especially pronounced about the broncho-pneumonia areas.

The general appearance of the heart muscle is that of a faint-staining myocardium, marked congestion, and some groups of round-cell infiltration between bundles of the muscle fibers. The individual cell often seems swollen, of a faint granular appearance, the nucleus is clouded, and the capsule indistinct, while occasionally minute hemorrhages within the bundles, with small collections of leucocytes, are seen. An interesting feature of two cases is the distinct proliferative activity of the intima of the larger vessels.

The liver and spleen, while intensely congested, show no active inflammatory changes. Occasionally a sharp biliary pigmentation is present.

The kidneys uniformly exhibit more advanced inflammatory changes. The congestion here is extreme; the capillaries seem almost bursting, while extravasations from the same in and around the loops of the glomerular and intertubular vessels are quite common. An advanced cloudy swelling, especially of the convoluted tubules,

is noted in all cases. In a few cases glomerulo-tubular inflammatory changes are undoubtedly taking place.

The adrenals exhibit the same intense congestion, but without progressive inflammatory changes.

One case proved an interesting epidemiological study, the patient being one of about 25 men received from a ship which had been at sea during the height of the epidemic and on which within 48 hours of arrival at this port a large proportion of the liberty party became stricken. Postnasal cultures of a group of these cases have a high per cent B. influenzae, and this case had a very strikingly rich culture. One week later he developed the typical post-influenzal pneumonia. Two others exhibiting a sparser growth of B. influenzae also developed pneumonia but recovered.

TABLE 7.—*Occurrence of organisms in culture in 31 other lung punctures.*

B. influenzae (predominating) (35 per cent)	8
B. influenzae with strepto-pneumococcus	3
B. influenzae with M. catarrhalis	2
B. influenzae with staphylococcus aureus	1
B. influenzae with B. mucosus	1
Total B. influenzae, 65 per cent.	
Pneumococcus (III, II*a*)	2
B. mucosus	2
B. mucosus with pneumococcus (IV)	1
M. catarrhalis	1
Staphylococcus aureus	1
Streptococcus	

TABLE 8.—*Occurrence of organisms in culture from pleural fluid.*

Streptococcus	5
Streptococcus hemolyticus	1
Pneumococcus (I)	1
Pneumococcus (III)	1
Pneumococcus (IV)	1

The cases of Type I were given intrathoracic administration of 50 c. c. of serum and a like dose intravenously with rapid and marked improvement for Type I pleurisy.

In the lung puncture made during life, care was taken to carefully outline areas of consolidation, using a powerful 20 mil. syringe, containing about 3 to 5 mils. citrated saline to plunge through sterilized skin surface directly into these. Cultures were made in blood agar and blood bouillon. Obviously it was quite impossible to obtain as uniform and satisfactory material as when made at necropsy.

This operation was attended with very little discomfort and no unfavorable complications.

Commentary.—Surveying the epidemic, our general impressions, as gathered from laboratory and clinical study, may be summarized

as confusng and, broadly speaking, nonproductive, and our opinions as largely theoretical.

Unfortunately, in our experience, as was the case with many others, we presume, we did not feel that our technic was sufficiently accurate in the earlier days of the epidemic to detect the constancy of the influenza bacillus.

Taken as a whole, however, our percentage of positive findings was sufficiently high to establish the term influenza for the epidemic. This with the clinical picture satisfies the uncomplicated cases.

As to the high incidence and mortality of the postinfluenza pneumonias, we have only theories in explanation, namely:

1. That the pneumonia was a true primary B. influenzæ invasion of the lung parenchyma.

2. That intercurrent with a very active influenza pandemic was carried a pandemic of pneumonia of unestablished origin.

As to the first supposition, we have found a high percentage of pure B. influenzæ in antemortem lung punctures, carefully made from localized areas of consolidation.

More striking have been the results of necropsy, where on several occasions we isolated B. influenzæ in pure culture from the discrete lobules of lobular pneumonia. From the peripneumonic areas and bronchi never-pure B. influenzæ, but usually secondary invaders were gotten.

We felt at the first few attempts that this was convincing evidence of the extension downward of the organism and were satisfied that the entire clinical complex was simply an inflammatory invasion of the respiratory tract, *a priori* of B. influenzæ origin. Subsequently, however, we were not able constantly to demonstrate the B. influenzæ in the lobular patches of consolidation, and, unfortunately, by this time the crest of the pandemic had passed.

We feel thoroughly honest in ascribing to the B. influenzæ the causative factor in the influenza pandemic. To say that such was the case in the postinfluenza pneumonias is decidedly insufficient, unless we can demonstrate a particular strain or strains of B. influenzæ possessing a virulence and specificity as yet unknown.

As to the second supposition, we can not, from our experience, feel honest in ascribing to the B. influenzæ alone the full burden of the high incidence of pneumonia, nor can we glean from the mass of literature presented any proof that it is solely responsible.

Several facts again present themselves:

(*a*) No case of pandemic pneumonia that came under my observation failed to present the clinical signs of influenza well before any pneumonic symptoms were recognized, thus apparently demonstrating a distinct relationship of the causative factor (Bacillus influenzae) in the uncomplicated influenza and the post-influenzal pneumonia.

From a clinical standpoint this would seem sufficient evidence to establish the presumption of a simple extension of the B. influenzae into the lung parenchyma. Bacteriologically, however, the facts do not support this.

(*b*) The post-influenzal pneumonias were all so clinically similar that the causitive agent, if known, should be relatively constant. This was again not the case. B. influenzae which was found in the highest percentage was decidedly not a constant factor, nor even in these high percentages are there any facts so far presented to establish its specificity.

We are justified, therefore, with no further facts at hand, in presenting theories in an effort to explain the nature of the recent pandemic. These would be:

1. That a true pandemic of influenza caused by the B. influenzae prevailed, differing only from the frequent sporadic outbreaks in its virulence and pandemic qualities.

2. That a certain percentage of these typical uncomplicated influenzas may have progressed to a true influenzal pneumonia.

3. That parallel with the influenzal epidemic there was present a pandemic of pneumonia, due to an unknown organism or agent, and one which may have existed symbiotically or by preference with the B. influenzae, this agent causing the great majority of the fatal pneumonias.

4. That, as suggested above, this agent may be some exhalted strain of a nonpathogenic mouth organism, the subject of inversion of transmutation as the result of the unusual interchange of respiratory organisms incident to the mobilization of military masses.

5. That supported only by our own thoroughly unestablished presumption, we believe this organism to be a spirillum, because:

(*a*) A spirillum was found during the height of the pandemic strikingly unlike usual mouth organisms.

(*b*) It is as thoroughly tenable to attribute pathogenic possibilities to mouth spirilla as to mouth streptococci, etc.

(*c*) Pathogenic spirilla have been demonstrated in the lungs, kidneys, and liver incident to war infections.

(*d*) Spirilla have been demonstrated in animals, notably the horse, while veterinarians assert that a pandemic in animals paralleled the influenza epidemic.

(*e*) The morbidity age of 18 to 35 parallels that of the military age.

We wish to reiterate that we present the above theories, unsupported by facts, not with any claim for acceptance or originality, but only that in the light of totally negative or confusing reports some seemingly unopened direction may be presented along which to further extend our efforts to clarify the etiology of the recent conflagration.

INFECTIOUS AND CONTAGIOUS DISEASES ON THE ISLANDS OF ST. THOMAS AND ST. JOHN, VIRGIN ISLANDS OF THE UNITED STATES, MARCH-SEPTEMBER, 1918.

By E. PETERSON, Lieutenant, Medical Corps, United States Navy.

On entering St. Thomas Harbor a very picturesque panorama unfolds. The city of Charlotte Amalia, built on numerous small hills, with houses scattered on the hillsides and in the valleys, gives the impression of an extremely clean community.

The sanitary conditions of St. Thomas will, however, on closer observation, be found far from satisfactory. The conditions as they exist now are primitive, indeed. The reason for this lies in the very limited funds that have been available for sanitation. The present regulations are broad and give the sanitarian a considerable amount of authority, but where no money was to be had no improvements could be made.

The largest and most thorough work done on the island in a sanitary line is the very complete system of surface gutters. These are, on the whole, made in a first-class manner, and take care of the surface water during the rainy season.

The whole system of these smaller gutters is connected with gutters of larger size, which extend from the hillsides down through the city to the harbor. During the rainy season these gutters serve their purpose well, being the only outlet for the large amounts of water pouring down from the hillsides. After a continued dry period, however, they prove to be the cause of no slight disturbance through the ever-present odor. Small collections of waste water, mixed with urine at times, are responsible for this far from agreeable smell.

One interesting incident may be recorded in this connection. On inspection of certain property near one of the large gutters the owner prided himself on a very ingenious mode of cleaning his pit privy. It was located in the basement on a level with the bottom of the gutter. A ditch had been dug from the slanting yard through the pit out into the gutter. The owner never had to clean this privy because after every heavy rainfall it was washed thoroughly clean and the contents carried out into the gutter, and from there through the city down to the bay.

The sewage disposal is a problem of extreme importance in St. Thomas. A certain number of properties are supplied with pit privies, no attempt having been made in previous years to make them fly proof. A very few properties are supplied with sanitary surface privies. In the large majority of cases the night soil was emptied in buckets or cans, with hardly any attempt to cover them properly, and accumulated here for weeks, in many cases, before the cans were emptied into the bay. In the outskirts of the city and in the suburbs

the night soil is, in many instances, thrown in the bush. Attempts are at present under way to supply all properties with properly covered receptacles for night soil, which are to be cleaned at least once a week.

The garbage of the city is well taken care of. Hardly any edible stuff is wasted by the natives. Whatever garbage is left is collected every day by the street-cleaning department in conjunction with the street sweepings and is burned on two public dumping and burning places, located one at each end of the town.

Another problem that presents itself in St. Thomas is the water supply. The city is nearly entirely dependent on the collection of rain water for drinking purposes. This necesitates a large number of cisterns, barrels, and tanks on the different properties. Up to the time of the American occupation hardly any attempt had been made to make these mosquito proof. Hence the overabundance of mosquitoes, the Stegomyia being the prevalent one.

Diseases.—During the period of Danish occupation a very strict system of reporting diseases was in vogue. The system was not very practical working from a sanitary standpoint, although it formed an excellent basis for statistical reports. It included such conditions as continued fever, intermittent and remittent fever, intestinal catarrh, and acute diarrhea. Below is a comparative list of diseases as they were reported during the whole of 1916, and for seven months each, during the years 1917 and 1918, April to October and March to September, respectively:

	1916, whole year.	1917, April–October.	1918, March–September.
Actinomycosis	0	0	0
Acute poliomyelitis	0	0	5
Anthrax	0	0	0
Asiatic cholera	0	0	0
Amebic dysentery	0	0	7
Bacillary dysentery	0	0	0
Balantidic dysentery	0	0	1
Bronchitis	324	61	(1)
Broncho-pneumonia	26	18	(1)
Chancroid	45	16	37
Chicken pox	45	8	21
Chronic alcoholism	16	4	(1)
Croup	0	0	(1)
Croupous pneumonia	9	2	(1)
Continued fever	21	7	(1)
Dengue fever	19	16	95
Diarrhea, cause undetermined	.....	.....	8
Diphtheria	1	0	0
Dysentery	70	11	(1)
Delirium tremens	9	2	(1)
Epidemic cerebro-spinal meningitis	0	0	0
Erysipelas	0	0	0
Filariasis	0	3	10

[1] Not reportable.

	1916, whole year.	1917, April–October.	1918, March–September.
Glanders	0	0	0
Gonococcus infection of genito-urinary tract	48	42	38
Gonococcus infection of conjunctiva	10	3	0
Intermittent and remittent fever	41	9	(1)
Impetigo neonatorum	0	1	(1)
Intestinal catarrh and acute diarrhea	325	161	(2)
Leprosy	0	0	1
Lymphangitis, cutaneous, recurrent	0	14	(1)
Malaria	2	59	11
Malta fever	0	0	0
Measles	0	1	1
Measles, German	0	0	0
Mumps	0	1	0
Pellagra	16	26	2
Plague	0	0	0
Puerperal infection	1	0	0
Rabies in animals	0	0	0
Rabies in man	0	0	0
Relapsing fever	0	0	0
Rheumatic fever	9	6	(1)
Scarlet fever	0	0	0
Smallpox	0	0	0
Sore throat	110	15	(1)
Sprue	0	3	0
Stomatitis	0	8	(1)
Streptococcus sore throat	0	0	3
Syphilis	9	10	31
Tetanus	2	1	1
Trachoma	0	0	38
Trichinosis	0	0	0
Tuberculosis, pulmonary	20	14	12
Tuberculosis, all other	0	0	2
Typhoid fever	16	10	46
Typhus fever	0	0	0
Uncinariasis	0	0	19
Whooping cough	0	0	0
Yaws	0	0	0
Yellow fever	0	0	0

[1] Not reportable. [2] See Diarrhea, cause undetermined.

Several points of extreme interest may be noted. No attempts had been made in previous years to differentiate between the various types of dysentery. Other interesting points to be discussed later under the different diseases may be noted. Take, for instance, the large number of cases of intestinal catarrh and acute diarrhea during the years 1916 and 1917—325 and 161 cases, respectively. It is to be noted that these cases include the diarrheas of infants, which are not reported at present. But if the reports of the 1917 period, which are available at present, are analyzed, it will be found that 66 are under 5 years and 95 over 5 years. Compare this with the 8 cases of diarrhea, cause undetermined, reported during the 1918 period. This marked reduction is hard to explain at present. Some

of the above cases undoubtedly were caused by an infectious organism not diagnosed at the time. This will, however, not explain all of them. Another point of interest in the same connection is the large number of cases of pellagra that were reported during the years 1916 and 1917—16 and 26, respectively. During the 1918 period 2 cases were reported. The marked reduction in this disease is also hard to explain, because the living conditions are practically the same.

A considerable number of the cases of continued fever and intermittent and remittent fever can be explained, however. If we look at the comparatively small number of cases of typhoid fever during the years 1916 and 1917, as compared with those of 1918, the explanation does not seem to be illogical that a certain number of cases of typhoid fever went unrecognized during previous years. As will later be shown, facilities for serological and bacteriological diagnoses of this disease were not available until March, 1918. Hence the apparently marked increase in this disease during the latter period. Hookworm disease has received very little consideration during previous years. The same holds true with trachoma. The latter disease is extremely common in the younger generation.

The large increase in dengue fever during 1918 is explained by the large influx of susceptible Americans, represented by the military forces.

One point of extreme interest that is brought to our attention is the absolute absence of smallpox on the island. The reason for this is to be found in the thorough vaccination that has been kept up from year to year by the Danish physicians. It can be stated, almost without any qualification, that this is the most thoroughly vaccinated community in the world. At a recent survey of the population, made in connection with typhoid vaccinations, very few cases were found who did not present typical cowpox scars.

The present system of reporting diseases was introduced in March, 1918, and comprises the following diseases: Actinomycosis, acute poliomyelitis, anthrax, Asiatic cholera, amebic dysentery, bacillary dysentery, balantidic dysentery, chancroid, chicken pox, dengue fever, diarrhea (cause undetermined), diphtheria, epidemic cerebrospinal meningitis, erysipelas, filariasis, glanders, gonococcus infection of genito-urinary tract, gonococcus infection of conjunctiva, leprosy, malaria, Malta fever, measles, measles (German), mumps, pellagra, plague, puerperal infection, rabies in animals, rabies in man, relapsing fever, scarlet fever, smallpox, sprue, streptococcus sore throat, syphilis, tetanus, trachoma, trichiniasis, tuberculosis, (pulmonary), tuberculosis (all other forms), typhoid fever, typhus fever, uncinariasis, whooping cough, yaws, and yellow fever.

DISEASES OF THE 1918 PERIOD.

Chicken pox.—Quite a few cases of chicken pox appeared in St. Thomas during the spring months. March had 3 cases; April, 10 cases; May, 7 cases, and June, 1 case. Partial isolation of these cases was attempted by keeping the children at home.

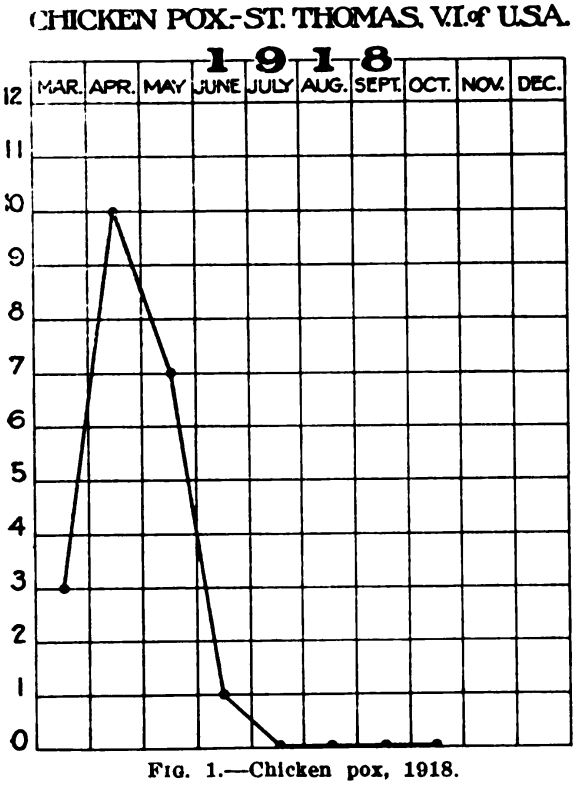


FIG. 1.—Chicken pox, 1918.

Measles.—There is a question of the presence of this disease on the island at the present time. Some time ago a case of German measles was reported. Further investigation proved this to be a case of dengue fever with a well-marked rash. Not long ago a true case of measles was reported in a negro boy, with supposedly typical Koplik spots and a rash. The case was placed in the hospital and the home was quarantined for two weeks. No other case developed, which speaks for a possibly mistaken diagnosis. The similarity between the eruption of dengue fever and measles, especially in children, will be spoken of later.

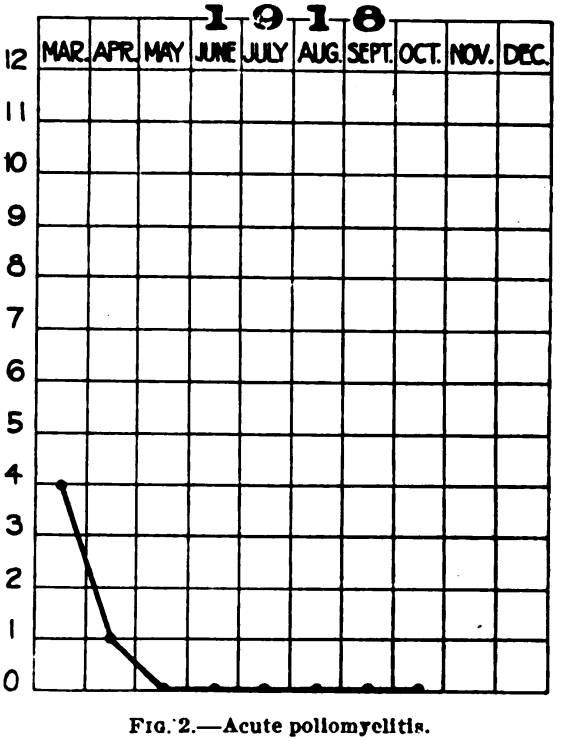


FIG. 2.—Acute poliomyelitis.

Acute poliomyelitis.—This disease has apparently visited this island several times during years past. This year five cases were reported—four in March and one in April. Of these the youngest case was 8 months and the oldest 4 years. No

relation or possible connection could be established between the above cases. Hospitalization was enforced in all cases.

Leprosy is at present very rare in the island of St. Thomas. This is the only disease of which we have a complete record covering a considerable period of time. The accompanying chart shows the gradual disappearance of this disease. The number of cases charted for 1897 indicates all the cases present on the island that year. After that only newly discovered cases are recorded. For a number of years all lepers have been sent to the leper asylum at St. Croix, Virgin Islands of the United States. This isolation, with thorough disinfection of the premises occupied by lepers, has apparently been responsible for the decrease in this disease. So far this year (1918)

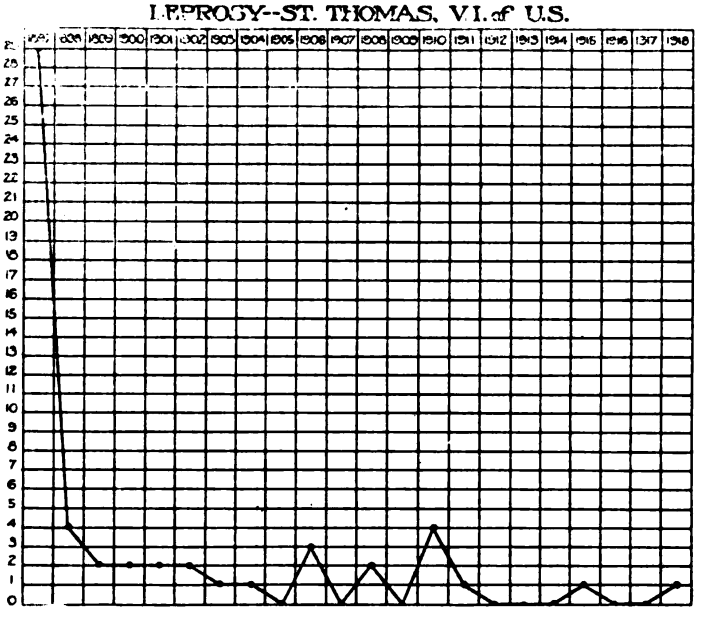


FIG. 3.—Incidence of leprosy for 21 years.

only one new case has been discovered—a young girl of 11 years, with typical nodular lesions, the bacillus lepræ being present both in the nasal discharges and in the nodules. No history could be obtained to ascertain the possible source of infection. This patient was also sent to the leper asylum at St. Croix.

The only case of leprosy known to the Department of Health to be in St. Thomas at present is an old Jewish woman suffering from the anesthetic type. She is one of 29 cases present in 1897, and has been kept in isolation ever since. It is to be noted that the disease has been prevalent in her family in the last generation, her brother, two nieces, and one nephew having died from the disease. At present she is the only member of the family suffering from leprosy.

Venereal diseases.—Venereal diseases are extremely prevalent in St. Thomas. From March to September, inclusive, the following cases have been reported: Gonorrhea, 38; chancroids, 37; syphilis, 31. The control of these diseases at present is a difficult undertaking, due to lack of funds. The local law, however, is very broad in this respect, leaving wide powers with the health authorities.

It is criminal to have sexual intercourse when knowingly afflicted with venereal disease, and isolation of all contagious and infectious diseases is left in the hands of the health authorities. Due to the comparatively small area of the island, a complete control of the situation would be possible if funds and space for isolation treatment were available. The local municipal hospital takes care of all virulent cases.

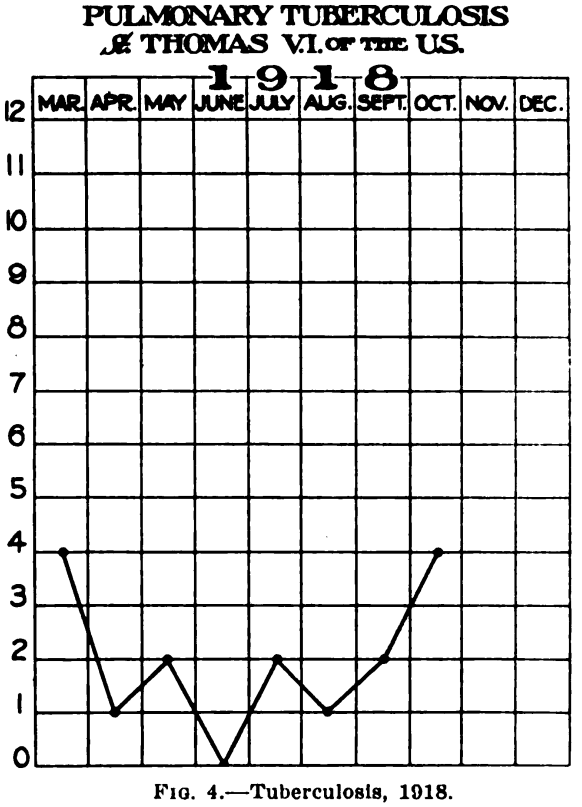


FIG. 4.—Tuberculosis, 1918.

Yaws.—This disease occurs in St. Thomas. No case has been discovered, however, since March, 1918.

Tuberculosis.—Pulmonary tuberculosis is quite common in St. Thomas. The poor living conditions and extreme poverty of the inhabitants are undoubtedly responsible for the frequency of this disease. In spite of the warm climate, it is surprising how closed in the dwellings are. Windows, shutters, and doors are all closed during the night. The numerous persons living and sleeping in each room increase naturally to a marked degree the chance for infection.

The poor quality of the food has lowered the resistance of a large number of the inhabitants. Tea and a piece of bread for breakfast; a little nourishment, consisting mostly of porridge or mush, for luncheon; while supper, as a rule, is composed of fish. On the whole, it is astonishing how little food can keep some of these people alive. At present time, however, the wages are rapidly going up and a higher standard of living will, without question, in time replace the present rather low one.

The following cases of pulmonary tuberculosis have been reported: March, 4; April, 1; May, 2; June, 0; July, 2; August, 1; and September, 2.

Tetanus.—Only one case of tetanus has occurred since March.

Trachoma.—Trachoma is extremely common in St. Thomas and St. John. The close relation between all the members of a family and the lack of personal cleanliness are the causes of this widespread condition.

The following cases have been reported on the two islands: April, 1; May, 33 (32 of which were found amongst school children in St. John); June, 0; July, 0; August, 1; September, 3; October, 3.

A survey of all school children in St. Thomas is going to be made within a short time and will undoubtedly reveal a marked prevalence of this disease.

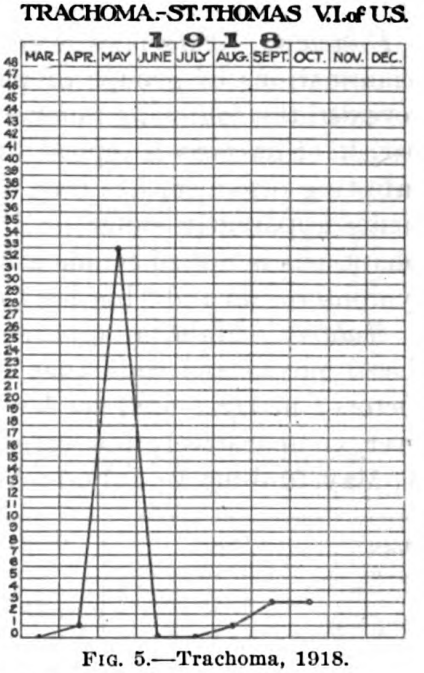


FIG. 5.—Trachoma, 1918.

MOSQUITO-BORNE DISEASES.

In spite of the extreme abundance of mosquitoes on the island, the mosquito-borne diseases are rather rare, with the exception of dengue fever and filariasis. The predominating mosquito present is the house variety (Stegomyia), which breeds in the cisterns, tanks, and barrels scattered over every property. Extreme efforts are now being made to eliminate and destroy all mosquito-breeding places, a truly difficult undertaking. The people are at the present time absolutely dependent on rain water for drinking purposes. On a large number of properties no cisterns exist. The poor tenants collect the water in barrels, tubs, or pails, which soon become alive with mosquito larvæ. A slight

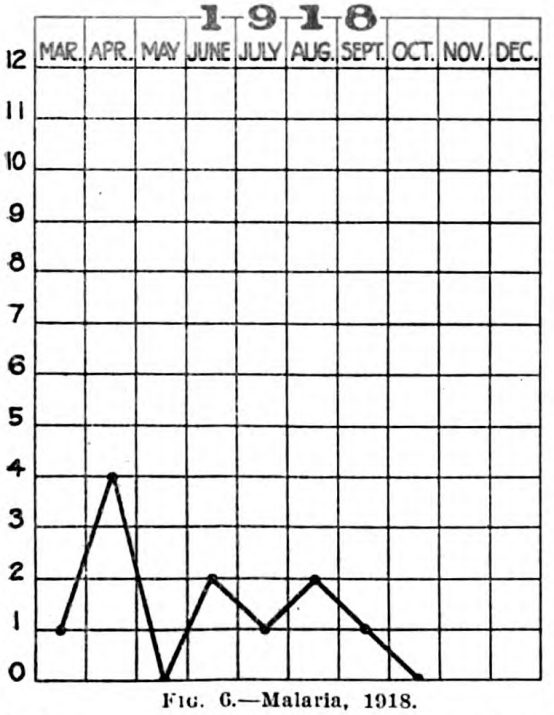


FIG. 6.—Malaria, 1918.

headway is, however, made in rendering the different properties more or less mosquito proof.

Yellow fever.—Yellow fever is extinct in St. Thomas and St. John at the present time.

Filariasis.—Filariasis is endemic on the island. Occasional blood examinations of groups of patients at the municipal hospital have revealed the following number: June, 4; July, 3; August, 2; September, 1. Filariasis is reported to the sanitation service only when the infesting organism has been found. The majority of the above patients apparently suffer no ill effects from their infestation. Elephantiasis is not so common in St. Thomas, although a few cases of lymphscrotum and "big leg" may be found.

Malaria.—Malaria apparently appears at times on the island. Local physicians state that during the months of September and October malaria used to develop quite regularly. This year, however, comparatively few cases have been reported: March, 1; April, 4; May, 0; June, 2; July, 1; August, 2; September, 1.

Cases.	Address.	Onset.	Type.	Notes.
		1918.		
1	Estate of Crown.....	Mar. 8	Aestivo-autumnal	Has been living on estate of Crown for 6 years; first attack in 1917; native and inhabitant of St. John.
2	St. John.....	(?).....	Tertian.....	
3	Estate of Elizabeth..	Apr. 4	.....do.....	Child of 1 month. (See case 5.)
4	Hassels have B. P...	...do.....	Aestivo-autumnal	Was working at Botany Bay for 3 weeks before taken sick; malaria is supposed to occur at said place.
5	Estate of Elizabeth..	Feb. 2	Tertian.....	Mother of case 3; first taken sick in Porto Rico, Feb. 2, 1918.
6	Dronningensgade 67a	(?).....	Not found.....	Therapeutic test positive; formerly lived at hospital ground 3.
7	Marine barracks.....	(?).....	Tertian.....	First attack in Quantico, Va.
8	Prinsensgade 1, K. Q.	July 2	Aestivo-autumnal	
9	Silkegade 3a.....	Aug. 7 (?)	Tertian.....	Possibility of receiving infection in Macoris, Dominican Republic; was there for 5 months in beginning of year; is not sure when he was first taken sick.
10	Estate of Charlotte Amalia.	Aug. 28	Aestivo-autumnal	
11	Ship.....	(?).....	(?).....	Infected in Brazil (transient case).

Of the above cases only half may rightly be charged to St. Thomas proper. They are cases 1, 4, 6, 8, and 10. The rest apparently are

imported cases. Case 2 developed on St. John, a contiguous island. Cases 3 and 5, child and mother, are recent arrivals from Porto Rico, where, as the mother definitely states, she had the first chill. Case 7 is a marine who gave history of having received the infection in Quantico, Va. Case 9 gives a history of having visited Macoris, Dominican Republic, during the first five months of the year. He is not sure when he was first taken sick. The probabilities are, however, that he contracted the disease in Macoris. Case 11 is a transient, giving a history of infection in Brazil.

Of the cases above reported, it seems that all living in the city proper give a pretty definite history of having been infected in foreign places.

All native cases have developed in the rural districts, where in years gone by, according to local physicians, malaria had been more prevalent than at present.

Spasmodic attempts to find the anopheles mosquito in St. Thomas have hitherto been fruitless. A more systematic search during the last few months has resulted in locating several breeding places for anopheline mosquitoes. These are at present the subject of study and investigation.

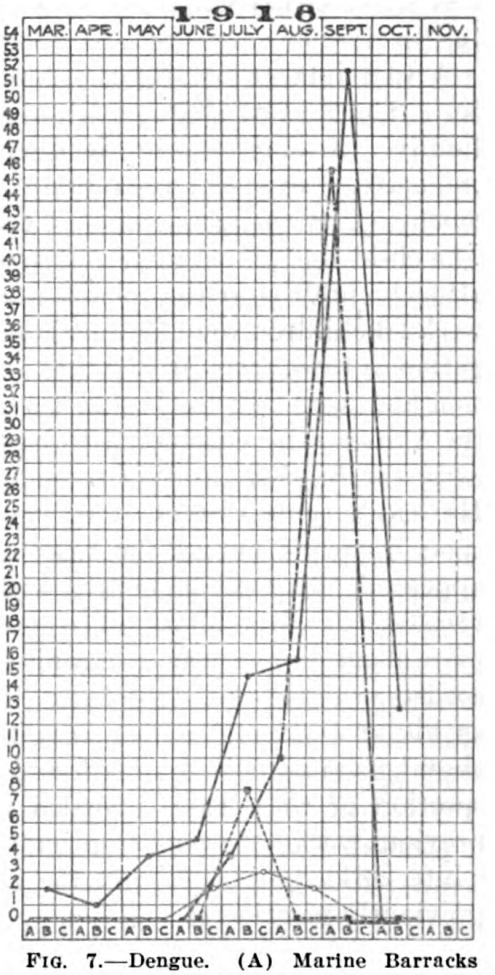


FIG. 7.—Dengue. (A) Marine Barracks H. Q., (B) East Point, (C) Mosquito Bay.

Dengue fever.—Dengue fever is extremely common in St. Thomas. During the period of discussion, the following cases have occurred: March, 2; April, 1; May, 4; June, 5; July, 15; August, 16; September, 52. The incidence dropped markedly during October. The accompanying chart shows how the headquarters detachment of the United States Marines suffered the most. The main barracks are located in the middle of town by the shore. On the premises are five cisterns and three tanks, all of which have been screened. The men sleep in tents; all cots are furnished with mosquito nets. In spite of these precautions, mosquitoes appear in numbers. The East Point and Mosquito Bay detachments are located outside

the city. At these places mosquitoes are quite rare, with corresponding falling off in the incidence of dengue.

The most common mosquito present is apparently the Stegomyia calopus, very few Culex having been found. This fact seems to carry out the findings of Burton, Cleland, Bradley, and McDonald, of Australia, who proved that Stegomyia calopus was the transmitter of dengue (Manson, British Medicine in the War, 1914–1917, p. 101). The possibility of Stegomyia calopus being the transmitter of dengue was also recently emphasized by Lane (U. S. Nav. Med. Bull., Vol. 12, No. 4).

A very interesting situation has arisen during the month of October. The first of the month an eruptive fever occurred in a white family. A diagnosis of dengue fever was made. The rash was extensive, however, resembling markedly that of measles, so much so that the correctness of the previous diagnosis was doubted. The child was placed under quarantine and an investigation made of all sick children at the school attended by the patient. During the week 23 children were kept at home on account of sickness. Investigation of these cases proved that all suffered from a respiratory infection and were sick for two or three days with fever and cough. All these cases were considered to be influenza. Two weeks later, however, the brother of the first-mentioned child was also taken sick. He had a typical onset of influenza with some cough. No Koplik spots occurred, but on the fourth day a marked erythematous rash appeared, identical in nature with that of his brother, resembling measles. A white blood cell count was made, and found to be 2,100 with about 45 per cent of lymphocytes. This case was then also recorded as a case of dengue fever. The child attended the same school as his brother, and a new investigation was made of all children absent from school. It was found that 26 children were absent. Inspection of these cases revealed the same condition as during the previous week with the exception that three cases had eruption. One white child had identically the same eruption as the two children previously mentioned.

Two others of mixed blood had the type of eruption often found in dengue fever.

The question of a differential diagnosis now comes up. Measles, according to local physicians, occurs at intervals of several years. When an epidemic appears, it sweeps the entire island.

The present condition certainly is a limited affair as far as the eruptive fever is concerned. In no one of the above cases were Koplik spots found. The case previously described as positive measles occurred in another part of the city and was not followed by any secondary cases. These facts seem to exclude the probability of the

present cases being measles. Quarantine of all premises where the eruptive fever occurred was instituted, however.

Influenza must be taken into consideration, due to its prevalence at present and on account of the respiratory complications. That many of the children absent from school and suffering from cough and fever for a few days were victims of mild attacks of influenza is undoubtedly the case, but the ones who had eruptions apparently suffered from another disease.

Dengue fever must not be lost track of in this connection. Dengue fever is endemic on the island. There were 52 cases reported during the month of September. The sudden onset, the typical leucocyte count, and the rash speak for dengue fever. The respiratory symptoms may be caused by a complicating influenza.

It is to be noted that the marked eruption occurred only in white children. A very instructive case is brought to mind. Last year an officer's child was taken sick with eruptive fever. The junior medical officer, recently arrived from the States, made a diagnosis of measles. The diagnosis was soon changed, however, on advice of senior men, to dengue fever. Hence it seems that the rash of dengue fever is more extensive in the young child and may resemble that of measles.

Influenza.—The pandemic of influenza of the present year has exacted its toll among the population of St. Thomas and St. John. The number of cases undoubtedly came up to several hundred. The exact number can not as yet be ascertained, because this disease was not one of the reportable ones, but, due to the exact records kept at the Municipal Hospital of not only the hospital cases, but also of the out patients as visited by the municipal physicians, a more or less complete report of the number of cases that actually occurred will soon be a matter of knowledge. Pulmonary complications have been quite common, and several deaths from broncho-pneumonia have occurred.

It is to be noted that the warm climate decreased the virulence of the infection markedly. Comparatively few cases have developed among the white population, who, as a rule, live in a more hygienic manner than the natives. It is the poorer classes, afraid of the eastern wind, and given to closing up their sleeping quarters tightly, who are the biggest sufferers. The crowded conditions of their dwellings must also be emphasized.

GASTROINTESTINAL INFECTIONS.

Amebic dysentery.—Amebic dysentery apparently is not so very common on the island. Since March the following cases have been reported: March, 0; April, 4; May, 1; June, 3; July, 0; August, 1; September, 1.

Balantidic dysentery.—One case was discovered in the municipal hospital in May. This patient also suffered from uncinariasis. She has never been away from the island.

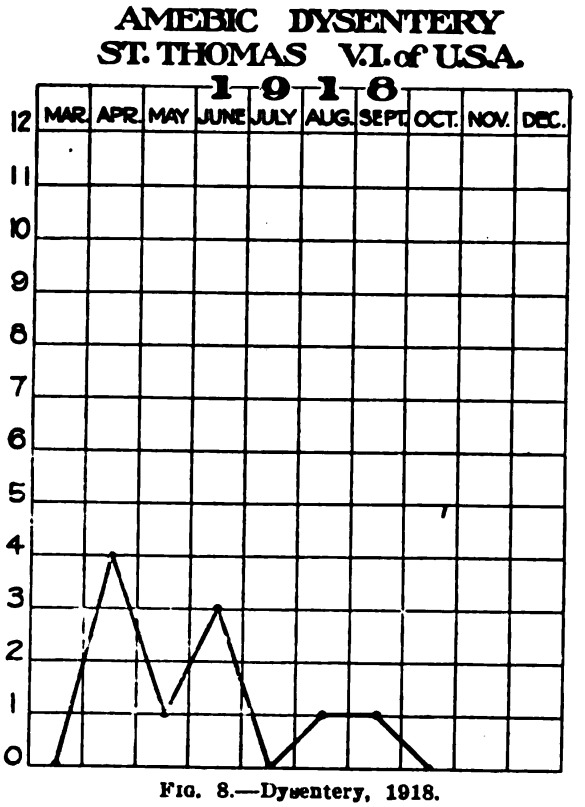


FIG. 8.—Dysentery, 1918.

Schistosomiasis.—One case was discovered in June in a transient from one of the British West India Islands.

Uncinariasis.—Hookworm disease is not common in St. Thomas. The discovery of the present cases is due to the routine feces examination as carried out in the municipal hospital. Nineteen cases have been reported from March to September, inclusive. Of these, 10 are of foreign origin, 8 being discovered at one time among a shipload of colored people en route to New York from one of the British West India Islands. Of the other nine, four were in the hospital for treatment of entirely different ailments. Four were also living in the city proper, while five were living in the rural districts. Of the whole series, 2 were white and 17 colored.

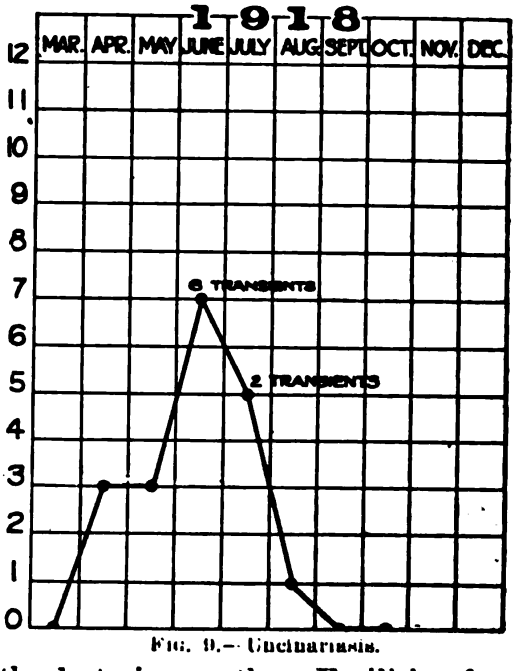


FIG. 9.—Uncinariasis.

Typhoid fever.—It has been stated by resident physicians that typhoid fever has never been as frequent as during the last six months. This statement, however, must be questioned. No up-to-date methods of diagnosis have been in vogue, and a certain number of patients have died or recovered from such diseases as continued fever, intermittent and remittent fever, acute diarrhea, etc. Typhoid fever has been very common during the last six months. Facilities for

serological and bacteriological diagnoses were made available at the United States Naval Hospital in April, 1918.

Only a comparatively small number of families receive milk regularly from a distributor, the big mass of the people buying theirs from different venders in the street.

This may account for the unusually large number of supposed cases. The following numbers of cases occurred during the different months: March, 3; April, 7; May, 9; June, 16; July, 10; August, 1; September, 0.

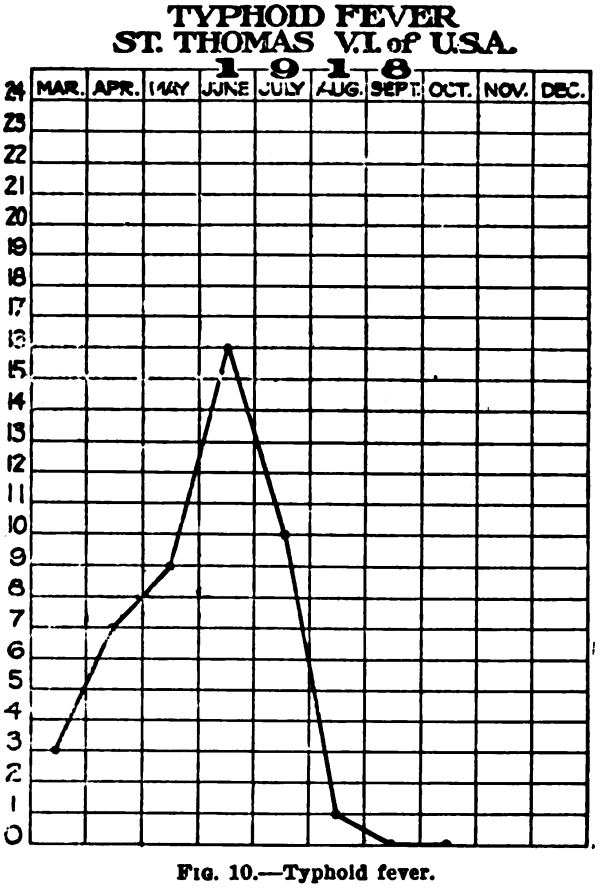


Fig. 10.—Typhoid fever.

From an epidemiological standpoint these cases make a very interesting study. From the very peculiar local conditions the common avenues responsible for the spread of the disease may be excluded.

The entire city is almost wholly dependent upon rain water for drinking purposes. The cisterns, barrels, etc., used for the collection of this water must, from a bacteriological standpoint, be considered satisfactory. The chance for their infection is small. In this series of cases no positive evidence whatsoever could be obtained which would lead to suspicion of any cisterns. Neither could milk, so often described as being responsible for small epidemics, be proved to be the cause. This is not, however, due to the fact that the milk supply in St. Thomas is carefully guarded against infection. The most primitive means are used in its distribution. It is, as a rule, transported to town in bulk and dipped out to the consumers. Some is distributed in bottles. One dairy only uses the standard American milk bottle.

This irregularity in distribution would make it very difficult indeed to trace an epidemic to any special source of milk supply. The

danger from this insanitary way of handling milk is, however, overcome to a very large extent by the nearly universal habit of boiling the milk before consumption.

Many other routes are open, however, for the spread of typhoid fever. The careless manner, previously described, in which night soil is removed from premises, together with absence of all ideas of cleanliness amongst the people at large are, it appears, the factors that have been mostly responsible for this epidemic.

The habit of the people of placing their night soil in a little can or bucket, never properly covered, and keeping same on the premises for weeks before cleaning, seems, indeed, to be the cause of the present epidemic.

Another factor of importance is the people's habit of moving from one place to another. The pauperism of so many of the inhabitants, together with loose family relations, are responsible for the lack of stability in this connection. The infected privies and other receptacles for night soil are in this manner very much increased in number. The link between infected receptacles and susceptible individuals, namely the fly, is present everywhere. These same infected privies and buckets were found to contain large numbers of maggots.

The following report represents a few epidemiological data in this epidemic:

Cases.	Located.	Admitted to hospital.	Taken sick.	Discharged.	Laboratory finding.	Notes.	Milk.
MAR.		1918.	1918.	1918.			
1	Kongensgade 6.....	Mar. 1...	Feb. 20..	Mar. 30..	Wid.+1-50.....	Moved to Palmestraede No. 6 one week before taken sick.	From Mr. Fabio; always scalded.
2	Dronningensgade K. Q. 35b.	Mar. 25..	Mar. 21..	Apr. 25..	Cult.+B. t.....	.....	From Mrs. Beretta; always boiled.
3	Kronprinsensgade 65.	Mar. 30..	Mar. 23..	May 11..	Wid.+1-80.....	Milk from woman who sells for Mrs. M. V. Cid, of John Bruce Bay.	Mrs. M. V. Cid.
APR.							
4	Prinsensgade 18a.....	Apr. 13..	Apr. 7...	Apr. 17 (1)	Ant.+.....	No milk; no privy; house utensil with few flies.	No milk.
5	Norregade 12 K. Q...	(2)	Apr. 3...	.....	Not made.....	First in series of 3 cases on these premises; second, No. 6; third, No. 7; privy in very insanitary condition, with numerous flies; milk from Raimer estate. NOTE.—Moved to Commandantgade 22 three days before taken sick.	Raimer estate.
6	.....do.....	Apr. 24..	Apr. 18..	June 9...	B. t. from stool.....	Same premises as above.....	Mrs. Gray from Jurgensen's dairy Tutu. Norregade 19.
7	.....do.....	Apr. 25..	Apr. 21..	...do.....	B. t. from stool. Wid.+	Same premises as above; last two probably infected from Case No. 5.	Maria Simmons.
8	Ross 18.....	Apr. 24..	...do.....	Aug. 30..	Wid.+.....	Ross 18—suburb east of town.....	Seldom milk.
9	Kongensgade 13.....	(2)	Mar. 28..	.....	Wid. not made. Clinical picture.	Worked and ate at Kongensgade 13, where insanitary surface privy; slept at Norregade 34, where house utensil took place of privy. NOTE.—Nearest previous cases at Kongensgade 6, 7 yards distant and at Prinsensgade 18a, 5 yards distant.	No milk.

[1] Death.

[2] Not in hospital.

Cases.	Located.	Admitted to hospital.	Taken sick.	Discharged.	Laboratory finding.	Notes.	Milk.
APR.		1918.	1918.	1918.			
10	Dronningensgade 10 K. Q.	Apr. 28..	Apr. 13..	June 14..	Wid. +.....	Took sick 16 days after Case No. 9, Kongensgade 13, two lots distant.	
MAY.							
11	Kongensgade 13 K. Q.	May 6....	Apr. 30..	May 11 (1)	Blood cult. +B. t..	Lived at Norregade 26 when taken sick (Apr. 30, 1918), but had stayed at 13 Kongensgade between Apr. 13, 1918, and Apr. 22, 1918, with her sister, where Case No. 9 took sick (Mar. 28, 1918).	Small quantities from various carts.
12	Hospital ground 45..	May 8...	Apr. 30..	July 27..	Wid. +cult. stool...	Mother worked at 13 Kongensgade since illness of Case No. 9, but according to mother no food taken home and boy never visited her.	E. Adams of 18 Prinsensgade, where Case No. 4 died of typhoid.
13	Dronningensgade 13 K. Q.	May 13..	May 3...	Aug. 12..	Wid. +.....	Next yard south is privy used by Case No. 9 (Kongensgade 13), almost under window of back hall of patient's house; 2 yards to east is home of Case No. 10, Dronningensgade 10.	Boschulte's dairy; always boiled.
14	.....do.....	...do.....	May 6...	June 27..	.....do.....	Taken sick few days after father (previous case).	Do.
15	Hospitalgade 2.....	May 26..	May 1...	...do.....	.....do.....	Nearest case 13 Kongensgade.....	Eliza's retreat; always boiled.
16	Dronningensgade 50 K. Q.	May 14..	May 5...	May 28..	.....do.....	Nearly across street from Dronningensgade 13, and next yard to Hospitalgade 2; last 5 cases developed about same time. NOTE.—Milk from different places; not living far from 13 Kongensgade.	At times from different places.
17	St. John.....	May 20	.....	July 24	Wid.+stool B. t...	.....	
18	Kongensgade 6.....	May 30	May 23	June 27	Blood B. t.....	Same house case No. 1 (Mar. 1, 1918), 7 lots from Kongensgade 13 and 5 lots from Dronningensgade 10.	Any seller on street.

19	Hospital ground 6...	(2)	May 13	.....	Wid.+negative.....	No trace; doubtful case.....	Anne E. Frederick.
JUNE							
20	Prinsensgade 13b....	June 6	June 13	Aug. 3	Wid.+.....	Visited often with father at 13b Prinsensgade, but lived at 24 Regjeringsgade, Kronprinsens Quarter.	No milk.
21	Hospital line 12.....	June 8	June 5	July 24	Wid.+stool B. t...	3 house lots from previous case (13b Prinsensgade), infected practically at same time.	C. Jackson from estate Charlotte Amalia.
22	Norregade 19.....	June 12	May 28	Aug. 17	Wid. stool B. t.....	Case No. 11, lived at Norregade 26 when taken sick (Apr. 30, 1918); this is just across street from Norregade 19.	
23	Kongensgade 19–20..	June 13	June 5	(1)June 14	Autopsy+	Employed at 19–20 Kongensgade; lived at 3 Skovgade up to June 10, 1918, when moved to 25 Regjeringsgade; no trace.	Mosquito Bay Dairy.
24	Prinsensgade 25.....	June 15	June 9	Aug. 10	Wid.+stool B. t...	Right behind 50 Dronningensgade, where Case No. 16, and 2 Hospitalgade, where Case No. 15.	
25	Palmestraede 5dd....	June 18	June 14	Aug. 3	Wid.+.....	2 house lots from Palmestraede 6, where Case No. 1 lived for a week before entering hospital (Mar. 1, 1918).	No milk.
26	Commandantgade 8..	June 18	June 14	Aug. 10	Wid.+stool B. t....	One case of typhoid suspect on these premises not reported since May 28, 1918; case No. 5 (April) lived at 22 Commandantgade, just across the street from 8 Commandantgade for a week before taken sick (Apr., 3 1918); when sick for 6 days moved to father at 4b Regjeringsgade, Kronprinsens Quarter.	

[1] Death.

[2] Not in hospital.

Cases.	Located.	Admitted to hospital.	Taken sick.	Discharged.	Laboratory finding.	Notes.	Milk.
JUNE		1918.	1918.	1918.			
27	Norregade 19.....	June 22	June 17	(1) July 22	Wid.+ Autopsy negative for typhoid; cause of death, noma, broncho-pneumonia.	Same premises as case No. 22.....	
28	Commandant Tvergade 3.	June 22	June 6	Aug. 3	Wid.+.....	Nearest case 8 Commandantgade, 5 house lots distant, where 1 case typhoid suspect since May 28, 1918.	No milk.
29	Vestergade 42.....	June 25	June 17	Aug. 17	Wid.+.....	No trace.....	Various sources.
30	Kronprinsensgade 49.	June 27	June 18	July 27	Wid. blood urine stool.	Reported suspect typhoid June 28, 1918; not typhoid, July 12, 1918; but note, visited at father's residence on Palmestraede, about 20 feet from Palmestraede 5dd, where case No. 25 was taken sick (June 14, 1918); case 42 (48 Kronprinsensgade) reported positive typhoid July 25, 1918. Next house to 49.	Estate Lilliendahl; boiled.
31	Altona 6.....	June 28	June 18	Aug. 3	Wid.+.....	No trace.....	No milk.
32	Vestergade 42.....	June 28	June 25	Aug. 17	Wid.+.....	A brother in hospital with typhoid fever since June 25, 1918.	Various sources.
33	Ross estate.....	June 28	June 20	(1) July 2	Aut.+ third week..	A younger brother in hospital since Apr. 24, 1918, with typhoid fever; this case (33) came home every week to visit brother.	
34	Palmestraede 5aa....	June 29	June 20	Aug. 3	Wid.+.....	1 house lot from 5dd Palmestraede, where Case No. 25 sick with typhoid fever since June 14, 1918.	At times.
35	Commandantgade 8..	(2)	May 28	.....	Wid.+.....	This is the unreported case previously mentioned. NOTE.—Cases Nos. 5 and 26.	

JULY.								
36	Lyttons Fancy 8....	July 4	June 29	Aug. 24	Wid.+.....	No trace.....		
37	Norregade 19.....	July 3	June 24	Aug. 10	Wid.+.....	Lived at Kongensade 51b, but associated with sister (Case No. 22) and playmate (Case No. 27) at 19 Norregade.		
38	Commandant Tvergade 3.	July 8	July 4	Aug. 9	Wid.+blood.....	Lived at Commandantgade O. V. 12bb, but played with sister (Case No. 28), who was taken sick with typhoid June 6, 1918, living at Commandant Tvergade 3.	No milk.	
39	Annas Fancy.....	July 11	June 27	July 24	Wid.+.....	No trace.....	Various places.	
40	Dronningensgade 52. K.Q.	July 9	July 2	Aug. 12	Wid.+stool B. t....	6 cases of typhoid fever within a radius of 3 house lots.		
41	Jodegade 8d.....	July 22	July 18	Aug. 26	Wid.+stool B. t...	No trace.....	G. Jacobs from estate Lilliendahl.	
42	Kronprinsensgade 48.	July 22	July 15	Sept. 6	Wid.+.....	Next yard to Kronprinsensgade 49b, where Case No. 30 reported suspect typhoid June 28, 1918, but reported not typhoid July 12, 1918.		
43	Norregade 27e.....	July 27	July 22	Aug. 25	Wid.+.....	Several cases of typhoid fever in vicinity, especially at 19 Norregade, 4 house lots distant.		
44	Estate Charlotte Amalia.	July 29	July 26	Sept. 6	Wid.+.....	No trace.....	No milk.	
45	Kronprinsensgade 33.	July 31	July 21	Aug. 22	Wid.+.....	No trace.....		
AUG.								
46	Estate Charlotte Amalia.	.....	Aug. 1	.....	Wid.+.....	Apparently same infection as that of Case No. 44, with whom he is cousin and close associate.	Tutu estate.	

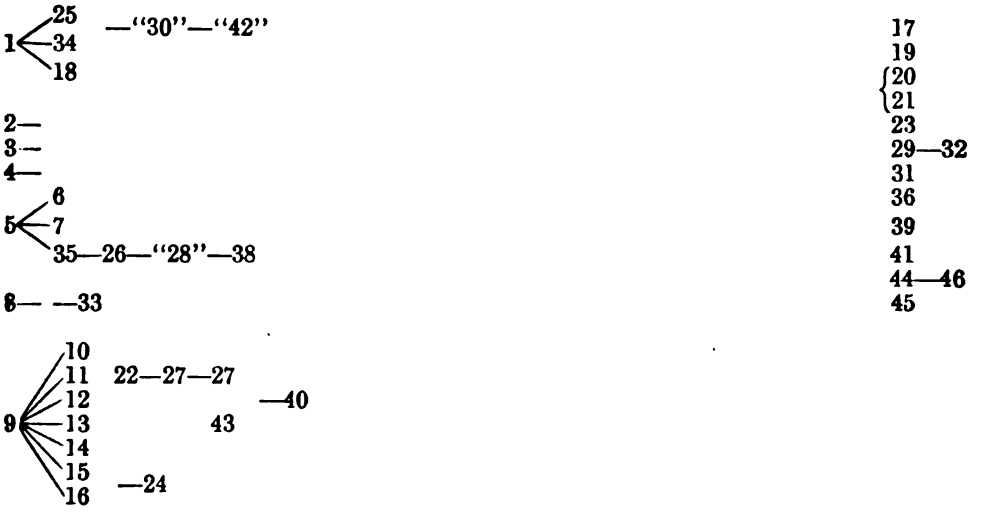
[1] Death.

[2] Not in hospital.

It is to be noted that the first five cases occurred in widely separated places in the city. No connection could be traced between these cases. *Cases 1*, *2*, *3*, *4*, and *5* received milk from different sources. *Cases 1* and *2* always boiled their milk and *Case 4* did not use milk at all. It is also to be noted that *Case 1* moved one week before being taken sick from Kongensgade 6 to Palmestraede 6, Queen's Quarter. Three and a half months later *Case 25* developed at Palmestraede 5dd, two house lots from Palmestraede 6, and six days later *Case 34* developed at Palmestraede 5aa, next property to 5dd. Three months after *Case 1* was taken sick *Case 18* developed the disease on property Kongensgade 6.

Case 5 moved to Commandantgade 22 three days before being taken sick, up to which time she had lived at Norregade 12. About two weeks later *Cases 6* and *7* also developed at Norregade 12, and about eight weeks later *Case 35* was taken sick at Commandantgade 8, just across the street from Commandantgade 22, to be followed about two weeks later by *Case 26* on same propery.

Diagrams showing the possible interrelation between the different cases of typhoid fever.



It is to be noted that *Cases 5* and *9* were not isolated in the hospital, and further that *Case 9* was considered a doubtful case and escaped the rigid routine of later cases.

Case 8 developed on "Ross estate," a suburb on the eastern side of the town. About two months later his brother, *Case 33*, developed typhoid fever. This patient was a sailor by occupation and came home regularly every week, when he visited his brother.

Case 9 has proved to be a very important link in this particular epidemic. Whence this case possibly received her infection we are unable to state. The nearest cases are *Case 1*, Kongensgade 6, seven house yards distant, and *Case 4*, Prinsensgade 18a, five yards distant. The

following cases may without question be charged to *Case 9: Case 10*, who took sick two weeks later, lived at Dronningensgade 10, King's Quarter, just two lots distant from Kongensgade 13. *Case 11* lived at Norregade 26, King's Quarter, when taken sick (Apr. 30, 1918), but had stayed with her sister at Kongensgade 13 between April 13, 1918, and April 22, 1918. The mother of *Case 12* had worked at Kongensgade 13 since the illness of *Case 9*. Mother stated, however, that she never took any food home and that the son never visited these premises. *Cases 13* and *14* lived next yard to *Case 9*, the privy used by *Case 9* being directly under a hall window of the house where these cases resided, Dronningensgade 13, King's Quarter.

Cases 15 and *16* were taken sick approximately at the same time as *Cases 12*, *13*, and *14*. They lived just across the street from the last two cases. *Case 24*, at Prinsensgade 25, was taken sick about one month later. He lived just behind Dronningensgade 50 and Hospitalgade 2, where *Cases 16* and *15* resided. *Case 22* came down with typhoid at Norregade 19 about May 28, 1918, one month after *Case 11* was taken sick at Norregade 26, just across the street, where she had moved from Kongensgade 13. Later two other cases developed at Norregade 19, namely, *Case 27* (June 17, 1918) and *Case 37* (June 24, 1918). The latter case resided at Kongensgade 51b, but associated closely with his playmate (*Case 27*) at Norregade 19.

Case 40 developed at Dronningensgade 52, King's Quarter, six cases of above typhoids being within a radius of three house lots.

One important factor in the epidemiology of these latter cases is that *Case 9* was a private case, and consequently not taken to the hospital for isolation. Further, it was considered a doubtful case and escaped the rigid routine of the positive cases.

The large number of secondary cases that developed and could be traced to this particular case may thus be explained. Compulsory hospitalization of all cases was soon after made the rule.

Here it may also be stated that *Case 5* was not isolated in the hospital. These two cases show the largest number of secondaries and emphasize the importance of hospitalization of typhoid fever patients in order to insure a satisfactory treatment of the excreta.

Case 17 developed on a small contiguous island, St. John, and was sent to the municipal hospital, St. Thomas, with diagnosis of septic abortion.

Cases 19, *20*, *21*, and *23* can not be traced to any definite source. They all four received milk from different parties. *Case 19* was considered a doubtful case, was not in hospital, and had negative Widal reaction. *Case 28* at Commandant Tvergade is difficult to trace. This child was taken sick (June 6, 1918). The nearest premises where typhoid fever had occurred was at Commandantgade 8. This is, however, about five house-lots distant from above place. *Case 38*,

a brother of *Case 28*, lived at Commandantgade, O.V 12bb, but associated closely with his sister and developed typhoid about a month later.

Cases 29 and *32* are also a brother and sister, living at Vestergade 42, who developed typhoid practically at the same time. No possible trace to the source can be established. *Case 30* presents a very peculiar aspect. This patient lived at Kronprinsensgade 49, but was in the habit of visiting his father who lived in Palmestraede not far from No. 6, where *Case 1* had resided, and from No. 5dd, where *Case 25* was taken sick (June 14, 1918). *Case 30* was reported as suspect typhoid June 12, 1918. On July 12, 1918, however, he was reported as not typhoid due to the absolutely negative results in all laboratory findings. Widal reaction was negative. Cultures from blood, urine, and stool all proved negative. *Case 42* was taken sick with typhoid on July 15, 1918. This is a 2-year-old child, living next door to *Case 30*, at Kronprinsensgade 48. This speaks for the possibility of *Case 30* being a positive case.

Cases 31, *36*, *39*, *41*, *44*, *45*, and *46* all developed in widely separated places, except *Cases 44* and *46*, who were cousins, and taken sick at practically the same time.

Types of infection.—In all cases where the causative organism was isolated from blood or feces the bacillus typhosus was found. No case of paratyphoid presented itself.

Number of deaths.—Of the 46 cases of typhoid fever that occurred in this epidemic, four died, giving a death rate of $8\frac{7}{10}$ per cent.

Methods of control.—Sanitary improvements on properties. This epidemic of typhoid fever served as a distinct reason for compulsory repair of all the properties where typhoid fever developed and also in the neighboring properties. As soon as a typhoid fever case was reported to the sanitation service, the premises on which it occurred was investigated and privies, receptacles, and water containers rendered fly and mosquito proof as speedily as possible. Frequent inspections by the sanitary inspectors were made in an attempt to keep the premises up to standard. Many difficulties were encountered. The large majority of pits were found to be in anything but a sanitary condition. Some consisted only of the pits with the remnants of the old shade privy serving as some sort of camouflage, giving flies and all kinds of insects free access to the contents. The native night-soil receptacle was ordered to be covered, and at intervals to be sprinkled with kerosene. At the present time a uniform system of night-soil removal is being installed by the sanitation service, which system will supply every property with properly covered receptacles, to be removed and replaced by a clean one at least once a week. The importance of sanitary improvements on the properties has now

been impressed upon all the property owners, and repairs of this kind are now in full swing all over the city.

Hospitalization of all typhoid fever patients.—Soon after the outbreak of this epidemic all cases were required to go to the hospital. The importance of this in a community of this kind is seen in cases 5 and 9. This latter case was sick for two or three weeks before a physician was called. It further did not present a typical picture of typhoid and no Widal reaction was made. Hence it escaped the rigid routine of other cases. The patients were kept in hospitals until the excreta were found to be free from typhoid bacilli.

Vaccination.—August 5, 1918, universal vaccination against typhoid fever was instituted by the chief municipal physician.

The vaccine was made in quantity at the U. S. Naval Hospital, St. Thomas, from local cultures. The vaccine consisted of 24-hour-old bouillon cultures, rendered sterile by heat and later tested for sterility.

The vaccinations were performed at the municipal hospital. All inhabitants of St. Thomas between the ages of 5 and 45 years who had not had typhoid fever recently, or who had not been previously vaccinated, were to appear at said hospital at designated hours and days. One hour a day, between 3 and 4 p. m., was set aside for this purpose. Two injections one week apart were considered enough to immunize for all practical purposes, the dose being 1 and 1½ c. c., respectively, for adults. Children were given correspondingly smaller doses. The inhabitants of the city proper were first vaccinated, then the suburbs and outlying estates.

In this manner 6,784 people were vaccinated in about two months with no marked disturbance in the industrial affairs of the island. Forty persons presented certificates to the effect that they had recently had typhoid fever or that they had been previously vaccinated against typhoid.

Of the 46 cases of the present epidemic, 39 belong to this group, 7 being excluded for the following reasons: 4 patients died, 1 was from St. John, and 2 were under 5 years of age.

The total of immunized people then comes up to 6,863. The census of 1917 gives the number of people in St. Thomas between the ages of 5 and 45 as 6,999. Hence, 98.5 per cent of all people between the specified age limits have been rendered immune against typhoid fever.

CONCLUSIONS.

As a peculiar coincidence it may be stated that not a single case of typhoid fever developed since the day vaccination was started. The greatest number of cases appeared in May, June, and July—9, 16, and

10, respectively. A sudden drop occurred in August, when only 1 case developed early in the month.

The reason for this sudden disappearance of typhoid fever is hard to understand. The effect of the vaccination could not be established so soon, especially when it is considered that the same was begun in King's Quarter and from there extended westward to Queen's and Crown Prince's Quarter, and later to the country districts.

It is to be noted that the later cases of typhoid occurred in Crown Prince's Quarter and in the country districts, where vaccination was not started until September.

The natural decline of the curve must be taken into consideration, although no comparative figures are at hand to show when it occurs in these parts. One factor that undoubtedly has had marked bearing on the control of the situation is the hospitalization of all cases as soon as the disease was suspected. The importance of this has previously been discussed with regard to *cases 5* and *9*.

Another factor that without question has played a rôle in checking the disease is the systematic improvement of the sanitary conditions on the infected premises.

The early hospitalization, together with these improvements, lessened to a marked degree the danger from the ever-present fly, whose season is continuous in this climate.

When typhoid fever occurs again a radical change in the curve will undoubtedly present itself. The effect of the typhoid vaccination will then be established, and from the figures previously submitted will protect 98.5 per cent of the population between the ages of 5 and 45. A compulsory vaccination every fourth year should keep the incidence of typhoid down to a minimum, or possibly completely eradicate the disease.

NAVAL AMBULANCE TRAINS OBSERVED IN GREAT BRITAIN

By F. L. PLEADWELL, Captain, Medical Corps, United States Navy.

The larger naval hospitals of Great Britain are placed in or near the southern naval ports, their location here having been the result of strategical considerations governing policy in the past. When, however, the strategy of this war placed the Grand Fleet well to the north, the evacuation of sick and wounded from the vessels of the fleet to the larger naval hospitals in the south involved the organization of a new and special system of transport, unique in the history of the navy. The absence of hospitals with adequate bed capacity in Scotland was met partly by the use of hospital ships with the fleet. These ships might have served to convey the excess sick and wounded to the southern hospitals, but this course was found to be imprac-

ticable owing to difficulties of navigation, particularly in winter, through the narrow channels of mine fields, and finally because of the requirement that these ships should not be sent far from the fleet bases in the north, where they served as hospitals. Hospital ships did operate between the northern base at Scapa and the other bases at Invergordon and in the Firth of Forth, but for transport beyond this point ambulance trains became the routine medium by which the sick from the fleet were conveyed to hospitals.

Four naval ambulance trains were organized and equipped for this service during the war. One, the smallest, did a shuttle service between the base at Ivergordon (Cromarty) and Leith, and the three remaining trains were operated on routine and emergency trips between Leith and the naval hospitals at Plymouth, Portland, Portsmouth, and Chatham. The naval hospitals at Queensferry and Leith, in the vicinity of Edinburgh, had a limited capacity, and the hospital projected for Rosyth had not been constructed.

The shuttle train (No. 4) was inspected at Inverness, Scotland, on July 19, 1916, but a more extended experience was had in June, and again in September, 1916, in train No. 3, which will be described at length. On the first occasion the train was dispatched from Chatham to Plymouth to meet the hospital ship *Rewa*, arriving from the Mediterranean with sick collected from Mudros and Malta. Distribution of patients was made first at Gosport for Haslar Hospital, and then at Gillingham for Chatham Hospital. On the second occasion the train was boarded at Craigentinny near Edinburgh. Stops were made at Leith and Newcastle and the patients distributed to the hospitals at Plymouth, Portland, Haslar, and Chatham.

Train No. 3 was an improved type of one organized early in the war by Surgeon General (now Surgeon Vice Admiral) Sir James Porter, K. C. B., Royal Navy, former medical director general of the navy, who had resumed active service during the war as principal medical transport officer. To him and to his assistant, Acting Staff Surgeon (now Acting Surgeon Lieutenant Commander) A. Vavasour Elder, D. S. C., R. N. V. R., the writer is greatly indebted for the privilege of making two extended trips in this train and for the opportunity thus afforded of observing its construction, equipment, organization, and administration. The Royal Naval Ambulance Train No. 3 was converted for ambulance purposes by the Great Northern Railway and was commissioned on June 2, 1916. The train was in charge of two surgeons of the Royal Navy, temporary service, and comprised 12 coaches with a capacity of 146 patients, in the following classes, viz: Officers, cot cases, 20; officers, sitting, 10; men, cot cases, 116, making a total of 146. Four additional emergency cots could be rigged if necessary. The sick berth staff, waiters, cooks, etc., numbered 36. By utilizing the spare room in the staff

coach and fitting two bunks, two nursing sisters could be accommodated, but ordinarily women nurses were not carried in the complement of the train. The 12 coaches were all of the "bogey" type, converted to this use from ordinary rolling stock and marshalled in the train in the following order:

1. Crew and general coach.
2. Number 1 cot coach.
3. Number 2 cot coach.
4. Day coach.
5. Store, office, and kitchen coach.
6. Number 3 cot coach.
7. Special cot coach No. 4.
8. Cot coach No. 5.
9. Officers' cot coach No. 6.
10. Dining coach.
11. Staff coach.
12. Baggage and guard coach.

Some of the coaches were 42 feet long, some 45, and some 50 feet. The total length of the train over all was 622 feet. It was provided with 11 water-closets; compressed gas for cooking, carried in six cylinders; and several water tanks with a total capacity of 1,140 gallons. The gas supply was sufficient for about 24 hours' service. There was a telephone system between the staff coach and the office and administration coach, and each coach was lighted independently by separate dynamo and accumulators. Heating was by steam from the engine, the piping for which in the wards was carried in the overhead space of the clerestory roofs. Theoretically, this principle of having a radiating surface overhead is wrong, but practically it was stated to work well, and by this disposal of the piping the floor space was left free of radiators, which arrangement also contributed to cleanliness. When cut off from the engine, a substitute system from a hot-water heater in the coach itself was provided. The floors of the coaches were covered with thick linoleum. Both vacuum and Westinghouse brakes were fitted to the train. The advantage to be gained from smooth running in an ambulance train is obvious, and for this reason the length of the coach was designed to be as great as possible without exceeding a length which it was possible to use over the various railway lines of the Kingdom. For easy communication the train was arranged on the corridor plan throughout, vestibuled, and with a special system of signals provided between the train and locomotive driver so that the speed of the train could be adapted to the requirements of the occupants of the train. Over good sections of roadbed a speed of about 60 miles was sometimes attained, but over a rougher roadbed 20 miles an hour was fast enough. An average running time of 40 miles an hour was supposed to be maintained, but over a good road the patients state that they

Interior view of a cot coach, British Naval Ambulance Train No. 3.

769-1

are more comfortable when a higher speed is made and on a bad way 40 miles would be uncomfortable or even dangerous.

Stocked with linen, food supplies, medical equipment, etc., the train was quite independent of outside assistance for the period of a run from its base and return, except that in long runs certain stops are made for renewal of water and gas. Gas was only required for cooking purposes as the lighting was by electricity throughout. The internal surfaces were painted a hard, bright, firm enamel white and the exterior a naval gray with the red cross on a white ground on the sides of each coach.

Each ward coach had four large sliding side doors, which, when open, were guarded with a bar and had a grab rope at each side to afford a handhold on entering or leaving the coach. The doors are in pairs and opposite so that stretchers and bearers are not cramped for turning space. Water-closets and lavatories are provided for each coach, and the staff coach has in addition a bathroom. This was the third run of this train, on which a mileage of 571 was made.

On the second occasion on which I made a trip (No. 11 run) in this train, the mileage was 830, and the total mileage since commission, about three months, had then reached about 17,000 miles. In this time 1,198 patients had been carried. Three galleys were provided in the train—one in the staff coach, one in the ward-room coach, and one in administration coach. The number of meals which could be served in a day from the galleys on the train numbered 190 (including tea).

DETAILED DESCRIPTION OF COACHES.

Crew and guard coach.—This accommodated the train crew and the noncommissioned officers, the former having 12 bunks and the latter three, with collapsible mess tables, lockers and cupboards for clothing, etc. A lavatory and water-closet were fitted in one end.

Cot or ward coach.—Five coaches of this description were in the train and each coach accommodated 24 cots, hung 12 in each side in two tiers. The cot used is much the same as the service canvas cot which was formerly issued to ships in our service, consisting of canvas stretched over a wooden frame and laced in position, with side pieces to hold a mattress in place and triangular end pieces terminating in an eyelet, to which a supporting rope or lanyard is rove. These cots are suspended from the roof of the coach by chains. The illustration will give an idea of the arrangement and appearance of cots and of their method of support in the coach.

The supports were made the same length and the cots were readily interchangeable. They were held in place and kept from swinging by being fastened against two buffers or fenders by a chain and hook

with a spring attachment. The fenders were fitted to the sides of the coach and extended from the floor to a point above the upper cot. The face of the fender was padded with a cushion of horsehair or tow in canvas. This was mounted on a wooden fender block. In military ambulance trains the cots are of the fixed type; that is, they are more or less permanent fittings of the train, too heavy as a rule to be unshipped and used as stretchers, even when designed and intended to be so used, while in the naval train the movable cot may be said to be its distinctive feature. Naval medical opinion inclines to the view that the movable cot is decidedly better for the purpose than the fixed cot, and all naval trains use the movable cot system. The objections to the fixed cot are stated to be the following:

1. As the cot is rigidly fixed to the coach the patient is more subjected to jars transmitted from irregularities of the roadbed, whereas in the movable cot this is lessened by its flexible structure, as well as by the cushion on the side buffer, and by the spring grips and chain which hold the cot against the buffer.

2. With fixed cots patients have to be transferred to and from the train by stretchers, while in the movable-cot system the cot itself is used as a stretcher and no transfer of the patient from stretcher to bed or vice versa is required. Occasionally a patient with a serious fracture can not stand the transfer from stretcher to the fixed cot, and the stretcher then has to be placed in the cot and the journey made in this manner with a material loss of comfort and perhaps less safely. The movable-cot system, however, requires a larger number of stretcher bearers, four to each cot and two to hook on in the train, and a large number of cots. For the military service, therefore, this system may not be appropriate, but for the naval ambulance trains it operates very satisfactorily.

For instance, a patient for transfer, either in his own ship or in a hospital ship, is already in the service cot, which is unshipped and carried as a stretcher and rigged in position in the ambulance train, the train force leaving previously disentrained as many cots as there are patients to be received, the ship or hospital ship receiving one of these cots in exchange for the one carrying the patient. On arrival at the point of disembarkation for a naval hospital the train receives a clean cot from the hospital for every patient transferred to the hospital. On transfers between trains a similar procedure is followed. Each cot is arranged with full equipment, namely, one mattress, one pillow, one pillowcase, two blankets, and two wooden spreaders, and care is taken to see that cots received in exchange contain the standard equipment. Another advantage of this system is that the ward coach can be completely and readily emptied of cot equipment and the cleaning of the interior of a coach easily carried out, the cots being scrubbed and dried outside the coach (or disinfected, if necessary, at a neighboring hospital). To securely fix the cot in position is quite important, for if the lashings work loose

there is too much play and swinging when the train sways or starts and stops. The attendant can easily remedy any undue motion by setting up the lashings as required. The cots when used as stretchers require a little more clearance than an ordinary stretcher, and interference of bearers with each other may result if a definite routine in loading and evacuating the coach is not adopted. Six bearers are required to place a cot in position, four as bearers and two to assist in hooking it on in the train. With the ordinary stretcher two bearers are sufficient to carry the stretcher and two train attendants to assist in transfer of patient to the cot in the train. The upper cot in this train was suspended direct by its eyelets to two hooks in the roof of the coach; the lower cot was suspended from the same hooks by means of a chain and hook. In addition, each cot has its lanyard, which enables it to be slung centrally or elsewhere in the coach from any support. In front of each section of two cots is hung a curtain. If a ward coach is required for sitting cases only it can be readily converted by lowering the lower cot to the floor, placing another cot on top of this one, and a third placed to form a back rest, being secured in place by lashings. Twenty-four to 40 sitting patients are thus accommodated in the naval train.

Day coach.—This is an ordinary coach fitted at one end with two water-closets and at the other end with two padded cells for mental cases. It also has a small surgical dressing room with appropriate equipment and a section for treatment, which can be screened off by a curtain. This is equipped with washbasins, cupboards, treatment couch, poison locker, etc. The remaining space of the car is fitted with 19 washbasins, which when not in use are covered over with a board, hinged to fall over the basins, and used as a table, on which meals can be served. In front of each table is a collapsible seat or a bench.

The day coach is centrally placed so that it is about equally accessible both from the kitchen and from the cot coaches containing sitting cases, and it serves usually as a dividing line in the train between lying-down cases and sitting cases. A food carrier is used for carrying rations from the galley to this coach. This is a wooden box fitted with a handle and containing six removable shelves.

Sick officers.—If required, one of the cot coaches can be fitted exclusively for officer cot cases, or a portion of a coach may be so fitted by screening off a section. Sitting-up cases among officers are provided for in the dining car, and 10 in number can be accommodated there. If sleeping places are required in this car, cots are placed across two adjacent seats. Eight officers can be provided for in this manner. This car is also fitted with a pantry, kitchen, a heating stove, and a water-closet.

Office, store, and kitchen coach.—This coach is fitted with a lavatory at each end, an office, linen store, kitchen, storeroom for provisions, and a pantry for steward and cook.

The office contains a safe for valuables, a desk with a typewriter, and lockers for papers. It has telephone communication with the staff coach. The kitchen is equipped with a gas range and boiler, an ice box, sanitary can, sinks, water filter, and a work table. The storeroom has shelves for dry stores, groceries, and other provisions. The remaining compartment is allotted to the cook and the senior sick berth steward.

Staff coach.—This coach provides accommodation for the two medical officers and two nursing sisters when carried. Two additional medical officers can be accommodated if double berths are shipped. This coach is divided into five compartments. The two end ones are fitted with sleeping berths for two persons with a lavatory and water-closet adjoining one, and a bathroom and water-closet adjoining the other. The two central compartments comprise a sitting and dining room and an additional sleeping compartment.

Baggage and guard coach.—This coach is used for patients' kits and baggage, spare cots, train tools, stretchers, and four cots for emergency cases. Lockers are provided here for storage purposes and for cleaning gear, spare lamps, fuses, fire extinguishers, tool and ladder box, etc.

ADMINISTRATION.

With the exception of emergency medical and surgical work, patients rarely need elaborate professional attention on ambulance train trips, the chief concern of the surgeon being to render them comfortable, provide food and drink, and perhaps loosen a bandage, adjust a splint, or administer morphine when indicated. The opinion was expressed by the surgeons in charge that the extremely rare occasions upon which the facilities of an operating room might have been used hardly justify its provision in ambulance trains, whose run between points where hospitals are accessible is not much over four or five hours. It is realized that the situation is somewhat different when a train is called upon to assist in the evacuation of the wounded direct from a naval engagement. This situation, however, rarely arises, as hospital ships and northern hospitals endeavor to retain the more seriously wounded until fully able to be transported by train.

DETAILS OF ROUTINE PROCEDURE.

Hospital ships.—When the port of disembarkation is determined upon by the senior naval officer, telegraphic information is sent to the medical transport office, London, under the following heads:

1. Date and probable time of arrival and port of arrival.
2. Total number of patients carried, giving officers and men separately.
3. Details of cases belonging to the port divisions of Plymouth, Portsmouth, and Chatham, shown categorically by numbers in the following sequence prefixed by the word "Cases" and name of port divisions: Officers—cot, noncot; men—cot, noncot.

The words "officer" or "men," "cot" or "noncot," are, however, not included in the telegram, as the same consequence is always adhered to and these terms are understood. For example: "Plymouth four nil twenty-two twenty-seven" is interpreted to mean that there are four officers patients, cot cases, and no noncot cases; and 22 men, cot cases, and 27 men, noncot cases for both. Whenever "nil" is used it means no cases of that category. Thus only four numbers need be telegraphed to each port division, the word "nil" being used to cover one category not present. When, however, the number of patients in any one category exceeds 100 it is necessary to use the word "and" to avoid confusion. Those wounded in action are not included in the above telegraphic arrangement, but are shown separately in similar sequence, prefixed by the word "wounded" and the name of the port division. A similar arrangement is made to show infectious cases, and also mental cases, both shown in the total, prefixed by the word "infectious" or "mental," with name of port division, the latter category using two numbers only—officer and men. If extra attendants besides the usual escort are required for mental cases, the word "escort" is added after the figure relating to the special case, the number of men required for an escort following the word "escort."

The number of officers and men unfit to travel by train is included in the information required. This is shown by a sequence of two numbers, the first for officers, followed by a specification of the disease, and the second for men, also specifying the disease. The sequence is prefixed by the word "unfit."

The number of officers and men fit to travel by ordinary train is to be included and should be prefixed by the word "ordinary."

The number of officers and men requiring low diet is to be shown similarly by two numbers, using the word "diet" as indicator.

If there are any cases likely to require the services of sisters during the journey, this should be indicated by the word "sisters" at the end of the telegram.

The following specimen telegram is an example of the above arrangement:

From hospital ship *Hygeia*. *To* Bumed, Washington.

Hospital ship *Hygeia* due Key West ten a. m. twentieth July cases forty three one hundred and seventy five. Pensacola five nil thirty five twenty four. Norfolk nil two sixteen twenty five. New York ten three nil sixty four. Wounded Washington three two forty nine. Infectious Norfolk two nil nil

three. Washington nil nil nil five. Mental Pensacola nil two Norfolk two escort one nil Washington nil three escort one. Unfit four two fracture cardiac abdominal seven three abdominal two fracture cardiac. Ordinary nil twenty one. Diet seven seventeen sisters.

This form of dispatch is adhered to strictly, and when no cases of any particular class exist no reference to same is necessary and the next class in the next sequence is dealt with.

Procedure adopted when transferring patients to an ambulance train.—All cases are previously grouped by the senior medical officer of the hospital ship (or other establishment forwarding cases) in a certain order, chiefly on a geographical basis, but men who have no port division or depot (home port) are sent to the port most convenient to their homes. Lists in triplicate are made out for each port division, giving name, rank or rating, official number, name of ship, and nature of disease or injury for each patient transferred to the train. One list goes with the patients to the naval hospital receiving the cases, one for medical transport office (via the officer in charge of the train), and one is retained by the officer forwarding the cases. Each patient is labeled, the labels having a distinctive and different shape for each port division. The label shows the patient's name, rating, ship, and disease or injury. If wounded, an additional label is used to indicate degree of wound sustained. A luggage label with no mark means "slightly wounded," with blue pencil cross "seriously wounded," and with red cross "dangerously wounded." The labels are tied on in a conspicuous place, and when morphine is given the dosage is recorded on the label.

On the ordinary label the diet required for the patient is indicated for the information of the train surgeon, by a letter, thus: M=milk diet; L=low diet; the cases on full diet having no mark. When the train arrival time at a hospital or hospital ship is calculated to fall within the meal hours, any patients landed from the train will have had their meal, or if received from a hospital or hospital ship should be given their meal prior to leaving the hospital. Under ordinary circumstances patients are not entrained after 11.30 p. m. or before 7 a. m.

Baggage.—Bags, baggage, and hammocks are assembled in groups according to port divisions and distinguished by labels similar to those attached to patients and carrying the same data. After baggage is checked into the train the surgeon in charge acknowledges receipt on a baggage summary. Baggage is stored in the train in the same order as the cases; that is, in such a way as to facilitate its delivery from the train without delay. Arms belonging to patients are handed over to the train baggage-master and the number is shown on the baggage summary.

Instruction of officers in charge of trains.—Trains carry two medical officers, and one is required to be in or about the train—that is, within the station limits—at all times. When a train completes a trip and is stabled at Chatham, week-end leave is granted; but officers on ordinary leave are required to be within two hours' journey of the train.

Whenever a train is stabled in a railway yard the ambulance-train force becomes responsible for the cleanliness of the immediate vicinity, and the surgeon in charge carefully inspects the area occupied by the train during his routine daily inspection.

Stores for the train are loaded at its home yard upon the completion of a trip and in sufficient quantity to last until the completion of the next routine trip. Fresh stores or perishable supplies are bought only from naval contractors as required. A daily log is kept by the surgeon in charge, in which are entered details of administration, such as movement of train, gassing and watering, liberties, etc. This log book is presented to the medical transport officer at the home yard of the train whenever time allows. This log is additional to ordinary routine reports. Orders from the medical transport office in the Admiralty relating to train movements come through the local medical transport officer, or if sent direct the latter officer is informed. An acknowledgement of "movement orders" is made by telegram to the medical transport officer transmitting the order.

Passage in trains is not allowed to other than the sick or officials of the medical transport service. Passage for any other person must be by order, and the order and a report thereon forwarded to the principal medical transport officer at the Admiralty. Friends or relatives of the crew are not allowed to meet the train at any station except under special circumstances by prior permission of the surgeon in charge. Leave is usually granted to the train crew at the train depot upon the completion of a run, but not until the train has been made clean and ready for service. The petty officer of the watch musters the men for going on leave and sees that they are in regulation uniform. When the train stands empty a guard of one petty officer and three men is kept by the watch on duty in four hours' watch. A guard book is kept and signed by each petty officer in turn, who records the watch detail and any unusual occurrence noted. The surgeon in charge signs the guard book after his inspection. Visitors to the train are only permitted by permission of the surgeon in charge on duty. All members of the watch on duty wear white gowns and white shoes, removing them when relieved. Only men actually on watch remain in ward coaches with patients and are not permitted to go on platforms in their gowns. If hands are required on a plat-

form they are told off from those "standing easy" by the petty officer of the watch. No man is allowed to leave his station without permission of the petty officer of the watch, who is communicated with by passing the word along the train from coach to coach, and no member of the "watch below" is to leave the train without permission of the surgeon in charge, obtained through the petty officer of the watch. Doors of the coaches are closed and fastened while making stops in stations. All ward utensils are placed in lockers or laboratories during stops at stations. No gifts are allowed to be given directly to the patients from the public or buffets at stations.

At the end of each running a report is sent to the principal medical transport officer at the Admiralty, through the medical transport officer Chatham, concerning the following:

I. Remarks on the run.
II. Abstract of cases transported.
III. Abstract of railway notes (the original "train guard log").
IV. Nominal list of all patients carried.

(1.) *Remarks.*—These should invariably include notes as to how patients stood the journey, cases given special attention during the run, restraint applied to mental cases, complaints, etc. In case of death, a full report of details is to be rendered separately for each case.

(2) *Abstract.*
(3) *Railway log.*
(4) *Nominal list.*

Runs are numbered consecutively and considered completed when all cases are landed. If a train has to make a second journey, say, to empty a ship, such a run is considered a separate one. All telegrams are worded as briefly as possible, and a duplicate of all telegrams and telephone messages is kept and filed with other documents on completion of the run. The surgeon in charge is expected to make the second medical officer fully conversant with all routine and duties of the train service so that the latter is ready to carry on in the absence of the surgeon in charge. Mental cases are never left unattended, and special watches for these cases are furnished. No loose valuables are accepted for transport, but are bulked in a sealed package and receipts given and taken when they change hands. Metal-bed frames, of which four or more are carried, are used for men over five feet 10 inches in height, or for other cases which might be considered more comfortable on them. In the event of a death occurring during a journey, the cot is screened off and the remains transferred quietly to the baggage coach, then landed at the first naval depot.

The following menu represents the character of the meals served on this train:

BREAKFAST.

Porridge and cream.
Fish, haddock or kipper, etc.
Bacon and eggs.
or tomatoes.
sausages.
kidneys.
Jam and marmalade.
Tea, coffee, or cocoa.
Toast.
Bread
Butter.

LUNCH.

Soup.
Fish.
Joint or poultry.
Two sweets, including a milk pudding.
Cheese and coffee.
Bread.
Biscuits.
Butter.

AFTERNOON TEA.

Tea.
White and brown bread and butter.
Jam and marmalade.
Cake and biscuits.

DINNER.

Soup.
Fish.
Joint or poultry.
Two sweets, including a milk pudding.
Cheese, biscuits, etc.
Coffee.

WORKING OF TRAINS.

1. Trains are worked throughout on a point-to-point timing, as described below.

2. As a general principle, throughout arrangements will be communicated to the first company, who will then advise the other company next concerned, and so on throughout the journey.

3. The medical officer in charge of the train notifies the station officials of the first station on the outward journey, as follows:

(*a*) Time train is required to start as soon as determined.

(*b*) The destination station of the loaded train.

(*c*) Intermediate stations at which the train is required to stop to pick up cases and approximate time at each station.

(*d*) Stations at which gas and water should be supplied.

(*e*) Hour at which train should arrive at destination station if later than that time laid down in point-to-point timing, in order that the railway companies concerned may determine upon which system the train should be stabled during the waiting period. In the event of this information being supplied by the naval authorities short of the company on which system the return train will start, the company receiving the particulars will communicate them direct to the starting company and not to the intermediate companies, the starting company in turn advising the forwarding company as set forth above.

4. The railway company at point of departure of return trip will at once transmit these particulars to the next company concerned, who in turn will advise the next company forward, and so on throughout the journey.

5. The train can by prearrangement be gassed and material supplied at any of the stations shown on a list carried or watered only at certain others.

Sample index.

Number of table.	Page.	Station between—	Route.
1	6	Boston and Washington.....	Mansfield, Providence, New London, etc.
2	8	Washington and Pittsburgh.....	Baltimore, etc.

Point-to-point timings.

TABLE ROUTE NO. 1.

	H.	M.
Boston to New York (N. Y. N. H. & H. Ry.)_____	5	10
New York to Washington (Pa. Ry.)_____	5	30

NOTE.—Ambulance train should be dealt with at_____Sta., and at_____

TABLE NO. 2.

	H.	M.
Washington to Philadelphia (Pa. Ry.)_____	3	5
Philadelphia to Pittsburgh (Pa. Ry.)_____	3	15

For much material appearing in this paper I am greatly indebted to the articles on "Ambulance Trains," by Acting Staff Surgeon (now Acting Surgeon Lieutenant Commander) A. Vavasour Elder, R. N. V. R., appearing in the January and July issues of the Journal of the Royal Naval Medical Service for the year 1915. I am under obligations also to the managing editor of The Railway Gazette for the privilege of using data concerning hospital trains contained in that publication.

BONE SURGERY: A STUDY OF THREE CASES.

By A. L. CLIFTON, Lieutenant Commander, Medical Corps, United States Navy.

The following cases are presented, not with the idea that the operations are by any means original, but that in each instance the terminal results were good after the patient had failed to respond to the ordinary method of treatment for a long period of time.

The first case is one of nonunion of the humerus after three months' treatment. The history is as follows:

H. P., Sea–2c, was admitted to a civilian hospital June 1, 1918, following injury received in a trolley car accident. There was a fracture of the humerus at the junction of the lower and middle third and fractures of the third and fourth metacarpal bones on the same side.

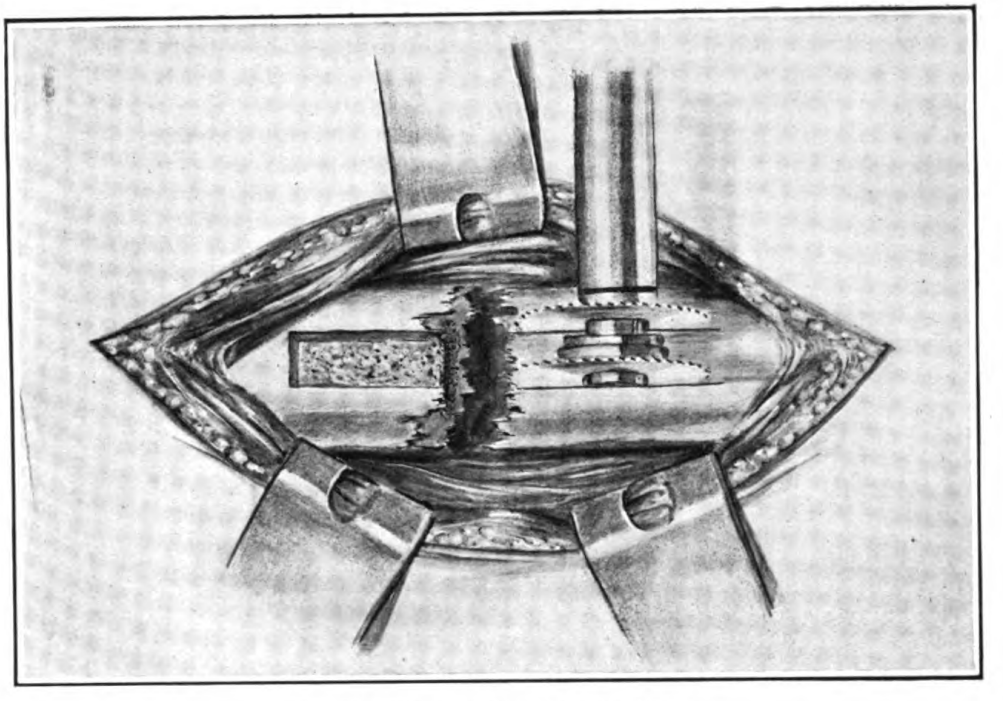


Fig. 1.—Groove prepared for the inlay.

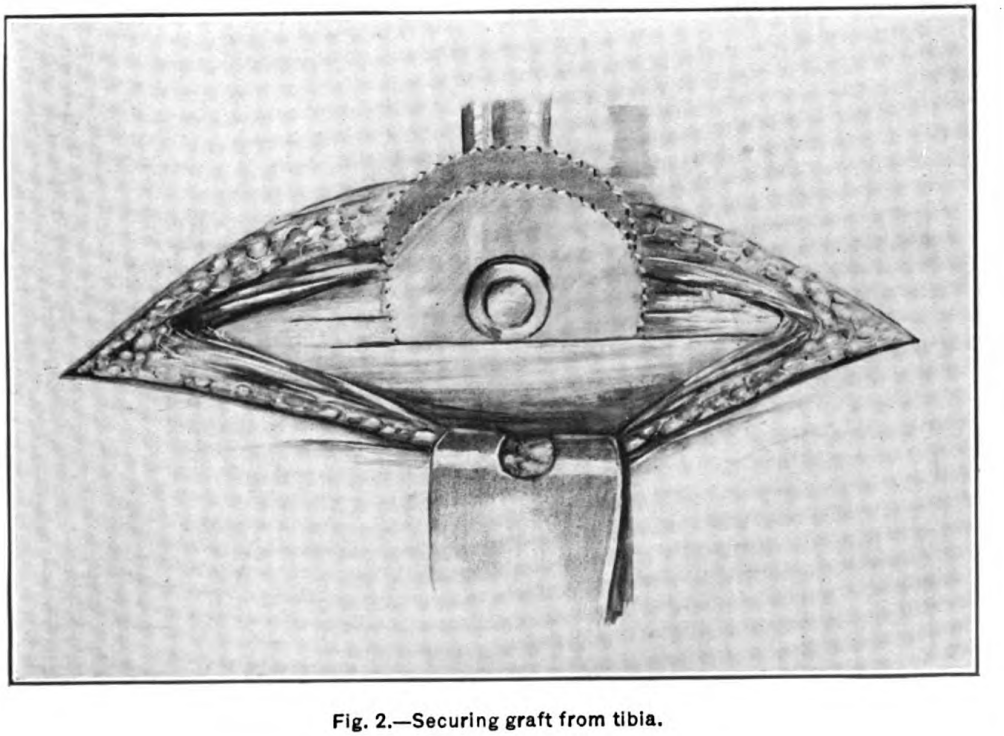


Fig. 2.—Securing graft from tibia.

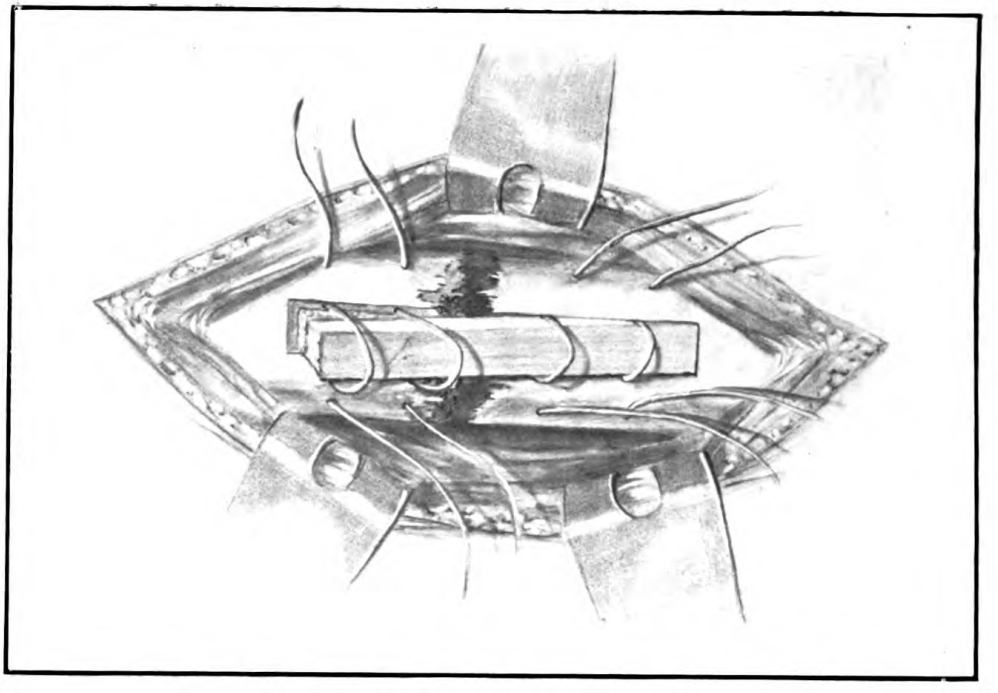


Fig. 3.—Holes drilled and sutures in place.

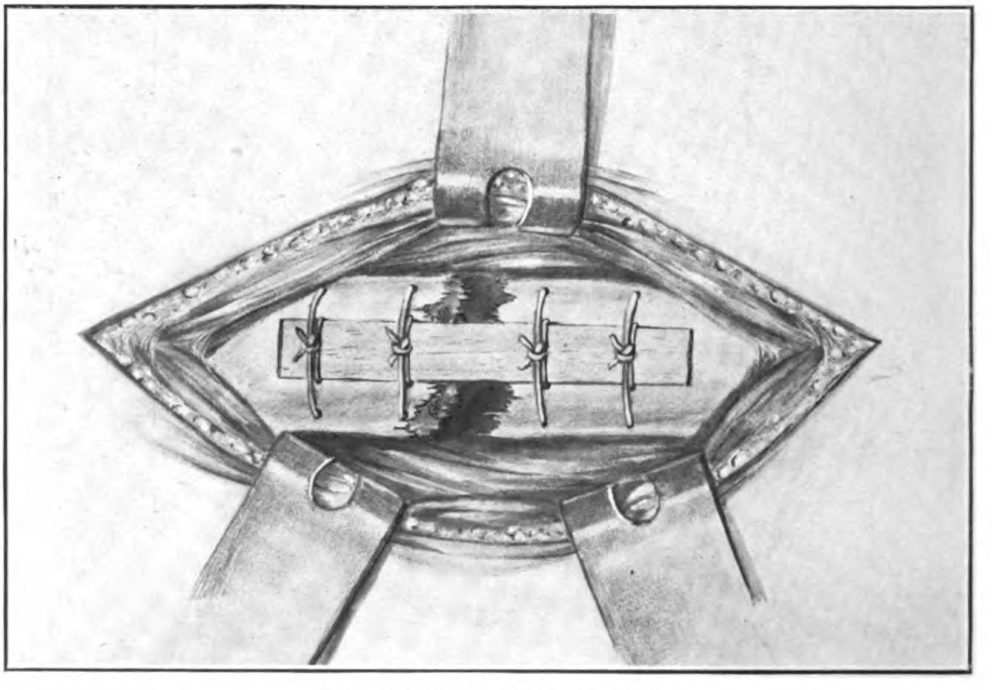


Fig. 4.—Graft securely tied in place.

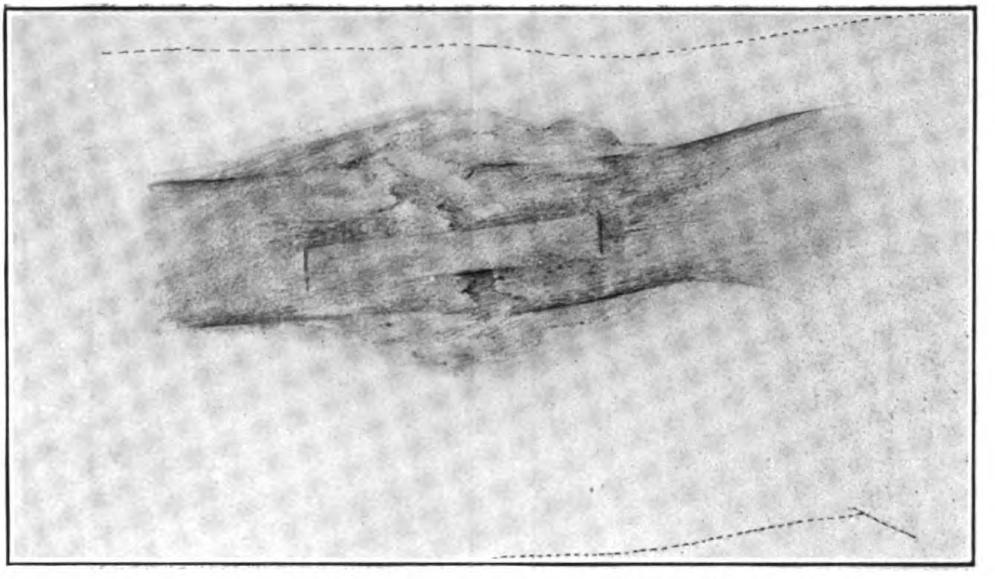


Fig. 5.—Drawn from X-ray plate. Shows final result in Case 1 after 8 weeks.

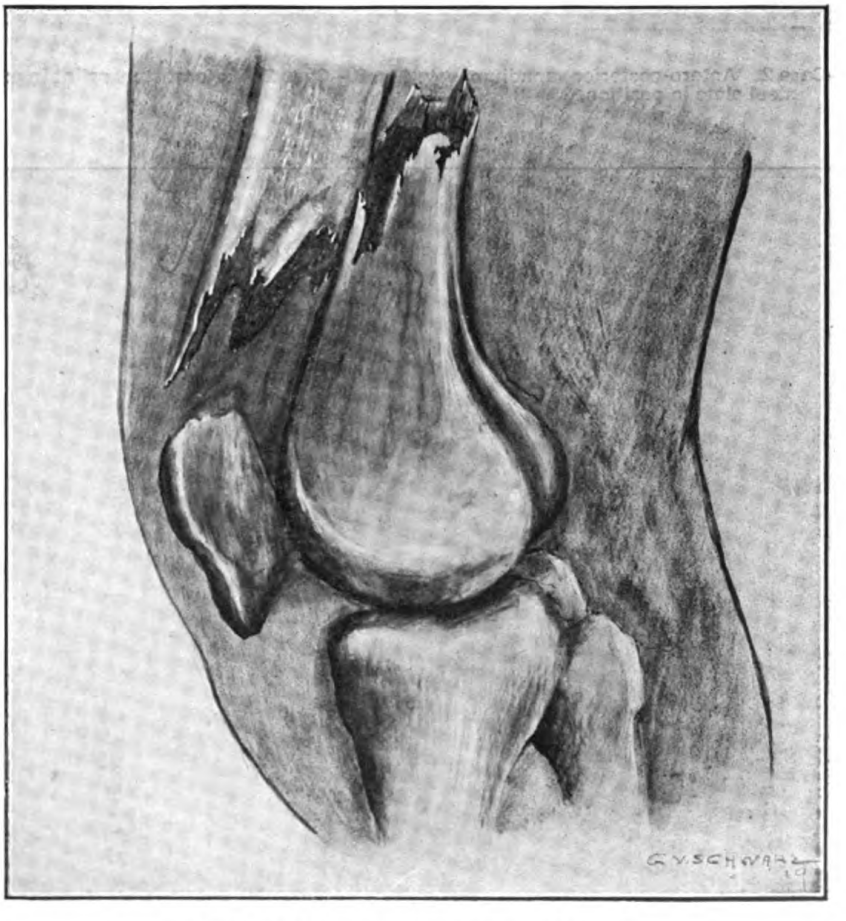


Fig. 6.—Case 2. Shows overriding fragments.

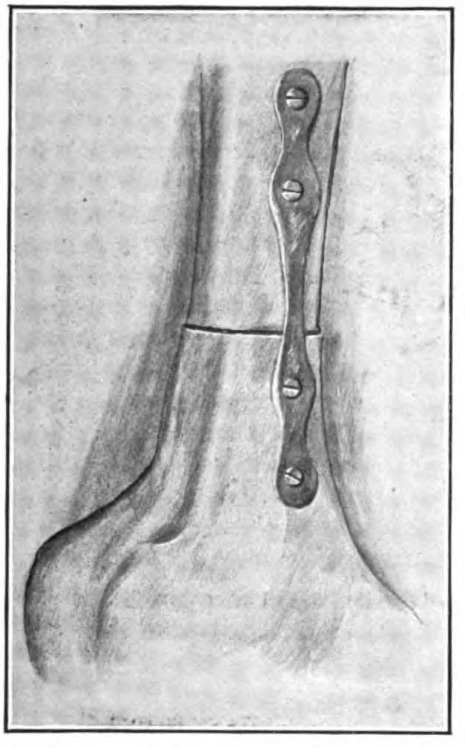


Fig. 7.—Case 2. Antero-posterior vanadium steel plate in position.

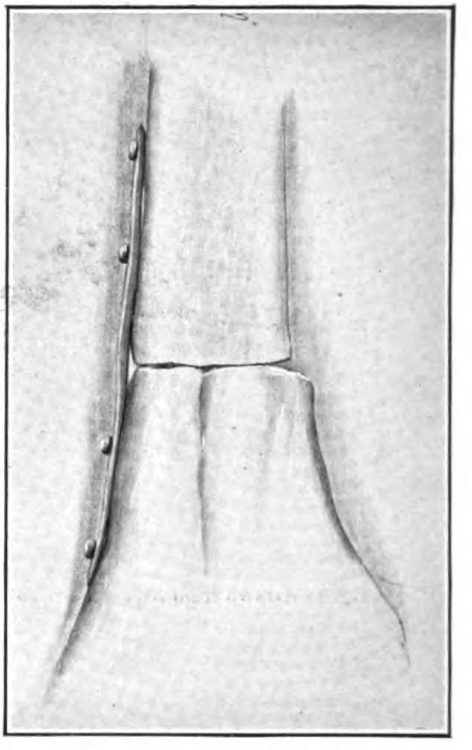


Fig. 8.—Case 2. Lateral steel splint in position.

Figs. 9 and 10.—Case 2. Recovery with good motion and ¾-inch shortening.

The fracture of the humerus was nearly transverse. The fracture was put up in a plaster cast a few days after the injury, which cast was used more or less continuously for a period of three months. Patient admitted to the United States Naval Hospital, Philadelphia, September 19, 1918. On admission there was no attempt at union on the part of the humerus, but the metacarpal bones had united in malposition. In addition to the above findings there was fixation of the elbow joint, midway between flexion and extension, due to dense fibrous adhesions and a marked atrophy of the muscles of the arm and forearm. After carefully considering the merits of each possible operative procedure, a bone-graft operation was decided upon.

Accordingly, the patient was operated upon on January 16, 1919, incision being made on the outer side of the arm. The humerus was exposed and a considerable separation of the fragments was found, partially filled in by fibrous tissue. The ends of the bone were cleared and held with clamps. With the twin Albee saws a groove was cut for the inlay (Fig. 1). The inner surface of the tibia was exposed and a graft was cut to fill the space made in humerus (Fig. 2). Holes were then drilled for the chromic catgut and the graft tied in place (Figs. 3 and 4). The arm was firmly fixed by splints and at the end of four weeks passive motion and massage were started. The patient carried a small tin bucket of sand in his daily trips around the hospital. Six weeks after operation, fine union had taken place. The accompanying drawing of an X-ray plate, taken eight weeks after the operation, shows the final result (Fig. 5).

It was necessary to move the elbow under gas anesthesia three times during the course of convalescence. At the present time the patient has recovered practically full flexion and extension, the musculature has returned to normal, and it is believed that he can be restored to duty after 30 days' sick leave.

The operative technic described above is rather a simple procedure, the only difficulty being the question of holding the motor-driven saws accurately. If one is not doing this sort of work frequently enough to become proficient meat bones can always be procured from the galley and the necessary practice acquired in a surprisingly short time.

It is hardly necessary to say that the bone inlay plays no part in holding the fragments in position and that splints must be used to secure fixation. The inlay only serves as a conducting path for the osteoblasts, and where there is a great separation of the fragments the graft tends to take the shape and size of the bone in which it is engrafted. Absolute cleanliness is essential in this operation and instruments only should come in contact with the wound. Cases have been reported where union has taken place even with infection, but this is the exception to the rule.

Case 2.—G. P., Sea-2c. Patient was admitted to a civilian hospital August 24, 1918, having been thrown from an ambulance in collision with another car. It was found that he had an oblique fracture of the left femur just above the condyle.

Following the accident the patient was anesthetized and reduction attempted. The leg was put up in a double inclined plane and Buck's extension applied. This method of treatment was continued for several weeks. He was then given a pillow support for two weeks, after which he was allowed to sit up. Later on crutches were allowed, but pain and loss of function were so great that the patient had to return to bed.

The case was admitted to this hospital about December 1, when the X-ray showed a complete overriding of the fragments with an absolute fixation of the knee joint (Fig. 6).

Operation was decided upon and was done December 5, 1918. An incision was made over the outer surface of the femur. When the femur was brought to view, it was found that the end of the upper fragment had been driven into the knee joint and that it was firmly fixed in this position. The two opposing surfaces of the fragments were united together with dense fibrous adhesions and a small amount of callus.

It became necessary during the course of the operation to open the knee joint to free the upper fragment. Just previous to the operation a Buck's extension apparatus had been applied to the leg, but, despite vigorous extension and counterextension at the time of operation, the fragments could not be pulled in place. The Albee single saw was then used and the rough ends of the fragments were removed.

The original plan in this operation was to use a bone inlay as well as a plate, but as the anterior and posterior surfaces of the lower fragment were split off, it was found impractical to use the graft. When the two fragments were properly aligned, a vanadium steel plate was applied to the lateral aspect of the femur. The wound was then closed in the regular manner and the leg placed on a posterior splint. Figures 7 and 8, drawn from X-ray plates, show the anteroposterior and the lateral results.

After six weeks, when union had taken place, passive motion and massage were started. Under gas anesthesia the knee joint was moved once a week for three weeks. The accompanying illustrations (Figs. 9 and 10) show the final result. Union is good and the leg can be flexed at more than a right angle. There is three-fourths of an inch shortening.

The interesting feature of this case is that although the upper fragment had remained in the knee joint for almost three months there

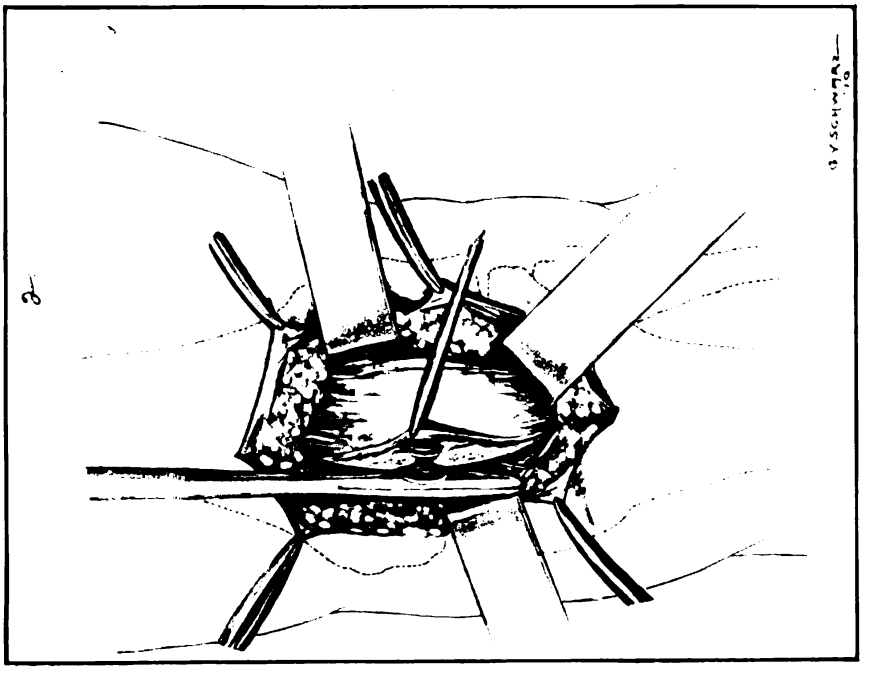


Fig. 12.—Case 3. Sawing the patella longitudinally.

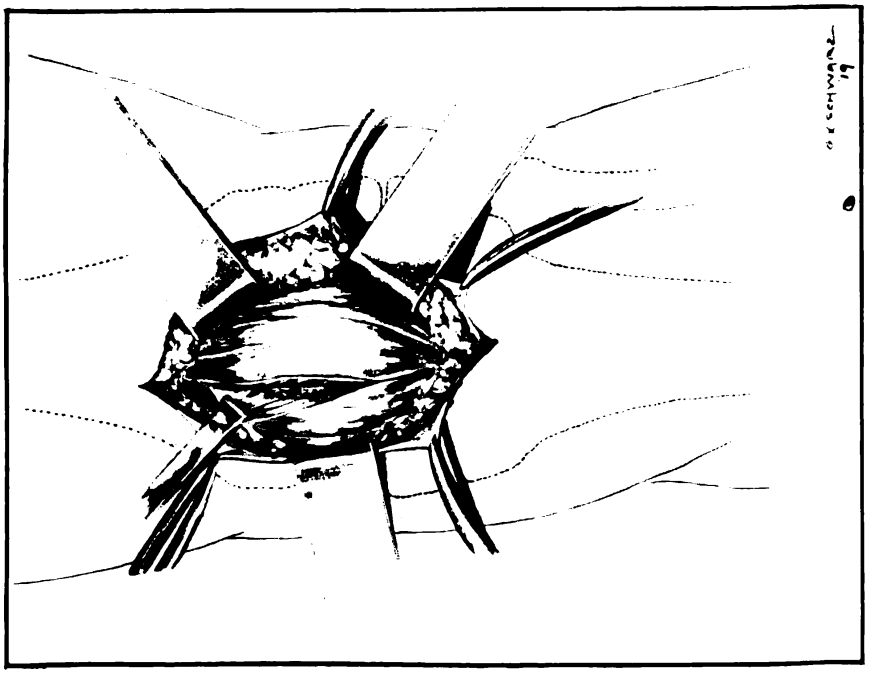


Fig. 11.—Case 3. Division of expansion of quadriceps.

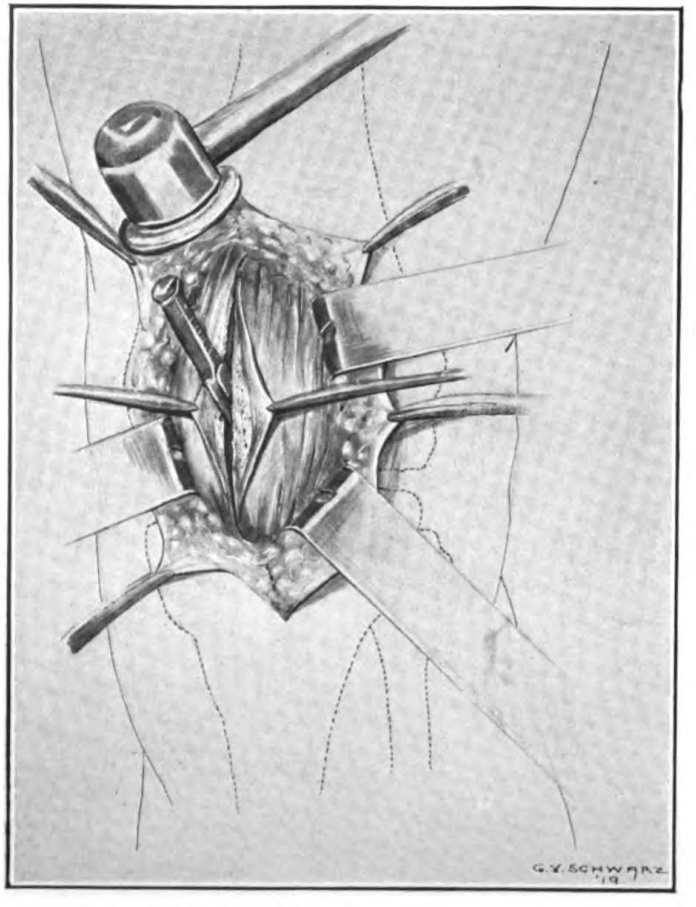


Fig. 13.—Case 3. Dividing patella with osteotome.

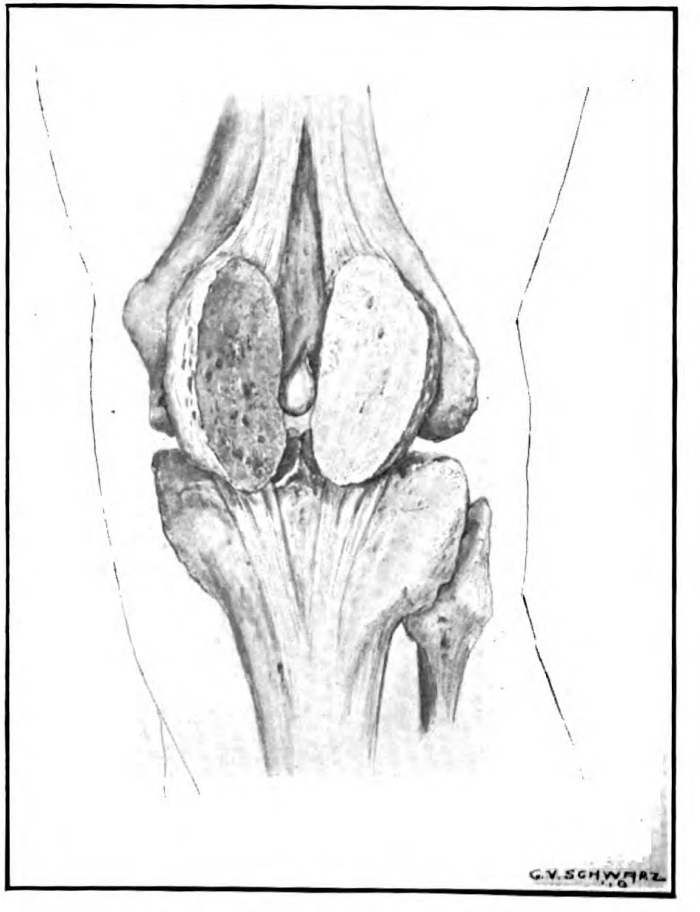


Fig. 14.—Case 3. Dense body in joint formed from synovial fringe.

was not sufficient injury to the joint to prevent excellent motion as the end result. After five months the plate is still *in situ.*

Case 3.—T. A. S., ensign, U. S. N. R. F. The patient was struck on the left knee by a lump of coal on September 18, 1918. The knee immediately became swollen and painful and there was complete loss of function for two weeks.

He was admitted to this hospital December 18, 1918, with pleurisy (acute fibrinous), and stated that his knee was still painful and that it became stiff if left in one position for any length of time. If it was flexed and left in one position he was at times unable to straighten it out.

Examination at this time showed some effusion in the knee joint, and the X-ray showed a transverse fracture of the patella in good position. The patient was discharged improved on February 21, 1919.

He was readmitted on March 9, 1919. At this time he again complained of the knee symptoms noted above. Wassermann and G. C. negative. X-ray showed two shadows in the knee joint, one above the patella and the other behind the patella, more or less oval in shape and about the size of a small marble. They were of about the same density as bone.

At first it was thought that these shadows were sesamoid bones, but by getting them at various angles and by taking stereoscopic plates it was finally decided that one body at least was in the joint.

On April 15 patient was operated upon. A curved incision was made over the outer side of the knee joint; the expansion of the quadriceps was divided in a longitudinal direction and separated as far as possible from the patella (Fig. 11). The old fracture was examined and there was found to be good bony union.

The patella was then sawed through for about three-fourths of its depth in a longitudinal direction with a handsaw (Fig. 12), the patella being finally divided with an osteotome (Fig. 13).

In order to get a good exposure of the knee joint, it is necessary to split the quadriceps tendon for some distance on either side of the patella. When this is done and the knee is flexed, allowing the two fragments of the patella to be moved to either side, the operator can then see any part of the knee joint.

On opening the joint a dense body of the size described above was found attached to the synovial fringe in the lateral aspect of the joint. This was removed (Fig. 14). It is believed that this body was formed by a hypertrophy of the synovial fringe due to injury. Later on calcification had taken place.

After thoroughly inspecting the joint the expansion of the quadriceps was closed (Fig. 15) and the operation completed in the usual

manner (Fig. 16). Passive motion was started on the fourth day without much discomfort, and at the present time there is full motion in the joint.

I believe this open operation on the knee joint was first suggested by an English surgeon, and later on was used extensively by Sir Arbuthnot Lane, especially in pleating the crucial ligaments in certain injuries to the knee joint.

After hearing Dr. Lane give the advantages of this method of approaching the knee joint, we tried it at the U. S. Naval Hospital, New York, on five cases, where the results were excellent.

It is believed that many times the knee joint is opened laterally to remove a cartilage when there are pathological conditions in the joint demanding attention other than those of the cartilages. In the open method it is almost impossible to miss any pathology, as the joint can be so thoroughly inspected.

Fracturing the patella in the longitudinal direction certainly does not interfere with the function of the joint, as the quadriceps pull tends to keep the fragments in position so that active motion may be started early, this, after all, being one of the greatest points in successful bone surgery.

The only difficult point in the operation described above is to get a clean fracture of the patella. To do this it is necessary to saw about three-quarters of the way through the depth of the bone, then use an osteotome, tapping lightly until the final division is made. If care is exercised a clean break is secured instead of knocking off a part of the articular surface. Occasionally there is very troublesome hemorrhage from the fractured surfaces of the patella, which takes some time to control.

I have been unable until recently to find a description or illustration of this operation in any textbook. It is now to be found described in Warbasse's new work on surgery.

Operations on the knee joint under the best possible conditions give doubtful results, but it would seem that when we have the entire joint exposed we are in a better position to get a good result than if the joint is approached laterally, where there is only a limited view.

If one is careful to use only sterile instruments in the joint the chances of infection are rather slight.

One of the interesting features of this case is the fact that the patient had a transverse fracture of the patella with good union when he had received no treatment except two weeks' rest in bed.

I am indebted to the artist, G. V. Schwartz, United States Naval Reserve Force, for the illustrations accompanying this article.

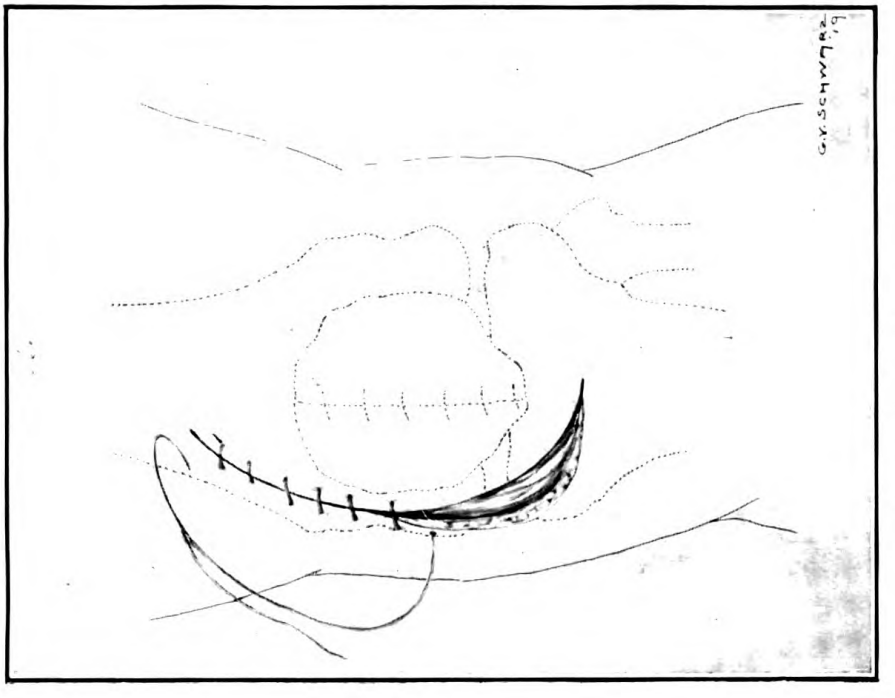


Fig. 16.—Case 3. Closing external incision.

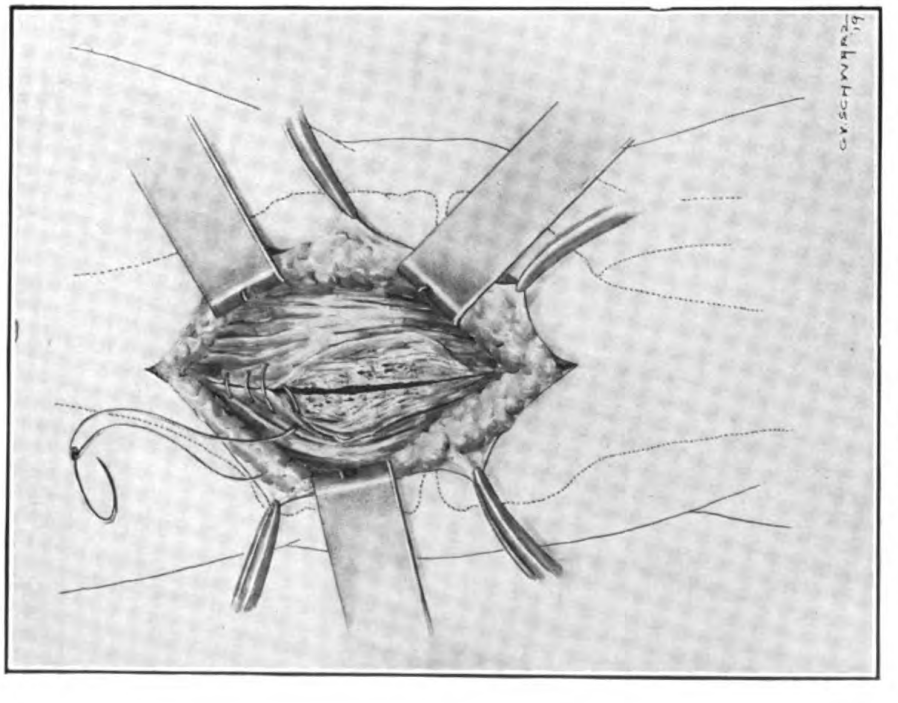


Fig. 15.—Case 3. Closing the quadriceps expansion.

STUDY OF AN EPIDEMIC OF MUMPS.

By R. B. H. GRADWOHL, Lieuenant Commander, Medical Corps, United States Naval Reserve Force; C. F. CARTER, Lieutenant, Medical Corps, United States Navy; W. S. BARCUS, Lieutenant, and H. L. FOUGEROUSE, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

The following observations were made in the course of a rather extended study of a group of cases of epidemic mumps, which were seen by us in the isolation wards and tents of the United States Naval Hospital, New Orleans, La., during the months of December, 1918, and January and February, 1919. Most of these cases were sent to this hospital from the West End Training Camp, a Navy training station situated just outside the city of New Orleans. The total number of cases reported here was 120. Our interest in these cases displayed itself in the following manner: An attempt to isolate an organism from the blood of these patients, a study of the cases with a view of tabulating the prominent symptoms, a study of the blood picture of all cases, a notation of the complications of the disease, and an effort to apply specific medication in the shape of a convalescent serum.

At the very outset we wish to emphasize the fact that our observations have thrown but little light on the disease beyond what is already known. The material was thrown rather unexpectedly upon our hands, and we did what could most conveniently be done to develop whatever new facts suggested themselves to us that might be useful to other workers in this line. It is to be hoped that the negative character of our findings respecting the etiological factor of mumps may serve as a suggestion to others to pursue other lines of investigation in dealing with future epidemics.

In scanning the literature we note that all attempts to find the specific microbic cause of mumps have resulted in failure. Charrin and Capitan (1), Laveran and Catrian (2), Busquet (3), and Tessier and Esdrian (4) have sought in vain for the etiological agent of this disease. The most systematic work that has been done is that of Wollstein (5), (6), and (7). This worker in her first publication showed that when cats were inoculated with bacteria-free parotid secretion into the parotids and testes definite pathological changes were produced in these organs, accompanied by fever, leucocytosis, tenderness, and swelling in the above-mentioned glands. Normal saliva used as a control did not produce these effects. The rise in temperature began 24 hours after the inoculation, reaching its maximum in from 7 to 14 days. The rise fluctuated between 1° and 2/5 C. The white cells showed a definite increase on the second day following inoculation, consisting in the main of a polymorphonuclear leucocytosis, followed by a small-lymphocyte increase of from 7 to 10 per cent. The histological changes in the glands were an edema of

the interlobular connective tissue with mononuclear interstitial infiltration.

Wollstein in her first contribution concluded that the saliva of epidemic parotitis contained a filterable substance capable of producing definite pathological changes in the parotids and testes of cats. She affirmed that it was impossible to state whether this was or was not due to a microorganism. In a second communication, entitled "An Experimental Study of Mumps," in 1918, she came to the same conclusions. This last work was carried on with material secured from an epidemic in an Army cantonment.

In a third communication later in 1918, in addition to the previous experiments, she did the following: Mouth washings in normal saline filtered through a Berkfeld filter candle N, with the filtrate proven sterile by aërobic and anaërobic cultural methods, were inoculated into the parotid glands of cats. She used half-grown cats and insisted that old males did not react. She observed the same symptoms as heretofore described, with an incubation period of from five to eight days. She showed that the period of infectivity of these washings was short, only seven days in all. Animals inoculated with material from men sick 9, 11, or 12 days showed very slight changes. These cats displayed an involvement of the parotids, submaxillary, sublingual, and adjacent lymph nodes. She also showed that the blood of these patients when cultured by the ordinary blood methods was free from bacteria. She likewise showed that defibrinated blood, proven sterile by tests, when inoculated into normal cats in the manner just described, produced the same effects as the filtered saliva.

A recent publication by Radin (8) in connection with an epidemic observed and studied at Camp Wheeler, Ga., describes among other matters an attempt to isolate the organism from the blood and infected glands of mumps cases. No results were obtained. Inoculation intraperitoneally into mice and guinea pigs were equally without results.

We wish to summarize our laboratory studies as follows:

Urine analyses.—One hundred and thirty specimens were examined. Sixteen showed a trace of albumin, without any reference to metastases. Sixteen showed casts, without any reference to metastases. Twelve showed pus, without any reference to metastases. No other abnormal ingredients were observed.

Blood picture.—Complete blood picture was observed in 60 cases. In 44 cases the white blood count ran between 5,000 and 10,000 cells. In 15 cases the white blood count ran between 10,000 and 15,000 cells. In one we had a count of 20,000 cells.

Differential counts.—Polymorphonuclears, below 40 per cent in three cases; 40 to 50 per cent in 12 cases; 50 to 60 per cent in 23 cases; 60 to 70 per cent in 14 cases. Small lymphocytes, below 30 per cent in 12 cases; 30 to 40 per cent in 19 cases; above 40 per cent in 29 cases. Eosinophilia was present in 12 cases, and was shown to be due to hookworm infection (stool examinations

confirmatory). It is to be noted that this eosinophilia was found in but half of the cases of hookworm proven so by stool examination. Transitionals; the highest observed was 8 per cent. The normal figure for transitionals is up to 4 per cent. In our series it was above 4 per cent or above normal in 15 cases.

Red blood count.—The counts ran about 250,000 above or below normal in all cases.

Hookworm infection.—This occurred in 25 cases. It is to be remembered that these men came from a hookworm country and were comparatively recent recruits. By hookworm country we mean Mississippi, Alabama, and Tennessee. The presence of hookworm infection with mumps apparently had no untoward effect upon mumps.

Throat cultures were made in 30 cases without any definite findings pointing to an etiological agent of mumps resident in the throat. Gland puncture culture, blood cultures, and salivary cultures were negative in all cases.

Throat cultures were made on Loeffler media, blood cultures in regulation glucose bouillon, gland cultures on ordinary media and on saliva agar. The saliva was cultured on blood agar and saliva agar.

It was noted that the occurrence of complications in glands such as testes, pancreas, and cervical lymphatics did not in any way affect the blood pictures.

In studying the histories of these cases we found that the ages of the patients ran between 18 and 25 years. The general condition of these patients was good. A great majority came from the West End Training Camp, whose personnel was made up of comparatively new recruits, largely drawn from Mississippi, Alabama, and Tennessee. On inquiry it was found that most of these patients up to the time of their enlistment had lived on farms and in rural districts, coming from large families, and had never been in contact with any outbreak of this disease.

The outstanding feature of this epidemic was the mildness of the symptoms. These symptoms were: Rise in temperature in some of the cases, but some cases showed no rise in temperature at any time during the disease. In a tabulated study of 104 cases the following observations were made: At the time of admission—

Forty-nine cases showed normal temperature.
Thirty-six showed a temperature between 98.6 and 100.
Nineteen showed a temperature of 100 or above.

The maximum temperature recorded was 104.2 F., which occurred in but one case. In studying the temperature charts we found the maximum temperatures to be as follows:

Temperature normal throughout the disease, 24 cases.
Temperature 98.6 to 100 as a maximum, 18 cases.
Temperature 100 to 102, 26 cases.
Those running a temperature of 102 or over, 36 cases.

Of these 26 reached their maximum temperature within the first two days after admission. Of those who reached their maximum temperature within the first two days, this maximum was in 17 cases between 98.6 and 100; in 18 cases between 100 and 101; in 9 cases between 101 and 102; in 7 cases 102 and above Of the total 104 cases studied 80 showed a febrile reaction, 24 showed none. Of the 80 cases showing over, 46 ran their maximum temperature within the first two days. The average duration of the temperature was 1.9 days. The longest duration was eight days, the shortest 12 hours. In every instance in which the temperature rise lasted for as long as 72 hours there was an involvement of one or both testicles.

Involvement of glands.—At the time of admission there was an involvement of glands, one or more, in every case. A tabulated survey of this involvement showed the following:

Right parotid alone, 22.
Left parotid alone, 27.
Right submaxillary alone, 2.
Left submaxillary, none.
Right and left parotids, 43.
Left parotid and left submaxillary, 3.
Right and left parotid and right submaxillary, 2.
Right parotid and left submaxillary, 1.
Both parotids and both submaxillaries, 3.

From a study of these figures we find that the right and left parotid combination is the most frequent glandular involvement, while the left and right parotids separately come second in about the same ratio. As to the gland most frequently involved, we find that the left parotid in 77 cases, right parotid in 70 cases, left submaxillary 9, right submaxillary 7.

Pain.—As noted above, this epidemic was characterized by its mildness of symptoms. The factor of pain is included in this statement. These patients showed very little discomfort, although in most cases the glands showed marked swelling. Therefore, we assume that the amount of pain does not go hand in hand with the increase in size of the glands. Contrary to the general popular idea, these patients were able to take acids, lemons, etc., with impunity, without any reference to increase in pain or any other disturbing symptom.

Serum injections.—The question of the use of convalescent serum in the treatment of these cases came before us shortly after the beginning of the epidemic.

We were fully aware of the fact that this is a self-limited disease and that the use of a serum is hardly justifiable on the basis of severity of symptoms. However, there were two indications which we had in mind in contemplating this part of our investigation.

First, the combating of the severer complications; and, secondly, the use of this serum as a prophylactic measure. We therefore proceeded to carry out this part of the work with these two ideas in view.

Technic.—Blood was withdrawn from the superficial arm veins with the most rigid asepis possible, receiving the blood in large centrifuge tubes. The blood was allowed to clot and placed in an incubator for a few hours to accelerate the clotting, then centrifugalized, and pipetted off into sterile containers. The following tests were made on all the bloods withdrawn: The Wassermann and tests for agglutination and hemolysis between the donor and recipient. This permitted us to group the blood satisfactorily inasmuch as our first work was carried out by means of intravenous injections. Later we used subcutaneous injections, where, of course, only Wassermann tests were required.

Reaction.—Very little reaction was noted by us in using the subcutaneous injections. In the case of the intravenous injections we noted an occasional severe reaction in the shape of a sudden rise in temperature, with chilly sensations and headache. This persisted in one case for about 12 hours. In most cases it lasted only a few hours. We used 5 c. c. serum for both subcutaneous and intravenous injections. In general we saw a slight difference in the temperature range of the uncomplicated cases treated by serum injection, but often not enough to justify any conclusions.

We were particularly struck by the remarkable effects of these injections upon the complications of mumps, to wit, a lessening of pain and an earlier subsidence of swelling, together with an earlier drop in temperature. In one case, with localized pain in the region of the pancreas, extreme discomfort, and a very high temperature, the administration of 5 c. c. of convalescent serum was followed within two hours by a marked drop in the temperature and abatement of pain. In this case we had administered opiates, local applications, etc., before using the serum without any success. In a parallel case, with extreme pain in the testis from orchitis, we saw relief within five hours. In general our observations were that the use of convalescent serum abated the pain and fever very promptly in complicated cases.

As for the use of this serum as a prophylactic measure we have prepared a large quantity for future epidemics, and feel sure that it will find a very definite place in the prevention of the spread of this disease among susceptible persons. This statement seems to be justifiable on the basis of the report of Hess (9), who gives the following facts: Twenty children were inoculated with the blood of convalescent mumps cases. He used 6 to 8 c. c. intramuscularly. Bloods were taken from (*a*) patients just recovered from the disease, (*b*)

patients recovered 10 days, (*c*) patients who had had the disease several years previously. All these children, none of whom had ever had mumps, were exposed to the disease and none contracted it. Inasmuch as the period of incubation of the disease is about 18 days it is possible to protect children against mumps very easily by this measure.

We wish to render our thanks to Lieutenant Irvin Pope, Medical Corps, U. S. Navy, and Lieutenant (J. G.) D. S. McBride, Medical Corps, U. S. Navy, for valuable assistance in working out the blood pictures of these cases.

REFERENCES.

1. Charrin & Capitan: Cited by Vedrenes—Mém. de Méd. de chir. et de pharm. mil, 1882, xxxviii, 167.
2. Laveran and Catrian: Compt. rend. Soc. de biol., 1893, v. 528.
3. Busquet: Rev. de med., 1896, xvi, 744.
4. Tessier and Esdrian: Compt. rend. Soc. de biol., 1906, lviii, pt. 1, 803, 853.
5. Wollstein: Jour. Exp. Med., 1916, 353.
6. Wollstein: Jour. Am. Med. Assn., Aug. 24, 1918.
7. Wollstein: Jour. Exp. Med., Oct. 1, 1918, vol. xxviii, 377.
8. Radin: Arch. Int. Med., September, 1918.
9. Hess: Pediatrics, 1915, vol. xxvii, No. 5, p. 230.

CONSTITUTIONAL INFERIORITY IN THE NAVY.

By T. A. Ratliff, Lieutenant, Medical Corps, United States Naval Reserve Force.

In the Annual Report of the Surgeon General of the United States Navy for the fiscal year of 1918, under the statement for diseases for the year 1917, we find that constitutional inferiority has 427 admissions with 9,055 sick days. As a reason for discharge from the service, constitutional inferiority stands second on the list, with a total of 327. These figures are presented in order to emphasize the fact that this disease is an important problem to the medical officers of the Navy.

Constitutional inferiority as a disease entity has not been clearly defined by psychiatrists in general. In the Navy nomenclature we have two terms, namely, constitutional inferiority and constitutional psychopathic state, which by many writers are considered one and the same. In the nomenclature adopted by the American Medico-Psychological Association the term constitutional inferiority is not given. All such conditions are included under constitutional psychopathic states. However, having both terms in the Navy nomenclature, it has been necessary to differentiate between the two.

In the past year about 1,500 cases have been examined by the Psychiatric Division in the fifth naval district. Eighty-eight of these cases were given the diagonsis of constitutional inferiority.

A diagnosis of constitutional psychopathic state was made in cases other than those described in the following. This latter diagnosis was given especially in cases not showing a distinct psychosis or neurosis but whose symptoms showed mild mental disturbances, including paranoid trends, episodes, indefinite neurotic types, and psychopaths.

In the Navy nomenclature constitutional inferiority is listed under the Diseases of the Mind, Class XI. The diagnosis has often been used by naval medical officers to apply to physical inferiority or general physical defect alone. This has been necessary, perhaps, because there is no other diagnosis that would seemingly fit. While physical defect is evident in many cases, constitutional inferiority primarily means mental abnormality. In the majority of cases physical anomalies will be found.[1] Practically all of our cases showed at least three distinct "stigmata of degeneracy." Anomalies of the face, mouth, and ears are especially noticeable. Poor general development may be a most evident condition, but it is not characteristic. Various functional conditions are frequently present as symptoms, such as neurosis of bladder, dizzy spells, and neurasthenoid complaints. Those cases showing feminine characteristics usually present distinct physical traits.

Constitutional inferiority is a mental disease. The anomalies found are chiefly in the emotional and volitional spheres of the mind. Intellectual defect is not necessarily a characteristic. While the majority of our cases showed inferior intelligence, we may expect to find gradations varying from border line feeble-mindedness to intelligence distinctly above the average. By the Stanford Revision of the Binet-Simon Tests many of the inferior type showed a mental age as low as 10 years. A diagnosis of feeble-mindedness was not made in these cases, because neither the clinical picture nor the character of the performance on the tests were typical.

In this disease we find marked defects in the emotions. There is always a lack of equilibrium—an unbalance of this fundamental sphere of the mind, which varies from what is apparently total inadequacy to marked degrees of instability. We find the apathetic, stolid, or indifferent types in these cases, or the other extreme, the nervous, tearful, or excitable. The inadequate types predominate. There seems to be a lack of development of the emotions not only quantitatively, but also qualitatively, so that only simple feelings are observed to exhibit themselves. However, there may be present emotions which are labile and uncontrolled and show the degrees of instability that we would expect to find in a decided neurotic type.

Constitutional inferiors are weak willed and possess little determination and stamina. They lack the will power and inhibition to

[1] Mental Deficiency, Tredgold, chap. 7.

maintain a proper mental balance which will insure stability of thought and conduct. Deficient in powers of attention and concentration, and capable of being affected by suggestion to a high degree, their thoughts are swayed by their desires or inclinations or the object at hand. Although having an appreciation of right and wrong, their conduct is governed by unrestrained impulses. Such individuals can have little sense of responsibility, which means a failure to ever properly appreciate military discipline. Such attributes tend to aid in the development of certain character types as the tramp, sexual pervert, etc.

The following brief summaries are taken from histories in our files and represent typical cases of constitutional inferiority. I regret that lack of space prevents the presentation of more histories, because a clearer understanding of the symptoms can be gained from them than through a general discussion.

No. 810. Eng.—Age 25, A. O. L. for 5 days. History shows that during his first enlistment he received three district courts-martial and two summary courts-martial and was given a bad-conduct discharge by the last summary court-martial. During the present enlistment he has had three district courts-martials and one summary court-martial. He has had little schooling, and most of his life prior to his enlistment in the Navy has been spent wandering about.

Examination showed that his emotional reactions are inadequate, and history of the case indicates that he has little sense of responsibility. His attitude in general is indifferent, and he has little appreciation of the seriousness of his misdeeds. He is somewhat below the average general intelligence, but tests given him show no intellectual defects. Physically, he presents certain well-defined stigmata of degeneracy.

No. 530. Bkr., 2d class.—Age 17. Irresponsible. Patient has been in the training station for about six months, and during that time has been in constant trouble. He has been the principal in two summary courts-martial and has been under discipline for numerous petty offenses. Has been charged with stealing on two occasions.

History of his case shows that he reached the fourth grade at school; was arrested on one occasion for running away from school; and that he has been "bumming around," as he called it, for three years prior to his enlistment. He had entered a reformatory of his own volition, from which he escaped and joined the Navy.

Examination indicates that he is a careless, lazy, and shiftless type of individual. Although mentally inferior, tests did not reveal gross intellectual defects. He is lacking in stamina, and his emotional reactions are inadequate to such a degree that the usual standards, responsibilities, and duties do not call forth normal responses.

Physical examination shows patient to be well built. He has certain stigmata of degeneracy.

No. 62. AS.—Age 19. Irresponsible. Company commander states that he has been a source of continual trouble and does not seem to appreciate that he is in a military organization, and has little or no sense of responsibility.

History indicates that he comes from poor stock. Although he finished the seventh grade in school, he states that he was compelled to repeat three years. Mental tests showed no gross defects or deterioration of intellectual faculties.

During examination his mood was easily changed by the examiner, being in tears at one time and laughing shortly afterwards. He displayed marked emotional instability. He was plainly lacking in will power and inhibition and indicated that he had little sense of responsibility. He has many adolescent traits, being boastful, egotistical, and talking in a boyish and naïve fashion.

Physical examination shows numerous stigmata of degeneracy.

No. 356. AS.—Age 18. Irresponsible. Company commander reports that he has been a continual source of nuisance and trouble, and has showed himself to be very irresponsible. Has been on report twice for being asleep on post. History shows he has finished one year of high school. He is of average general intelligence, and mental tests given him reveal no intellectual defects. History also indicates that he is irresponsible and that little dependence can be placed in him. Examination shows he is lacking in will power and his emotional reactions are inadequate.

Physical examination reveals numerous well-defined stigmata of degeneracy.

No. 269. AS.—Age 18. Irresponsible. Left his post on two occasions without being properly relieved.

States that he finished sixth grade at school and had no trouble in making proper progress. Ran away from home on several occasions, and has been arrested twice—once for jumping freights, another time for gambling.

He is reported as having little sense of responsibility, being continually dirty and always endeavoring to shirk duty. Mental tests show him to be of normal intelligence. However, when confronted with the seriousness of his offenses and told of his responsibilities, he displayed no emotional reaction and appeared to be indifferent.

Examination and history show that his emotional reactions are inadequate and that he is lacking in will power and inhibition.

Physical examination showed stigmata of degeneracy.

No. 201. AS.—Age 23. Masturbation. Examination revealed the fact that patient has been addicted to chronic masturbation, and he

states that while in the service he has been compelled to masturbate several times a week, being unable to control his desires.

He has never shown normal reaction to female companionship, and admits that he regularly permitted himself to be a passive agent in sexual practices with other men before he entered the service. He admits that his associations with men on the training station have aroused him sexually, but denies any misconduct with them. He states that the main deterrent to such practices in the service has been his fear of a court-martial. By investigation it has been learned that he has been teased and called many nicknames by his shipmates. Examination shows that his general manner is feminine. He is decidedly introspective, hypersensitive, and hypochondriacal. He is lacking in stamina and is very suggestible. During examination he displayed emotional instability. Physical examination shows many decided stigmata of degeneracy and some so-called "secondary traits."

No. 763. HA–1c.—Age 28. Sexual pervert. Patient is a graduate of a college of pharmacy and is above the average of general intelligence.

History reveals the fact that he indulged in homosexual practices prior to his enlistment in the service. He has been a subject of teasing by his shipmates, having been called "sissy," "sweetheart," etc.

Examination shows that patient is of a decided feminine type. During examination he displayed considerable emotional instability, and indicated that he was lacking in will power and virility.

Physical examination reveals stigmata of degeneracy and some of the so-called "secondary traits," as feminine voice and manner.

No. 484. AS.—Age 19. Nervousness. History shows that patient has had about four years of schooling, and since leaving school he has held numerous odd jobs. He complains of many subjective symptoms, for which there is no apparent organic basis, such as being continually nervous, pains in his legs, hips, and back. He is somewhat below the average general intelligence, but tests revealed no gross intellectual defects.

During examination he displayed emotional instability, and plainly indicated that he is lacking in stamina and poise. He is very susceptible to suggestion.

Physical examination shows marked stigmata of degeneracy. He suffers from nocturnal enuresis.

No. 154. AS.—Age 18. Stealing. History shows that the patient while in civil life has been arrested a number of times and was an inmate of a reformatory for a period of about 18 months. States that he was sent to this institution because he repeatedly ran away from home. While at home he went with a tough city gang.

He freely confessed to chronic masturbation, and stated that while in the reformatory he had frequent homosexual relations with other boys.

Examination shows that he is somewhat above the average general intelligence. Mental tests revealed no intellectual defects. He was detected in the act of stealing money from his shipmates' clothes. He lied during the examination. No emotional response could be elicited, his general attitude being indifferent.

Physical examination showed stigmata of degeneracy.

No. 398. AS.—Age 18. Nocturnal and diurnal enuresis. History shows that patient finished grammar school, but he had to repeat 3 years. Since leaving school he has held many odd jobs and has never stayed at any one place longer than a month. Although patient is below the average general intelligence, tests revealed no gross intellectual defects.

History and examination indicate that he is a weak character, possessing little stamina and sense of responsibility. His emotional reactions are inadequate.

Physical examination reveals marked stigmata of degeneracy. He is suffering from diurnal and nocturnal enuresis for which there is no apparent organic basis.

Just as we find that certain grades of intellectual inferiors are capable of performing their duties properly in some of the lower ratings of the service, so we find that there are certain types of constitutional inferiors who are capable of doing their work satisfactorily. As a class, however, they should be considered a potential menace and always on trial. These cases are clearly a problem in any military organization. Not only should every medical officer be thoroughly conversant with the clinical symptoms, but every line officer should know something about them. They are not amenable to discipline or training and are not benefited by punishment. Civil law has not yet reached that point where it will entirely release these individuals from their responsibilities. Military laws are fortunately broader. A constitutional inferior when he comes in conflict with military law should be a case for a board of medical survey and not a military court.

ACUTE EARLY APPENDICITIS, DIAGNOSIS, OBSERVATION, AND CONCLUSIONS.

By H. E. Jenkins, Lieutenant Commander, Medical Corps, United States Navy, and L. A. Will, Lieutenant, Medical Corps, United States Naval Reserve Force.

It is with apologies that the writers of this article present it. As so much has been written and there is still so much to be learned we feel that by bringing forward a few points that are probably well known to the large majority, we will find some few who have not

looked at this condition in this light. We have all been taught during our days in the medical school, and some of us during our internships, that appendicitis is a more or less clear, clean-cut disease with certain characteristics which are unmistakable. This to a certain extent is true, but we see cases in which the early diagnosis is difficult and often overlooked or passed by with the giving of a dose of oil or other cathartic and telling the patient to report at sick call the following day if no better. This is often done because of the absence of certain signs and symptoms which we have been taught to look for and expect in all cases, but which are more often absent than present in the early cases. In this paper we are talking of early cases; that is, the first 12 hours. Cases seen and diagnosed early, operative interference being instituted as soon as a diagnosis is made, all get well. If they do not, it is due to an error in technic or post-operative care, usually the former.

Any case of acute abdominal pain, especially in the young, should not be diagnosed "gastritis," "indigestion," ptomaine poisoning," or whatnot, until appendicitis has been ruled out. The habit of giving salts, castor oil, and other cathartics to cases of this type is one that should be discouraged until acute appendix trouble has been definitely excluded.

Textbooks speak of the different types of appendicitis, namely, catarrhal, gangrenous, suppurative, etc., and tell of differentiating one from the other by the temperature, blood count, pulse, and other kindred symptoms. It is the belief of the writers that it is absolutely impossible to tell with any degree of accuracy what type of appendix you have to deal with until the abdomen is opened. Of course, at the end of three days or longer, when we have all the classical symptoms of a peritonitis, it is not difficult to tell that we are dealing with a pus case; but this is the type we wish to avoid and can avoid, as there is no excuse for a case of this kind to develop where our patients are all under our observation at all times and within easy reach of competent surgical care.

Our idea of the typical case as described in textbooks is that it is erroneous. They describe one of 24 to 72 hours' standing, in which all the classical symptoms are present, namely, sudden onset of general abdominal pain, nausea, vomiting, temperature 101° to 104°, pulse 100 to 120, muscular rigidity, localized tenderness, knee flexed on the abdomen, anxious expression, coated tongue, thirst, etc., but when this picture is presented to us we have 9 times out of 10, not an early case but one of 48 to 72 hours, or longer duration, and this is the type we wish to eliminate, as often we find a ruptured, gangrenous, or pus appendix which had it been taken care of 24 or 48 hours earlier, would have been a clean case with no necessity for

drains, long period of convalescence, post-operative hernia, and even death.

We will classify our symptoms according to our estimate of their value.

First. *Acute general abdominal pain.*—We place this symptom, which is agreed upon by practically all textbooks, as the most prominent. The character, duration, and intensity varies in different cases, but the usual character of the pain is of the old-fashioned "bellyache" type, more often located in the umbilical region and lower abdomen, but at times in the epigastrum or over the entire abdomen. This pain may be very severe or not severe enough to cause the patient to lie down. We will not attempt to differentiate the pain of an early appendicitis from the pain of other intraabdominal conditions, such as gall-bladder disease, renal colic, Dietl's crisis, etc., but merely state that in our estimation this sign should be placed first.

Second. *Muscular rigidity.*—This symptom comes early and if looked for carefully can be found. If we wait for the second or third 24 hours any hospital corpsman should be able to recognize this sign and its location. Usually we find a very slight muscular rigidity of not only the right rectus, but also of the entire right half of the abdomen. This rigidity is not as marked as we find it at the end of 18 or 24 hours, but by very close comparison of both sides of the abdomen it can be detected within the first few hours.

Third. *Localized tenderness.*—This symptom following an acute abdominal pain and muscular rigidity is the cardinal sign of an acute appendix. Tenderness localized at McBurney's point, with an absence of pus in the urine, and no localized tenderness over the right kidneys, is almost pathognomonic of this condition. We should always rule out pyelitis, as undoubtedly a number of appendices have been removed when the offending condition was a right-sided pyelitis or ureteral stone. But a careful noting of symptoms, taking a careful history, examination of the urine for pus, and attention to physical findings will rule out these conditions.

Fourth. *Leucocytosis.*—Our observations have found that a leucocytosis is a good guide in aiding us to make an early diagnosis, as we find very high white cell counts in ambulatory cases without temperature. The absence of a leucocytosis, providing the first three symptoms are present, may be disregarded.

Fifth. *Absence of diarrhea.*—Textbooks teach us that a number of cases begin with a diarrhea, but the presence of a diarrhea has always caused us to be very slow in making a diagnosis of acute appendicitis, as we believe that this is more often the result of the ingestion of some form of contaminated food and seldom, if ever, a symptom of an acute appendix.

Sixth. *The absence of pus in the urine.*—The absence of pus in the urine excludes a pyelitis, which as mentioned before is sometimes very hard to differentiate from acute appendicitis, especially where we have retro-caecal appendix.

Seventh. *Nausea and vomiting.*—We find this symptom as often absent as present. Nausea is more often present in the first few hours and sometimes vomiting, but case after case has neither symptom until late in the attack or not at all.

Eighth. *Fever.*—A large number of cases show an absence of any rise in temperature; in fact, this type of case is one to be watched more carefully than any other as we have seen at least 12 cases within the past six months of afebrile appendicitis, which at operation showed either a gangrenous or pus

appendix (unruptured). These cases if allowed to get out of the acute stage, and go as far as the third or fourth day waiting for our old classical symptom of fever, would very probably rupture and be cases for drainage.

Ninth. *Pulse.*—The pulse is of no practical value in the condition. If it is rapid or slightly increased in rate, it may be due to the excitement of the patient. If it is normal, together with a normal temperature, it does not rule out an acute appendix or one that should be operated upon immediately, as some of the most pronounced pus and gangrene cases show an absolutely normal temperature and pulse. Temperature and pulse are of no value, as their absence has a tendency to minimize the condition and their presence is of no aid in determining the type of appendix.

CONCLUSIONS.

First. Early diagnosis (first 3 to 12 hours) and early operation mean a short convalescence and an early return to duty; the elimination of post-operative hernia, adhesions, fecal fistulas, and often of obstructions.

Second. That no case of acute intraabdominal pain should be given a cathartic until carefully examined and acute appendicitis has been excluded.

Third. Temperature and pulse are of no practical value in arriving at an early diagnosis of acute appendicitis. They should be completely ignored, or not even taken, as they more often mislead than lead.

Fourth. And, finally, the cardinal symptoms of this condition should be enumerated as follows:

First. Pain.
Second. Muscular rigidity.
Third. Localized tenderness.

EXTRA-GENITAL CHANCRES.

By J. M. Perret, Lieutenant, Medical Corps, United States Naval Reserve Force.

Syphilis is such an important disease that the real student, be he surgeon or internist, never tires of studying it. Osler has well said, "Know syphilis well in all its manifestations and relations and all other things clinical will be added unto you."

Extra-genital chancres are given a goodly space in textbooks on syphilology, urology, and dermatology. This is as it should be, for these lesions are very important because of the serious results which would follow did they go about unrecognized.

Extra-genital chancres are of special interest to the military surgeon. In a military organization the men live under conditions which force them into close contact with each other. From a hygienic point of view the soldier or sailor who has a chancre on his lip is a source of much greater danger to the rest of the men than one who has a chancre on his genitals.

A chancre may occur on any part of the body which has been exposed to a syphilitic lesion. The contagion may be direct; or mediate by feeding utensils, smoking utensils, towels, latrines, surgical instruments, silver nitrate and alum sticks, syringes, pencils, penholders, etc. Contagion from any part of the mouth may be transmitted to any part of the mouth of the person who becomes contaminated. The saliva acts as the vehicle of transmission of the virus.

Syphilolgists are pretty well in accord that the chancre is merely the local manifestation of a systematic disease. Excision of the chancre would not cure a case of syphilis. It is probable that there must be a break in the skin or mucous membrane for infection to take place.

As the chancre and mucous patches abound in spirochetes, they are the most contagious lesions. The gumma contains but few spirochetes and hence it is not very contagious.

Extra-genital chancres are by no means rare. They are uncommon enough, however, to arouse a little interest when we run across one. In Russia, on account of the poor hygiene of the people, they are very common.

According to Osler (1) 8 per cent of chancres are extra-genital. He quotes Tarnosky as saying that in some parts of Russia 70 per cent of cases are transmitted by extra-genital contagion.

Sequeira (2) says that continental authors give the proportion as 10 genital to 1 extra-genital chancre. In Russia the proportion is much greater, 4 to 1.

Stokes (3) says that the older statistics estimate from 5 to 10 per cent of all syphilitic infections to be of nongenital origin, but he thinks that these figures are too low. He quotes Schamberg, who reports a case in Philadelphia of a young man who in one kissing game infected seven young girls, all of whom developed chancres of the lips or cheeks.

Guiteras (4) tells us that 10 per cent of chancres are extra-genital, and of these 3 per cent occur on lips, 7 per cent on remaining parts of the body, especially the fingers.

Stelwagon (5) cites C. M. Smith, who saw 64 tonsillar chancres in 16 years. He says that the relative frequency of tonsillar chancres varies from 1 to 75 per cent of extra-genital chancres, according to various authorities; in the United States it is about 3.5 per cent.

DaCosta (6) has had a number of interesting cases of extra-genital chancres. One man was infected by the alum stick of a barber; two young girls by dental instruments; a policeman by a pipe; another policeman by striking a prisoner on the mouth and cutting his own knuckle on the prisoner's teeth; a street car conductor from a borrowed whistle; a glassblower from a blowpipe; a hospital orderly by picking his nose with a contaminated finger. He quotes Bulkley, who collected 1,863 cases following vaccination, 179 following circumcision, 82 following tatooing, 745 following cupping or venesection.

Keyes (7) among 2,200 syphilitic men found 70 extra-genital chancres, while in 207 syphilitic women he found 21 extra-genital chancres, i. e., 3.5 per cent for men and 10 per cent for women, which shows that women are more often innocently contaminated.

He quotes Fournier as having tabulated 10,000 chancres (96 per cent of them in men) of which 94 per cent were genital in men and only 63 per cent genital in women.

Site of extra-genital chancres: Keyes.

Male	70	Arm	1
		Female	21
Finger	34		
Lips	24	Lip	13
Tongue	4	Finger	2
Tonsil	2	Vaccination	2
Abdomen	2	Breast	2
Cheek	1	Tonsil	1
Chin	1	Eyelid	1
Eyelid	1		

The following tabulation is taken from Fournier (8):

Chancres of cephalic region	434
Chancres of cervical region	4
Chancres of trunk	21
Chancres of breast	19
Chancres of upper limb	56
Chancres of lower limb	4
Chancres of anus and perineal region	54
	642

Location of cephalic chancres:

	Cases.	Cases.
Mouth:		
Lip	328	
Tongue	58	
Tonsil	40	
Gums	9	
Palate	4	
		435
Face:		
Chin	24	
Cheeks	10	
Eye	7	
Nose	5	
Forehead	2	
		47
Scalp		2
		484

Fournier says: "I confess that I am unable to establish the diagnosis of a syphilitic chancre in its early stage."

The laboratory in the last 14 years has added a great deal to our knowledge of syphilis. Schaudin and Hoffman discovered the treponema pallidum in 1905. Wassermann came out with his test in 1906. Noguchi, in 1912, cultivated the treponema pallidum in pure culture. The dark field illuminator, the India ink, and special stains now enable us to reach a diagnosis much earlier than our prede-

cessors. Clinically we should always think of chancre when we see a lesion the cause of which is not at once obvious. The following table is inserted because so many men seem to have the impression that the Wassermann reaction is usually negative during the primary stage of syphilis:

Investigators.	Number of cases.	Per cent positive.
Wassermann, Neisser, Bruck, and Schucht	25	91.0
Cition and Blaschko	64	90.0
Bruck and Stern	27	48.2
Bruhns and Halberstadter	9	88.9
Ledermann	19	52.6
Ledermann	46	61.2
Lesser	56	69.0
Noguchi	33	66.6
Hoehne	44	38.6
Boas	50	60.0
Detre and Brezovsky	43	98.0
	416	69.8

The same investigators in 1,605 secondary syphilis cases had 89.4 per cent positive reactions. Noguchi also mentions a series of 208 primary cases of syphilis in which the Wassermann was positive in 88 per cent and his own modification in 94 per cent.

A very brief history of my case follows:

H. F. J., a white male of 23 years, was admitted to United States Naval Hospital, Pensacola, Fla., on February 27, 1919, with diagnosis undetermined. He complained of a slightly painful sore on the upper lip. He denied all venereal diseases. At first the patient ascribed his trouble to a fight which he had had about two weeks previously, during which he was struck on the mouth with a brass knuckle. From that date a little blister formed, which soon broke down when he brushed his teeth. Later on the patient admitted having associated a good deal with a chorus girl and he felt sure that he must have contracted the disease from kissing her.

Physical examination showed swelling of the upper lip, on the middle of which there was a hard, elevated ulcer, covered with a grayish membrane. There was marked induration of the edges of the ulcer. There was general glandular enlargement—cervicals, submentals, epitrochlears, and inguinals.

On March 3 and 4 spirochaetes were readily demonstrated by Fontana's method. The spirals of five were counted and varied between 9 and 11. The Wassermann reaction was 4 plus on March 3. On March 5 there appeared a discrete, pinkish macular eruption on the chest, abdomen, and flexor surfaces of the arms and forearms. The patient was given vigorous antisyphilitic treatment. On March 13 the skin was clear. On March 16 the sore was about the size of a 10-cent piece, induration almost entirely gone, practically dry, scarcely more than a scab.

REFERENCES.

1. Osler: Modern Medicine.
2. Sequeria: Diseases of the Skin.
3. Stokes: The Third Great Plague.
4. Guiteras: Urology.
5. Stelwagon: Diseases of the Skin.
6. DaCosta: Modern Surgery.
7. Keyes: Urology.
8. Fournier: Treatment and Prophylaxis of Syphilis.
9. Noguchi: Serum Diagnosis of Syphilis.

THE INFLUENCE OF INCUBATION AND THE CHOICE OF ANTIGENS IN THE WASSERMANN REACTION.[1]

By E. D. Hitchcock, Lieutenant, Medical Corps, United States Naval Reserve Force.

At the present time the Wassermann reaction is mainly carried on with the antisheep hemolytic system with the choice of one or two of three antigens, an alcoholic extract of human or other heart muscle, cholesterolized alcoholic extract of heart muscle, and Noguchi antigen.

There is, however, a great variation in the period of incubation, owing to the demand on the part of the physician for an immediate report on the sera sent in for examination. Because of this tendency by many laboratories to lessen the period of incubation below the time necessary for the complement-fixation reaction to be completed, many positive cases needing further treatment may be released.

In this paper I shall present the results I have obtained with the Wassermann reaction under different incubation conditions and indicate the antigens found most satisfactory, especially for the treated cases.

Two series of 100 cases each, of known syphilitics, mostly men under treatment, were run under the following conditions and length of time of incubation.

In series No. 1, as shown in table No. 1, two periods of incubation were used: (1) Four hours in the refrigerator, (2) one hour in water bath at 37 C. In series No. 2, as shown in table No. 2, four periods of incubation were used: (1) Four hours in the refrigerator, (2) one hour in the water bath at 37 C., (3) one-half hour in the water bath at 37 C., and (4) 24 hours at room temperature.

Three antigens were used in each serum tested: (1) Alcoholic extract of human heart, (2) cholesterolized alcoholic extract of human heart, (3) Noguchi, or acetone insoluble antigen. The dosage of antigen, complement, hemolytic amboceptor, and red cells was the same throughout.

Technic of our regular method.—The human serum to be tested is heated to 56 C. for 30 minutes. The test dose is 0.1 c. c.

[1] Laboratory, U. S. Naval Hospital, Puget Sound, Wash.

As complement, the mixed sera of three or more guinea pigs is used. The blood is centrifuged and the serum allowed to stand on the cells overnight in the refrigerator. Dosage, 2 units, determined by titration. Antigens used are (1) alcoholic extract of human heart, (2) cholesterolized alcoholic extract of human heart (as prepared by Kolmer,[1] (3) acetone insoluble lipoids (Kolmer).[2]

Test doses of antigen are diluted so as to be uniform, 0.1 c. c. being used throughout.

Sheep blood corpuscles are washed free from albumin and are made into a 2.5 per cent suspension in 0.9 per cent salt solution. Test dose is 0.5 c. c.

Antisheep hemolytic amboceptor is used in dosage determined by titration before each set of Wassermann tests are run. One c. c. of 0.9 per cent salt solution is added to each test as a diluent. The serum, complement, and antigen mixture is put in the refrigerator for four hours, after which 0.5 c. c. of the 2.5 per cent suspension of sheep cells are added together with 2 units of antisheep amboceptor. The tubes are well shaken and placed in the water bath at 37 C. for 30 minutes. The test tubes are gently shaken once or twice during the 30-minute period of incubation. The results are read and then reread after the cells have settled and are then recorded.

We have found the proper adjustment of the hemolytic system of great importance as the dosage of complement varies and the relationship of the antisheep hemolytic amboceptor to the sheep cell suspension is not constant. A greater number of units of amboceptor than are required to bring about hemolysis may result in a positive case becoming completely negative. Noguchi[3] has shown that one antibody is made negative by six amboceptor units and three antibodies by 10 amboceptor units with the Wassermann system.

Table I.

Number of serum.	Treatment.	4 hours in refrigerator.			1-hour water bath at 37 C.		
		A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.
1	Salvar. 3..... Hg.+.....	++++	++++	++++	.....	±	±
2	None..... Chancre	++++	++++	+++	.....	+++	+++
3	Salvar. 4..... Hg.+.....	.....	+++	+	.....	.....	.....
4	None..... Chancre.....	++++	++++	++++	+++	+++	+++
5	Salvar. 3..... Hg.+.....	+++	++++	++	.....	+++	++
6	Salvar. 3..... Hg.+.....	++++	++++	++++	.....	+++	+++
7	None..... Chancre.....	++++	++++	++++	.....	++	+

[1] Kolmer, J. A., Infection, Immunity, and Specific Therapy, 1917, p. 445.
[2] Kolmer, J. A., Infection, Immunity, and Specific Therapy, 1917, p. 446.
[3] Noguchi, H. A., Homohemolytic System for the Serum Diagnosis of Syphilis, Jour. of Exper. Med., 1918, XXVIII, 43.

133354—19——8

Table I—Continued.

Number of serum.	Treatment.	4 hours in refrigerator.			1-hour water bath at 37 C.		
		A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.
8	Salvar. 2..... Hg.+.....	++	+++	±	.....	+++	±
9	Salvar. 2..... Hg.....	++++	++++	++++	.....	+	+++
10	Salvar. 7..... Hg.+.....	++++	++++	+++	.....	++++	+++
11	Salvar. 3..... Hg.+.....	+++	++++	.....	.....	.....	.....
12	Salvar. 3..... Hg.+.....	++++	++++	++++	.....	++	++
13	Salvar. 3..... Hg.+.....	++++	++++	++++	+++	++++	++++
14	Salvar. 3..... Hg.+.....	++++	++++	++	.....	.....	.....
15	Salvar. 4..... Hg.+.....	++	+++	+	.....	+	.....
16	None..... Chancre.....	++++	++++	++++	.....	++	.....
17	Salvar. 6..... Hg.+.....	+	++++	+	.....	.....	.....
18	Salvar. 7..... Hg.+.....	.....	++++	.....	.....	.....	.....
19	Salvar. 6..... Hg.+.....	+	+++	.....	.....	+	.....
20	None..... Chancre.....	++++	++++	++++	++++	++++	++++
21	Salvar. 6..... Hg.+.....	±	++	++	.....	+	+
22	None..... Secondaries.....	++++	++++	++++	++++	++++	++++
23	Salvar. 1..... Hg.+.....	++++	++++	++++	++	+++	+++
24	Salvar. 2..... Hg.+.....	+++	++++	±	±	++	±
25	Salvar. 9..... Hg.+.....	++	+++	.....	+	++	+

EXPLANATION OF TABLE.—A. E.= Alcoholic extract; C. A. E.= Cholesterolized alcoholic extract; Ac. I.= Acetone insoluble antigen; Salvar.= Salvarsan; Hg.= Mercury; ±= Doubtful positive.

In Table 1 the cholesterolized antigen in the refrigerator method is shown to be slightly more sensitive than the alcoholic extract or the acetone insoluble lipoids. Where the period of incubation is much shorter as in the one-hour method at 37 C., the cholesterolized antigen proved much more sensitive.

In Cases Nos. 3, 11, 14, 17, and 18 the cholesterolized antigen gave from +++ to ++++ in the refrigerator at four hours, while at one hour 37 C. the complement was not fixed.

In Case No. 9, at the one-hour incubation, the cholesterolized antigen failed to fix the complement as completely as the acetone insoluble antigen.

Plain alcoholic extract of human heart is shown to be reliable and constant where the four-hour incubation in the refrigerator was used, but less satisfactory than the acetone insoluble antigen in the one-hour incubation at 37 C.

Table 2.

Number of serum.	Treatment.	4 hours in refrigerator.			1-hour bath at 37 C.			One-half-hour bath at 37 C.			24 hours room temperature.		
		A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.
1	Sal. 2 / Hg.+	+++	++++	±	±	++	±	.....	.....	.....	.....	+++	.....
2	Sal. 3 / Hg.+	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
3	Sal. 1 / Hg.+	++++	++++	.....	+	+++	+	.....	.....	.....	+++	++++	.....
4	Sal. 2 / Hg.+	.....	+	.....	.....	+	±	.....	.....	.....	.....	+	.....
5	Sal. 6 / Hg.+	+	+	+	.....	+	+	.....	+	+	+++	+++	+++
6	Sal. 9 / Hg.+	++	+++	.....	+	++	+	±	±	.....	++	+++	+
7	Sal. 1 / Hg. 0	++++	++++	+++	++	++++	++++	.....	+++	++++	+++	++++	++++
8	Sal. 17 / Hg.+	++++	++++	.....	++	++++	++++	.....	++++	+	+	++++	++++
9	Sal. 15 / Hg.+	++++	++++	.....	+	++++	.....	.....	+++	.....	++++	++++	++++
10	None / Chancre	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++
11	Sal. 0 / Hg.+	++++	++++	++++	++	++++	++++	+	++++	++++	++++	++++	++++
12	None / Chancre	++++	++++	++++	.....	++	++++	.....	+	+++	++++	++++	++++
13	Sal. 11 / Hg.+	++	++	+	+	+	+	.....	+	.....	.....	+++	.....
14	Sal. 12 / Hg.+	+	+++	.....	+	++	+	.....	±	.....	+	++	.....

EXPLANATION OF TABLE.—A. E.=Alcoholic extract; C. A. E.=Cholesterolized alcoholic extract; Ac. I.=Acetone insoluble antigen; Sal.=Salvarsan; Hg.=Mercury; ±=Doubtful positive.

Table 2—Continued.

Number of serum.	Treatment.	4 hours in refrigerator.			1-hour bath at 37 C.			One-half-hour bath at 37 C.			24 hours room temperature.		
		A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.	A. E.	C. A. E.	Ac. I.
15	Sal. 1 / Hg.+	++++	+++	++++	.....	+++	++++	+	+++	+++	++	++++	(1)
16	Sal. 6 / Hg.+	+	+	+	.....	+	±	.....	+	.....	+	+++	(1)
17	Sal. 6 / Hg.+	.....	++++	.....	.....	++++	.....	.....	+++	.....	+	++++	+
18	Sal. 11 / Hg.	+	+++	.....	.....	+++	+	.....	++	+	+	++++	++
19	Sal. 4 / Hg.+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	Sal. 7 / Hg.+	+++	++++	+	+++	++++	+++	+	+++	++	+++	++++	+++
21	Sal. 5 / Hg.+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	Sal. 2 / Hg.+	++++	++++	++++	++++	++++	++++	+++	++++	++++	++++	++++	++++
23	Sal. 3 / Hg.+	++++	++++	+++	+++	++++	++++	++	+++	++	+++	++++	+++
24	Sal. 3 / Hg.+	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Sal. 8 / Hg.+	+	++	.....	.....	+	.....	.....	.....	.....	+	++	+

[1] Anticomplementary.

EXPLANATION OF TABLE.—A. E.=Alcoholic extract; C. A. E.=Cholesterolized alcoholic extract; Ac. I.=Acetone insoluble antigen; Sal.=Salvarsan; Hg.=Mercury; ±=Doubtful positive.

In Table 2, the cholesterolized antigen bound more firmly in all periods of incubation with the exception of Case No. 15, where in the four-hour method in the refrigerator the alcoholic extract and the acetone insoluble antigen fixed the complement slightly more than the cholesterolized antigen; also at the one hour in the water bath the acetone insoluble antigen proved slightly more sensitive than the cholesterin antigen. The plain alcoholic extract in Table 2 proved sufficiently sensitive and slightly more so than the acetone insoluble antigen in the cold, four-hour method or the 24-hour method at room temperature. In the shorter periods of incubation the acetone insoluble antigen is shown to be more sensitive.

The one-half-hour period of incubation did not prove sufficient. In cases Nos. 1, 3, 4, and 25 sufficient time was not allowed to fix the complement, giving negative results throughout. In sera Nos. 2, 7, 10, 15, 20, 22, and 23, strongly positive cases, the one-half hour period proved sufficient. Here the unit of antibodies was very large. However, in treated cases and early cases this period of incubation is not sufficient and should not be depended upon.

The 24-hour period of incubation at room temperature is shown to be satisfactory with all the antigens as to the fixation of the complement, but the negative cases are less clearly defined and the number of sera becoming anticomplementary greatly increases.

In a series of 558 cases with four hours in the refrigerator as incubation period and using three antigens, alcoholic extract of human heart, cholesterolized alcoholic extract of human heart, and acetone insoluble lipoids, 176 cases were found positive in varying degrees.

1. Alcoholic extract proved less sensitive than the cholesterolized antigen in 46 percent.
2. Alcoholic extract proved less sensitive than the acetone insoluble antigen in 0.22 per cent.
3. Acetone insoluble antigen fixed the complement to a less degree than the cholesterolized antigen in 60 per cent.
4. Acetone insoluble antigen proved less sensitive than the alcoholic extract in 33 per cent of positive cases.

In the above series of cases the alcoholic extract proved reliable, but less sensitive than the cholesterolized antigen. The addition of cholesterin affords a better gauge as to further treatment than may be required.

The acetone insoluble antigen has been less satisfactory in our hands where the refrigerator method of incubation was used than when the one-hour method at 37 C. was used.

CONCLUSIONS.

1. Sufficient time must be allowed to complete the fixation of the complement; where few antibodies are present a longer period of incubation is required. This is best accomplished by a period of not less than four hours in the refrigerator.

2. The one-half hour period of incubation is not sufficient and will lead to false negative cases.

3. Twenty-four hours at room temperature fixes the complement completely, but may give false positives and anticomplementary reactions.

4. Cholesterolized antigen is more sensitive than the other antigens and gives a better gauge as to treatment required and progress of case.

5. The alcoholic extract is satisfactory as an antigen where a minimum incubation period of four hours in the refrigerator is used.

6. The acetone insoluble antigen is especially satisfactory and more constant than the alcoholic extract where the period of incubation is one hour or less in the water bath or the incubator at 37 C.

HISTORICAL.

THE PRACTICE OF MEDICINE IN EUROPE DURING THE MIDDLE AGES.

The first and most striking fact about mediæval medicine in Europe is that it was very largely in the hands of the clergy. In the next place, it is to be noticed that during the thousand years between 500 A. D. and 1500 A. D. the practitioners of Europe added nothing of value to the sum of medical knowledge. Where they seem to have introduced new ideas and methods a close scrutiny shows that they were merely rediscovering or reviving something well known in the Hippocratic, Alexandrian, or Roman period and later forgotten, or else importing it from Moslem sources.

To understand how medicine came to be one of the indirect activities of the Church of Rome, it is necessary to appreciate how complete was the collapse of all of the old institutions when the Roman Empire was overthrown, as much through the decay within itself of all virtue and integrity as through the onslaught of enemies from without. Meanwhile there had been slowly developing a far greater power than Rome or the wild tribes which conquered it. This was the Christian Church. When darkness settled over the land of Cæsar, Horace, Cicero and Virgil, the light of learning was kept alive by all the vivifying influences that emanated from the new religion.

During the sixth century there is little evidence of secular schools, either literary or medical. Doubtless they existed, but they played a more and more insignificant part. Church institutions took their place. Thus at Bordeaux, Marseille, Toulouse, Arles, Nîmes and Narbonne, in France; at Rome and Ravenna, in Italy, the original lay schools were succeeded by church schools. Similar institutions sprang up under priestly patronage in England, Ireland, and Wales, and likewise in Germany.

Lay physicians such as flourished in Greece and Rome or later in Bagdad were displaced by the practicing priest and relegated to an inferior position because they were sure to be ignorant and untutored. The road to knowledge was through the church. The lay practitioner took to devious paths and became the professed quack, the itinerant vender of nostrums, the mechanic of medicine. The change did not come all at once. Theodoric the Great and Childeric, the Frankish King, each had private physicians who were laymen, and so later

did Charlemagne, who was attended by Jews and Arabians. The fact that in the earlier period practice outside the church was more and more confined in Europe to the despised descendants of Abraham is sufficient evidence of changing conditions. The learning was in the church. Outside of it were lithotomists, herniotomists, occulists of a low order, and so forth. Various Burgundian, Frankish, and Gothic princes had their nonclerical attendants, and laws existed which secured to them a limited protection and honor. Saxon chronicles record the names of various prominent leeches and tell of a certain Cynifred, who opened an abscess for Queen Aethyldyth and gave directions for operating on hare lip.

Evidences of the affiliation of medicine with religious institutions survives in the names of our hospitals, a St. Luke's, St. Thomas's, St. Mary's, or St. Elizabeth's being common in every large city, though now direct connection with a religious body is often small or entirely lacking. In ancient times it was largely around the church that clustered those philanthropic enterprises which to-day are maintained by private munificence, corporate bodies, and the provisions of city and State governments.

One of the salient features of the medieval church was monasticism. The monastery and convent not only furnished sanctuary for those who had fallen foul of the law and gave moral comfort to the poor and downtrodden mortals victimized by common bandit and highborn robber baron, but were centers of relief for physical distress, where the hungry were fed and the sick sheltered and cared for. A monastery usually had its infirmary and dispensary, where cordials, collyria, and healing salves were prepared. There was a garden, too, for the cultivation of medicinal herbs. The monks and nuns knew how to dress wounds and administer simple remedies. Travelers were hospitably entertained and afforded tranquility, security, and a clean bed, comforts not to be found in the wretched inns of the day. Among the earliest establishments were the hospices of Mont Cenis (825 A. D.) and St. Bernard (980 A. D.), which ministered to wayfarers across the Alps.

Equally important were the libraries connected with the larger institutions, which were often perfect treasure houses of learning. In them one or more of the confraternity toiled through a lifetime at the slow task of translating, copying, and illuminating rare manuscripts, while the more gifted studied them and utilized their contents for original work. (It is to be remembered that during the earlier part of the Middle Ages writing was an accomplishment which even the highborn did not always possess.) In the universal turbulence of the Dark Ages, amid the petty strife of rival families, and contending political factions using intrigue, the dagger, or the sword to attain their ends many a priceless historical document

would have been lost to us but for the monastery, an institution usually respected by all the contestants. If in time the scholar became a mere scholiast and the copyist waxed careless the fact remains that they were the custodians of medical and other archives that would have perished without them.

In connection with the monastery and the convent, schools, hospitals, almshouses, orphan and foundling asylums sprang up. The poverty, distress, and sickness engendered by constant warfare and unfavorable social conditions led pious people to establish hospitals—popes, bishops, and princes taking the lead. Sometimes hardened old warriors with deeds of violence to expiate were the founders or patrons of these charitable establishments, and the painters and architects of the day beautified them to the best of their ability, giving their art to the cause of God and the poor. They were often conducted on a large scale and provided asylum and food for the indigent as well as treatment for the sick. In 1198 Innocent the Third founded the great hospital of the Holy Spirit in Rome, in connection with which there developed a foundling and insane asylum. They are all three in operation to-day. More famous still and of greater antiquity was the Hôtel Dieu, of Paris.[1] Germany boasted 155 hospitals or dispensaries during the Middle Ages. There were 10 hospitals in Rome in the thirteenth century. In London St. Bartholomew's was founded in 1137, St. Thomas's in 1215. With time a large proportion of these hospitals passed into the hands of the civil administration.

The nuns were then, as they continue to be to-day in most Latin countries, the nurses for the sick, and even midwives obtained instruction from the clergy. A time came when the active practice of medicine by male members of the religious orders threatened to engross them unduly, diverting them from their primary and paramount duties. Bulls and ordinances began to restrict their labors in this field, though not actually forbidding anything but surgery.

A time came, too, when the church grew apprehensive of the effect upon belief of unhampered intellectual development and sought to curb scientific research, for which it had never cared, its medical work being carried on purely as a charity and not with any idea of investigation or advancement. But the nursing of the infant charity, the toleration of the infant science, and the chastisement of their adult forms were equally valuable in different ways, and now science fights its battles alone, standing or falling according to the measure of its inherent worth, the truth or falsity of its postulates.

Of the various monastic orders, that founded by St. Benedict (480-544 A. D.) was by far the most important in so far as concerns the history of medicine. Benedict first established himself at Subiaco, a

[1] See U. S. Nav. Med. Bull., Vol. XII, No. 4.

little town of Abruzzi, and later founded the famous Abbey of Monte Cassino in the Kingdom of Naples.

St. Benedict founded 14 monasteries in his lifetime, and these were perfectly independent establishments, merely observing the same rule. For 500 years this autonomy prevailed among the countless Benedictine monasteries and nunneries that sprang up throughout Europe, beginning with their spread from Italy to England under St. Augustine. Many, while observing the rule of St. Benedict, went by other names, the principal offshoot being the Cistercians. The Fourth Lateran Council provided for the federation of the various houses, and from the thirteenth century on we may with propriety speak of a Benedictine "order." The Benedictines were often spoken of as the Black Monks, and Blackfriar's Bridge in London is named for their monastery on the banks of the river.

The Benedictine nuns were originated by St. Benedict's sister, Santa Scholastica. From the point of view of charitable enterprise the nuns were in a way more important than the monks for as they were prohibited by their sex from ministerial functions they were forced to one of two extremes, a purely contemplative life or an intensely practical work in connection with almshouses, orphanages, schools, and hospitals.

A later development of monasticism was the foundation of the Franciscan order by St. Francis of Assisi in the beginning of the thirteenth century. Francis had been a gay wordling prior to his conversion and one of his pet horrors had been a leper. He now devoted himself to a life of poverty, to caring for the poor and sick, especially lepers. His call was to "cure the sick, raise the dead, cleanse the lepers, and drive out devils." Out of the Franciscan order developed the Capuchins. The order of the "poor Clares" grew out of the Franciscan sisterhood. In contradistinction to the Benedictines the Franciscans or Minorites were known as Grayfriars.

The practice of medicine was not contemplated in the original rule of the Benedictine order, but its study was encouraged, though prayer and conjuration were relied on for cures. Cassiodorus, sometime secretary of state to Theodoric, joined the Benedictines and urged the study of the medical classics—Hippocrates, Discorides, Galen, Caelius Aurelianus, and others—from the Latin versions of the Greek originals. His advice was acted upon and Monte Cassino attained and long held preeminence in the study of the medicine of antiquity and other classics. (After the sacking of Monte Cassino by the Longobards, the Benedictines temporarily repaired to the vicinity of the Lateran in Rome.)

Alcuin, another Benedictine, urged on Charlemague, who was a patron of learning, the founding of university schools, and the Em-

peror acted on his advice and desired that medicine be one of the courses provided for the students. He also ordered that plants having medicinal value be grown in all royal parks.

The monastery of St. Gall, near Constance, Switzerland, had a school which was justly famous. The monastery was founded in 612 A. D. by the Irish saint of that name. In 820 A. D. the monastery had a pharmacy, a house for physicians, special apartments for the sick, a permanent resident physician, and a garden where the lily, rose, gladiola, rue, cummin, and other plants were systematically cultivated for medicinal purposes. Other cathedral schools grew up at Fulda, Wurzburg, Metz, Paris, Lyons, Cremona, Florence, etc. So far as medicine was concerned, Monte Cassino eclipsed them all, but it was finally overshadowed by the medical school of Salerno, a lay school whose golden era lasted until the beginning of the thirteenth century.[1] Here medicine was once more distinctly dissociated from the participation of the religious orders and returned to the hands of the lay practitioner. Its example contributed very decidedly to bringing about this result throughout Italy, but celibacy and holy orders were features of medical practice in France till the fifteenth century, and medical students throughout Europe tonsured their heads and wore long clerical robes even though they did not take holy orders.

From the fifth century on we have increasingly rich records of the church's activity in medicine, a crude and unsatisfactory medicine, indeed, but perhaps its rough and ignorant methods harmonized with the attainments of the times in other matters. The list of abbots and bishops who played the part of physicians is a very long one and among them, alas, the ecclesiastical bias showed itself in one very lamentable particular. Their practice was too often bolstered up by the employment of amulets, symbols, relics, and appeals to all the saints of the calendar. As incentives to faith and hope these measures were not to be condemned, but too often they were placebos administered by ignorance to superstition.

As a matter of interest, because illustrating the spirit of the times, we may list the saints who were invoked for particular ailments—heavenly specialists, as it were. St. Christopher was appealed to by those who had a horror of sudden death, and even a sight of his picture was like the modern travelers' insurance—good for a certain number of hours. (The Romans, who did not have to undergo special spiritual preparation for the ordeal of death held, on the contrary, that only those whom the gods particularly love are accorded quick deliveance from the woes of life.) St. Eligius was good in fistula in ano. St. Just specialized on headaches. St. Stephen was the saint for sufferers from stone. St. Catherine of Alexandria helped

[1] See U. S. Nav. Med. Bull., Vol. XII, No. 2.

out in diseases of the tongue. Diseases of the eye required supplications to St. Ottilia, St. Clara, and St. Lucy, and to St. Martin of Tours. St. Ursmar could relieve the toothache and St. Matthias would keep the winebibber from getting hopelessly drunk. St. Margaret gave succor to the parturient, and relics of this saint were in use up to modern times to bring good fortune to the queens of France when in travail.

Some of the marvelous cures accomplished in the earlier days of the church smack suspiciously of the "incubation" of temple healing in Greece.

In 391 A. D. the nephew of Archbishop Theophilus of Alexandria built a Christian church on the site of the Serapeion his uncle had helped to destroy and provided it with the bones of St. John and St. Cyril of Edessa. Thither sick people resorted to spend the night and be advised in a dream by these particular saints as to what to do to get well. The Christian martyrs and physicians Cosma and Damianus had churches named for them, and equally striking miracles were performed in them, while in the *eleventh* century a German emperor-elect visited Monte Cassino and was there operated on by St. Benedict (died 543 A. D.), who appeared to him in a dream and told him that he was due to pass three stones from the bladder, which the fortunate patient duly found in his hand on awakening, his wound healed.

Marcellus Empiricus in the fifth century was a Christian physician and too pious a man to be mistaken for a practical joker when he directs that the words *socsocam sykma* be whispered 27 times in a man's ear to check nose bleed. A practical joker! No; he had too large a following.

Both Bernard of Clairvaux and Gregory of Tours, whose beautiful hymns we still sing, objected, in their exhalted piety, to combining human agencies and prayer in seeking relief from suffering as this betokened lack of faith. On the other hand, many physicians, either because they distrusted their own powers or relied on the mental effect produced, were in the habit of reinforcing their prescriptions with prayers and rhymes, while the bones of St. Matthew in the cathedral of Salerno were a real asset in attracting patients to that health resort.

It is well enough to provide spiritual consolation to the sick and to strengthen hope of recovery by the ministrations of religion, but too many of the practices associated with the church's medical treatment seems to have come directly from pagan sources like Sextus Placitus, who declared that for a child to kiss a horse's nose was a guarantee against toothache, but mentioned the risk of his being bitten in the act; like Apuleius, who with his list of herb-cures furnished also the spells to be used with each.

St. Hildegarde, who while a living being upon earth (1098–1179) was an abbess at Ruppertsberg, near Bingen, was a naturalist and physician who wrote on materia medica and therapeutics. She departed widely from many of the older methods and used galenical remedies almost entirely. Her favorite vehicle for the administration of drugs was flour in the form of pancakes. She was a capable and devout woman of strong character; but her singular credulity is illustrated by her belief in the unicorn. She ascribed great virtue to a belt made from the hide of a unicorn and worn next to the skin in protecting from pestilence and fevers. An ointment made from this animal's liver and the yolk of egg was a guarantee against leprosy. According to Hildegarde the unicorn is easily captured when, overcome at the sight of a girl—a creature in man's shape yet without a beard—he sits down on his haunches and stares at her. This truly pious and worthy woman appreciated the value of belladonna as an anodyne and recommends its local use for cardiac distress. Less wise was her reliance on arnica as a promoter of love. To touch man or woman with green arnica was to inspire him or her with a passion for the person who applied it, which increased to the point of folly as the plant withered. Paré dispelled the belief in the medicinal virtues of the unicorn much to the chagrin of his protector and patron, Charles IX, who had quite a costly store of it. One wonders who perpetrated this fraud on him. The idea of the unicorn was probably based on travelers' reports of the rhinoceros.

John of Gaddesden (fourteenth century) guarantees freedom from colic for those who will wear a specially constructed belt made from the skin of a sea cow. Throughout the Middle Ages a hound's tongue was regarded as a splendid sedative and was combined with opium, henbane, etc., in making the "dog-tongue pil." Francis I, a patron of art and admirer of beauty (he inherted his father's mistress, the famed Diana of Poitiers), used *theriaca* and always carried on his person a little powdered mummy, a specific against injuries from falls and accidents. Mumia owed its real or supposed efficacy as an astringent for hemorrhage, dysentery, and ulcers to the balsam and myrrh used when the body was first embalmed! So enlightened a man as Francis Bacon was a great believer in it.

Gentile da Foligno (1330) recommended the reading of the Psalms of David as an accelerator of labor. Fucinus of Florence regarded gold as the elixir of life. Peter Hispanus, commonly identified with Pope John XXI (died 1277), favored the use of amulets, and his prescription for chronic diarrhea suggests a mind totally bereft of common sense. Other foolish beliefs could be cited without number. The Knights Hospitalers and Templars carried a piece of coral in their belts, not merely to bring good luck, but to have it handy, because

palpitation of the heart, due to indigestion, was relieved by holding coral in the mouth. Arnold of Villanova tells how a priest cured him of over a hundred warts on his hands by making the sign of the cross over them, repeating the Lord's Prayer and burying a pellitary plant in a damp piece of ground. Gilbertus Anglicus treated warts by cutting open the back of a red snail and putting in salt. The juice which then came out of the snail was a sovereign remedy and so also was the application of a piece of burning wool; but he also recommended the knife. Pope John XXI recommended for gout that a frog, captured when neither sun nor moon was shining, shorn of his legs and wrapped in deer skin, be applied to the suffering member.

It was rather commonly believed in the Middle Ages that precious or semiprecious stones were valuable remedies for disease. Needless to say they were not employed in charity practice, but the distinction conferred on a wealthy patient by ordering expensive remedies for him is clear, and the psychic effect of such elegant pharmacology was enormous. Lorenzo de Medici was unsuccessfully treated by this method in his last illness and his doctor committed suicide.

Michael Psellus, a Byzantine physician (1020–1105), wrote a treatise on "The Healing Powers of Precious Stones" in which he made very careful and subtle distinctions. Thus amethyst was for delirium tremens, beryl for jaundice, jasper for epilepsy, amber externally for genito-urinary disease. Such ideas fitted in very well with dabblings in vague notions of alchemy and of astrology, and deserved a place in a practice of medicine which considered the movements and conjunctions of the heavenly bodies, the seasons, and the tides, and ascribed importance to the date of the patient's birth and the saint or star to which his life was a vital concern. Yet this man's learning was vast, ranging from theology to cooking, and he introduced the practice of public debates by physicians, which became a feature of university life in the Middle Ages.

Benivieni, the father of pathology, had a friend who consulted a priest about his hernia. The clerical practitioner made no pretense at taxis but applied a tight bandage. Benivieni was called at the end of a week and found his friend delirious, dying. He summoned the author of this fine piece of work and in his presence removed the bandage from the corpse, disclosing the ulcer and the gangrene of the bowel caused by the treatment.

Fallopius records how he prescribed laxative pills for the abbess of the convent of St. Paul, at Pisa, and the worthy lady instead of swallowing them, moistened them with her saliva, flattened them out into little cakes, and applied them to the region of her stomach under a tight bandage. They acted in four or five hours. This went on for two years, greatly to the astonishment of Fallopius. His friend Vidius tells us how a certain Florentine came to Pisa to be

cured of a huge cirsoid aneurism covering the whole back of his head. Fallopius had an apparatus for cutting out the tumor, but hesitated to use it, fearing the man might bleed to death. He lived for years in spite of the untreated growth.

Guy de Chauliac tells how one lord bishop who was medical treated another lord bishop suffering with strangury who was not. A little matter of 5 drachms of opium put him to sleep forever. A far more sensible type of prelate was that thirteenth century divine, Walter de Kirkham, bishop of Durham, who ordered the priests of his diocese to preach from the pulpit against the practice of a mother taking her baby to sleep in the bed with her, because this involved great risk of the infant being rolled on and suffocated. According to Baass, prostitution in London was for a long time regulated by the bishops of the city.

A routine and indispensable feature of practice was the examination of urine—by inspection only. The most important part of the procedure was to look wise and impress the patient or his friends. Undoubtedly, however, there were some doctors who really studied the sample submitted for books, even books in rhyme, were gotten out on the subject.

Many a doctor, weary of night calls and the unsatisfactory character of general practice, could, as a canon, retire to his ecclesiastical niche for leisurely study, and by examining samples of urine sent from a distance and by letters of advice, pursue a profitable career by giving absent treatment only. Then, as now, the physician of scholarly tastes found it irksome to be at the beck and call of the public. To these men abstract science was the main thing in life and medicine a side issue with the results to be expected. The pursuit of alchemy or astronomy made the doctor a theorist, hindered clinical observation, gave him an aloofness from the practical aspects of sickness which had deplorable results.

One of the venerable superstitions of the Middle Ages, surviving almost to our day, was the belief in the power of a king to cure scrofula by touching the patient. This belief was universal throughout Europe. The number touched by a single king amounted to thousands in a year. It was one of the divine prerogatives associated with the divine right by which they ruled. One can not refrain from a smile over the secret disgust Louis XI and St. Francis de Paul must have entertained for each other since the king could not cure the priest of his scrofula nor himself be relieved of his own disability by the miracle-working saint, summoned from Italy for that purpose.

The belief in the influence of the stars increased with the popularity of Arabic medicine. Certain days were not favorable for bleeding and could be ascertained by consulting an almanac. The

phases of the moon determined the propitious time for collecting certain plants and the administration of others. Marcellus Fucinus, a Florentine celebrity of the fifteenth century, ascribed special virtue to medicines prepared during the conjunction of Jupiter and Venus.

Most Rabelaisian of all the special measures of the fifteenth century were those recommended in his practice of medicine by one Guainerius for the treatment of poisonous stings. Take a chicken, pluck out all the circumanal feathers, and apply the denuded part of the unfortunate bird's anatomy to the site of the sting. Hold the chicken's beak closed and the poison will be aspirated into its body from that of the patient.

Of the follies and stupidity, the superstitions, and ignorance of both doctor and patient in the Middle Ages and after, volumes could be written, but there is every reason to believe that there were then many physicians fully as sincere, as earnest, as faithful as any of our time. Much that they did seems erroneous, crude, barbaric to us, but can we be sure that 500 years from now we shall come off any better? Most of the pioneers in the profession sinned by their servile adherence to ancient authority and blind conservatism, but their error was due to a misconception, a distorted sense of values, not to indifference or laziness. How hard they worked; how they traveled hither and yon in search of the truth (blind to the fact that it was close at hand for all to see in nature); what risks they ran; what courage of conviction they showed, venturing life itself for honest belief; what thirst for knowledge, what pride in their profession was theirs. All honor to the misguided but zealous men of the Middle Ages!

There are several ways of interpreting the life and thought of antiquity. One is to assume that whatever differs from our views, accepted as right and final, was stupid or ridiculous. Another is to so twist and turn a phrase from some early writing as to make it harmonize with modern conceptions, as though this were a kindness instead of a manifest injustice since, if progress is to continue, this course only robs error of its venerable age. The more correct method is to try first to find out what the men of former ages actually said and then what they really meant, taking into consideration their situation and other beliefs. Thus, if a man so intelligent and learned as Fracastor thought the stars had to do with epidemics, this is not a proof that he was superstitious, though it might suggest it in another man. He lived in a period when learning was prized as never before. New ideas were germinating, old ones were passing away. Copernicus was about to recast the most fundamental conceptions about the universe. Fracastor's associates and contemporaries, Cardinal Bembo, Pomponazzo, and others, were either indifferent to all save the form of religion or had discarded it entirely. Men were turning to nature and asking questions of it instead of

evolving laws from their inner consciousness. Hence for a pioneer in geology, a mathematician, a serious student of contagion to ascribe a pestilence to the stars he had seen instead of to the saint he had not seen was a step forward, though a mistake. On the other hand, it would be very far-fetched to say that because the moon determines the tides and tides may effect the level of underground water near the coast, therefore a belief in the relation of the heavenly bodies to pestilence was in harmony with the theories of Metchnikoff!

In considering the medicine of the Middle Ages it is proper to remember that there was no anatomy and physiology worth the name. If the medical reader can conceive himself compelled to practice without any conception of these fundamentals, he will inevitably have a higher and more just opinion of the sagacity and intelligence of the practitioners of the period in question; he will recognize at every step their marvelous powers of observation and their close reasoning. Their conclusions were false, but they had no premises. The medicine of Europe was a mixture of Greek and Arabian medicine up to the seventeenth century and there was nothing new in it or surgery until the eighteenth. In a general way, surgery was the better art of the two because it was more genuine, pretended less, made less assumption of a knowledge that did not exist, and was in the main less arrogant. The reputable surgeon renounced what was beyond his powers and did not, like the doctor, put all his trust and confidence in words and mummeries. His errors were costly, but he was working along sound lines. He looked, he listened, he smelled, he handled, he cut. He was in close contact with nature. Men might argue while a consumptive slowly lost strength and energy in spite of the potions, lotions, pills, and salves administered in profusion, but not while the blood spurted from a severed vessel.

The crime of the Middle Ages was the complete separation of medicine and surgery, the latter being regarded as a low and vulgar calling unworthy of an educated man. There could be no greater mistake than to blame the church for this fatal error. At least three popes were themselves physicians, and the unfavorable attitude of Rome was not to surgery, as such, but to the practice of surgery by men in holy orders. This objection was a valid one. Surgery was in a backward state owing to the total lack of any real knowledge of anatomy, and as the results of bad surgery are conspicuous and hard to hide, as in the Middle Ages the surgeon who killed his patient or left him maimed for life was lucky to get off with nothing worse than the loss of a nose or ear and a good cudgeling or ducking, the church most wisely discouraged its representatives from using the knife. The real causes of the attitude of the physician to the surgeon were the influence of Arabian practice on the one hand; jeal-

ousy on the part of the medical fraternity on the other. The Faculty of Paris took the lead in this matter and for 400 years evinced a bigotry and bitterness almost beyond belief, even going so far as to take under its patronage the barbers and barber surgeons and pit them against the surgeons proper. The example of Paris was followed by Montpellier, Oxford, Cambridge, and the German schools, except perhaps Vienna, where surgery was taught with some zeal, even as for a while at Montpellier.

The thirteenth century saw a revival of Arabian influence in European medicine. This school counteracted in some measure the ascetic and monastic ideas which made nature a vile thing full of demons enticing men to explore its mysteries at the risk of their souls; which deemed the human body a mere instrument of sin.

The "Canon" of Avicenna, the writings of Albucasis and Rhazes, together with those of Galen, now became the standard authorities in medicine and were the textbooks from which professors read aloud to their classes, this lifeless method being universal in the medical schools of the Middle Ages.

Arnold of Villanova or Villeneuve (1235–1312) was a powerful champion of Arabic medicine. His birthplace is disputed and he may have been a native of Spain or France, countries in which new towns were constantly springing up, their foundation and civic status being fostered by royalty seeking to neutralize the power of an overgrown and arrogant feudal nobility.

The least imaginative burgher could put together the equivalents for "new" and "town" and get Villanueva or Villeneuve, and there were fully a score of towns in France and Spain bearing this name. At all events, Arnold studied and taught at Montpellier. He was at once a doctor of theology, of law, of philosophy, and of medicine, but his heart's love was for alchemy. He had begun his studies under the Dominicans, to whom medicine was forbidden. He knew Hebrew and other ancient languages. His theological writings, which involved him with the Inquisition, were burned and the author might have shared their fate had not Pope Clement V befriended him and removed the charge of heresy. Boniface VIII, whom he treated for stone, had also been his protector. Clement, indeed, esteemed his professional skill so highly that he published an encyclical letter to the bishops of the church bidding them be on the lookout for a certain medical treatise composed by Arnold during his lifetime which His Holiness was most anxious to secure. One of the 14 deadly errors ascribed to the great scholar was his assertion that "the works of mercy and medicine are more acceptable to God than the sacrifice of the altar," though he had scripture authority for this belief.

Arnold was an alchemist and his great ambition was to discover some universal remedy, some elixir of life. Alcohol, because of its

preservative qualities, seemed to promise something along this line and though to-day we believe that it is anything but a restorer of youth, we employ the alcoholic preparations of drugs, tinctures, founded on his recognition of the readiness with which alcohol extracts the active principles of many vegetable substances.

Villanova was a Salernitan in his preference for simple and natural remedies and deprecated the too prompt resort to drugging. For example, his advice to sufferers from palpitation of the heart includes no special prescriptions but deals rather with personal habits, food, and exercise. Indigestible diet and exposure to cold are to be avoided. Beef, game, cheese, pastry, and poor bread are forbidden. Avoidance of cold is enjoined, and yet the patient must have fresh air, cooled in summer by decorating his apartment with branches of willow and grapevine sprinkled with water. Moderate exercise, as on a horse or gently trotting mule, is proper before, but not after, eating. Sleep immediately after a meal is not good either. One should lie first on the right side and then on the left side to assist the passage of food along the digestive tract. Strange to say, he admits salt pork to the ménu, and this was the one thing that Dr. J. Marion Sims could eat with impunity when almost dying of chronic diarrhea. A favorite recipe of the Middle Ages was Arnold of Villanova's pill of aloes, 4; saffron, 1; myrrh, 2 parts, which he wished never to be without. It survives in our pharmacopœia.

Peter of Abano (1250–1315) was one of the first men to reflect luster on his alma mater, the University of Padua, where he taught medicine after ranging over Europe from Constantinople to Paris. He was a man of strong religious convictions, to judge by his prefacing certain directions for treatment with an appeal to the "Giver of salvation," and by the conclusion to another direction, which reads: "Pray therefore that God, the Giver of health, will direct you to the choice of the proper remedy."

However, because of his independence and disposition to express his views he, too, fell foul of the church and the flames devoured either his bones or his effigy. Tradition says that his devoted housekeeper, Marietta, after his fine funeral and burial, disinterred and concealed the body so that the inquisitors might not get it. To deny the existence of the devil and suggest that Lazarus might have been in a trance and not actually dead when he was raised up was heresy, indeed. Peter seems also to have doubted the doctrine of free will. He was clearly outside the domain of his profession when he exploited novel ideas on life, conduct, and belief, and it would be narrow prejudice to charge that Rome condemned him as a physician. He lived at a time when to that institution alone was generally conceded the right to formulate creeds.

Peter's principal written work was designed to reconcile the teachings of the Greek and Arabian schools, being himself distinctly a professor of the latter. His learning, his freedom of speech, his great fame, raised up many enemies who found a ready basis for attack in his passion for astrology and magic. Before prescribing he considered the state of the weather and the hour of the patient's birth, employing all the mannerisms calculated to impress the patient and taking into consideration the movements of the heavenly bodies in determining the best time to gather the plants to be employed for a cure. On the other hand, he was a friend of Mondino of Bologna and undoubtedly did some dissecting on his own account.

Bernard de Gordon, probably a native of Gordon, France, and not a Scotchman, began to teach at Montpellier in 1285 and stayed there for 22 years. His textbook, "The Lily of Medicine," has neither the merit of originality nor soundness, but has historical value because of the reference to trusses for hernia and to spectacles. He claimed to have an ointment for the eyes, which made good vision possible without them.

The Podestà, or chief magistrate of Padua, one Pietro Bonaparte, must have attracted considerable attention when he attended the marriage solemnized at Vienna in 1319 between Juta, Duchess of Austria and Louis of Oettingen, by wearing a pair of spectacles. He had obtained them from their inventor, Salvino degli Armati, of Florence. In 1574 Augustus, Elector of Saxony, wanted a pair of spectacles and sent agents to hunt for one in Leipzig and Augsburg. Finally he sent to Venice and after months of delay a set of convex lenses was ground for him at a cost of $250. It was only 200 years later that myopics could be accommodated.

Gilbertus Anglicus, who lived at the beginning of the thirteenth century, was one of the first of English physicians to rise above the general level of ignorance and superstition that marked his colleagues. His compend of medicine contains a description of leprosy that remained authoritative throughout the Middle Ages. He asserted the contagiousness of smallpox.

John of Gaddesden made a reputation when summoned to treat the Prince of Wales suffering with smallpox. He enveloped his patient and hung the couch and walls of the appartment with scarlet cloths. This was characteristic of the man for he stooped to every trick to impress the world with his marvelous learning and originality. His writings do not display genuine erudition, and Guy de Chauliac, alluding to his "Rosa Anglica," says, contemptuously: "Finally there sprang up an insipid English rose which was sent to me and by me seen. I had expected to find in it an odor of sweetness but it contained only the tales of Hispanus, Gilbertus, and Theodoric."

A work of immense popularity was the "Treasury of the Poor." The authorship is in dispute but it is generally attributed to one Peter Hispanus, a graduate of Montpellier, some time physician to Gregory X and later himself pontifex maximus, as John XXI, his election being due in some measure to his good health and relative youth, three pontiffs in succession before him having been raised to the throne and died in a period of seven months.

Peter has in his book one or two infallible remedies. Hysterical females are to be brought around by applying a large cupping glass—any big vessel will do—to the lower abdomen, and the lively use of the actual cautery. Syncope due to hysteria can be overcome by blowing pepper and salt up the patient's nostrils. The efficacy of such methods is incontestible and there is no fault to be found with his itch remedy, composed of sulphur, pitch, niter, frankincense, and oil, except its claim to be a "one-day" cure.

We may note here the general character of the titles given to many of the medical writings of the period, which by their attempt at refinement and elegance reflect some of the least deserving features of Arabian medicine. The "Flower of Health," and "Rose of England," the "Lilly of Medicine," the "Light of Lights," the "Rosary of Philosophers" suggest the vanity of their authors and of the foreigners they feebly plagiarized, for too many of the physicians of the day who pretended to transmit the knowledge of their masters knew little Arabic and not much Greek and got most of their lore at second hand.

The style as well as the title of these writings was generally artificial and stilted like the bedside manner of the composers and their assumption of dignity and knowledge when ministering to the sick. Many of the writings were in verse, and no part or function of the human body was so humble but what it could be raised to honor if discussed in carefully composed couplets.

Giacomo de Dondi, who died in 1350, commonly known in his day as the "accumulator," from the large number of remedies he added to therapy in a work called "Aggregator de medicinis simplicibus," was of a good family of Padua and there he spent the greater part of his life, highly esteemed for the versatility of his talent, which ranged over mathematics, astronomy, and philosophy. He was thus typical of the early style physician, concerned with much more than belonged to his calling. According to Leclerc he devised an astronomical clock which told the hours, the course of the sun and moon, the days of the month, and the principal feast days of the year. It was set up on the palace of the Prince of Carara in the marble district. He also went in extensively for salt works. Both his sons were physicians, one of them being a friend of Petrarch, who willed to him enough money to buy a ring to remember him by. Dabbling in

all sorts of outside things was well enough in Italy at such a time, but in England and America a feeling was to develop later which made a generality of pursuits no recommendation for a physician. Harvey, Thomas Young, and Holmes (to mention only conspicuous examples) paid the penalty of not sticking strictly to the practice of medicine, but happily each was independent of practice and did more for the world by his collateral work than by his real fidelity in the daily round of calls.

The Arabist example, the example and the rulings of the Catholic Church, were not the only influences that affected medicine. Kings and governing bodies had a considerable share in the molding of opinion and the control of conduct. Roger II, of Sicily, in 1140 had promulgated a law to regulate the practice of medicine in his dominions. Regularly appointed officials granted the necessary license, and to prescribe without it was to incur the risk of a year's imprisonment and the confiscation of property. Roger's grandson, Frederick II, not only fixed the graduation examinations at Salerno and legalized dissection and anatomical instruction but regulated the sale of drugs and the relation of physician to apothecary. Under the Hohenstaufen, Angevine, and Aragonese dynasties, excellent laws were passed for the Kingdoms of Naples and Sicily, covering matters of sanitation and public health. The depth at which dead bodies were to be buried, the disposal of garbage, the raising of live stock within the city limits, the slaughter and sale of diseased cattle were all covered by these enactments. Somewhat similar ordinances were passed in Spain and Germany, though both these countries were backward in medicine. Italy, indeed, was the leader in all that betokened civilization, and France came next. Germany was far behind England, which scarcely approached the best features of life on the Continent.

The medical schools of importance after the passing of Salerno's best period were Bologna, Montpellier, Padua, Pavia, Paris, and Bâle, somewhat in the order named, but their fortunes fluctuated with politics, parties, and dynasties, now one now another being in the ascendant. Montpellier was the richest of them all in manuscripts whereas for a hundred years Paris boasted but nine. On the other hand, Montpellier was most dependent on political support, and in time it began to go down hill. Instead of standing or falling on sound principles of justice and right, it followed expediency. It had once been the resort of Jewish students; it now excluded them. It had once educated brilliant surgeons. Now, it subserviently bowed to the prejudices of the moment and went even beyond the bigotry of the Faculty of Paris and suspended its teaching of that branch. The foreign wars undertaken by Francis I and Louis XII were bar-

ren of political results, but the invaders of Italy came back enriched with spoils from the libraries of Florence and Pavia.

At Montpellier and Bologna the members of the faculty ran into the hundreds, the matriculates into thousands. The students constituted largely self-governing bodies, which selected their studies as well as their professors and enlivened life by hazing and initiations which, especially in Germany, often went to brutal lengths. They were in daily rows with the citizens of their respective towns and when the price of board went up or a pestilence threatened, they would move to some other town and set up their school in new quarters. Thus the faculty and students of Oxford, 3,000 strong, once boycotted the town of Oxford, for a space of several years going to Cambridge or foreign schools.

Various cities of Italy had their communal or public-health doctors, engaged to attend the poor and in some cases to serve with military expeditions as occasion arose. Such an official was Ugo or Hugh Borgognoni of Lucca, of the early part of the thirteenth century. In the fourteenth century, Venice, as the great commercial and seafaring people of the day, Marseilles, and Ragusa established systematic quarantine against ships, passengers, and cargo from infected ports to save themselves from the Black Death, one of the scourges that repeatedly swept over Europe (notably in 1348) and carried off some 60,000,000 people.

One of the truly marvelous achievements of the Middle Ages was the extermination of leprosy, which had appeared here and there in northern Europe in the sixth and seventh centuries, but became widespread at the time of the Crusades, so that France alone possessed 2,000 leper hospitals and the rest of Europe some 17,000 more. These establishments were at once the result of charity and the means of self-protection for the community and by the simple process of isolation finally ridded Europe of the dreadful malady.

Epidemics of dancing mania, sweating sickness, Plica Polonica, typhus, and influenza wrought frightful havoc. These visitations gave rise to the publication of "plague tractates" or short, concise directions for avoiding infection. They were sometimes as contradictory as the theories of our own time. The prevalent belief ascribed the origin of contagious disease to the air polluted by humors emanating from the bodies of those infected. Contagion was to be avoided by proper diet, avoidance of chilling, the use of acid fruits only, the inhalation of vinegar, etc. Disinfection by the combustion of aromatic substances was commonly practiced.

We depend in large measure on works of physicians of the period for our knowledge of medieval medicine. But what a comparatively

few medical men write is not always a complete picture of what the many practice. We must distinguish between a few exponents of their own times and practices and the larger number who worked in silence. In that class there were many worthy men, though they belonged in what Oliver Wendell Holmes has beautifully described as "the magnificent constituency of mediocrities of which the world is made up—the people without biographies, whose lives have made a clear solution in the fluid menstruum of time instead of being precipitated in the opaque sediment of history."

One may smile at suggestions of cupidity, avarice, and sharp dealing in some old text but must not deduce from it that all or even the majority of the writer's contemporaries were unscrupulous. Another possible mistake is to pick out the amusing, piquant, or anomalous incidents of some medieval practitioner and deem them characteristic of the period. Again, many a writer elaborated ideas and theories in his writings which he may have been far from trying to put into *execution* at the bedside.

Petrarch ridiculed the pretentious, ornate costume of his contemporaries of the medical profession, their rings, their tall horses, their golden spurs, and Gilles de Corbeil before him had satirized those of the twelfth century, but we do not have to rely on word pictures for the appearance of the physicians and surgeons of the thirteenth and fourteenth centuries, since portraits of them survive in illuminated manuscripts. John of Arderne is represented with a blond beard, apparelled in a gown, cloak, and cap. Mondeville is handed down to us as tall, slender, and sickly (he died of tuberculosis) arrayed in a long purple gown, black skull cap, and red stockings. The physicians were certainly high and mighty in their bearing and affected that dignity which too often bespeaks the shallow character or poorly furnished mind. The best men everywhere are outwardly simple. Their imitators, who have nothing genuine to offer, must adorn the outer man, impose their importance by manner, on those who will never discover it by their deeds.

One of the most interesting features of medical literature in the fourteenth and fifteenth centuries was the frequent publication of so-called *consilia* or letters of advice, which practically embodied the case records of the authors. Some of them were frank letters to inquiring patients, others were addressed to students and country physicians to instruct them after the fashion of our correspondence schools. The collections in book form were simply a popular way of teaching clinical medicine.

Three distinguished professors of Padua took the lead in this department. They were Gentile de Foligno, who died in 1348 of the plague; Antonio Cermisone (died 1443); and Bartolomeo Montag-

nana, in whose family medicine was hereditary for several generations. The Montagnanas dispensed their remedies from an apothecary shop of their own.

Many of the *consilia* had a form very similar to the clinical record of a modern hospital patient, beginning with a description of the sick man, his habits, history, temperament and symptoms, and passing on to a discussion of his disease, its cause, and possible cure by diet and drugs. We can not recover much of direct value in modern practice from these old letters, but they throw an interesting light on the beliefs and practices of the day in which they were written and in some instances have real historical value. Gentile's advice about a man who had gone mad through excess of joy shows his partiality for dosing. First there is a decoction of endive, senna, and other substances in sugar and water, of which 2 or 3 ounces are to be taken in warm water. At bedtime this is reinforced by the addition of poppy heads. Then the patient's head is to be rubbed with a liniment of violets, aloes, camomile, water lilies, poppies, and lettuce prepared with a barley water. Cupping glasses are to be freely applied to neck, shoulders, and buttocks. Finally the attendant is told that it will benefit the patient if he can develop hemorrhoids! Whether this last detail of treatment would cure him of madness is doubtful, but it would certainly attack the cause of the disturbance and rob him of any surviving excess of joy.

Montagnana wrote some 300 *consilia*. One of them discusses the case of a lady with a suppurating ear and impaired hearing. The writer gives a rather unfavorable prognosis as to the hearing but advises a depletive treatment. She is to avoid pastry, milk, boiled fish and eels, vegetables, and stewed meats, especially at night. Sweet wines are to be given up or diluted with water and the amount reduced. She must not hang her head down. A rhubarb pill in the morning, bleeding from the right cephalic vein or between the thumb and index of the right hand, daily poulticing, a purge on retiring, and locally sweet oil, alternating with cyclamen juice complete the carefully planned treatment which will result in a cure "to the glory of Almighty God. Amen."

An English abbot, contemplating a pilgrimage to Jerusalem, makes inquiries about what he may expect and the measures he should adopt for his health. Montagnana recommends a confection of quinces and coriander before meals to prevent seasickness. If this fails, he should bandage arms and legs and apply dry cups to the abdomen and use a suppository of scammony and colocynth, while plunging his feet suddenly into cold water. There is a good deal more advice but what has been quoted suggests that the author may have rightly attributed seasickness to vasomotor disturbance.

Montagnana was opposed to the use of trusses for hernia—"iron rings with pressure over the groin"—and treated the condition by incision, reposition, and cauterization without castration. He refers to a tumor of the groin which could not be hernia because pulsating, fluctuating, compressible, and feverish. To Montagnana's credit be it remembered that he had dissected or opened 14 human bodies during the course of his professional career.

Cermison recommends aloes and musk for eye affections, and foot and hand baths as revulsants. For catarrhal affections of the upper air passages cantharideal blisters are to be applied behind the ears. He gives directions for disguising a disagreeable taste by honey and melted sugar. His *consilia* also contain prescriptions clearly intended for acute gonorrhea. Solid pessaries of irritating substances are recommended to induce the catamenia.

Beverius de Baverius was another writer of *consilia*. He was sometime professor at Bologna and physician to the great humanist and art lover Pope Nicholas V. He treated chlorosis with iron. One of his *consilia* contains a description of an interesting case of paralysis of the arms, loss of speech and memory following acute catarrhal inflammation of the throat.

Matthew Ferrarus de Gradibus, who died in 1472, treated Louis XI for hemorrhoids and Bianca Maria Sforza, Duchess of Milan, for asthma. One of his *consilia* relates the case of a youth who acquired paralysis of two fingers from excessive writing. Another describes the chronic rheumatism of Gaston, Prince of Navarre. Again he notes the hemorrhages from vesical calculus, from suppressed menses; the sterility dependent on uterine displacements.

Another form of clinical record was contained in the so-called *observationes*, or in books of cures.

John Lange (1485–1565), a pupil of Leonicenus and physician of four Electors Palatine, mentions the prejudice against performing even minor surgery on certain unlucky days. In one of his letters of advice he tells about a girl who had to decline many advantageous offers of marriage because of ill health. Her case baffled the physicians, some diagnosing it as heart disease and others as hysteria, disease of the liver, etc. Her symptoms were pallor, palpitation, a visible pulsation of the temporal arteries, dyspnea at dances, oedema of the ankles. He bade the anxious parents dismiss their fears, give the patient emmenagogues and purgatives, accept the most available suitor for the girl and invite the writer to the wedding.

Amatus Lusitanus, a Jewish physician of the sixteenth century, was popular and prosperous until he incurred the displeasure of Matthioli of Siena by finding mistakes in the latter's edition of Dioscorides. The Siennese physician charged him with secretly following the religious practices of his race in spite of having been (forcibly)

baptized in childhood. This led to such active persecution that poor Amatus was not safe until he took refuge with the Turks in Salonica. He published some 700 cures, among which are head injuries which, due to the relative softness of the bones of children, turned out favorably. One of these was a girl with ulcers of the tongue who fell downstairs and got a large depression of the skull. Another was a lad who fell from a great height and similarly dented his skull. Both recovered. A boy of 12 was hit on the left temple. There was no local sign but severe constitutional symptoms with pain referred to the opposite side. Amatus trephined over the seat of pain, evacuated pus, and cured his patient in 35 days.

A case of melancholia was cured by bleeding, cupping, and friction combined with cathartics. It was proposed to cut off her hair, whereupon the girl grew angry and vowed she would rather die than lose it. She was gotten to sleep by putting lettuce and poppy seed in her food and recovered. Though opposed to dyeing the hair, he admits the necessity of gratifying the public taste and recommends henna as an infallible measure, which a very dear friend of his, a Florentine lady, always used with success. Henna is to be made into a paste with water, rubbed into the scalp and left on for 24 hours. This is followed by washing with warm wine and the use of a long-toothed, ivory comb. A French noble imagined that he had an abscess in his side. There was none. The patient was in good health, with rosy face, good pulse, and the appetite of a bull. He made his will and gave away everything but a single flagon of wine, which he hugged to his side as if it had been a bewitching girl. Amatus pretended to operate and showed the pus he had withdrawn—a mixture of milk and hen's blood prepared in advance.

He tells of being called in as an expert in the case of a woman accused of bewitching a young noble and causing him to lose his hearing. Amatus testified that incantations could not produce deafness and that drugs had not been administered or their effects would have been noticed sooner. Further, he proved that the plaintiff was suffering from syphilis, which sometimes causes deafness, and so got the woman off.

In Rome he was invited to treat Camillo Colonna, the head of one of the great patrician families. The patient suffered from gout and was put on a restricted diet and a course of purgatives, but he soon tired of this regimen and after the sixth treatment indulged in a huge meal of "fried eggs and all sorts of shellfish." This led to a night of torment, and when the doctor called next day, the servants, rushing up to help him dismount from his mule, told him all about it. "Always find out as much as you can from a patient's servants" is his wise advice, repeating what the Salernitans had taught long before. Lusitanus taxed the prince with having broken

his promise to obey orders, a quarrel ensued, and the physician departed in high dudgeon, vowing not to return. "And I would not have gone back to him again; no, not if he had offered me one of his estates," adds the Jew, with spirit, in spite of all he had undergone.

A monk of Pesaro fell in love with a gardener's daughter, and having often besought her in vain on his knees to run off and marry him he drank some vitriol, bought of an apothocary, and died of it after suffering great pain, an erosion of the stomach, vomiting, diarrhea, blackness and swelling of the tongue. The science of Amatus availed nothing in this case.

A young Jew of Salonica went insane with love. "I undertook his cure, prescribed the usual regimen for melancholia, together with a sirup of hellebore of my own composition and a purgative containing lapis lazuli." The issue of the case was a cure but only after the violence of the lover's feelings had been relieved by climbing a rope ladder to the lady's chamber and attacking her relatives with his fists. The watch was called in and led the violent youth to prison, where his distemper soon subsided. The regime to which Amatus refers is that of Haly Abbas, a Moslem physician of the tenth century. Love being but a form of melancholy, a moistening treatment should be carried out, consisting of baths, moderate horseback riding, and anointing with oil of violets. For the victims of love inclining to melancholia sweet, low music of lute or lyre, the contemplation of gardens, meadows and flowers, entertainment by stories, and interesting news are prescribed. They must have some business to keep their thoughts off the loved ones, and quarrels and arguments offer a further distraction. The acquaintance of other young women is valuable, too.

A great writer of observations was Peter Forest, professor of medicine in the new University of Leyden. He tells how, following the death of the botanist Valerius Cordus, in his arms, he too fell sick with fever and sore throat and next day, his teacher, a visiting physician at the Ospedale della Consolazione, Rome, commented on the sudaminal or impetiginous eruption on his face, likening it to syphilis. Patient and doctor discussed treatment, but decided to do nothing, and the former kept within doors, hating to be seen abroad with such serious looking sores. Things got worse with him until he recalled Avicenna's prescription of camphor and saliva. Forest used saliva alone and with the blessing of God soon enjoyed a permanent recovery.

He gives an account of the "sweating sickness" which existed in England for 40 years, and finally in 1529 spread to the Continent, prevailed there extensively, "entered Amsterdam on the afternoon of September 27 in a thick fog," and eventually passed back to England.

The chief symptom was "a rapid sweat, fiery and of most unpleasant odor, with pains in all the extremities and paralysis." Those who resented the heat and opened all the windows died at once, and those who went to the other extreme and closed up every crack, lit fires, and piled on bedding were equally unfortunate. The middle course was the practical one. He notes that purgation, bleeding, barley water, and mild diuretics constituted the best treatment. The English physicians ordered no drugs but waited for the sweating. "When it is free, nearly all escape: if suppressed, the majority perish." Absolute rest in bed was indispensable.

He describes an epidemic (influenza) which appeared in Holland in June, 1580. It was very contagious, sudden in onset and marked by fever, inflammation of throat and lungs, hoarseness, and cough. "Many families were suddenly struck down." It was not serious unless complicated by pleurisy and pneumonia. It decreased in July and reappeared with severity in the autumn. In winter the pulmonary cases were more serious and experienced pleuritic pains and expectoration of blood. Forest wisely calls attention to the importance of recognizing early which cases required bleeding and which did not. He did not ascribe much benefit to the use of theriac and gold leaf, inclining to a rational treatment. He avoided wine and objected to treating all cases with a single routine drug. True, wine supported weakness, but there were other measures for this, and too much wine lead to delirium and mania. He did use wine in some cases to relieve the cough, adding sugar candy. Forest had been well educated in various schools, in France and Italy, and acquired great popularity in his own country.

History distinguishes between the Middle Ages and the period of the Revival of Learning, separating them by the date of the fall of Constantinople (1453) into the hands of the Turks and the consequent scattering of many scholars with their manuscripts throughout the rest of Europe. But in many ways this classic distinction between the older period and the new and brighter one is inappropriate in the history of medicine, whose revival or renaissance is foreshadowed by Vesalius and Fallopius and fully inaugurated by Harvey in the seventeenth century, when so many enterprises of far-reaching importance were begun in the medical world. Certainly the proverbial ignorance of the Dark Ages persisted long after the renewal of scholarly interest in Greek and Latin lore, and medicine in a way suffered by its renewed dependence on antiquity when original work was the need of the hour.

Hence reference has been made to men and things which, according to the accepted subdivision of past eras, do not belong to the Middle Ages proper, and this sketch concludes with an allusion to two men

who in some ways were typical of the time of their birth and in others far ahead of it.

Girolamo Fracastoro[1] was born in Verona, 1478, and died in his villa near by in 1553. He came of a good family and received the best possible education. At the University of Padua he was thrown with the most brilliant minds of his day, among them Copernicus, Contarini, Rhamnusius, the brothers Della Torre, etc., and came under the influence of Pomponazzo, a new order of being. Later Cardinal Bembo and the Farneses, one a pope as Paul III, the other a cardinal, were his friends.

To many Fracastoro is known mainly as the author of a poem, "Syphilis or the French Disease," which sets forth the woeful consequences of the amours of a young shepherd, Syphilis by name. Both the elaborate, high-flown, artificial style, in keeping with the taste of the day, and the general interest in the topic gave it an enormous popularity. It is the source of the word syphilis and affirms the sexual origin of the disease. Vastly more important and interesting was Fracastoro's book "Concerning contagions and contagious diseases," a conscientious and accurate study summarizing the prevalent ideas on the subject and clearly defining his own. The essential types of infection are: 1, Those due to contact alone, where a disorder of the relations of heat and moisture in the body lead to putrefaction, heat and moisture being regarded as entities rather than qualities; 2, those due to contact and fomites, as scabies, leprosy, elephantiasis, etc., the clothes, linen, etc., called "fomites," not being themselves more than the agents which harbor and foster the growth of essential seeds of contagion; 3, those conveyed by contact or fomites and also transmitted at a distance, such as pestilential fevers, phthisis, etc. It is by the closest and most accurate reasoning (on what he believed to be facts) that Fracastor proceeds to explain the propagation of disease by seeds thrown off from the body and either attacking directly or after an abode in fomites. The great difficulty (his successors have encountered it) was to explain the transmission through space without contact. Though carefully excluding supernatural agencies, he shows here his weak side and refers to the injury which a glance may do (belief in the "evil eye" is still common) as in some way analogous to the problem in hand and he suggests also the influence of the stars, of bad air and water, all causes acting from without. Fracastoro's use of the word *seeds* of contagion, his careful distinction between the poison which affects a single individual and can not reproduce itself in another body, and contagion whose seeds have a power to "multiply and propagate their like" is a groping after the germ idea which had to await the development of the microscope for demonstration.

[1] C. and D. Singer: The Scientific Position of G. Fracastoro. Annals of Med. Hist., Vol. I, No. 1.

The book contains an admirable clinical description of typhus fever and the statement that the contagion of this disease is *not* conveyed through air. The onset, the cerebral symptoms, the eruption and its time of appearance, the character of urine, pulse, and fever, the prognosis, etc., are set forth briefly and clearly. Fracastor's influence on contemporary medical thought and throughout the succeeding century was enormous. All subsequent writings abound in references to him.

In the general scientific world he was less appreciated though with a clearer title to fame. He grasped the true significance of fossil remains as related to changes of surface levels and was the first to suggest their secular variations. He appreciated the nature of refraction of light, and while in no sense the equal of Copernicus he worked along similar lines and was prompt to accept the revolutionary teachings of the great astronomer. He constructed the first orrery and anticipated Mercator's idea of rectilinear maps. He was the first writer to use the word pole as applied to the earth itself.

With all his learning Fracastor was a kindly, simple, sociable being, rich in friends, rich through his enjoyment of poetry and music.

Paul III appointed Fracastor physician to the famous Council of Trent, and it was on his advice that the sittings were transferred to Bologna when the plague made its appearance. The King of France and the German Emperor conferred honors upon him and Margaret of Navarre, who sought to surround herself with the lions of the day, did everything she could to attract him to her court, but the great man preferred the charms of his villa and its opportunity for quiet and study.

Antonio Benivieni (1448–1502) was not a professor but a practitioner of medicine and surgery in Florence, and this adds a flavor of interest to his career because so large a proportion of those who wrote on medicine up to the nineteenth century were professional teachers with the dictatorial spirit that stamps the class. Benivieni had a consuming desire to get at the reason of things and may be regarded as the founder of pathology, though his actual attainments in this field do not compare in magnitude with those of the great Morgagni. For his time, however, he was phenomenal. His story of a case of gangrene of the bowel due to malpractice has already been told.

Benivieni's book, "Concerning the Hidden Causes of Disease," was very short, for he had not explored a great range of subjects, and this brevity is one of its charms. There was no padding, no display of learning, no quoting of what other men had said. He gives his notes on cases studied and that is all. He quoted nobody, for there was no one before him to quote. The book went to press after the author had been dead four years, so some of the credit be-

longs to the brother and friend who edited it. But Benivieni's merit lay in this, that he was the first to deliberately open the body (and he did so at every opportunity) to learn the cause of death, and, as Albutt says, not looking for secrets or mysteries but for things that were out of sight only. He describes senile gangrene for the first time and reports cases of biliary calculus, morbus coxae, mesenteric abscess, thrombosis of mesenteric vessels, cardiac cases, cancer of the stomach and bowels, rupture of the intestine, etc., a goodly collection for the world's first pathologist. Benivieni not only studied his own cases, but sought autopsies everywhere. With each report is a brief statement of etiology and symptoms. Benivieni was a successful surgeon practicing lithotrity, perforating the hymen for retained menses, cutting into the cicatricial tissue resulting from a burn of the arm, and making slow extension to improve motion.

The question of whether syphilis existed in Europe before the discovery of America seems to me to offer no difficult problem. That all the symptoms of this protean disease were grouped together as an entity and always recognized as having the same origin and given a definite name requires a different answer.

Ugo Bentius, who flourished under Pope Eugenius IV (1431–1447), describes in his *consilia* a young man of 20 who suffered with severe headaches, foul sweats, and pains, often almost unendurable, in his limbs. His face, head, and back were covered with pustules; abscesses developed first on the leg, then on the foot, and finally all over. There were reddish blotches on legs and back. Bentius died 45 years before the discovery of America and the supposed introduction of the disease from there into Europe. He called his case sciatica with pustular eruption, an unconscious euphony. Another individual was described as having painful swellings of the joints, atrophy of the muscles, and serious changes in nose and mouth. Menghus, in a rare work, "Concerning Every Variety of Fever (Venice, 1486)," described symptoms strongly resembling syphilis and attributed them to sexual impurity.

But the reader who has pursued the subject this far may still ask, "What was the medicine of the Middle Ages?" It was a medicine of incessant dosing with countless elaborately compounded drugs, of bleeding and purging, thanks to a huge pharmacopœia and huge ignorance of the causes of disease. When the unusual, poetic, or disgusting remedy failed—the substances used varied from lilies, violets, and roses to the blood, excrement, and intestinal concretions of animals—resort was had to amulet and exorcism; to scripture, prayer, holy relics, appeals to Venus or Jupiter. Except in Italy, where, in spite of the Arabians, the best physicians were often good surgeons, no manual operations were undertaken by ethical members of the profession. The fashionable clyster was administered by the

apothecary, bleeding was done by the barber, and anything more elaborate called for a barber-surgeon. As for real surgery, a herniotomy or lithotomy, that was taught in the college classroom but never done. The surgical patient had to rely on the good offices of men who passed for charlatans. For the most part they were Italians or had learned their trade in Italy, where there had been a sort of apostolic succession of surgery. The anatomy of pigs taught by Copho of Salerno became the anatomy of human beings under Mondino de Luzzi, teaching at Bologna early in the fourteenth century, but he only made a worthy beginning and the practical results have been greatly overestimated. The great medical centers rarely boasted more than one or two dissections a year and in most cases went for three and four years without one. When a rare cadaver was secured a barber opened the abdomen with a razor, a demonstrator pointed out the viscera, and the professor, keeping at a safe distance, expounded in Latin the ideas of Galen or some Arabist as found in a garbled manuscript. The performance began with a brief religious service out of respect for the dead and was concluded with a sort of vaudeville to relieve the overwrought feelings of the students after witnessing such an invasion into the forbidden mysteries of nature.

The anatomy and physiology of the Middle Ages was little better than that of the fifth century before Christ save for what Galen had added by cutting up apes. Everybody, except and after Hippocrates, was satisfied that the way to learn the truth was to argue about it, and in the public debates that constituted one of the features of college life he who quoted from the oldest manuscript always carried the day. Albertus Magnus, a Dominican, used his knowledge of physics and mechanics to construct automatons and this, with his fondness for astrology, proved him a sorcerer. Roger Bacon, an English Franciscan, who had the instincts of a true naturalist and wanted investigation to take the place of speculation, went to prison. The great majority of men were content to philosophize about the humors of the body and never thought to look.

The followers of the Arabist school came upon the scene in force armed with purer texts, a horror of surgery, and a strong racial inclination to casuistry. They added many new remedies. They were clever, earnest men and masterly clinical observers. For their period they were modern interpreters and revisers of the cherished ancient lore.

We marvel, not that the physician of the Middle Ages knew so little, but, that knowing none of the essentials, he accomplished so much; made such shrewd guesses, was so useful in spite of his limitations. He bore to the modern practitioner about the relation that a

fourth- year medical student who had had no first, second, or third year would occupy. Or we may compare him to an intelligent, observing male nurse who for years has worked with a scientific doctor but never been allowed to use a stethoscope, look through a microscope, or touch a specific gravity apparatus.

The Revival of Learning in the middle of the fifteenth century technically concluded the period under consideration and was followed by a disposition to look for material causes and to doubt the force of immaterial ones. The new-springing scholarship discovered that the texts of its venerated authors were inaccurate or spurious. Confidence in authority thus rudely shaken produced the inevitable consequences. While some men devoted a lifetime to bringing out faithful editions of Galen and Hippocrates, others rejected their broken idols altogether and started out on a new and untried road. Vesalius, disgusted with the superficial, crude, and bootless anatomy of Paris, could endure no longer to sit on a bench and listen to trivialities. He "had to get his hand into the business." Vesalius, Fallopius, Eustachius, Columbo, Cesalpino, Servetus, and Fabricius of Acquapendente did not see the dawn but the stars of the ancient night were paling above their heads and soon Harvey, not so much by his wonderful discoveries as by his distinctly scientific way of making them, was to usher in a new day.[1]

[1] The data for this paper were collected from data too numerous to mention. No originality is claimed for it.

EDITORIAL.

Intangible damage.

He would be a poor physician indeed who failed to see a great difference in prognostic import between the behavior of two patients, both seriously ill, one of whom stoutly affirmed that he was determined to recover—"Do your best for me and I'll play my part; my work is too interesting, too important for me to die yet"—while the other, soul-laden and heartsick, showed in his apathy and supineness, better than in words, his utter weariness of life.

The autopsy does not always reveal the cause of death, though we may fasten the guilt on this or that departure from normal. To plead an ultramicroscopic lesion or agent is begging the question and there is such a thing as overdoing the endocrine business. Our materialism may lead us as far astray as the people of one or 25 centuries ago, who had their "archeus," their "vital spirit," or their "pneuma" to explain the phenomena of life and death.

Every clinician has seen people die who "ought to have gotten well," as far as their lesions were concerned, and vice versa. To claim that momentary depression of spirits causes a normal organ to discontinue its function would be an error, but certain phenomena, of such daily occurrence as to be forgotten in the search for remote ones, may be full of meaning. The modest girl blushes at a questionable joke or a relished compliment. Fear causes pallor, tremor, and perspiration, and the anticipation of a court-martial or a visit to a dentist produces marked disturbances of the splanchnic region. Joy, hope, despair, and avarice illumine or becloud the countenance. The constant recurrence of shades of feeling leaves unmistakable evidences in face and gait and bearing so that a mere child unerringly recognizes a predominant expression in physical features and says: "What a sad old man," or "What a sweet, lovely lady," or "What a horrid, mean face." The physician recognizes the dyspeptic by a selfish, peevish expression; the cardiac case by a certain sadness, a haggardness of the eyes, and the drooping lines about the mouth; and there is unmistakable wistfulness and appeal in the eyes of the gravid woman nearing her term.

That the constant recurrence of depressing emotions can traumatize the cardio-vascular apparatus seems hardly open to question, and this conceded it follows that long-continued sorrow and anxiety

can secondarily play havoc with the whole organism to the shortening as well as embittering of life.

The war recently forced on Europe and America has caused to be laid at the door of the world's enemy a bill for damages reckoned in dollars, pounds, and francs, but even should it ever be paid there will remain the debt for intangible damage which no commercial activity, no enterprise in business, nor thrift nor economy can ever redeem. The man whose business was ruined, the bankrupt, the unemployed laborer, he whose education was interrupted, the girl whose lover was killed in battle—all these may recover from their destitution. A better business, a better education, a better matrimonial arrangement may be realized for them in time. So-called prosperity will return, even as after other wars, and a few years hence silver-tongued orators will speak applause-provoking platitudes about the "fruit trees shedding their blossoms on the once devastated fields of France and Flanders" and tell how "hope burns again in countless hearts." But to many who have passed youth's zenith of buoyancy, to those whose ears strain from the general harmony the melancholy pulsing of the bass viols and hear only the plaintive notes in the mad waltz, to those whose eyes see in the beauty of the autumn leaf a hint of death and decay, for those to whose senses the crisp autumn air foretells the winter's chill, there will be no forgetfulness of the irremediable and intangible damage which kaiserism inflicted on an unoffending world.

For how many struggling mortals life's burden has become a crushing load! For how many in the great mass of average mankind has anxiety over financial matters meant sleepless nights and not mere meatless but tasteless meals! What humiliations, what perturbations of spirit, what blighting of lifelong hopes and plans have they not endured? How vain have proved the toil and privations endured through long years for some cherished aim that can never be compassed now!

These things the young and irresponsible, whose future still unfolds alluringly amid war's loud alarums, can never know, for love has helped devoted parents to gulp down their sorrows, but the bitter cup has like a slow poison sapped the latter's resistance, killed enthusiasm, dimmed the brightness of life, and veiled the beauty and sunshine of earth.

A few men here and there, bewildered by conflicting feelings of duty, have made a quick end of everything; a few, having no anchorage for their souls in the changeless principles of right, have blindly run riot in conflict with law and order, but these are isolated and negligible incidents compared to the thousands of unrecorded cases whose heads are bowed a little lower, whose step is less secure because

of the day's distress and the night's vigil. On these people the blight of want and the agony of apprehension have left a permanent mark.

For the dead and the maimed we mourn, for wrecked homes and dismantled shops payment may be asked, but how to calculate the loss through intangible damage, how count the number of those who with no fame, no glamour, no reward of ribbon or monument have simply lost their grip on life or been robbed of a few years of their allotted span?

THE ATTITUDE OF THE BUREAU.

There are few service readers who have not spoken or heard others speak about the "attitude of the bureau." When a medical officer gets back to hospital or ship after a visit to Washington his colleagues and shipmates gather around him begging for the latest item of news or gossip, and at such a time this expression is very apt to be heard more than once. It is safe to say that no two people outside the bureau or in it have the same idea about this "attitude," but those who are not affiliated with the organization agree in one thing; they conceive of the attitude as a stolid, resistant, homogeneous thing like the facade of a building looking north or south, east or west, in a certain block on a certain street, whose topographical location will not change unless the foundation collapses. This general opinion embodies all the error which it is possible to crystallize into definite form. If the Bureau has an attitude at all it is one eminently susceptible of change, being a sort of composite of many minds of the greatest diversity and far from a definite formula in black and white.

Sitting in a niche in the wall past which men come and go, it has been interesting, amusing, rather saddening—everything laughable has its tearful side and the fountain-heads of the sweet and bitter waters of life are very near each other—to hear the comments of the passers-by. A. comes forth loud in his denunciations because a suggestion made by him received little or no encouragement and a moment later B. is heard grumbling for the same reason. The joke in this case is that the schemes of A. and B. are diametrically opposed and each would be much more incensed had the other's proposition been accepted than he is at the rejection of his own.

Behold, now, C.'s bent head and clenched fists. He is about to shake the dust of the Capital from his shoes vowing never to return, not even for duty here. He is thoroughly angry at the scant consideration paid to his flash of genius and far from suspecting that it was out of regard for his feelings that he was not told the facts of the case. The reform he contemplated is impossible because it is opposed to the expressed wishes of the President of the United States, the laws of Congress, and the published Regulations for the

Government of the Navy, with all of which C., apparently, has but a slight acquaintance. D. with a slight change in present methods would reform the Navy, but his scheme involves the appropriation by Congress of a little matter of a quarter of a million. E. is spared the humiliation of being told that his plan was tried out and proved a dismal failure when he was still in the mud-pie and rocking-horse period of life. He returns to the scene of his labors satisfied that everybody in the department is a Bourbon for ignorance and inflexibility. F. actually lost his nerve in the anteroom and talked about something else when his turn came, but in a month he will be telling about how he "put the thing up to the department and got turned down." G. made a splendid suggestion and would have been surprised to learn that the bureau had already planned something of the kind and was only awaiting the settlement of a legal point to put it in force.

And so it goes. The truth of the matter is that the bureau is not one man, nor two men, but a goodly number of men, ranging from civilians old or young, a lieutenant of the Medical Corps, members of the Hospital Corps, to an officer with stars on his collar. The report or letter that embodies a startling novelty circulates from office to office "for comment and return" and is passed upon by at least a dozen people each with a different viewpoint, each having had an experience of service conditions which makes his opinions different from those of the others. It is doubtful if the Navy could assemble a dozen officers of different ranks who would wholly agree on everything that came up, and in such a group a really good, practical suggestion is sure to find a champion.

The bureau is not infallible. The men who compose it are human; likewise the men who come to it with requests or counsel. Complete satisfaction for everybody could only be obtained if all requests were proper, all advice were sound, and all decisions made with divine wisdom. If there is any definite feature of the bureau which might be termed an *attitude* it is conservatism in relation to radical departures which may promise the most gratifying results but are without guarantee of success and which, if they failed, would spell disaster for the medical department and undo the achievements of years of labor.

The bureau labors under the disadvantage, where change and innovation are concerned, of being responsible, and that is the reason why it does not always give immediate acquiescence to plans which on the surface have everything to recommend them. The author of the suggestion is irresponsible so far as consequences go. He has only to show good intentions and honest motives and he is free to make any and every recommendation. To bear the brunt of the consequences, to pay the price of failure, is an entirely different matter,

and it is so delightfully easy to assign all this to the other fellow that people forget that side of it entirely. The world abounds with men who are very daring for others but become extremely circumspect when the consequences of rashness are to recoil on themselves. It is one thing to plan, in the privacy of one's room, the first steps in a far-reaching scheme of operations, and it is altogether another matter to undertake the execution of all its ramifications in relation to a host of other people who are perhaps unsympathetic or hostile.

The attitude of the bureau, then, is one of caution toward the untried path which it must tread alone, particularly when only the first few yards are illuminated. It has a very healthy appetite for new ideas but hestitates to swallow things that may cause an acute indigestion. It is receptive of ideas that have been viewed from all sides and tried out, if only on the dog.

Now, no one asked the editor to undertake a defense of the bureau or suggested the need of doing so, but a chance visitor who chuckled with me over certain popular misconceptions offered this as a topic for an editorial. He will think it poorly done, of course, but *he declined the invitation to write it himself!*

IN MEMORIAM.

ABRAHAM JACOBI.

1830–1919.

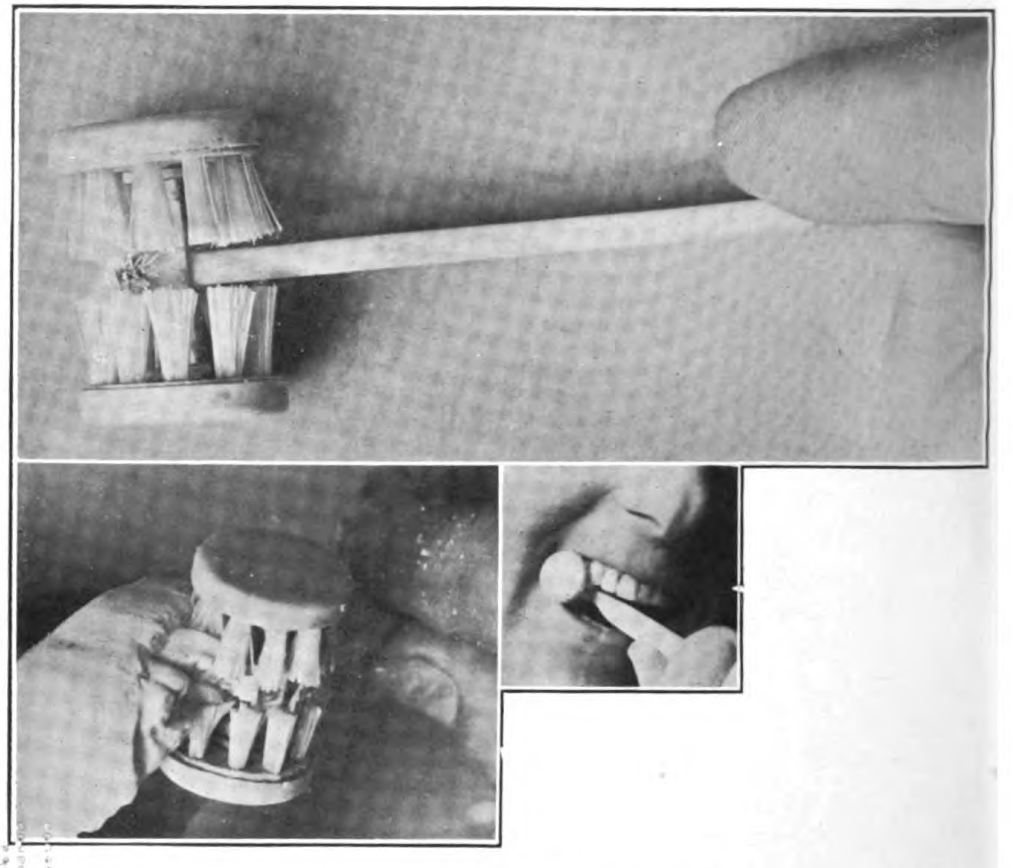
When Abraham Jacobi died at his home on Lake George on July 10, 1919, there passed away one of the few remaining Germans of the type so respected and loved, a type that in recent years has been replaced by a wholly different one. We all know of the Germans who came to this country at and soon after the Revolutionary period to become Americans, heart and soul, and transmit the instincts and traditions of loyal citizenship to their posterity. The Germans who came to America during and immediately after the political disturbances of 1848 in Europe were of similar mold. When our Civil War broke out they played their part in the ranks of one or the other of the two great armies according to their conceptions of duty. For years, under the leadership of Carl Schurz, the influence of the Germans who had cast in their lot with us and the influence of the German press of America was an asset for good in our public and private life. The decay of the German American and of the German press resulted from the secret propaganda of the pan-German policies of Berlin and of the wholesale migration of a very different class of people; people who came to us not to share in a larger national and individual life and to become assimilated to what we had of good while toiling with us for the elimination of what was bad, but to further the interests of a foreign government while learning English, engaging in business, and profiting by the large fields available to frugality and industry.

Like his friend Carl Schurz, Abraham Jacobi came to America fresh from a German prison, where he had been immured on account of political activities. He married an American woman and in 1860 was appointed to the first chair of diseases of children established in any American medical school. When in 1903 the land of his birth recognized his high professional standing and tendered him the position of professor of pediatrics in the University of Berlin it did not take Jacobi 24 hours to make up his mind to decline the supposed honor.

Abraham Jacobi was born at Hartum, Westphalia, May 6, 1830. He studied at the Universities of Greifswald, Göttingen, and Bonn, receiving his M. D. from the latter school in 1851, and came to

America in 1853. From 1860 to 1865 he taught pediatrics in the New York Medical College, in the medical department of the University of New York from 1865 to 1870, and in the College of Physicians and Surgeons of Columbia University from 1870 to 1902.

The honors bestowed upon him by American colleges and societies were too numerous to mention, and his eminent professional attainments were too widely appreciated to require circumstantial reference here. We mourn rather the loss of the citizen, the patriot, the man of high principle, of loyal spirit, of kind and gentle heart; of the type that sought to broaden and ennoble our national life as compared with all the recent importations who wrought in secret to compass its destruction.



Rotary toothbrush and method of manipulating it.

783–1

SUGGESTED DEVICES.

THE CONSTRUCTION OF ANIMAL CAGES.

By G. F. Clark, Lieutenant Commander, Medical Corps, United States Navy.

The accompanying cut shows the construction of an animal cage which has several advantages. It can be readily and cheaply constructed. It is easily cleaned and the surrounding floor space is not soiled, as the cage is placed in a pan containing a layer of sawdust.

After folding the wire gauze over the wooden form, the redundant portion at the corners is folded across the front and across the back of the cage, thus serving to strengthen it. Since the bottom is composed of gauze the cage is cleaned by merely lifting it and permitting the feces to fall into the sawdust. Fresh sawdust is supplied as required.

The cost is as follows: Wire gauze (½-inch mesh), $0.34; tin, $0.05; brackets for corners, $0.20; hinges, $0.25; enamel pan, $1.65; rivets, $0.05; labor, $0.75; total, $3.29.

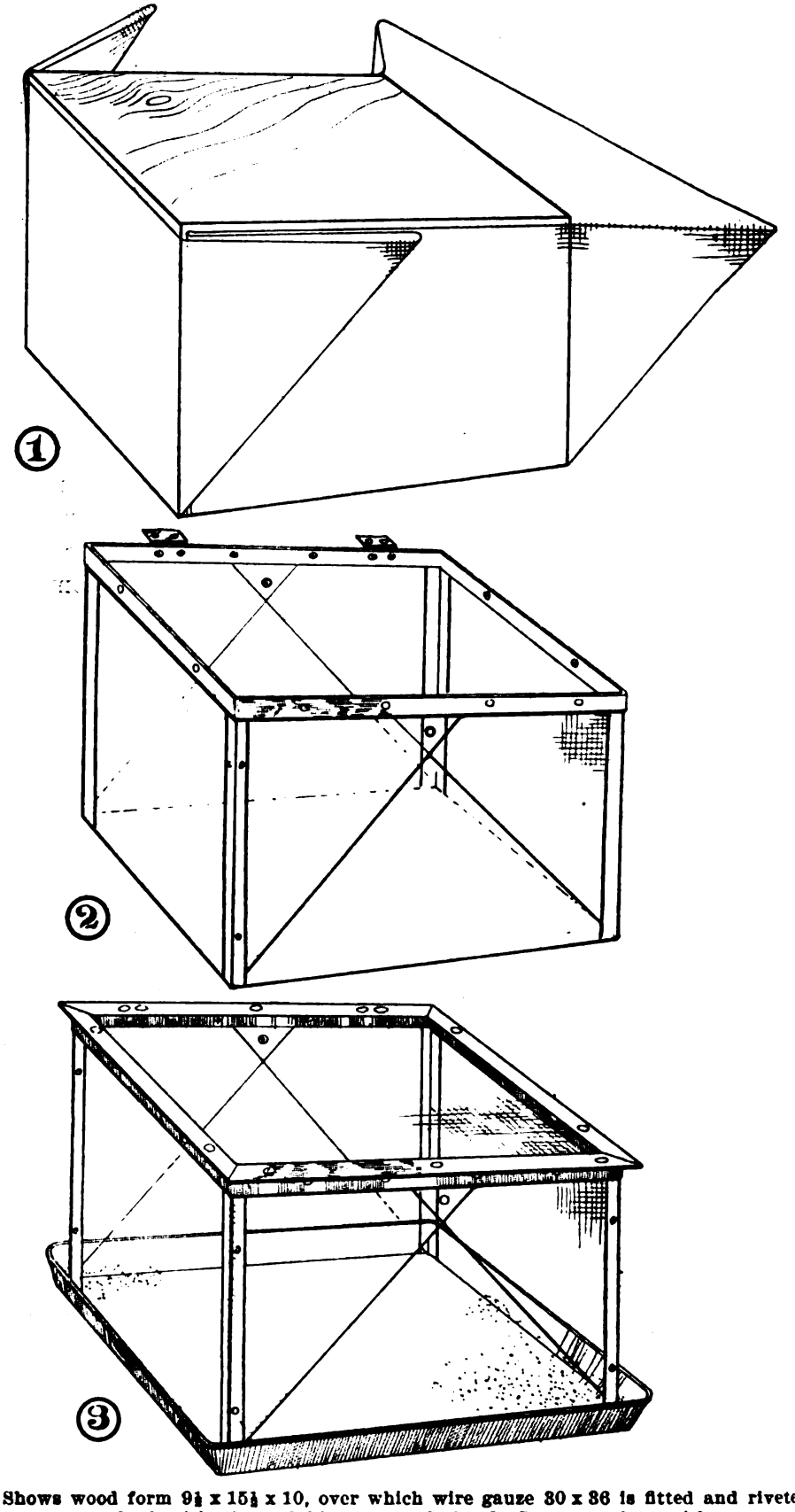
A ROTARY TOOTHBRUSH.

By H. E. Harvey, Lieutenant Commander, Dental Corps, United States Navy.

The importance of the care of the teeth and gums has increased directly in proportion to the development and researches in bacteriology and the study of focal infections.

One of the principal difficulties in the cleansing of teeth has been the inability to clean in between the teeth, that is, to loosen the bacterial plaques constantly present in the interproximal spaces. Several methods have been given for doing this, those most used being careful manipulation of toothbrush after special instruction by the dentist, use of floss silk or tape charged with precipitated chalk or tooth powder, and the use of sprays under pressure.

Recently a method has been advocated in which the bristles of a toothbrush are pushed directly into the interproximal spaces and withdrawn, in an endeavor to promote circulation in surrounding tissues and cleanse surfaces of teeth involved. The inventor of the rotary toothbrush about to be described was told by the dentist who



1. Shows wood form 9½ x 15½ x 10, over which wire gauze 30 x 36 is fitted and riveted. 2. Shows cage edged with tin and hinges attached. 3. Cage complete with cover and placed in enameled pan containing sawdust.

was treating his gums "to brush in between the teeth, and inside as well as out," but an easy and efficient way of carrying out these instructions was not to be found.

The following is the result of that particular dentist's instruction to that particular patient:

The idea involved is that of *two revolving* wheels which are parallel and have bristles projecting from the adjacent surfaces and a small tuft extending up between them to cleanse the biting surfaces of the teeth. The brush is placed over the upper right teeth and pushed up so that one wheel is on the outside of the teeth and the other on the inside, the handle projecting from the mouth. The handle is then gently pulled forward and to the left as the front teeth are reached. After the upper central teeth are passed over by the brush it is then pushed back until the back surface of upper molar is cleansed, the back-and-forth motion being performed several times. As the handle is pushed back and forth the wheels in which the bristles are set *revolve* and the brushes pass over the teeth and gums with gentle friction, where the teeth and gums are healthy, but going into spaces not occupied by gum, thus cleasing between teeth in which decay or gum recession is present. The brush is then pulled off of the teeth and shifted to the other side of the upper jaw, where the process is repeated.

The lower teeth are cleansed by removing the brush from the upper teeth, turning it over and facing over the lower teeth, when further procedure is clear.

After thoroughly brushing with precipitated chalk or some standard tooth powder, a glass of water is used to remove the loosened débris by forcing it in medium-size mouthfuls back and forth between the spaces about the teeth.

One of the practical uses of this brush is the cleansing of the mouths of sick and injured men by the nurse. The nurse after a few moments instruction can cleanse more thoroughly the teeth and interproximal spaces of a helpless patient than a normal individual himself can do on himself when using the ordinary toothbrush.

The gums can be massaged at the same time as the brushing by pushing the brush a little farther over the teeth while using and thus brushing the gums as well as the teeth.

For those who appreciate the feeling of exquisite cleanliness in the mouth and for the eighty odd per cent otherwise doomed to pyorrhea this method is especially commended.

For over two years this method of brushing has been under observation by the writer and is offered as a method worthy of consideration.

EQUIPMENT OF BATTLE DRESSING STATION STOREROOMS.

By W. S. Pugh, Commander, Medical Corps, United States Navy.

The general plans and equipment of the modern battle dressing station have been so thoroughly covered in various department and fleet circulars that they will not be touched upon in this article.

Practically nothing has as yet appeared on the subject of the necessary stock for the storerooms of these stations, and as conditions have changed so greatly aboard ship in the last few years it is believed that an itemized list of necessary storeroom equipment would be of assistance to those about to go to sea, and particularly so if placing a new ship in commission.

The list of articles should be kept on a card index, one set in each storeroom. The card box should be divided into two compartments, the first section showing a list of expendable and nonexpendable articles on white and salmon-colored cards, respectively, the rear section containing a list of articles not on hand but which must be supplied.

The following is a classified list of articles in each battle dressing station storeroom of the U. S. S. *Mississippi*, and is believed to be adequate for use in battle:

MEDICINES.

Acid:		
Boric	grams	500
Boric (ointment)	do	500
Picric	do	125
Adrenalin	bottle	1
Alcohol	liters	8
Ammonia, aromatic spirit	bottle	1
Chlorazene	bottles	6
Chloroform	do	10
Collodium, flexile	do	6
Hydrogen dioxid liquid	do	3
Iodine (crystals)	do	2
Iodine (tincture)	mils	200
Parafin-wax compound	packages	2
Petrolatum, liquid	bottle	1
Sapo mollis	jars	2
Silvol (10 per cent)	ounce	1
Sodium carbonate	bottle	1
Zingiberis, fluid extract	do	1
Whisky	bottles	3

ANTISEPTICS AND DISINFECTANTS.

Cresol	bottles	4
Mercury, bichlorid of	do	2
Phenol	do	4

TABLET TRITURATES.

Morphine sulphate (¼)	bottle	1
Saline transfusion	do	1

HYPODERMIC TABLETS.

Atropine, 1/100 grain	tube	1
Hyoscine	do	1
Morphine and atropine, 1/8–1/200	do	1
Morphine and atropine, 1/4–1/150	do	1
Nitroglycerine, 1/100	do	1
Strychnine sulph., 1/30	do	1

SURGICAL INSTRUMENTS AND APPLIANECS.

Case:		
Medical		1
Surgical		1
Forceps, hemostatic		1
Dressing container	set	1
Catheter, soft rubber	box	1
Inhaler, chlor. (with drop bot.)		1
Needles, suture, surgeon's	bottles	2
Shears, bandage		1
Sterilizer, electric		1
Syringe, hypodermic (complete)		1
Table, operating		1

SURGICAL DRESSINGS.

Bandages:		
Four-tailed		25
Flannel, 3-inch		25
Gauze, assorted	doz	24
Head		25
Many-tailed		30
Muslin, assorted		28
Scultetus		55
Shell-wound, 1-inch		438
Shell-wound, 2-inch		1,428
"T" (5 in package)	packages	6
Triangular		10
Compresses, gauze:		
4 by 4 (20 in package)		392
9 by 9 (25 in package)		2,375
9 by 9 (20 in package)		440
8 by 10 (4 in package)		88
Cotton, absorbent	rolls	18
Gauze:		
Plain, absorbent	do	24
Lap pads, 4 by 16		15
Lap pads, 12 by 12		20
Ligature, catgut:		
Plain, No. 1	tubes	9
Plain, No. 2	do	12
Chrom. No. 2	do	3

Ligature, silkworm gut, assorted	tubes	22
Packets, first-aid		106
Pins, assorted	papers	4
Pins, safety	doz	4
Plaster, adhesive	rolls	6
Pouch, Hospital Corps, small		2
Sewing outfit		1
Splint:		
Wire mesh for	yards	8
Basswood for	pieces	24
Wood, large	do	12
Tubing, rubber, drainage		12

DISPENSARY AND LABORATORY EQUIPMENT.

Brush, nail		4
Measure, graduated, 250 c. c		1
Medicine dropper		6
Pencil, hair		6

HOSPITAL AND NURSING APPLIANCES.

Bag, hot-water		2
Bag, ice		2
Basin, dressing agate		4
Basin, pus, agate		1
Bucket, agate		4
Close stool		1
Cup, sputum, paper	package	1
Gloves, operating	pairs	4
Irrigator, agate, with fittings		1
Irrigator, rubber, complete, FS type		2
Medicine glass		4
Mug, agate		4
Pad, operating rubber		1
Pitcher, agate		5
Razor		1
Razor strop		1
Thermometer, clinical		2
Tongue depressor, wood	package	1
Tumblers		4
Toilet paper	packages	2

BEDDING AND LINEN.

Blanket		6
Gown, operating		6
Pillowcase, gum		1
Sheet, cotton		24
Towel, hand		36

ADDITIONAL ARTICLES.

Binder boards	sets	4
Candles		12
Cargo lamps		2
Fracture pillows		7

Gun bags		50
Lamps, extra (Mazda)		5
Litters, Army type		4
Litters, Stoke's splint		5
Matches, safety	box	1
Oakum pads, 8 by 12		148
Sponges:		
Knit		46
Hand		124
Tags, white		88

Stock bottles, 1 gallon, unfilled, 8, labeled as follows:

Acid, boric.
Alcohol.
Chlorazene.
Distilled water.
Bichlorid of mercury.
Iodine.
Normal saline.
Tr. green soap.

CLERICAL BOX.

Cord	ball	1
Carbon paper		2
Battle station casualty report		50
Nomenclature		1
Envelopes, large		25
Erasers		3
Form "F"		50
Form "G"		25
Form "K2"		50
Form "N"		25
Ink, red and black	bottles	2
Medical history sheet		7
Pencils		2
Penholders		2

The clerical box is really a portable desk containing in suitable slots all the necessary medical department forms for use in the station. This enables one to have all the necessary papers prepared so that patients can be transferred from the dressing stations to a hospital ship should one appear after a battle.

133354—10——11

CLINICAL NOTES

FOUR CASES OF WOOD ALCOHOL POISONING FROM DRINKING BAY RUM.

By N. S. Betts, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

During the week of March 9–15, 1919, three fatal cases of poisoning from drinking bay rum were admitted to the sick bay of the Marine Barracks, League Island Navy Yard, Philadelphia, and a fourth case, which is now convalescent, was seen on April 7.

For many years bay rum has occasionally been used as an intoxicant by sailors and other classes of men who are unable to procure the ordinary strong alcoholic drinks. The present high cost of grain or ethyl alcohol has apparently resulted in the substitution of methyl alcohol by some manufacturers. Some of the bay rum drunk by the cases here reported was purchased within the League Island Navy Yard; other bottles were obtained from first-class drug stores in Philadelphia.

With one exception, none of the labels on bottles seen by the writer made any note of the alcoholic content, of any of the ingredients, or of the fact that the contents were poisonous if taken internally. This single exception specified that the bay rum contained 50 per cent "alcohol."

While it is scarcely conceivable that our experience at this post is an isolated instance and that no other bay rum poisonings have occurred throughout the country, though the writer understands that a number of such cases have occurred, he has so far failed to note any official or newspaper reports of similar fatalities, and hence feels that it is worth while to draw attention to the possibilities arising from the substitution of wood alcohol for grain alcohol in an article so universally purchasable as bay rum.

The prohibition of the sale of alcoholic drinks to enlisted men and the present high cost of distilled spirits would seem to make the danger from poisonous substitutes a very real one and worthy of widest publicity.

The general symptoms seen in our four cases were fairly typical of wood-alcohol poisoning, yet if this possibility should not be borne in mind and especially if the case is seen in late stages the cause of the symptoms will probably be overlooked unless the history reveals the etiology or attention is drawn to visual impairment. All of our cases had vomiting and epigastric distress, intense nervousness, soft,

rapid, but regular pulse, and, where the man was conscious, complaint of dimness of vision and pains in various parts of the body.

In the three fatal cases the end came very quickly after pronounced toxic symptoms developed. They all had histories of having been ill from 24 to 48 hours, chiefly with nausea and vomiting, but refused to go to the sick bay, probably from fear of punishment. When serious symptoms developed they applied for treatment, which was without avail, death occurring in from one-half to four hours. It may be only coincidental that the case which survived was seen within about 11 hours after drinking 3 pints of bay rum during an afternoon and evening.

Since these cases came under our observation the widest publicity has been given throughout the marine reservation to the fact that bay rum and other toilet waters may contain substances which are poisonous if taken internally, and a recent post order has prohibited the sale of all articles which contain alcohol.

It may be contended that the publicity given to the fact that bay rum contains alcohol and might be used as an intoxicating drink would do harm by drawing attention to a field of supply of which most men may have been ignorant. We are of the opinion, however, that a policy of publicity in a matter of such potential danger is the lesser of two evils until other and better deterrent measures may be taken.

Chemical analysis of one sample of bay rum was made by Mr. C. H. LaWall, a civilian chemist of Philadelphia, who reported that it contained 50 per cent of wood alcohol. Examination of other brands was not made on account of the involved cost. The single analysis was made gratuitously.

Following is a résumé of the four cases:

Case I.—F. P. McC., private, U. S. M. C., age 33, was brought to the sick bay at 9:30 p. m., March 9, 1919. His condition was as follows: Unconscious; slight muscular rigidity; skin cyanotic; stertorous breathing; pulse regular, rapid, and fairly strong; temperature, 94.8° (axillary); odor of breath normal; pupils dilated; no evidence of external violence.

External heat was applied and atropine sulphate 1/100 gr. given hypodermatically. While this was being done the pulse suddenly became almost imperceptible and one drachm of aromatic spirits of ammonia was given hypodermatically at 9.50 p. m., at which time death occurred. A catheter-drawn specimen of urine was negative for albumin.

The history which was obtained on this case is substantially as follows: On the day of his death the patient, having no duty, had laid all day in his bunk without taking food. He had vomited a

number of times and complained only of gastric distress. No mention was made of visual disturbance and no retinoscopic examination was made in the 20 minutes that he was alive in the sick bay. He had refused the advice of friends urging medical aid, saying that he expected to feel better shortly. Only when his condition appeared serious had medical attention been sought.

An autopsy performed March 11, 1919, which included an examination of the peritoneal cavity, exterior of oesophagus, stomach, and intestines, the liver, spleen, pancreas, kidneys, adrenals, lungs, heart, coronary arteries, and pericardium revealed no apparent cause for death.

This case, the first of our series, caused no suspicion of poisoning until later investigation revealed the probable cause of death.

At the meeting of the board of inquest witnesses testified to the apparent good habits of the deceased and to having never seen him take an alcoholic drink. He had not been on liberty for at least eight days.

We were puzzled as to the cause of death in this case. While in our care the only apparent symptoms were those of circulatory failure, and in the absence of other evidence the fatal outcome was attributed to angina pectoris, though the age and autopsy findings gave small warrant for such a diagnosis. His appearance was that of a man considerably older than his stated age. It was later found that he entered the service under an assumed name, so that his given age may also have been fictitious.

After this case had apparently been thoroughly investigated and the matter dropped as far as this office was concerned it was accidentally learned through one of the man's acquaintances that he had been known as a bay-rum drinker. In the light of subsequent observation and comparison with the known cases of wood-alcohol poisoning we have no hesitancy in grouping the above case with the others.

Case II.—W. W. B., private, U. S. M. C., age 36, reported at sick call, 8 a. m., March 12, 1919. While ascending the stairway he was partly overcome and had to be assisted to the third floor, where the sick bay is located. He complained of severe abdominal cramps, with vomiting, which had continued since the previous morning. After being put to bed the pain became so severe that he had to be restrained. While conscious and able to answer questions intelligently his mental condition was peculiar. He cried out continually, asking if this were the end of the world, begging some one to help him, or groaning and screaming at the top of his voice. The man was evidently suffering frightfully; the sweat literally poured from him and his expression indicated the most intense agony.

A cursory physical examination was negative, but acute pancreatitis was suspected. No detailed investigation was made, as he was

immediately transferred to the U. S. Naval Hospital, Philadelphia. While waiting for the ambulance a hypodermic of morphine and atropine was administered. When he reached the hospital he was unconscious and remained so until his death at 12.20 p. m. from "respiratory failure."

Examination of the eye grounds showed a papillitis, which was considered to have the appearance of chronicity. A spinal puncture was negative; the blood pressure a short time before death was normal and a blood culture was later reported as negative.

Autopsy showed nothing to account for death. The stomach contents were sent to Prof. Marshall, of the University of Pennsylvania, who tested for antimony, mercury, and lead with negative results.

When the clothing of this man was sent for on his transfer to the hospital an empty bottle of lemon extract was found in his locker.

Case III.—E. D. L., private, U. S. M. C., age 28. This man reported at sick call 8 a. m., March 15, 1919, complaining of abdominal pain and vomiting, with which he had been suffering all night. The pain was not extremely severe and the patient looked well, was quiet, perfectly rational, but very nervous. Except for a rapid, weak pulse a hurried physical examination was entirely negative. He told the writer that he had been drinking large quantities of bay rum and whisky for the last few days. A hypodermic of caffeine and atropine was administered, and he was immediately transferred to the U. S. Naval Hospital in this navy yard. He became unconscious shortly after admission and died in 1½ hours. Hypodermic stimulation and the use of the pulmotor were without avail.

At autopsy nothing notable was found, but the stomach contents smelled of bay rum. Chemical analysis of tissue from the brain, kidneys, and liver as well as the stomach contents gave positive tests for methyl alcohol.

Case IV.—C. M. S., private, U. S. M. C., age 36. The writer was called to the brig to see this patient at 9.15 a. m. April 7, 1919. He complained of pains all over his body, nervous tremors, and partial blindness. He had vomited several times. The military police in Philadelphia had arrested him as drunk at 10.40 p. m. the previous evening, and he was retained in a police station until 12.45 a. m., when he was transferred to this post. He stated that he began to have pain while in the police station, but it had become progressively more severe. Examination revealed nothing noteworthy except a soft, rapid pulse, slightly dilated pupils, and partial blindness. He was not able to distinguish one finger from two when they were held two feet from his eyes. When asked what he had been drinking he stated that he had had considerable whisky and 3 pints of bay rum during the previous afternoon and evening.

A hypodermic of caffeine and atropine was administered, and he was transferred to the U. S. Naval Hospital, League Island, Pa., at 9.45 a. m. At the hospital, to which the writer accompanied the patient, the pulse became distinctly better. Examination of the eye grounds was negative. Evidently the visual deficiency was due to retro-bulbar neuritis. Urinalysis was negative.

This case was treated like one of acidosis, i. e., by enteroclysis, and alkalies and diuretics by mouth. He continued to improve, and at the end of a week seemed perfectly well except for some visual impairment. On April 14 his vision was 20/30 for both eyes.

He told the writer that he had learned that a soldier with whom he had been drinking the bay rum had subsequently died in New York.

The following simple test for the detection of methyl alcohol was devised by Pharmacist R. W. King, U. S. N., of the laboratory of the U. S. Naval Hospital, League Island, and depends upon the oxidation of methyl alcohol with the production of formaldehyde and the detection of the latter substance in the material under examination.

To stomach contents or tissue extracts add 10 per cent NaCl solution to precipitate the albumin; then filter. In the case of bay rum it is advisable to decolorize the same by shaking with magnesium carbonate and filtering. The reagents must be tested for formaldehyde to eliminate false results, and the material under examination should be tested before oxidation as well as after oxidation.

Dilute a few cubic centimeters of bay rum with distilled water, add approximately 0.2 gm. of $KMnO_4$, and boil gently for about five minutes. During the boiling a funnel should be kept in the neck of the bottle to prevent evaporation of formaldehyde if any be present. More potassium permanganate must be added if the fluid in the flask is decolorized while boiling. After the boiling is completed decolorize the mixture with a few crystals of oxalic acid.

Put 5 c. c. of this mixture in a test tube and add 2 c. c. of milk, mixing thoroughly. Underlay this with the sulphuric acid reagent (100 c. c. of concentrated sulphuric acid plus 1 c. c. of Fehling's copper solution). If formaldehyde be present a violet ring will form at the line of contact.

ARSENIC POISONING FOLLOWING THE USE OF NOVARSENOBENZOL.

By C. M. Burchfiel, Lieutenant, Medical Corps, United States Navy.

The patient was admitted to the sick list April 24, complaining of a slight headache, a mild diarrhea, and nausea. He had vomited twice.

The history was negative except for syphilitic infection. Two months ago the patient developed a copper-colored macular rash, mucous patches in the mouth, and a general adenopathy. Blood Wassermann was 4 plus. He denied a primary sore, and entry in the health record stated that examination had failed to reveal the site of the initial infection. As antiluetic treatment he had received intravenous injections of the French preparation of novarsenobenzol and deep muscular injections of mercury succinimide. Intravenous injections had been given twice a week. The first dose given was .30 gram; the second, .60 gram; the third, .75 gram; and the fourth and following doses, .90 gram. In all the patient had received 10 injections of novarsenobenzol and six deep muscular injections of ⅗ grain each of mercury succinimide, but had received no treatment for the two weeks previous to April 24.

The patient stated that there had been no reaction following the treatment except for a slight rash and flushing of the skin a few hours after the fifth or sixth intravenous injection. Examination showed flushing of the skin and a macular rash over the body, most pronounced over extremities; puffiness of the eyelids and slight edema of the extremities; blood pressure, 105 systolic and 65 diastolic; urine analysis negative, except for a diminished 24-hour output. Treatment: To bed, elimination, alkalis.

April 26.—Edema more marked; both arms markedly swollen. Temperature, 101 F.; pulse, 110. Examination of urine and feces gave a positive qualitative reaction for arsenic. Urine analysis showed a trace of albumen and a few hyaline and granular casts. Twenty-four hour output, 1,400 c. c.

May 2.—Edema subsiding. Average daily urine output, 1,500 c. c. or better. Urine and feces still positive for arsenic. Skin, especially over arms, shows a marked eczema with serous exudation and crusting.

Patient also gives some symptoms of a mild peripheral neuritis, complaining of numbness, intense burning, tingling and shooting pains in extremities, especially of feet.

May 8.—There is extensive crusting and scaling of skin and small multiple abscesses over the body, especially over right arm. Abscesses incised and drained, smears and culture from pus showing organisms to be streptococci. Urine and feces negative for arsenic. Urine analysis showed a faint trace of albumen and occasionally a hyaline cast.

May 20.—Abscesses fewer in number; skin clearing; general condition improving.

June 10.—Patient convalescing. Repeated urine analysis shows an occasional hyaline cast and trace of albumen.

A DEATH FOLLOWING ARSEPHENAMINE.

By A. GOETSCH, Lieutenant, Medical Corps, United States Navy.

G. E. P., F., 3c., U. S. N., age 19, came to my attention on board the U. S. S. *Vixen* on December 13, 1918, after he had concealed his trouble. At this time he had a large ulceration, the size of a dime, with an indurated margin, on his foreskin. His body was covered with a maculo-papular rash and he had several mucous patches in his mouth. He stated that he had lost about 10 pounds in weight.

He was sent to the United States Naval Hospital, St. Thomas, Virgin Islands of the United States, where on the following day he was given 0.6 grams of arsphenamine (Arsenobenzol D. R. L.), there being no contraindications in the way of demonstrable kidney or special sense pathology. The result of this injection was very striking. His rash and mucous patches began to disappear as if by magic and there was marked systemic improvement. In two days there appeared a distinct Herxheimer phenomenon, which disappeared in 36 hours.

Encouraged by the favorable progress of the case, he was given a second injection of 0.6 grams one week after the first injection. This was followed on the evening of the same day by a rise of temperature to 102 F., but other untoward symptoms were absent and his case was not considered serious. The following day the patient showed mental confusion, and complained of headache and nausea. During the night he went into a stupor, which became progressively worse, and on the following morning he lapsed into coma. At 11 a. m. on the third day the patient went into convulsions, initiated by a cry such as sometimes precedes an epileptiform seizure. There was marked cyanosis, feeble pulse, and Cheyne-Stokes respiration. The muscles of the face began to twitch and violent convulsions of the body musculature, particularly the flexors and extensors of the upper extremities followed. Both knee jerks were hyperactive. The convulsions lasted about 10 minutes and were followed at intervals by several similar ones.

During the entire comatose state the patient's breath had the odor of wine. Catheterization after the first convulsion gave 250 c. c. of urine, which contained a heavy cloud of albumin and numerous red blood cells.

Lumbar puncture revealed a clear, limpid fluid under no increased pressure. Cytology was normal. Hemorrhagic encephalitis was therefore ruled out. Death followed a convulsion at 3 p. m.

Autopsy showed an extensive nephritis of the acute hemorrhagic type. The kidney parenchyma, particularly the cortex, was densely hemorrhagic and the capsule was swollen. There was subcapsular

infiltration in parts. Punctated hemorrhages were numerous throughout the kidney substance. The findings corresponded precisely to the "arsenic kidney" of some authors.

The other findings were quite negative. Even the gastroenteritis so frequently found in acute arsenical poisoning was absent.

Under certain conditions, as incomplete neutralization of the arsphenamine solution or the presence of toxic split-products such as amino-oxyphenol-arsenoxid, it is conceivable that the normal blood protein might unite chemically with these products, causing to all intents and purposes the formation of a foreign protein. As anaphylaxis is a qualitative rather than a quantitative phenomenon, even minimal amounts of altered (and therefore "foreign") protein might render the patient sensitive to a subsequent injection with resulting nitritoid or anaphylactic reaction.

Anaphylactic shock, however, could hardly have entered as a cause in this case, as death would then have occurred very shortly (probably a matter of minutes) after the second injection, with rapid, spasmodic breathing and complete arrest of breathing in inspiration with the heart in full dilatation. Such were not the observations in this case.

The "Wasserfehler" theory of the Germans can not be applied as care was taken to use double-distilled water, free, therefore, from bacterial and other proteins. Also, there was subsequent complete neutralization (litmus indicator).

It has been demonstrated that in the average individual, arsenic, when administered intravenously, may be eliminated completely in 24 hours and that the majority of cases are arsenic-free in 36 to 48 hours after injection.

It is well known that early syphilis may produce a distinct nephritis of the "vascular type" with or without laboratory findings in the urine. During life it is difficult to estimate to what extent syphilis may interfere with arsenic elimination from the kidneys, particularly in the absence of urinary findings. It is likely, therefore, that arsenical poisoning with production of nephritis may occur as an accumulative effect, in some instances following a second injection of an arsenical when there has been retention of arsenic following the initial injection. Wechselmann states that "insufficiency of the kidney and not hypersensitiveness of the brain is the point of the entire question of salvarsan fatalities."

The organic compounds of arsenic contain the metal in the nonionic form, and the effects differ materially from those of arsenic in the ionic form partly because the organic molecule acts as a whole and partly, perhaps, because the organic substances alter the selective action of the arsenic and hence prohibit its penetration in effective concentration. Briefly, it might be stated that the difference be-

tween organic arsenic and inorganic arsenic is quantitative rather than qualitative. Incidentally, it is difficult to estimate to what extent and how rapidly organic arsenic is changed into the vastly more toxic, ionized pentavalent and trivalent inorganic arsenicals under certain conditions of altered metabolism. Obviously, the extent of these changes cannot be determined quantitatively.

The cause of death in the case just reported was quite obviously acute hemorrhagic nephritis, due to acute arsenical poisoning.

HIGH TEMPERATURE IN A CASE OF INFLUENZA.

By P. W. Williams, Lieutenant (J. G.), Medical Corps, United States Naval Reserve Force.

The patient was admitted to the observation camp with a temperature of 103° and was immediately transferred to the isolation camp. He was given the routine treatment, which consisted of camphorated oil to the chest and a pneumonia jacket. Magnesium sulphate, fl. oz. 1½, and aspirin and sodium bicarbonate āā gr. X. His temperature continued to rise until 21 hours after admission, when it reached 108°, where it remained for 45 minutes. This was verified with two thermometers. The patient did not lose consciousness at any time. His temperature returned to normal in 72 hours after the maximum was reached. His mentality was somewhat hazy and sluggish for several days after his temperature became normal.

He later developed a mild degree of bronchitis, and this was followed by a right sided pleurisy, which yielded to treatment very rapidly. Patient was discharged from the hospital 26 days after onset. Urinalysis showed no albumin or sugar. Blood culture showed Gram-negative diplococci. Sputum analysis showed pneumococcus and micrococcus catarrhalis.

VOIDING OF A BULLET FROM THE BLADDER.

By F. H. Bowman, Lieutenant Commander, Medical Corps, United States Navy.

F. L., private, U. S. M. C., wounded at Soissons, July 18, 1918, was admitted to the U. S. Naval Hospital, New York, N. Y., on December 10, 1918. Two machine-gun bullets had entered the upper third of the anterior surface of the thigh about 2 inches apart. One of these fractured the femur and remained in the thigh, while the other traveled upward and lodged in the pelvis.

The fracture of the femur united in good position without any complications.

The bullet which entered the pelvis gave no symptoms until October (about three months later), when he first noticed a little pain

on urinating but only while standing. There was no discomfort whatever while voiding in a bed urinal. No blood appeared in the urine. He thought that he had "a little kidney trouble" and did not consider it of sufficient importance to be reported to a medical officer.

On the night of February 14, 1919, the patient returned to the hospital after 48 hours leave, during which time, as he stated, he passed no urine whatever, although he made several attempts. A few drops only would pass at a time accompanied by very severe pain. For the first time he noticed a little blood after each attempt at urination. Remembering that he experienced much less pain in the recumbent position and feeling the need of some relief, he took a bed urinal and lying down in his bed made several rather vigorous efforts to void. After a few efforts he experienced more pain than usual and a machine-gun bullet dropped out of the meatus into the urinal.

The case is interesting both from the unusual lack of symptoms and from the rather novel way in which the bullet made its exit.

DEPRESSED FRACTURE OF FRONTAL BONE INTO FRONTAL SINUS.

By A. W. Hoaglund, Lieutenant, Medical Corps, United States Navy.

Following an explosion on board the U. S. S. *Brooklyn*, the patient was admitted to the hospital in an unconscious condition, with an apparent laceration over right eye, fracture of the nasal bones, and concussion.

Enormous swelling at the time of admission completely concealed any depression, and careful palpation at the time likewise failed to disclose any fracture.

The patient remained unconscious for 10 days, during which time he could not be aroused, but occasionally responded by a slight twitch or turn when hard pressure was applied over the nerve trunks. Supraorbital pressure on the uninjured side elicited only an occasional twinge.

During this period the pulse remained good, respirations were slow but regular, and the patient was fed entirely by rectum, using milk, eggs, and whisky. Also this period was marked by extreme continuous restlessness, the patient tossing about in bed so as to require constant restraint and emitting short inspiratory grunts at irregular intervals. These sighing grunts increased in frequency until on the tenth day the patient commenced to respond slightly when called by name. Improvement gradually increased, and on the twelfth day, with persistent effort, the patient was enticed to take liquids by mouth. During these periods, however, it was necessary

800-1 Fracture of the frontal bone.

to continuously focus the patient's attention by repeated exhortations; otherwise he would quickly fall back into the same half stuporous condition. Reduction of swelling and laceration now permitted examination, which revealed a complete crushing of the right superciliary ridge from the internal nasal eminence to the external angular process. At the junction of the middle third with the inner third, approximately directly over the supraorbital notch or foramen, a depression fully one-half inch in depth had been produced. In view of this complete and full depression it is considered remarkable that no damage had been produced to the orbital plate nor any injury to the supraorbital artery, vein, or nerve.

The mental condition slowly but gradually improved. The patient responded slowly and at times with considerable delay, but always accurately and sensibly. This improvement continued until at time of discharge, 90 days following receipt of the injury, the patient returned to duty apparently normal.

Palpation revealed a firm solid mass with a few slightly irregular projections at the bottom of the depression, the entire area being absolutely painless and resistant to considerable pressure.

The accompanying illustration gives an accurate view of the condition. Unfortunately no X-ray has been available.

COLON PTOSIS.

By G. U. Pillmore, Lieutenant, Medical Corps, United States Navy.

The stomach is fixed firmly in position at the cardia, where it is suspended from the esophagus. There is another attachment near the cardia extending from the stomach to the diaphragm, the gastrophrenic ligament. The lesser curvature is suspended from the liver by the lesser omentum. Another fold of peritoneum serving as a stomach ligament extends over to the spleen. Thus the stomach is an organ suspended firmly, not by ligaments alone, but by the esophagus, an adjoining structure or continuation of the stomach itself. One perceives that the stomach must undergo an organic change before becoming fully prolapsed and that primary gastroptosis can not result to any considerable extent without dilatation.

The liver can be considered as the heaviest organ in the abdominal cavity. At first glance it is not easy to comprehend why it is not a primary factor in visceroptosis. Cunningham sets forth the following reasons in the description of the anatomical suspension: "The abdomen, a closed cavity, has a firm framework stretched across its upper surface, the diaphragm. Into the concavity of the diaphragm the liver fits perfectly. The two can not be separated without creating a vacuum. Atmospheric pressure alone is therefore sufficient to

retain it in place. In addition, the abdominal muscles maintain the intraabdominal pressure." The ligamentous attachments of the liver are numerous. The coronary, the falciform, the triangular, and the round ligaments are the chief ones. Also there is a rather firm areolar tissue attaching the back of the right lobe to the diaphragm. It is believed that intrathoracic conditions causing abnormal pressure have very little influence in permanently displacing this organ, as commonly supposed.

Turning now to the colon, one becomes impressed with the marked difference in firmness of fixture as compared to the stomach and liver just described. The usual description of the ascending colon is as follows: It begins at about the level of the intertubercular plane opposite the ileo-cecal orifice, where it is continuous with the cecum. From there it extends upward and somewhat posteriorly until it reaches the under surface of the liver, where it bends forward and to the left passing into the right flexure of the colon. Its posterior surface, which is free from peritoneum, is connected by areolar tissue to the quadratus lumborum muscle and finally to the inferior border region of the right kidney. The transverse colon leaving the region of the anterior surface of the kidney passes across the descending portion of the duodenum. To both kidney and duodenum it is attached by either a short mesentery or areolar tissue. Thereafter a fairly long mesentery attaches this transverse portion to the back part of the belly wall, the colon being thus suspended loosely in the abdominal cavity. At the left, or splenic flexure, suspension takes place under cover of the stomach at the inferior base region of the spleen.

An anatomical consideration of the three organs described shows the colon to possess the chief susceptibility to displacement.

The fixation of the second portion of the duodenum should receive consideration. It is found upon the posterior aspect of the belly wall behind the greater peritoneal sac and fixed firmly to adjoining solid structures. It is difficult to displace. A mild ptosis of the hepatic flexure and the beginning of the transverse colon, particularly the transverse colon which has a band of peritoneum extending up to the pylorus, will cause a displacement of the stomach in such a manner that difficulty may be experienced in the passage of food up and around the peculiarly fixed second portion of duodenum. As time progresses the stomach may assume dilatation and after dilatation ptosis and its symptoms of neurasthenia result.

It is a surprising thing in the examination of young men in the service to note how many have a ptosis of the colon with no other visceral changes or apparent relaxation of the abdominal wall. The condition is accompanied by obscure abdominal symptoms, among

which it is believed the nervous element plays an important rôle. The appendix and stomach seem to show the chief clinical symptoms.

The series of cases under discussion seem to emphasize the theory of Glenard, who first described enteroptosis as a clinical entity. He stated that the transverse colon in many instances was a primary factor in causing general visceroptosis. They show the colon in ptosis while the other organs are in normal position, and they stimulate the idea that colon ptosis in young adult life may be a primary factor in causing general visceroptosis in later life.

The appendix is particularly liable to infection because of the large amount of lymphoid tissue comprising its make-up. It is in a dependent position and always full of bacteria. The blood supply is poor and because of its shape it is easily kinked and constricted. This organ being easily susceptible to the various changes which take place in the head of the large bowel, and there are many, we find a factor which can bring about a low-grade irritation over a considerable length of time. This irritative reflex may cause an inhibitory function in the stomach to a marked degree. A chronic inhibitory irritation may in time cause an organic change to develop in the stomach in the form of dilatation. With the ever-increasing dilatation of the stomach from this or various other primary functional causes, the mechanical result to the colon is displacement downward as the stomach takes up more room. The stomach in some cases, it will be noticed, may in part occupy space lower than the transverse colon itself. Obscure changes of position result.

Just what part may chronic irritative appendicitis play in patent ileo-cecal valve? A vicious circle may be established in such a way as to have a considerable influence. Irritation in the appendix may cause inhibitory function in the stomach, and this in turn may reflexly cause cecal atony and stasis, and its pathologic possibilities, until finally the normal function of properly emptying the ileum into the cecum is inhibited. Other factors along with the primary appendical irritation, such as unbalanced dietaries, irregular eating, poor food, etc., aggravate the circle's persistence.

The mechanism of contrary innervation is known regarding the muscles involved in the process of emptying the urinary bladder. The sphincter relaxes while the main bladder muscle contracts. Very recent physiological and anatomic studies demonstrate the same action between the termination of the common bile duct and the gall bladder in emptying the bile into the duodenum. The poor efficiency of the large bowel for emptying itself in stasis may not be caused chiefly by devitalized musculature innervation resulting from absorption of toxins alone, but by contrary sympathetic innervation between stomach, small intestines, and the large colon primarily instigated by unbalanced dietaries, irregular eating, habitual incomplete evacuation, chronic irritative appendix, etc.

Reversed peristalsis in the large colon is an imposing factor in intestinal stasis and is commonly present. It may be caused by the preliminary stasis in the large bowel or be secondary to the above suggested upset innervation relationship. Gas formation predisposes to this phenomenon. Chronic habitual constipation is one of the main causes. Habitual retention of feces in the rectum is accomplished by the voluntary contraction of the sphincter ani in relationship with the innervation of the lower gut. A relaxation of the sphincter will stimulate contraction of the musculature of the lower bowel with resultant emptying of the bowel. Habitual retention of feces in this locality will predispose to reverse peristalsis in the whole of the colon to accommodate abnormal accumulations in the rectum.

Upon looking over a series of pictures taken one is impressed by the variation of peristalsis in the colon. In one case the peristaltic indentations are seen to be marked in the transverse colon with none or very little in the ascending or descending portions. In another instance the ascending colon shows very little peristaltic indentation, while throughout the rest of the entire colon there is marked peristalsis. One case shows the transverse and descending colon in marked peristalsis and practically emptied of barium with quite a considerable amount in the rectum, while the ascending portion is under very feeble peristaltic influence and filled up with the barium, all of which had been taken at one meal.

Again, in another individual the cecum is full and there is no barium in the ascending portion, while the transverse bowel, the descending bowel, the sigmoid, and rectum are full. This is because of reverse or antiperistalsis. A case shows a sort of arrhythmic peristalsis which places the colon in a tortuous position throughout its course. For example, a series of small indentations run along one side of the colon while on the other side there are deep indentations which do not correspond to the waves across the way.

The means by which the peristaltic movement normally makes its orderly forward progression is at present in dispute. The extrinsic nerves running to the colon may be severed, but the peristaltic movement will progress just the same. The theory that the impulse for peristalsis is conveyed directly from cell to cell in the circular muscular coat is to be discarded because we know that the wave of contraction is directly preceded by the wave of inhibition, and also because in the normal individual the waves go one way.

The movement is brought about somehow by the intrinsic nerves of the colon which are in direct communication with the local nerve ganglia having afferent and efferent connections. I believe that the contractions are brought about to a certain extent by the process of contrary innervation between colon, stomach, and intestines in some

way similar to the example set forth in the urinary bladder and lower bile tract mechanism referred to above. But there are several associated factors causing the contractions. Mechanical stimulation is an important one. When a bolus is placed in the intestine at any place, the result is a contraction of the intestine just above it. This is brought about by a reflex to the nearest ganglia from the intrinsic nerves of the particular part.

It seems easy to assume from the evidence in these cases that abnormal conditions in or near the colon, such as visceroptosis, marked increase of gas, chronic appendicitis, and intestinal putrefaction on the one hand, and unbalanced dietaries, irregular eating, and functional and organic disturbances in the rest of the gastro-intestinal tract on the other, do play at cross purposes with this afferent and efferent system of reflex innervation in the large colon to such an extent as to cause all sorts of abnormal conditions to exist to a serious degree in the large bowel. This results in a marked variation of symptoms.

The colon of the series which shows variable amounts of gas is clear enough to determine unsteady rhythmic movements in the areas inflated. This suggests the close physiological association of solid material in direct contact with the intestinal wall as a factor in peristaltic movements. If the normal functions in part can be easily promoted by such a simple primary mechanical stimulation as a semisolid existing mass, one can comprehend the influence intestinal putrefaction with absorption of toxines through the walls may have in creating an inhibition of this function.

Just how much of a rôle so-called intestinal [illegible]refaction plays in causing abnormal colon function, with its allied resultant condition, it is difficult to say. The organisms usually promoting the condition certainly have an elective localization in the large intestine, but beyond question there is an elective elimination of a great deal of their pathogenicity in sufficient amount to normally offset the evil of putrefaction to a great extent. The varying ability of different individuals to perform proper elective elimination against abnormal organisms in the large bowel is the great factor in maintaining the proper nervous mechanism in control of the colon. With a deficiency of this eliminative function against the virulence of intestinal flora, local changes of the normal musculature innervation will affect the progressive peristaltic movement of the large bowel and increase the reproduction of the organisms, resulting in the systemic effects of intestinal autointoxication.

From recent studies of the duodenum Rhefuss has shown that the liver plays an important part in the elimination of the pathogenicity of the organisms in the intestinal tract. He is able to pass

his tube into the duodenum and study the elimination of the liver especially from this standpoint. He is treating biliary affections successfully by using autogenous vaccines from organisms collected directly from the duodenum and has demonstrated that the vaccines made from these organisms taken from that locality give results, whereas the same organisms taken from other regions will not

Focal infections also play a part in the disturbance of the nervous mechanism. Many bacteria from these infectious foci obtaining access to the blood stream are eliminated from there directly into the gastrointestinal tract, the stomach being no exception. Remaining in the colon for a time, they reproduce in virulent form and undergo reabsorption. They are then whirled through the great clearing house, the liver, which may in time be overwhelmed to such an extent as to again place the organism into the gastrointestinal tract still in virulent form without its having undergone the destructive influences against its pathogenicity.

IDEAL TONSIL OPERATION.

By A. H. Robnett, Lieutenant Commander, Medical Corps, United States Navy.

There are many different and successful operations for the removal of the tonsil. However, after more than eight years of following the specialty of eye, ear, nose, and throat, the operation that appears to me to be the most perfect in results is that done with the Miller-Beck-Sluder tonsillotome. This is not a new instrument, for I have known of it for some time but only recently began to employ it. The enucleation of tonsils with this instrument leaves a smooth tonsillar fossa, covered with a thin layer of areolar tissue. There is practically no traumatism to either the anterior or posterior pillar and almost no hemorrhage.

It is a very complete instrument in itself and the technique of operating it can be readily acquired if one has a working knowledge of the throat. During the past three months I have used it in the removal of tonsils in 50 cases, although the instrument and technique were entirely new to me. About 65 per cent of these cases were very satisfactorily enucleated with this instrument alone. Those which I failed to remove with this instrument alone called for the aid of other instruments. I blame my failures on my technique, which is improving with each operation and feel sure will eventually arrive nearer a 100 per cent mark of satisfactory removals.

I will not attempt to describe the technique as it can be found in late books on this subject.

For the last two years I have made a routine practice of removing the tonsils of all cases reporting to the sick bay with tonsillitis, in-

cluding cases of quinsy. In not a case have I had the slightest unsatisfactory result, hemorrhage, infection, or otherwise, the patient being returned to duty in three to five days, while the ordinary case of tonsillitis runs its course in four to seven days. This covers a series of over 150 cases. I strongly advocate the prompt removal of inflamed tonsils. However, this should be done by a specialist or one who is familiar with the tonsil operation, otherwise a great deal of damage may result to the anterior and posterior pillars, followed by cicatraces, which cause interference with the speaking and singing voice as well as a bad hemorrhage, which may cause death.

I have just come across an enlisted man (Chief Yeoman J. J. D., U. S. N. R. F.), who during his time in the service has spent 7 per cent of his enlistment on the sick list with tonsillitis, acute follicular. If the tonsils had been removed the first time he appeared at sick call, he would have been much improved in health, and the Government would have received the full service for which it was paying.

There is another very satisfactory operation originated by Dr. A. Braun, of New York, which is similar in technique, involving the use of the old Sluder instrument used for seizing and crushing the tonsil, combined with an additional snare instrument for completing the enucleation. As performed by Dr. Braun, it is a beautiful operation, but the multiplicity of instruments is against its adoption. I have the instruments and though I have been shown by Dr. Braun the technique of using them, have not had the success which has attended the use of the Miller-Beck-Sluder instrument.

Emetine hydrochloride, grain $\frac{1}{3}$, given hypodermically preceding the operation for tonsillectomy, is being used by several prominent men to aid in the control of hemorrhage. I have used it in a few cases recently, but as I rarely get any hemorrhage I can not vouch for its efficiency.

The purpose of this note is to call the attention of those interested in the tonsil operation to this most excellent instrument and operation.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Captain J. C. PRYOR, Medical Corps, United States Navy.
Captain J. S. TAYLOR, Medical Corps, United States Navy.
Commander G. B. TRIBLE, Medical Corps, United States Navy.
Lieutenant Commander E. W. BROWN, Medical Corps, United States Navy.

GENERAL MEDICINE.

MCCASKEY, G. W. **Bacillus botulinus poisoning.** Am. Jour. Med. Sc., July, 1919.

Local outbreaks of food poisoning have frequently been reported in which the causative agent appeared to be the *B. botulinus* identified and isolated by Van Ermengem in 1895.

The strictly anaërobic character of this organism probably explains certain anomalies in the outbreaks. For example, a number of people partake of the contents of a can of ham and are very differently affected; some not at all. The author suggests that portions of the preserved material below the top layer might be intensely toxic while the supernatant portion was innocuous.

The original conception of meal poisoning and still more that of a sausage poisoning are deceptive. The organism is oftenest associated with canned vegetable foods.

The various outbreaks of disease in cattle called staggers, cornstalk disease, forage poison, etc., have been studied by R. Graham, of the University of Illinois, who isolated an organism corresponding very completely with the *B. botulinus* and having identical morphological and cultural characteristics. The pathological conditions in animals killed by this organism are identical with those found in animals killed by known *B. botulinus* intoxication. There are other forms of food poisoning, but the symptoms caused by *B. botulinus* are clinically characteristic.

At noon on February 22, 1918, some 10 or 11 persons partook together of a meal consisting of beef and several vegetables, among the latter being mangoes and canned beans. Seven cases of botulism followed, with four deaths.

Case I, a boy of 13, developed symptoms the day after the meal. He had headache, vertigo, and vomiting. On February 25 there was a temperature of 99.5 F. On February 26 there was dysphagia, gastric pain, and change in timbre of voice. He died February 28.

Case II, a woman of 37, was taken ill on February 23 and died March 2. Nausea developed six hours after the meal, and later there was abdominal pain and vomiting. On February 24 vomiting increased and there was stiffness of the tongue. Then came ptosis, aphonia and aphagia (not marked), slight drowsiness, fullness of the head, headache. By February 28 aphagia and aphonia were complete; constipation, temperature normal or subnormal, transient diplopia, pulse variable, loss of pupillary reaction, fundus normal, mydriasis.

Case III, a man aged 41, was taken sick on the evening of February 22 and died February 26. The symptoms noted were epigastric pain, vomiting, and diarrhea, followed by stupor and later paralysis of palate and faucial pillars, slight ptosis, slight mydriasis, aphagia, aphonia, constipation. On the last day mydriasis was complete. There was no pain or distress; patient felt sleepy; slight icteric hue noticed; fundus negative; mind clear; respiratory embarrassment.

Case IV, a girl of 19, had vomiting, constipation, difficulty in swallowing on the day after the meal. Later there was partial paralysis of the tongue and ptosis. On February 24 she felt well enough to wait on the table. On the 25th there was aphonia, aphagia, diplopia, vertigo, and drowsiness. Later came respiratory distress, complete mydriasis, precordial pain; mind clear throughout; death February 28.

Case V, a married woman, developed vomiting, dysphagia, dysphonia, mydriasis, and diplopia within 24 hours. Symptoms increased in severity; prostration marked; ptosis; accumulation of mucus in throat; recovery complete March 26.

Case VI, a woman of 43, had vomiting, numbness, dysphagia, slight ptosis, and mydriasis and diplopia. Recovery.

Case VII, a male, had left vocal cord paralysis, no constipation, regurgitation of fluids through nose, drooping eyelids, diplopia. Recovery.

Reviewing his own cases and those of the literature, McCaskey gives the order of symptoms thus: Nausea, vomiting, and prostration mark the first 36 hours, developing early in severe intoxications. Next come disturbances of deglutition and phonation. Later developments comprise diplopia, amblyopia, ptosis, and mydriasis. Mydriasis is often an early symptom, ptosis a persistent one. With the ptosis is often associated a motor weakness of the seventh nerve, causing immobility of facial muscles. In some fatal cases cardiac weakness leads to syncopal attacks and inability to sit up, in spite of the absence of any debility of the general muscular apparatus. Patients without involvement of the cardiac nerve have no debility and sometimes sit up almost to the moment of death. Intestinal

paralysis is a striking feature. Active borborygmus may be the first indication of commencing recovery.

Under the heading of treatment, McCaskey advocates prompt and lively catharsis and, as fatty substances appear to combine with and attenuate the toxin, a cathartic oil is distinctly indicated.

The evidence regarding the efficacy of specific treatment is conflicting. Owing to the difficulty and delay incident to obtaining the antitoxin in the outbreak described, three of the patients had died before it became available and the fourth fatal case was moribund. Of the three survivors two were treated with antitoxin, the other declining it.

Case VI, after an anaphylactic test, received, on March 2, 5 c. c. of the antitoxin and at intervals of some hours received in addition two 5 c. c. doses and one 8.5 c. c. dose. On March 3 two doses of 10 c. c. each were given and likewise on March 4. On March 5 three doses and on March 6 one dose were administered. There appeared to be very prompt amelioration of symptoms 48 hours after specific treatment began.

Case V was apparently doomed to die when the antitoxin was given. Aphagia, ptosis, mydriasis, diplopia were extreme; the pupils did not react to light. Phonation was altered and almost impossible. Constipation was complete and the prostration very marked. Saliva ran continuously from the mouth. After an anaphylactic test, the antitoxin was given and the reaction was alarming, but in 72 hours improvement was very striking.

The author considers the use of antitoxin fully justified and suggests the wisdom of some provision for making it readily available when required. (J. S. T.)

SURGERY.

DEAVER, J. B. **Pathological possibilities of neglected gallstone disease.** Am. Jour. Med. Sc., June, 1919.

The author holds that neglect of prompt and radical treatment for gall-bladder disease is comparable to disregarding the appendix when symptoms of disorder in that organ appear.

The specific varieties of gallstone disease that give rise to serious complications and sequelæ are: Cholecystitis, stone in the common duct; cholangitis and the direct results of neglected gallstone disease, pancreatic lymphangitis, chronic pancreatitis, and carcinoma of gall-bladder.

The chief factor in the lamentable series of disabilities under consideration is cholecystic inflammation leading to general adhesions in the vicinity and to infection of liver and pancreas, more particu-

larly the dense peritoneal adhesions around pylorus and duodenum, the strong bands that bind the parts mentioned and the hepatic flexure of the colon, the great omentum and even the tip of the appendix to gall-bladder obscuring the identity of these parts. To break up these adhesions is often impossible without jeopardizing the integrity of the various organs involved and incurring serious risk of cystic, gastric, and duodenal fistulæ. Deaver has not met with the so-called embryonic bands, veils, and sheets of peritoneum in this locality often referred to in connection with intestinal stasis, and believes that they are the result of pathological processes. It can not be stated positively that such bands are always the result of cystic inflammation until the peritoneal sheet is lifted, which is often a dangerous proceeding, and this is a strong argument for early intervention in cholecystitis. It must be accepted that gall-bladder disease is a surgical condition only when it has gone on to the stage of gallstone production.

Cholecystitis is one of the commonest causes of upper abdomen infections and of chronic indigestion, and is wrongly considered an affection of middle life simply because it escapes recognition at earlier periods. A gall-bladder once infected rarely returns to normal even after a supposed cure, and loss of function is apt to be the end result either from the necessitated cholecystectomy or from the conversion of the organ into an atrophic mass.

Ordinary operations on the biliary passages are comparatively simple for the experienced surgeon but not so when changes have been going on for a long time. In the earlier stages gallstones may float out with the bile, but later on, when dislodged by a contracting gall-bladder, they may lodge in the cystic, common, or hepatic duct damming up the bile and inducing changes in gall-bladder, liver, and intestines and even forcing an opening into the duodenum. Dense adhesions now bind the various viscera together and obscure all landmarks.

Stones in the common duct are not very serious if operated on early, but the impaction of the duct is the reverse and usually involves the hepatic duct too. Cholecystitis when neglected leads to cholangitis with reduction of and gastic and duodenal mobility. Neglect of stones in the common duct leads to general rather than local disorder through interference with lymphatics and hepatic ducts and the functions of pancreas and intestine. Stones in the cystic duct are less serious but act as irritants and favor infection.

Neglected gallstones have a direct and most pernicious effect on the pancreas, being among the commonest causes of lymphangitis of that organ. Much of the upper abdominal distress for relief of which the appendix or gall-bladder is removed is due to disturbance of the pancreas. When there is enlargement of the glands intimately

related to the pancreas as well as of those along the cystic and common ducts, Deaver does not content himself with a mere removal of the gall-bladder, but combines with this an anastomotic operation.

The paper closes with a clinical case illustrative of the author's belief that chronic calculous cystitis favors malignant degeneration. (J. S. T.)

HYGIENE AND SANITATION.

SMITH, A. H. **Historical inquiry into the efficacy of lime juice for the prevention and cure of scurvy.** Jour. Roy. Army Med. Corps, London. Vol. 32, Nos. 2 and 3 (February and March, 1919).

In this very interesting article the author brings out information, supported by experimental evidence and historical data, that appears to justify the use of lemon juice as an antiscorbutic. The prevalence of scurvy in the merchant marines and navies of the world led Great Britain to adopt the so-called "lime-juice" ration for prevention of scurvy in the latter years of the eighteenth century. The value of this agent was so great that in the merchant shipping act of 1844 a ration of "lime" juice (so-called) was made compulsory for the merchant service, and in 1867 the ration was even doubled. Until about 1875 the so-called "lime juice" was that of the lemon (*Citrus medica Limonum*) obtained from the Mediterranean region but particularly from Malta. The "lime" (lemon) juice was prepared in two ways; (*a*) By adding one-tenth brandy; (*b*) by simply boiling the fruit juice. In each case the juice was preserved in bottles under a layer of olive oil about one-half inch thick. It appears that so long as this (lemon) "lime" juice was used liberally scurvy was held in abeyance.

In 1845 the governor of Bermuda suggested the use of the West Indian lime juice, and this sour lime (*Citrus medica acida*) was cultivated for the purpose of supplying lime juice to the British Navy. By 1875 the contracts of the British Admiralty had been transferred so that the lime juice supplied to the British Navy thenceforward was in reality lime juice and not lemon juice.

Following the general adoption of the West Indian lime juice occasional cases of scurvy appeared, despite the fact that the enlisted men were compelled to swallow a daily ration of lime juice in the presence of an officer.

The failure of the immunity from scurvy previously enjoyed (during the use of lemon juice commonly called "lime" juice) led the Lister Institute recently to make a careful study of the antiscorbutic values of the several vegetables and fruits. Of these, oranges and lemons were found to be the most potent in their antiscorbutic qualities, while the West Indian lime was found to possess only one-fourth the value of oranges and lemons, and it was further found that the

method of preparation of the West Indian lime juice appeared to destroy even the small proportion of antiscorbutic property originally possessed by the fruit.

The author calls attention to the fact that steam has shortened voyages, has increased opportunity for replenishment of fresh food supply, and the consequent almost complete disappearance of scurvy is erroneously attributed to the faithfully used lime juice. Since there had been little opportunity to lean upon this weak staff its weakness had not been made apparent. The author, however, feels that polar exploration has given the needed opportunity to demonstrate experimentally "the worthlessness of the lime juice of the present day and the undeniable value of the juice used at the end of the eighteenth century." The following two instances are cited in support of the author's contention, namely, that of the (*a*) *Investigator*, which left England in 1850 in search of members of the Franklin expedition. The first case of scurvy among her crew developed "27 months after she left England and seven months after her principal rations had had to be reduced by two-thirds. It will be noted that she was supplied with lime juice"; and (*b*) that of the *Alert* and the *Discovery*, which sailed from England on the Franklin search in 1875, and within 11 months scurvy had generally developed among their crews. These ships were supplied with juice of the West Indian lime (*Citrus medica acida*), but it was prepared in the same manner and issued in the same quantities as the lemon juice (*Citrus medica limonum*) with which the *Investigator* had been supplied. The author states "their diet shows no important variation except in favor of the later ships (*Alert* and *Discovery*)."

The author quotes the history of several other polar expeditions in which "lemon" (lime) juice was used with little or no scurvy, and then compares these with other expeditions in which West Indian lime juice was used. Among the latter is quoted the Second Grinnell Expedition under Dr. Kane, U. S. Navy, 1853–1855, in which West Indian lime juice was used, and all, including Dr. Kane himself, were affected with scurvy, he being one of the worst cases. During the second winter his health was good, and he attributes this "to his having been the only man on board who would eat the rats with which the ship was infested."

The history of this expedition indicated the value of the vitamines in maintenance of health. Stefansson, Arctic explorer, has spoken to the reviewer in highest terms of the antiscorbutic value of fresh meats.

The author concludes that history and scientific experimentation both justify the wisdom of administering lemon juice or orange juice where a sufficiently varied diet of fresh meat and fresh vegetables is not obtainable, and that lime juice, i. e., the juice of *Citrus*

medica acida of the West Indies, is unworthy of the confidence which has been reposed in it. The juice of the fresh, ripe lime was discovered to be markedly inferior to that of the lemon and preserved lime juice as issued to the services (British) was found to be useless for the prevention of scurvy by the method employed.

(J. C. P.)

SHAW, T. B. **The ship's water supply.** Jour. Roy. Naval Med. Service, January, 1919, and April, 1919.

In time of war conservation of fuel in the naval service may necessitate the use of water from sources other than the ship's distilling plant. During the European War the British Navy was compelled to use much water from shore stations and some of the experience gained has been given to us by Surgeon Commander Shaw, R. N., in this interesting article.

After a general description of the kinds and sources of water used on board and of the condensers and evaporators used on a first-class battleship in the British Navy, the writer concludes that the per capita allowance of fresh water should be at least 10 gallons per day with several additional in the Tropics.

Concerning the transport of water from shore he states that the hoses used for filling the water boats should be kept on the water boats and not on shore for the reason that they may be kept cleaner when not in use. Whether the hoses are of canvas, rubber, or leather they should be triced up to drain after use, and when dry their ends should be coupled together to prevent entrance of dust and dirt. When the hoses are about to be used they should be thoroughly washed out by rejecting the first water which passes through them. The author states that leather hoses are the most durable but are expensive, heavy, and difficult to keep in good condition. He warns against the practice of keeping them in a tub of water to soften them because dirt accumulated on the outside of the hose is transferred to the inside through the agency of the water. He also recommends distinctive markings for hoses used for the conduct of drinking water in order to prevent their indiscriminate use for salt water, feed water, and drinking water.

With reference to the tanks he divides water boats into two classes, namely, (*a*) those in which the tanks are complete in themselves and are not formed by the sides of the water boat, and (*b*) those in which the sides of the water boat form the actual sides of the tank. The latter type is undesirable in that as result of stress of weather "strain or injury to the hull may result in the leakage into the tanks of sea water which is dangerously polluted." As water boats are frequently going alongside ships or tugs bumps are apt to occur in which plates may be dented and leaks may result, consequently water

tanks should be complete in themselves and the hull of the ship should not enter into the composition of their sides.

In discussing the cleaning of the tanks he points out that A. M. O. 129, 1916, includes the following important regulations:

> In the case of large water boats each tank should be cleaned out at least once every six months, and in small vessels at least every three months. To insure that tanks used for drinking water are adequately cleaned and in order to prevent infection the following instructions are to be observed: (1) The work of cleaning, of disinfecting, and of cement washing the tanks is to be carried out to the satisfaction of a naval medical inspecting officer detailed for water duties; (2) the clothing, including footwear of the men who actually enter the tank, is to be previously disinfected; (3) the work is to be done by suitable ratings, wherever possible rather than by contractors' men; (4) too frequent cleaning is to be avoided, and the question as to whether cleaning has become necessary should be referred for decision to the medical officer, who should examine the tanks periodically when they are empty.

Before entering the tanks the men should be carefully examined physically. Those who have a history of typhoid fever, dysentery, diarrhea, venereal diseases, and those who have septic mouths, otorrhea, pronounced nasal discharges, abscesses, or other commnuicable diseases should be excluded. Men passed for duty in the tanks should be required to take a bath immediately before entering the tanks and to wear canvas suits or overalls which are kept for this use only and sterilized by steam before each use. Rubber boots should be worn and these should also be sterilized immediately before entering the tanks. This may be accomplished in the ship's sterilizer or may be done by having two basins of water, one containing a 1 per cent chloride of lime solution for the washing of the boots, especially the soles, and the second for rinsing off the disinfecting solution. Disinfectants containing chlorine are best for this purpose.

Where a sounding rod is used it should be kept free from dirt and should be sterilized before introduction into the tank.

Raised manholes, at least 4 inches high, are recommended and flush manholes are condemned.

The air vent of the tanks should be gooseneck shaped, screened again insects, and should lead always into the open air, not into poorly ventilated spaces.

It is important that the drinking-water pump be used solely for the purpose for which it is intended in order to avoid pollution of drinking water.

Too frequent cleaning of storage tanks should be avoided as it offers opportunity for pollution. The author lays much stress upon the employment of the ship's own complement for this work, rather than contract labor, as it is difficult to take the necessary precautions without the cooperation of those who are interested in the results. He states that he has seen "several cases where tank pollution was directly due to this employment of shore labor."

The author mentions our standard Navy scuttlebutt, which he erroneously states was devised by Surgeon "Bates." It is assumed that he refers to the sanitary scuttlebutt devised by then Surgeon Gates, U. S. Navy. Concerning it the author states "such devices as the above would, however, appear unnecessary and the custom in our ships of obtaining a drink from the issuing tank by means of a bowl or a cup from one's mess is satisfactory."

An Admiralty order directs that all drinking water received on board His Majesty's ships is to be chlorinated as it passes into the ship's storage tanks. This is done by adding 30 grains of chloride of lime to each hundred gallons of water while the tanks are being filled. The powder is dissolved preferably with distilled water or boiled water, and this solution is allowed to flow slowly into the tank. When dissolving the powder it is better to add just sufficient water to make a thin paste, after which water can be added as may be required.

He recommends the potassium iodide and starch test as a guide to the efficiency of the chloride of lime. He says that Houston "when carrying out experiments prior to the chlorination of part of the London water supply showed that the blue test is not always satisfactory." In a series of samples of which after treatment with chloride of lime, 75.8 per cent were sterile he found that all but one gave the blue coloration. The sample in which the test was negative was not sterilized.

Halazone tablets are recommended to naval medical officers in charge of landing parties.

While we may not agree with the author on every point, this article is well worthy of the attention of naval medical officers as it appears to have been written after considerable experience with the working conditions of water transport and the care of water from the time of its delivery on board ship to its issue for consumption. (J. C. P.)

PATHOLOGY, BACTERIOLOGY AND ANIMAL PARASITOLOGY.

ROSE, F. G. **Vaccine treatment of filarial lymphangitis in British Guiana.** Jour. Trop. Med., May 1, 1919.

The writer having confirmed the observation of Wise (Report Trop. Dis. Research Fund, 1907) regarding the presence of streptococci in cases of lymphadenitis and lymphangitis has experimented with a vaccine prepared from streptococci isolated from these cases. In his preliminary report he recommends an initial dose of 100,000,000 dead cocci and two other injections a fortnight apart of 200,000,000 cocci each. The reactions are mild and in old cases the dosage may be doubled.

The author gives result in 60 cases treated by this method. Of these, 19 were of a year to more than three years' duration, the other 41 cases recent. More than six months have intervened between inoculation and the report of results. Of the 19 old cases, 9 have had no recurrence and 10 report a distinct modification in severity of symptoms. Of the 41 recent cases, 30 received their inoculations a year ago and have had no recurrence. The remaining 11 are reported on as follows: 3 cases can not be traced, 2 went a year without symptoms, 6 were inoculated six months ago and have had no symptoms to date. (J. S. T.)

SCHWARTZ, B. **Blood destroying substance in Ascaris lumbricoides.** Jour. Agricult. Research, Vol. XVI, No. 9.

Experiments with body fluids and extracts of various species of Ascaris support the view that parasitic worms secrete toxic substances absorbed by the host and responsible for some of the symptoms presented.

Anemia both in horses and man has been frequently ascribed to Ascaris; even pernicious anemia in children has been reported. Various investigators have reported hemolytic properties in the secretions of this parasite.

The author has studied extensively the question of absorption of toxic products by animals harboring Ascarids using the *A. lumbricoides* of swine which are easily obtainable. He reports that the body fluid of *A. lumbricoides* taken from worms recently removed from the host is not hemolytic to the washed red cells of cattle, swine, sheep, rabbits, guinea pigs, and rats, but the fluid from worms removed from their host and kept alive in salt solution for a few days acquired hemolytic properties. After worms are kept *in vitro* 24 hours the fluid is but slightly hemolytic, but this property increases markedly in six to eight days. The hemolytic property is not destroyed by boiling the fluid. The fluid seems to vary in hemolytic power inversely as the presence in it of oxyhemoglobin. Extracts of the worms in salt solution are hemolytic regardless of the acid or alkaline reaction of the solution. Extracts of dried worms are hemolytic to red cells of various animals. Laked blood and blood serum additions destroy the hemolytic action. Excretions of the worms absorbed by salt solution when they are kept *in vitro* are not hemolytic.

The author suggests that as the excretions of worms kept *in vitro* do not show hemolytic principles the hemotoxic substance of Ascaris may be in the nature of an endotoxine. The death of the worm and disintegration in the intestine of the host may liberate toxic substances before the dead worm is eliminated.

The presence of oxyhemoglobin in the worms, a substance constantly excreted by them *in vitro* and therefore presumably con-

stantly renewed confirms the view, based on their chitinous and denticulated lips, that they are blood suckers. It is a noteworthy fact that coincidently with the disappearance of oxyhemoglobin from the worms *in vitro* they become sluggish. When this substance has been completely eliminated their existence is very brief. (J. S. T.)

CHEMISTRY AND PHARMACY.

MORRIS, J. L. **New titration method for the determination of uric acid in urine.** Jour. Biol. Chem., 37, 1919, No. 2.

A volumetric method for the determination of small amounts of uric acid in urine is described which is based upon the precipitation of uric acid as the zinc salt and a single direct titration with permanganate in a solution made alkaline with sodium bicarbonate. The end point used is the blue starch iodid color. The procedure, which requires from 30 to 40 minutes for the complete determination, is said to be entirely satisfactory for urine and to give with the usual blood filtrate obtained by precipitation of the proteins with dilute acetic acid results agreeing with those obtained with the colorimetric method. (E. W. B.)

HASKINS, H. D. **Modifications of Benedict's and Folin's quantitative sugar methods.** Jour. Biol. Chem., 37, 1919, No. 2.

The author has substituted sodium thiocyanate for potassium thiocyanate in the Benedict method (E. S. R., 25, p. 15) for determining sugar in urine and in Folin's modification of this method (E. S. R., 38, p. 614). Benedict's solution prepared with the substitution of equivalent amounts of sodium thiocyanate for the potassium salt proved to be a perfect substitute, but in the preparation of Folin's mixture it was found that correct titrations could be obtained only by reducing somewhat the amount of sodium thiocyanate and using periods of boiling half as long as those originally recommended. (E. W. B.)

BENEDICT, F. G., and CARPENTER, T. M. **Food ingestion and energy transformations with special reference to the stimulating effect of nutrients.** Carnegie Inst. Washington Pub. 261, 1918.

This publication includes an historical summary of the evidence with human subjects which has thus far accumulated to show that there is an increase of heat production following food, and the results of an extensive series of observations made under the auspices of the Carnegie Institution of Washington during a period of 10 years on the quantitative relations between the energy intake and character of the ingesta and the quantitative increase in the metabolism of man following the ingestion of various diets. Determina-

tions were made in respiration calorimeters and with the Universal and the Tissot respiration apparatus. The investigations include determinations of basal metabolism during 24-hour, 8-hour, and short periods, metabolism during chewing, and metabolism following ingestion of water, coffee, beef tea, carbohydrates, fats, diets predominating in proteins, and mixed diets. From the analytical data presented the following general conclusions are drawn:

The mechanical work of chewing produces a definite increase in metabolism. The drinking of liquids, especially in large amounts, increases to a slight extent the metabolism. Ingestion of all kinds of food in any amount results in an increment in the metabolism. Protein produces a more marked and extended effect on metabolism than does any other nutrient. All carbohydrates differ but little in their effect on total metabolism, although levulose and sucrose appear to exert a somewhat more powerful influence than the other sugars. Experiments with mixed diets showed that it is possible by the ingestion of a large meal to stimulate the metabolism to 40 per cent above the basal value for a number of hours and to 20 per cent for at least eight hours.

A comparison of the fuel value of the diet with the subsequent increase in heat production showed the average "cost of digestion" for the ingestion of pure carbohydrates or a predominatingly carbohydrate meal to be about 6 per cent of the fuel value of the food ingested, of fat approximately 2 per cent, of a protein-rich diet about 12 per cent, and of a mixed diet about 6 per cent. The authors assert, however, that "the excess heat produced from the ingestion of protein or carbohydrates like sugars may not properly be considered as purely a waste process, but that it is far more logical to consider it as a general stimulation of all the cells in preparation for the drafts of muscular activity." The results are considered to give no basis for recommending an exclusively protein diet or an exclusively sugar diet prior to muscular work, but to show the value of large diets of either protein, carbohydrate, or mixed nutrients in replenishing the glycogen depots and stimulating the whole body to cellular activity.

Practical suggestions as to the methods to be employed for an ideal study of the effect upon basal metabolism of ingestion of food and drugs are appended. (E. W. B.)

Osborne, T. B., and Mendel, L. B. **Nutritive factors in animal tissues.** Jour. Biol. Chem. No. 1, 1918.

In continuation of the investigations previously noted (E. S. R., 39, p. 665), other animal substances were examined with particular reference to the adequacy of the protein and the presence of vitamin. The following results are reported:

Dried pig's heart was found to contain adequate protein, water-soluble vitamin, and in some cases fat-soluble vitamin. Kidney tissue sufficed as the sole source of protein and both fat and water soluble vitamin. Brain tissue served as the sole source of protein and water soluble vitamin. The oil extracted from pig's liver was found to resemble cod liver oil in containing fat-soluble vitamin. When pig's liver was used as the sole source of water soluble vitamin in an otherwise adequate diet it was found that if the diet contained 10 per cent of the liver tissue growth always ensued, which was not the case when the proportion was reduced to 5 per cent.

The experiments also demonstrate that the vitamins are not destroyed by heat, as all the preparations were heated to about 90 C. for several hours in the process of drying. (E. W. B.)

EYE, EAR, NOSE AND THROAT.

McIlroy, J. H. **Methylene blue in purulent discharge from the eye socket.** Brit. Med. Jour., April 5, 1919.

Purulent discharge from the conjunctival sac following enucleation and the wearing of an artificial eye is particularly difficult to treat with the ordinary zinc sulphate, alum, or usual silver preparations. Use of methylene blue 1 to 1,000 saline solution was employed as a routine and the results obtained were so striking that investigation was made to determine how the drug exercised its effect, whether through a definite germicidal action or if by a selective action for one microorganism more than another. Films and cultures were made, and the organism found was Staphylococcus aureus. Methylene blue, while proved to be very active clinically, had but little bactericidal action *in vitro*, 0.03 c. c. of a very dilute emulsion of the microorganism, after 24 hours' exposure to the methylene blue, still giving a number of colonies. (G. B. T.)

Salinger, S. **Prophylactic use of pituitrin in nose and throat operations under general and local anesthesia.** Am. Jour. Surg. Anesthesia Supplement, October, 1918.

In a series of 48 cases in which pituitrin was given as a prophylactic against hemorrhage the following striking features were noted: (1) Uniform and prompt rise of blood pressure, averaging 10 mm. systolic and 60 mm. diastolic, manifest 15 minutes after injection (except in one case). The increase was maintained in 60 per cent of the cases for as long as 18 hours. (2) Consistent lowering of the coagulation time from one-half to five minutes. In only one case was any post-operative bleeding noted. (G. B. T.)

133354—19——13

Livingstone, D. M. Colloidal manganese in gonorrheal ophthalmia. Brit. Med. Jour., April 5, 1919.

During the past three and a half years a number of cases were treated by gonorrheal vaccine in addition to the usual local treatment, which was varied from time to time. There seemed to be but little difference in the result taken as a whole. The most dangerous period is during the time of the intense edema of the lids and the bulging chemotic ocular conjunctiva when the cornea is obscured over the whole or most of its area. The corneal epithelium is damaged by the organism or its toxins, while the nutrition of the cornea is interfered with by the excessive swelling. Colloidal manganese appears to have an influence in controlling and abating the violent reaction to the gonorrheal infection by bringing about a rapid decrease in the conjunctival swelling. This permitted a satisfactory use of cleansing and nonirritating collyria. The manganese was given intramuscularily in doses of 1 c. c. The injections were given daily. After the second injection a most striking improvement was noticed. (G. B. T.)

Moore, I. Hemorrhage following removal of the tonsils and its treatment. Jour. Laryngol. Rhinol. and Otol., Vol. XXXIV, No. 4.

Hemorrhage following removal of the tonsils has become more frequent, though not systematically reported. The sources of the hemorrhage are: (1) The tonsillar artery or its branches, (2) the ascending pharyngeal, (3) a branch from the descending palatine, (4) a branch of the ascending palatine, (5) a branch of the dorsalis linguae artery, (6) capillary oozing from small vessels, (7) an enlarged venous plexus, (8) the internal carotid. The predisposing causes of hemorrhage are acute inflammation of the tonsils, anemia and luekemia, cardiac and renal diseases, the menstrual period and pregnancy, hemophilia, purpura and malignant disease. Exciting causes are undue trauma, coughing, vomiting, and the use of local anesthesia. As a prophylactic measure calcium lactate may be given for three days prior to operation. Adrenalin is unsuitable. Pituitrin reduces the coagulation time, increases the strength of the heartbeat and reduces its frequency. Subcutaneous injections of horse serum, or coagulose, which is prepared from horse serum, have been found useful. Hemorrhage following removal of one tonsil is controlled by pressure or swabs introduced in the tonsillar fossa. Reactionary hemorrhage occurs about three to six hours after operation.

The most dangerous type is a slow oozing from the whole surface of the wound. Occasionally a large clot in the fossa may conceal leakage behind and for that reason should be removed. Ligature or, if the hemorrhage can not be controlled by that measure, suturing the pillars, are the measures advocated by the author. (G. B. T.)

NOTES AND COMMENTS.

Capt. Louis Julian Genella, attached to the British Expeditionary Force in France, has an interesting article entitled "Recollections of the War in Europe" in the New Orleans Medical and Surgical Journal, June, 1919. The organization to which this officer belonged and his nationality are not given. The following paragraph is significant:

"I took a good deal of interest in the manner by which the Germans destroyed the French farms. Whether it was just war or not, it was surely a thorough job. First the sewers were opened up into the cellars of the houses; all equipment of the home was next broken up and twisted around; the floors were blown in, so that one corner fell into the cellar and jammed things; a couple of dead animals were now dropped down any channel of the house; the walls were covered with filth and knocked in; the windows and doors were smashed and the rafters cut away and all the roof allowed to cave in. The mass was set on fire and allowed to burn just enough, yet not enough to clear the mass away. After the fire, the children's toys and other belongings and many private things of the women folks of the house were placed around where they could attract attention. Letters of a scandal-spreading nature were placed in the family trunks. We occasionally read these letters, and they were usually works of art in their line. Military notices, apparently coming from the district commander, were posted around, and these were always calculated to cause lasting disgrace on the community. The trees and all plants and flowers were destroyed completely. The garden walls were all torn down and great care taken to shift known registered surveyors' markings. Now the fields were all planted with weeds and harmful grasses; furrows and trenches dug, so that the top soil would wash off; all wells and water supplies filled with filth and poisoned; the roads blown up at crossings and notices left that if anyone returning wished to know where the inhabitants of the village were they would find them in some notorious district of Paris. Before leaving, the village cemetery was always visited and the tombs ransacked, all marble slabs taken down and the owners' names cut off and the name of some Heinie dead placed there. Tombs were never closed, once opened, and frequently the dead were left hanging half in and half out of the tomb."

The latest thing in medical colleges is the Peking Union Medical College, whose first regular session begins October, 1919. This col-

lege, backed by the Rockefeller Foundation, has taken over the property of a former medical college organized by missionary enterprise in 1906 and carried on until 1915.

The course will cover four years. A premedical course of three years is also offered. The medium of instruction is the English language until medical development in China shall make the use of the native language possible. Women are eligible for admission. The college has a complete plant and the buildings, located on a former private estate between Hatamen Street and Morrison Street, follow the general lines of Chinese architecture.

Smallpox is distinctly on the increase in California as in the rest of the world. A. F. Gillihan, State district health officer, Sacramento, writing in the State health bulletin, shows how up to a century ago smallpox was a disease of childhood. The adults of a given period were those who had survived an attack as children and acquired immunity for life. The mortality of the disease was high and vaccination was welcomed in Europe and America after brief opposition. To-day smallpox is a milder disease and attacks principally adults whose artificial immunity by vaccination in infancy has worn off, but far too large a percentage of the population has escaped vaccination entirely. From 1913-1917, inclusive, the cases of smallpox in California numbered on an average 480 per year, but during 1918 there were 1,100 cases and the months of January and February, 1919, exceed the total for 1916.

An analysis of 770 smallpox cases which occurred in California in 1918 shows:

Vaccinated successfully 2 years ago	1
Vaccinated successfully 5 years ago	2
Vaccinated successfully 6 years ago	1
Vaccinated successfully over 7 years ago	48
Successfully vaccinated	52
Never successfully vaccinated	718
Total where histories were obtained	770

AGE INCIDENCE IN 770 SMALLPOX CASES IN 1918.

Vaccinated successfully—		Never vaccinated—	
10 years old	1	0 to 10 years	178
14 years old	1	11 to 20 years	144
21 to 30 years	12	21 to 30 years	89
31 to 40 years	16	31 to 40 years	98
41 to 50 years	9	41 to 50 years	45
51 to 60 years	9	51 to 60 years	15
Age not given	4	Over 60 years	4
Vaccinated	52	Age given as "child or adult"	145
		Not vaccinated	718

As long as vaccination is carelessly done it will be a bugbear. Until it is universal smallpox will be a sporadic menace to life.

A new departure for American hospitals is the elaborate mural decoration recently carried out in the City Hospital, Indianapolis. The idea originated with certain members of St. Margaret's Guild of St. Paul's Church. This organization also contributed $1,000 toward furthering the scheme. The Modern Hospital for June, 1919, gives the history of the movement, the names of the artists employed, and excellent reproductions of some of the paintings, which are in oils on canvas stretched along the walls.

In the hospitals of the Middle Ages in Europe everything was done to beautify both the exterior and interior. This beautification was in part merely a manifestation of architectural tendencies, the irresistible expression of love of the beautiful as it existed in that period. On the other hand, there was the definite purpose, too, of giving consolation, pleasure and hope to the sojourners in these asylums.

The Ospedale del Ceppo, erected in 1277, in the little Tuscan town of Pistoia, boasts friezes of indescribable charm wrought by della Robbia. The Santo Spirito in Rome, the Hôtel Dieu of Paris, the hospitals of Beaune and Tonnerre all illustrate these motives.

The modern hospital has put asepsis and strictly material features of professional care ahead of everything else, forgetting that even from the strictest utilitarian standpoint the attractiveness and charm of a ward is an enormous asset. It is particularly in the municipal institution, against which the ignorant and the poor very generally entertain a certain amount of prejudice, that these indirect measures are most valuable, and no argument is necessary for the embellishment of a children's ward.

The Gothic arch and groin, the frieze, carving in wood, stone, or metal are no longer desirable for interior decoration in hospitals because they are collectors of dust. The difficult but beautiful vehicle known as fresco remains available and this would be superior in cleanliness to canvas hung on a wall. The fresco was probably known in 1500 B. C. and, though in abeyance after the early Christian era, it revived with great brilliancy in the 13th century.

INTERALLIED CONFERENCE ON MEDICAL ASPECTS OF AVIATION.

The first interallied conference of doctors concerned with aviation was held in Rome February 15 to 20, 1919, at the call of the undersecretary of state for aviation and under the auspices of the Italian Government. America was represented by W. H. Wilmer,

T. R. Boggs and L. G. Rowntree. The meeting was presided over by Prof. Gradenigo, of Naples.

The subjects discussed were:

Examination methods in vogue in different countries to determine physical fitness of pilots.

Pathology of aviators.

Methods of neutralizing the effect of high altitudes.

The discussion amply demonstrated the reduction in the percentage of accidents since systematic examination of heart, lungs, nervous system, and special organs has been enforced. Particularly interesting were the reports of the French physiological laboratories at Longric, which investigated respiratory and cardiac problems, psychophysiology, atmospheric pressures, etc. Similar work was done in Rome, Turin, and Naples. The French quartermaster general's department had its special aviation medical officers for the larger aviation units and a medical inspector of aviation to visit all stations and standardize methods.

The value of testing psychomotor reactions was dwelt on. Some of the members of the conference inclined to give greater weight to "reactions of discrimination" and emotional coefficients. The Italians, who have gone deeply into the subject of psychomotor reactions and perfected their laboratory methods, attach great importance to them. Others still emphasize chiefly the need of gauging cardio-respiratory function and testing labyrinthine conditions. Reports were submitted of tests made to determine efficiency of respiratory muscles.

Other points reported on were: Determination of rapidity of vision, significance of hypernormal vision, twilight vision, vision after dazzling light, determination of muscle sense, the use of oxygen-inhalation masks, inhalation of oxygen and CO_2 mixtures, protection against wind and cold, the use of compressed-air cabinets, etc. Summary of unanimous decisions of the conference:

1. Importance of international uniform standard of examination before aviators qualify.

2. Examinations should include tests of general somatic integrity and of the integrity of special senses; of the ability to endure great and sudden changes of atmospheric pressure; psychic soundness.

3. Every aviator should have a monthly physical examination even in the absence of symptoms; should have periodic rest; should be treated in special hospitals provided with all necessary facilities for medical and physiological research.

4. The necessity of Government assistance in medical aviation-research work.

5. Aviation physicians should have special preliminary laboratory work.

6. Importance of investigating (*a*) vital capacity, (*b*) maximum expiratory capacity, (*c*) time of holding the breath at 40 millimeters pressure for all pilots.

7. Importance of standardizing all apparatus for testing blood pressure.

8. Every aviator should be furnished with breathing apparatus providing oxygen or oxygen and CO_2 mixture.

9. Employment of metric scale in all reports, etc.

10. Organization of a society for the medical study of aviation. The next conference will be held at Oxford in 1920. The headquarters of the executive committee of the society will be in Italy.

11. Suggestions of the conference recommended for consideration by the peace conference should it undertake international control of aviation.

(Summarized from La Presse Médicale, Paris, April 17, 1919. Report by G. Guillain, medical inspector of aviation.)

Under the auspices of the United States Interdepartmental Social Hygiene Board studies are being conducted at Yale University Medical School on—

Effect of anilin dyes on gonococcus.

Methods of isolation and identification of gonococcus with reference to different strains and their relationship.

Unusual syphilitic lesions found post mortem.

Similarly, at the Union University Medical Department, researches are under way on the Wassermann reaction.

Other schools conducting experiments of a kindred nature are University of Nebraska, St. Louis University, Woman's Medical College of Pennsylvania, Washington University, Jefferson Medical College.

The 30,000,000 records in the United States Treasury Department's War Risk Insurance Bureau, Washington, D. C., are housed in filing cabinets 4½ feet in height and aggregating a length of 3 miles. The business of this bureau requires the services of 13,614 persons, employing 4,000 typewriting machines.

Every medical officer and every member of the Hospital Corps should do what he can to further the cause of the Boy Scouts of America. There are 10,000,000 boys between the ages of 11 and 21 in the United States, and the significant question is asked by the executive committee of the Boy Scouts: How do these youths spend their leisure time? We do not know, but it is certain that some of the time goes to reading trash, to damaging property, to corrupting each other, to practical jokes of doubtful propriety, to eating candy and ice cream, to smoking cigarettes, to loafing and exchanging boasts about things they have never done. The Boy-Scout movement aims to supply good reading matter, to indoctrinating the protection of life and property, to foster mutual helpfulness, healthy bodies, hygienic habits, and manly activities.

In March, 1919, the State of Connecticut passed a law providing that no motion pictures or stereopticon views relating to the subject of venereal diseases shall be exhibited in the State without written permit from the commissioner of health. The "sole purpose of the bill is to prevent the commercial exploitation of a subject which ought to be handled delicately and judiciously to avoid a grave and harmful reaction in the public mind."

During the period from September 1 to December 31, 1918, 10,000 cases of influenza, of which 3,000 were serious, were treated at the U. S. Naval Hospital, Great Lakes, Ill. Of the admissions to the hospital, 96 per cent were under 25 years of age. There were 1,807 cases of pneumonia under treatment on September 25. The largest number of admissions (influenza and pneumonia) for any one day was 384 on September 24. There were 92 deaths on September 25. The total deaths in the period were 892.

Conjunctivitis was a common initial symptom; so was acute nasal catarrh. A pseudodiphtheritic membrane on nasopharynx was not uncommon. There was often some congestion of the glottis.

When the symptoms did not subside within six days there was presumptive evidence of pulmonary complications. Often the first physical sign of consolidation was at the angle of the left scapula.

It is estimated that pleural involvement existed in 75 per cent of the cases. Pain was not a constant feature. Empyema was the rule where tenderness was elicited on percussion and a temperature of 101 F. or over continued for 10 days. In some of the cases of empyema, where the pus collected between visceral pleura and diaphragm, right abdominal muscular rigidity and a septic temperature curve with restriction of diaphragm movement on the affected side were the only symptoms.

The common circulatory complications were myocarditis, pericarditis, and heart block.

Sailors were daily arriving in Pittsburgh to be paid off, but the complicated process of disenrollment and inadequate officer and clerical force delayed the final discharge of some hundreds of men. These men expecting quick discharge were there with little or no money and poorly outfitted for a prolonged stay. The overburdened demobilization machinery was straining to the utmost to meet a situation daily growing more serious. Social unrest amongst civilian elements was in the air and a situation threatening trouble was rapidly developing. The VI Division of the Bureau of Navigation was directed to survey the field and take such steps as would aid the officers in charge at Pittsburgh. Negotiations were under way for

the securing of a large armory for the use of the men. These negotiations were pushed through, a large drill and athletic field was secured within the armory grounds and equipped with athletic gear, showers, and laundry facilities. A large recreation room, library, and waiting room were fitted out, messing facilities were provided, all the great welfare organizations of the city were brought together and with the local press put into close touch with the officers. Within 72 hours the men were comfortably housed, fed, amused, and under naval discipline. The VI Division had then fulfilled its mission as an auxiliary to the commanding officer and had aided materially in preventing what promised to become a very troublesome situation.

This is a sample of the sort of work done by the VI Division. It shows one form of the many activities in which the division engages. No single naval enterprise of recent years gives promise of such far-reaching benefit as does this new organization, which supplies the need so long felt of what we might call the official doing of unofficial things.

The individual naval officer has always been well disposed to the enlisted man and willing to go out of his way to help him, but officialdom often barred the road—where money was needed for some recreation or beneficent enterprise it was unavailable under existing appropriations; too often sporadic, individual effort proved abortive or was limited to a small local field. Now, at last we have an official recognition and provision with coordinated, carefully made plans for the soul of the enlisted man, not the soul in the religious sense but the spirit, the activities of heart, and mind and body. The operations of this division cover education, athletics, occupation of all kinds for leisure hours, moral uplift by indirect agencies, protection, and furthering of the sailor's interests ashore, etc.

The authorities of a naval hospital were recently called up by telephone and asked if they would like some athletic supplies, some theater tickets, etc. The message did not come from a group of benevolent women, from the Red Cross, from a well-disposed millionaire, but from the VI Division. It almost lead to apoplexy in the recipient. Did this mean an end to the desperate struggle to get things done that come neither under Ordnance nor Naval Intelligence, nor Supplies and Accounts, nor Medicine and Surgery? Was the Navy going to do for itself what had previously been obtainable only through public benevolence? Yes. Such was the meaning of the message. The VI Division is the clearing house for ideas and purposes about the happiness and welfare of the sailor after he has been clothed and fed and trained and armed by the Government. What a woman is in the household the VI Division promises to be in the great Navy family. The Navy is to provide its own humanities,

its own comforts, and it is going to make life livable, clean, and sweet, working out its own salvation from within. It is the good we do ourselves and not the good we receive as a charity that upbuilds.

When disorder was rampant recently in the city of Washington the VI Division got together for informal conference the petty officers of the Navy on duty here and spoke thus: "The sailor must not appear in this rioting. You represent the law. Wait until you are called on and then go in strong." It was a hard saying for a sailor's wife had been insulted and the spirit of bluejacket loyalty to bluejacket was roused to white heat, but the argument "You represent the law" won out and the bluejacket ceased to figure in the disorder.

The medical officer, the hospital corpsman, the trained nurse, the civilian friend of the Navy who has some well-digested plan for improving in any way the mental, moral and physical condition of the enlisted man, who has thought out a practical means to make him happier and more contented, and so more efficient in the service of his country, will find a ready sympathetic attitude and a broad spirit of cooperation in the VI Division laboring for "the good of the service" without discrimination as to corps, title, rating, or other distinctions. Lieutenant Cmmander W. D. Owens, Medical Crops. U. S. Navy, is attached to this division.

It is with sincere regret that we learn that Commander C. B. Mayo, U. S. Navy, whose energy and tact have initiated this movement and laid broad plans for its development, has to go to sea at this formative period of the movement. It will be a matter of extreme difficulty to replace him adequately.

REPORTS.

WITH A NAVAL RAILWAY BATTERY IN FRANCE.

By C. S. STEPHENSON, Lieutenant Commander, Medical Corps, United States Navy.

About one-half of the personnel left the navy yard, Philadelphia, May 25, 1918, and sailed from New York on the U. S. S. *Von Steuben*, May 28, 1918, with a large group of ships convoyed by the U. S. S. *North Carolina*. Several of the officers, including the writer, sailed on the U. S. S. *Henderson* and arrived in Brest, France, June 8, 1918. Upon arrival one man was found to be suffering from diphtheria and was immediately transferred to the U. S. Navy Base Hospital at Brest.

On June 9, 1918 all the personnel of the railway battery entrained for St. Nazaire in the "40 Hommes-8 Cheveaux" type of car and arrived on the morning of June 10, after a most trying night. We were then sent to U. S. Army Camp No. 1 occupying barracks C–9, C–10, and C–11, recently vacated by negro troops and in a miserable sanitary condition. Soon the rain began and continued for several days, which added nothing to the comfort of the organization for the roof was one in name only.

At sick call June 10, 1918, two men were found with sore throats, clinically diphtheria. They were immediately transferred to Camp Hospital No. 11 and a provisional quarantine instituted. Cultures were positive from these patients, and after cultures from the whole draft 19 suspects and two positive carriers were found and promptly isolated until three successive negative cultures were procured.

We began at once to build suitable barracks near the tracks we were to use, and on June 21 moved into very comfortable quarters. Our work then began in earnest and was carried on day and night until the whole amount of material was ready for use. On August 14 trains Nos. 1 and 2 left St. Nazaire for the front with Lieut. L. M. Morris, Medical Corps, U. S. Navy, as medical officer. Train No. 1 went into position at Soissons first. Here the drinking water was obtained from a well recently used by the Germans. It was carefully cleaned, scraped from top to bottom and dug down for some distance, chlorinated, allowed to fill up, baled out, chlorinated again and again baled out and when filled again was chlorinated, 1 gram to 40 gallons. It was carefully banked to prevent seepage from the Aisne, not far distant, for the water was said to be heavily contaminated with typhoid. No disease of water or fly-borne nature

occurred. The incidence from disease was extremely light. The bulk of the sick days were from minor unavoidable industrial accidents, and from boils due to lack of facilities for bathing. The facilities for evacuation here were good as there was a French evacuation hospital 6 kilometers away, and the commanding officer was extremely anxious to do anything he could for us and put an ambulance at our disposal.

Latrines were dug and kept in excellent condition. At this position the flies were very bad, due to the fact that so many troops had been in the locality and little or no attention had been given to sanitary disposal of sewage.

Here we were shelled, the shells landing in a forest behind our gun position, and among them were a large number of mustard gas shells. The men had all been instructed in advance by Lieut. L. M. Morris, U. S. Navy, and the senior medical officer, until they were proficient in the application of masks. After this shelling the men were ordered to stay out of the woods for three days. The reason for this order was explained to them, and they were impressed with the necessity for such care and for the use of masks and helmets. Fortunately they escaped casualties. The closest shell fell 6 feet from the gun, and as luck would have it, no one was hit. From Soissons this gun went to Nixeville and remained about a week. There the water used was from the Sommesous and good. They then went into position near Nancy, but the armistice was signed and no firing took place. Here the usual sanitary precautions were carried out.

Train No. 2 took her first position at Fontenoy-Amblanay. The sanitary conditions here were miserable, as we were on the grounds of an abandoned French camp. The garage (side tracks) was well protected from aeroplane attacks, but the tracks, both proximal and distal, were bombed with regularity. One night three bombs were dropped at the gun, a piece carrying away the side of the telephone booth in which two men were working, but fortunately no one was injured. The men were given an object lesson in the reason for lying down when being shelled and taking to shelter trenches. Attention was called to the fragments hitting high on a car 50 feet distant from the bomb hole. From here they went to near Flavy-Martel, a position 5 kilometers from the front line. Our position was evidently known to the Boche, who shelled heavily a hill 500 meters away from our position as well as the bridge 1 kilometer away. The garage was 500 meters away, located in a forest. There were many good dugouts here, but we later found that they were inhabited, and several of the men were infested with lice. Hospital facilities were only fair. Three American ambulances were assigned to us, as it was believed that we would be heavily shelled in this position, but

the enemy was on the retreat and gave us no trouble. It was found necessary to quarantine the town on account of typhoid, which had broken out in a French regiment. The water was hauled from a distance, and all the precautions taken with it on account of typhoid in the locality.

From here No. 2 went to Charney, north of Verdun. The garage was fairly protected by a hill, but within easy reach of gunfire from the 77 batteries and well within the gas zone. Masks were worn at the alert. The counterbattery work given us was very weak. Since our position was within sight of enemy balloons the only thing that saved us was the fact that the "Huns were on the run." The cross-roads near us was a special target and was quite heavily shelled; rarely a day passed that some of the engineer people were not killed. Several of our men were knocked down from the force of the explosion and escaped injury by a very small margin. Only once were we bothered with gas here. It came floating down with the wind; very soon a lot of coughing began, and masks were ordered worn until all danger was past. Our dugouts were in a bank of the Meuse River, and they were also infested with lice. No disease has occurred that could be traced to them as carriers. There were also a goodly number of mosquitoes here as well as at St. Nazaire. They belonged to the anophiline family, but perhaps were not capable malarial carriers, as no malaria occurred, with the exception of one case, which was believed to be a recurrence of the infection he had in Haiti.

The gas quite freely used here at times was mostly mustard. On several occasions as many as 500 men a day were evacuated from the front line to the hospital at Glorieux.

Several cases of extreme nervousness occurred among the people, and we would have had some nervous exhaustion ("shell shock") if we had remained here very long, for the men had been under fire for more than a month with no adequate rest period.

There was an evacuation hospital in Glorieux, about 5 kilometers away, and plenty of ambulances passed our position all the time.

The water was gotten at Charny and on the advice of an Army medical officer was chlorinated.

From here train No. 2 moved to the forest of Mondon near Luneville; position, 5 kilometers from the line and by far the best of all. Large, comfortable, well-camouflaged dugouts were at hand. We were not shelled at this position, as armistice was signed before our "zero hour." Water and sanitary arrangements were satisfactory.

Trains Nos. 3, 4, 5, and staff train were ready and departed from St. Nazaire September 14, 15, 16, 17, 1918, and all arrived at Sommesous, Marne, by September 22, 1918. We were now attached to the Railroad Artillery Reserves, First American Army. The garage was located on a large rolling plain. The soil was loam, under which

was chalk. There were no sanitary arrangements here, but a force of men was immediately put to work digging latrines and shelter trenches from air raids, a storehouse, and such other buildings as we required. We were constantly on our guard against disease from the incoming trains from the front, for the garage was also used by French colonial troops, and their ideas of sanitation were crude indeed.

The water here was excellent, being obtained from deep-bored wells and was always free from any suggestion of any contamination. The bathing arrangements were most primitive and far from satisfactory, for it was cold and quite disagreeable to bathe from a bucket in the open. The Army camp 500 meters away had hot baths, but the men preferred to use buckets rather than fraternize with the soldiers and acted accordingly.

It became necessary to quarantine the men away from the Y. M. C. A. at this camp on account of an epidemic of influenza there. We only had one case as a result of this infection and he was sent to Army camp hospital, Mially, 10 kilometers away. Our ambulance service was from the camp above mentioned.

One case of what was diagnosed at the hospital as pneumonia proved on post mortem to be typhoid, as two perforated ulcers of the ileum were found. After figuring on the incubation and our past location it is not improbable that this diagnosis is correct, for there were a few cases of typhoid reported from Montoir, where this man worked in our storehouse while we were erecting our material, and he admitted having drunk some water that had not been chlorinated on account of not liking the taste. Then, too, there were innumerable flies around the storehouse and he might have become infected from eating food which they had contaminated despite the fact that he had had typhoid prophylaxis in January, 1918.

An interesting accident occurred at this place. A man fell on his left side and in a few hours went into profound shock with symptoms of abdominal hemorrhage. He was transferred to the U. S. Army camp hospital at Mially, where the diagnosis of rupture of the spleen was made and he was prepared for an operation, but the writer advised expectant treatment for a few hours, which advice was acted on. He ran an irregular temperature for a few days and in due course made a complete recovery.

Trains 3, 4, and 5 left Sommesous for the Verdun front October 11 and went into position on Apis, 200 meters south of the village of Thierville, 4 kilometers north of Verdun. Our position here was well known by the enemy, for another battery left that position three days before we arrived. The ground was low and rather wet from heavy rains and had a tendency to constant softness, due to the close proximity of the Meuse River. One hour after our first three shots the

enemy answered with six and all were "good direction" and uncomfortably close to the guns, but no one was near, as it was mealtime. This position and the immediate locality were shelled every day during the stay. There was some air activity, but no bombs were dropped very close to our garage. The incidence of illness here was very low, indeed. One case of influenza occurred and was transferred to U. S. Army Evacuation Hospital No. 114 at Glorieux, near Verdun, where he developed pneumonia and was evacuated from this place October 22 to some hospital farther back, the location of which I have been unable to determine after repeated thorough attempts, nor have I been able to determine the outcome of the case after repeated letters and telegrams to every one, from the chief surgeon, A. E. F., to the chief of Graves Registration Service. Just here it might be added that the system of keeping track of men evacuated seems to be worthless, as I have heard numerous complaints on all sides from the same cause.

At 11.30 a. m. October 28, an enemy shell landed 85 feet back of No. 5 gun and the following men injured, and those requiring it evacuated to the hospital mentioned above:

B., A. J., Sf2.—"Lacerated wound nose," shell "K"; condition favorable.

E., R. E., Eng. 2.—"Contusion scalp," "K" trivial; retained with battery.

E., W. E. L.—"Lacerated wound chest," shell "K" trivial; retained with battery.

G., K. W., Sf2.—"Lacerated wound," "K," left thigh, right calf, posterior.

S., A. P., Sf1.—"Lacerated wound," shell "K," right thigh, through Hunter's canal. This man was seriously shocked from the very beginning and died probably from an embolus after the ligation of the femoral artery and vein. He was buried in the Military Cemetery of the hospital at Glorieux, near Verdun, Meuse, France.

B. has returned to this organization, but G. is still in Evacuation Hospital No. 3, near Bordeaux, and is classified "B" and will soon be returned to America. It is only after long and repeated efforts to find this man that we gave up in despair. Finally he wrote to one of his shipmates and told where he was or I doubt not that we would be in ignorance of his whereabouts still.

The nearest hospital to this place was 2 kilometers and the ambulance for our service was from P. C. MacMillan, 2 kilometers farther on, which made it a most uncomfortable position to be in. Ambulances were required for as quickly as the method of operation was known, but the situation was not overcome when the war was over. This could have been obviated by sending one or both of the medical officers to study conditions when we first arrived, but it was not

considered advisable even after repeated requests from the medical to the commanding officer, for there were two hospitals in easy reach of our camp and very little sickness and remarkably few injuries to handle, with the one exception of an epidemic of influenza already reported.

The water at Thierville was excellent and did not require chlorination. Repeated culture showed no trace of colon or other gas-forming organism. It was obtained from the Verdun supply.

The usual latrines were dug and suitable precautions adopted for excreta. Shell holes were mostly used for garbage pits and covered over when filled. We were troubled for a while with flies on account of the stables of a French camp located about 400 meters west of us, but the coming of cold weather put a stop to this annoyance as well as to the mosquitoes. No disease occurred that could be classed as fly or mosquito borne.

Train No. 4 moved up to Charny after several days' firing from Thierville. The conditions of this location have already been described for train No. 2.

On the signing of the armistice all trains returned to our base at Sommesous and after getting together all spare material started for St. Nazaire to get ready to return to America. A two-day stop in Jouvisy for the purpose of giving liberty was welcomed by everyone until the incubation period of a certain venereal disease was passed when the medical officer had cause to regret this stop, for a good record was spoiled by this two-day period. Several cases have already shown up and been reported on suitable forms. Even with this disease incidence we yet hold a better record than any organization of like size with which I am familiar.

The writer and Lieut. Morris have both taken every opportunity to lecture to the men on the venereal question, gas defense, communicable disease, first aid, camp sanitation, and numerous other topics of interest to them.

Too much praise can not be given the other medical officers for the way that they have carried out plans and suggestions under most trying circumstances and in several cases in the face of open opposition on the part of the train commanders, who were ignorant of the most rudimentary knowledge of hygiene and sanitation and felt that the medical officers were only trying to exert unnecessary power in carrying out their pet ideas of what should be done. That the work of preventative medicine has borne fruit is attested by the monthly reports.

The hospital corpsmen, too, have done splendid work and have always been ready and willing to give first-aid instruction to those men who wanted such knowledge.

The low incidence of disease may be attributed to such factors as rigid sanitary measures, not forgetting to explain to the men the necessity of such sanitation. As a whole they appreciated the attitude and were more responsive than some of the officers and took far more interest in first-aid instruction and sanitary lectures than most of the train commanders. Then, too, the men always had dry clothing after hard work and, by no means least, a comfortable bed in which to sleep, when they could. Hot food was always served at meals and between times when especially arduous duty had to be performed under trying conditions. The supply department deserves the everlasting gratitude of all concerned for being able to deliver supplies under all the conditions encountered.

Complement of officers and men—Percentage of sickness, mortality, general health, epidemics, venereal disease, vaccination.—Average complement of officers, 30; average complement of men, 398.5; total, 428.8, for the period of service from June to December, 1918.

Percentage of sick, 0.854.

Mortality.—Disease, 1, typhoid perforation of ileum. It is believed that Pharmacist's Mate R. E. B. died of pneumonia, but no official information can be obtained.

One death from shell wound "K," A. P. S., Sf.1.C.

General health, excellent.

Epidemics.—We had 23 admissions from an epidemic of influenza, but fortunately no serious complication arose and no deaths followed. Doubtless prompt isolation and cubical isolation prevented a further spread.

Venereal disease was extremely prevalent in St. Nazaire, but during our stay there we only had nine cases, a far better rate than any organization in our vicinity. From December 1 to 17, the date of going out of commission, 13 cases of venereal disease developed from a two-days' liberty in Paris. Before each liberty party left the train, they were given a lecture on venereal disease in its various phrases and how to prevent it, but the length of time away from train and prophylaxis was too long to prevent infection. The men were told about the various prophylaxis stations and where they could be found, but their ignorance of the city prevented the use of such places. The writer seriously doubts if any good has ever been done with moral prophylaxis, and he has lectured on this question to every organization to which he has been attached, but he is a firm believer in the efficiency of chemical prophylaxis when used within one hour after exposure.

There have been 10 admissions for gonorrhea with no sick days, 9 admissions from chancroid with 26 sick days, and 3 admissions from syphilis with no sick days.

For all disease there have been 98 admissions with 442 sick days and 41 admissions from injuries with 271 sick days.

Vaccination (cow pox), 6; typhoid prophylaxis, 67.

Structural details in their sanitary aspects.—The men were berthed in a standard box car 36 feet by 8 feet 1¼ inches by 7 feet 2½ inches, giving a cubic capacity of 2,016 cubic feet. Deducting 438.06 cubic feet for displacement of bunks, stove, and lockers gives 1,593 cubic feet. Dividing by 25, the number of men bunked in a car, we have 63.3 cubic feet per man.

The car is ventilated by eight windows, four doors, and numerous cracks caused by the shrinking of the green lumber used in the construction of the cars. This was the cause of no little discomfort for frequently the bedding was wet from blowing rains. After a lot of urging, three ventilators, 8 inches in diameter, were supplied each car, which greatly relieved the situation. Except in rainy weather they were ordered to open the doors and windows on the lee side of the cars before retiring. This provision made up in a measure for the poor ventilation, but was a poor substitute for proper ventilation, especially when the weather was cold.

The lighting was by means of kerosene lamps, except the staff cars, inadequate in number and a general nuisance, for they would not burn when the train was under way, thereby leaving the crew in darkness. Then there were too few lamps to adequately light the cars. How much vitiation resulted from them is not known, for we had no apparatus for testing the CO_2 content of air. This should be remedied in the next battery with a lighting plant of some type like the Delco. Then adequate lighting would be provided and at less expense than the oil method and a much more sanitary condition be insured, while oil space would be saved from the transportation end.

Heating—amount, means, defects, remedies.—Heating was done by a coal stove situated in the center of the car. There was no great complaint from this, for the men of this organization do not complain, but that does not alter the fact that the system is wrong. There was always a hot space in close proximity of the stove and the ends of the cars were cold. This could be remedied by using a plant for each car, as on some of the older types of passenger cars in America. The original cost would be greater, but when coal is as expensive as it is in France the saving would almost pay for the plant in a year's running. The heat would then be carried to all parts of the car by circulation in the hot-water pipes and equally distributed. Cleanliness of living quarters would be promoted by the absence of ashes and coal dust and, by no means least, tonnage would be saved by the reduction of fuel consumed. It is urgently recommended that this be done for the next berthing cars. It is

doubtful if steam heating from the engine would be practicable, for the engine might be in use elsewhere when heat was urgently needed. Otherwise that would be the ideal system.

The officers were quartered in the main in the battery headquarters cars. A general description of one such car follows: The commanding officer's room, 9 by 8 by 7 feet 6 inches, with deduction for furnishing, gives an air space of 362 cubic feet, an unequal distribution of space out of all proportion to fairness as will be seen by the following: In many instances line and staff officers senior to the commanding officer were living in double compartments. It may be noted here that the commanding officer did not carry on office work as an independent organization. This should be corrected in future construction. It is suggested that a common sleeping compartment be provided, doing away with the individual rooms and the space-killing bulkheads. Under the stress of war is no time for sticking to the antiquated idea of shipboard life, where the commanding officer is given far better quarters than the remaining officers. In shore warfare officers living as we did are thrown so closely together that the customary seclusion is nothing short of ridiculous.

The next compartment, 320.5 cubic feet, housed two junior officers. The dispensary is next and is described elsewhere. The radio room comes next and contains 234 cubic feet, exclusive of bunk displacement. It accomodates two officers. It is ventilated by natural ventilation and heated by the same means. The stove from the dispensary heats that compartment and the one next to it.

The officers' mess room for each train was a compartment approximately 8 feet square, fitted with a folding table, and was fairly comfortable for those not near the stove, but it was extremely inconvenient to move about in at meal times. It was usually a feat to have a mess boy serve one and not soil one's uniform.

The staff headquarters' car contained an office and state rooms for the admiral, orientation and senior medical officer. The latter rooms were torn out to enlarge the office, and the toilet in this car was removed and utilized as a clothes locker for the adjoining rooms. Cubic space minus the deduction for displacement as follows:

	Cubic feet.
Office	622.0
Admiral's state room	402.5
Orientation officers' room	362.0

Heating and lighting as for staff train.

The senior pay officer and executive officer were quartered in another car whose compartments correspond about to a battery headquarters' car, with slightly more cubic space in the pay officer's room than in the junior officer's room in a battery headquarters' car. The

office was slightly smaller than that of the executive and commanding officers. There was one other car with rooms the same size as for battery headquarters' car. Heat, light, and ventilation have been described.

Water—Source, supply and preservation.—At St. Nazaire our water was from the city supply obtained from near by. Unfortunately the chemical analysis has been lost. Bacteriological analysis gave it a bad reputation for on many occasions gas-producing colonies were numerous and for this reason all water that was used for drinking and for cooking was chlorinated—1 gram to 40 gallons. Each car used for living purposes was equipped with a 200-gallon tank, and in these water was stored. They were fitted with a valve that permitted steam connection to the engine and they were sterilized when deemed necessary.

At the base at Sommesous the water was excellent and did not need chlorination. The water question has already been discussed.

The only sanitary fittings used in the completed cars were the sinks in the various galleys. The water from these was caught in large cans and emptied when necessary into seepage pits provided for that purpose.

The berthing cars were all originally fitted with portable water-closets, but the space occupied was desired for other purposes so they were dispensed with and latrines used instead.

The barracks in St. Nazaire were provided with shower baths, but at all other times buckets were used for bathing. This method was far from satisfactory and the aversion to this method led some to neglect of bathing.

The Navy ration.—It could hardly be called a Navy ration for when serving with the French we procured what commissary stores we could—vegetables, meats and bread—and used Army and Navy dry stores to complete the menu. The ration was prepared in the kitchen car, which was altered from the original plan roughly as follows: The galley range and sinks were in one end and the opposite end was used as a storage space for commissary stores, all bulkheads and berths having been taken out. In the main the food was well cooked and excellent in quality and abundant in quantity. It was impossible to vary the ration as is usually done aboard ship, but no ill effects can be attributed to this fault. The monotony of such a ration was quite apparent, but everyone took the situation good humoredly and there were remarkably few complaints. In fact, the only persons that I ever heard growling were a few chronic grumblers among the officers, and it was expected of them and would have been a disappointment if it had not been forthcoming.

The general messing system.—The men ate from their aluminum mess gear and lined up at the galley door for food and were served

in a very short time. In fact, the service was quick enough to insure each man getting hot food. The officers had a small mess room in the end of the battery headquarters' car, which was always stationed next to the galley, and they also had hot food. While at St. Nazaire the men had a long shed for a mess hall and the officers had a mess room in one end of their barracks. The food was prepared on an Army field range until this broke down, and then a hole was dug in the ground and a heavy sheet of steel used as a top. This worked fairly well, but the galley was of necessity located so far away from the messing places that it was the rule to get cold rather than hot food. We had a great deal of trouble from flies, in spite of all the care and attention given the sanitation of our camp. The reason for this was the village of Penhoet, about 400 meters away and without any sanitary arrangements and over which we could exert no control. Such stores as we had were carried in box cars and were well protected.

While in St. Nazaire we were fortunate enough to get ice a few times, but it was considered dangerous and never allowed to come in contact with any food or water. An improvised cold-storage room was built here, but there were no such facilities on the trains. The ice boxes as planned originally were useless for no ice could be had. No disease occurred that could be attributed solely to the food.

Clothing.—When the organization reached St. Nazaire the standard uniform allowance of a marine (same uniform) was issued to each man and his naval outfit packed away. For summer weather the uniform was quite satisfactory, but as cold weather came on it was found necessary to put on heavy woolen underwear. It would seem desirable to have two weights of the same uniform for use in a climate like that we were operating in. Its texture was the rather loosely-woven marine shoddy and of not very strong material. In fact, there was a general tendency for the clothes to rip in the seams. I was greatly surprised at the wearing qualities of the uniform, as it lasted longer than I expected.

Whenever a garment was worn out or lost it was replaced by the Army standard uniform of about the same quality.

The laundry work for the organization was done in the main by the men themselves, for there was a general scarcity of people with time to do washing. There were few places where such work could be done, and the price was generally out of all reason in comparison to the local daily wage. The men used canvas buckets or any other vessel convenient or suitable for the work, and as a whole were extremely neat and clean considering the character of the duty performed.

Cells for prisoners.—It was found necessary to build a brig at St. Nazaire for punishment of minor offenses. A house was built

containing six cells, each 4 by 8 by 6 feet, a cubic capacity of 182 cubic feet. The brig was located on a hill in the camp, well above the level of the other buildings, well ventilated, and having natural heat and light. It was summer time and no additional heat was necessary. They were carefully policed and kept in excellent condition.

There was no provision for such space on any of the trains nor were any necessary or desirable.

Medical and surgical supplies.—The medical supplies required for on the original requisition were adequate for the original complement, but 200 more men were added and it was necessary to require for additional articles. In the main such supplies were issued by our naval supply depot, and it would not have been necessary to get certain articles from the Army had we not been annoyed by the loss of requisitions in the mails. Later they turned up filled and this overstocked us on some items. The greatest fault to be found is the inflexibility of the supply table and the inability of the supply depot to supply certain well-known patent remedies in any quantity when supplied. I have never seen the time that I could not get all or more than I wanted of any article that I did not want. It would seem that the time has come to correct such inherent faults and furnish people operating in the field or on a ship which may be far from any supply with the new and proven drugs and appliances. Even the Army is showing a tendency to be more liberal in the allowance list and in France supplied the things that the medical men asked for.

It was necessary to require on the Army for litters which were not supplied on the original order as well as several other articles required for on the supply depot at Brest. This requisition was one of those lost in the mail.

The surgical supplies were satisfactory in both quality and quantity with the exception of dichloramine-T and a few other minor articles for the treatment of surgical conditions, as chlorcosane, Thomas splints, transfusion tubes, or complete outfit. All of these articles are of indisputable value.

Facilities for the treatment of the sick.—In our camp at St. Nazaire a house 20 by 20 by 14 feet was erected for a sick bay—cubic capacity, 5,600 cubic feet; bunk capacity, 10 berths. This was located on the highest ground in the camp, ventilated by natural ventilation—6 windows, 2 doors, lighted by electricity, with natural heat, as it was summer time. The dispensary was in the same building and was partitioned off from the ward by a partition reaching about halfway to the ceiling. Cubic capacity, 896 cubic feet; fitted, heated, lighted, and ventilated as for sick bay.

Only a few necessary supplies and instruments were kept here, the rest being kept in the battery storehouse at Montair and were adequately protected.

There was a small dressing room in the building, but it was far too crowded. This could not be obviated, as the officer having charge of construction objected strongly to building a house of sufficient size at the beginning, and as a result, with the advent of the epidemic of influenza, he was forced to build another place with a capacity of 16 berths. After the epidemic we used the place as a storeroom.

A small venereal prophylaxis room was adjacent to the sick bay and was filled with such crude fittings as we could lay our hands on and could be improvised by willing helpers. It answered the purpose for which it was intended, even though it did not present a very good appearance.

The sick bay for the train is a standard box car, divided into the following compartments—one ward containing six bunks. In this compartment there is a small linen locker and on the bulkheads are two bottle racks. The bottles are filled with nonpoisonous medicines. It was recognized that this was not a suitable place for a dispensary or dispensing, but the lack of space prevented a more sensible arrangement. The objection was raised that the fittings and space asked for were not necessary and no amount of discussion could change the decision made, despite the fact the space was only one-sixty-seventh of the space of the train and in the original plan. Next to this was a small compartment fitted with one of the portable toilets as were all the rest of the cars, and it was found satisfactory. It is believed that this is the only one used of the whole outfit, the space occupied being more desirable than the toilet arrangements.

The next compartment was occupied by the senior medical officer, and has a cubic capacity of 357.8 cubic feet. He intended this compartment as an additional space for the berthing of three men and as a dispensary and was so fitting it out, but plans were changed again.

The next compartment was intended as a commissary storeroom, but since this car was turned over to the medical officer for the medical department it was converted into an office and poison locker. It has a cubic capacity of 182 cubic feet and is very small, but we managed to do the work in it.

The last room was fitted up as a dressing room, cubic capacity, 446 cubic feet. This space was very small for the purpose, but in comparison with other cars I think that this car was the best of the lot.

Two porcelain washbasins were bought in the open market, and by an ingenious device framed up by Ensign T. J. Leblanc, U. S. Navy, furnished us with hot and cold running water. The water was stored

in old gasoline tins secured to the roof and heated by kerosene lamps directed against a copper coil, which was incased in a nonconducting jacket. This was a splendid arrangement and was very satisfactory, as it took only a few minutes to get plenty of scalding-hot water. The greatest disadvantage was the necessity of draining the tanks at night to prevent freezing, for it was getting quite cold when we left the base for St. Nazaire. The sterilizer was placed in this compartment as well as a cabinet for dressing. One of the folding mess tables was to have been used as a dressing table should the occasion arise.

This compartment was ventilated by two ventilators, four windows, and two doors, to say nothing of the numerous cracks caused by the seasoning and slight warping of the new boards.

The lighting was by the standard passenger-car kerosene lamps. Heating was by oil stoves, as in the stateroom of the medical officer until the tool car arrived, when oil lighting was replaced by electricity generated in the tool car by the dynamo for running the electrically-driven tools. The lighting of the ward was the same as the dressing room, and ventilation was by two ventilators, four windows, and two doors. The heating of the ward was by a coal stove, which was always a nuisance, the car being too hot or too cold, to say nothing of the filth from coal and ashes. The stove was too large for the compartment.

There was no isolation ward after the middle compartment was converted into a stateroom nor was there any venereal prophylaxis room. The latter was taken on the ground beside the car. No necessity arose for an isolation ward. Had such a contingency arisen a tent would have been used or cubical system employed until the case could have been sent to a hospital.

The sick-bay car was attached to the staff cars and was never taken to the front although the medical officer recommended that this be done.

Each train was equipped with a small, inadequate dispensary, 5 by 7 by 8 feet, most of the space being occupied by medicine lockers, bottle racks, and a stove to heat it and the next compartment. There were no bunks provided and it was impossible to properly examine a man in this room. Prophylaxis was given here as on the staff train.

Stations in battle.—The various medical officers always found dugouts near the position and equipped them as best they could under the circumstances. The hospital corpsmen of the train were in the dugout as assistants. The stretcher bearers were detailed from the crew. The usual apparatus used in handling the sick and wounded was the Army litter and such ambulances as were handy.

Hospital corps drill.—There was no drill or formations, as time was not at hand for such work. Six of the men were used as checkers

to help in unloading the large amount of material and rendered excellent service. They were drilled frequently in the application of first-aid dressing and splints and in transportation of wounded as well as in professional work.

General hygienic considerations, suggestions, and recommendations.—The general conditions could have been greatly improved at the very beginning and at no additional expense and no loss of time, but the general cry of one officer was that he would be ashamed to go to war with such elaborate equipment as an electrically lighted train. To my astonishnent this is just what we found the French using in their railway batteries. The general sanitary conditions were poor, but could not be easily remedied. There were too many men berthed in a car, but this could not be helped without the addition of another car, which was objected to, but such a condition should never be tolerated again. This report is being written in great haste on account of being ordered to leave in a very short time, and against time, for some of the trains did not get in until late and the data were not available.

Recommendations.—That more space per man be allowed in future berthing cars and that the cars be of better construction; that they be heated from a centrally located plant like those used on some of the older types of passenger cars (this would be more economical and more satisfactory for the proper distribution of heat, preventing a hot place near the stove and the rest of the car cold); that the train be lighted by a small lighting plant like the Delco type, kerosene being only used in emergency; that a car be provided for water like an ordinary oil tank car and connected to a compartment in another car fitted with bathing facilities with hot and cold water (this latter car should also have a clothes-drying room, delousing plant and gas disrobing room; this additional car can be handled easily, as the next battery will be without pits and the necessary construction material, since guns are now designed to shoot at high angles from the rail without pits); that one sick-bay car or at least adequate sick quarters be provided for such purposes for each train and provided with at least one isolation bunk and prophylaxis room; that each train be provided with ambulance of dependable make and of at least four-stretcher capacity; that in future wars medical officers be not detailed as censors or as gas-defense officers. This duty places upon them obligations not rightfully theirs and takes a considerable amount of their time that could be better utilized in studying subjects of strictly medical or surgical nature. The senior medical officer kept an accurate record of the time that he spent in censoring mail and it averaged little over an hour a day from the time that he landed in France until the date that the armistice was signed. It is believed that detailing a medical officer to such duty is the wrong

policy, but that it would not be objectionable for him to volunteer his services when he had time for such work.

SUBMARINE DIVISION FIVE.

By E. W. Brown, Lieutenant Commander, Medical Corps, United States Navy.

The organization in 1918 had consisted of the Bushnell and seven submarines. The division was based at Berehaven, Bantry Bay, Ireland, from February to November, 1918, and antisubmarine patrols were carried out from that point. During December, 1918, the base was located at Portland, England; for three weeks in January at Ponta Delgada, St. Michaels, Azores.

Overhaul periods.—From time to time submarines were at first assigned to H. B. M. dockyard at Haulbowline, Queenstown, for overhaul and later on to Plymouth. These overhaul periods covered six to eight weeks and served as intervals of comparative rest and recuperation for the officers and men. The usual schedule covered eight days at sea and seven days in port.

While there was some variation according to circumstances it was customary to submerge at daylight. It was the practice of the majority of the commanding officers to come up at noon for a sight, remaining on the surface for a half to one hour, advantage being taken of these intervals to ventilate the boat. Submergence would then be resumed until darkness.

Occasionally the dive would be entirely uninterrupted throughout the entire daylight period. In the case of the *L–3*, this was the rule. Continuous periods of submergence may be said to have varied from 6 to 18 hours, the longest single record period being 20 hours. Under certain conditions it was practicable to carry on a surface patrol during nearly all of the 24 hours.

Charging of batteries was carried out on coming to the surface after dark. Surface running was then continued until about daylight in fair weather. In heavy or foggy weather it was customary to run submerged at night to avoid the risk of being rammed.

HEALTH.

During the eight-day patrol periods all men under treatment for venereal disease were not only retained aboard the tender, but by order of the flotilla commander, were considered as admitted to the sick list. Such men were, however, detailed to perform duty if not incapacitated and therefore suffered forfeiture of pay during the period of treatment when the boats to which they were attached were actually cruising on patrol. This punitive measure, however, did not produce the desired result of a low rate of veneral admissions.

Syphilis.—It is again urged that a regulation be adopted transferring all men contracting syphilis from submarine to general service, as emphasized in the 1917 report. This should be done for two reasons: (1) Such cases may develop open lesions and under the conditions of close contact prevailing become a menace to the health of the command; (2) a course of treatment of not less than three years under the close supervision of a medical officer is essential. The proper management of the disease will tend to be more or less interrupted as submarines are frequently separated from the tender and cases are therefore not available for treatment. It is also obvious that the environment of a patient on submarine duty involves certain hardships which are not incidental to general service and is therefore not conducive to rapid response to treatment. In the British submarine service all syphilitics are, by regulation, promptly transferred to general service.

During the spring epidemic of influenza a considerable proportion of submarine crews was infected while on patrol—on certain boats one-third to one-half of the personnel. It is of interest to note that the bulk of these men were practically well before the patrol was completed. Commanding officers were carefully instructed in the first-aid care of such cases. In no instances were any patrols prevented or interrupted on account of the epidemic.

VENTILATION AND HEATING.

Submarines.—It was pointed out in another report that the torpedo and forward battery compartments in the *L–1*, *L–2*, *L–3*, and *L–4* have been provided with a positive air supply. The blowers were installed on the forward bulkhead of the central operating compartment with a duct leading to the forward battery and torpedo spaces.

This arrangement has continued to afford relief. There is still some complaint of offensive odor and a general stuffiness. It is believed that entire comfort could be afforded if the blowers were of larger capacity.

It should be noted that the *L–9*, *L–10*, and *L–11* have not been equipped with any arrangements for air supply to the two forward compartments. This situation should be remedied at the earliest opportunity as these three boats now suffer a marked disadvantage when cruising on the surface.

Fans in each compartment.—It is again urged that each compartment be provided with a desk fan of the usual type. Under surface conditions the chief factors in ventilation are physical rather than chemical. It is a question of overhauling, undue relative humidity, and air stagnation, with accumulation of odors, rather than the question of CO_2 and oxygen. The air should be kept in motion, and

such fans will prove a valuable adjunct to the ship's ventilation system. Particular attention is paid to this feature in the British submarine service.

The deleterious effects of oil fog in the engine room originating in the cylinder relief valves and crank pits has been previously commented upon. This condition predisposes men on watch to conjunctivitis and catarrah of the nasal passages. It is believed that the situation is in part indirectly responsible for the marked prevalence of ear complaints.

The elimination of this oil fog appears to be impracticable with this type of two-cycle Diesel engine. Oil fog appears to be a negligible factor in British submarines equipped with four-cycle engines. As our later classes of submarines are equipped with the four-cycle engine it will be of interest to ascertain the situation with respect to this question.

PREVALENCE OF PARTICULAR DISEASES.

The writer's experience of over three years with submarines has shown that diseases of ear and eye and intestinal stasis were characteristic of submarine duty under patrol conditions.

Ear affections.—The chief complaint among officers and men was with reference to the ear. The writer was very much struck with the large number of men presenting themselves for treatment. The symtom-complex in general was that of a mild middle-ear catarrh. In four instances it was necessary to permanently transfer men from submarines to the tender. While more prominent among machinist mates, it was also reported among the other ratings. As an instance, it may be stated at one time three ship's cooks were under treatment.

The probable causes of the conditions were discussed in the 1917 report. It is now believed that the air supply to the engines through the conning tower and induction valve is not sufficient to prevent a slight alternate air suction and release throughout the boat, which constitutes an additional factor. This induces a slight pull on the ear drum and is more noticeable in the two forward compartments.

This irritation, while very trifling, tends to have a cumulative effect over a period of months, particularly with ears presenting a history of previous injury or infection.

In a considerable proportion of cases there was a history of injury from diving or gunfire or ear trouble before entry into the service. In the case of men entering the submarine service with perfectly sound ears it is considered that serious trouble will not result. Greater care should be used, therefore, in ruling out candidates for submarines who have definite history of defective ears.

It was noted with great interest that diseases of the ear are not prominent in the British submarine service or not more so than in general service. This may in part be due to the lessened noise of the

four-cycle engine, the relatively slight oil fogging of the air, and the sufficient air inlet preventing suction in the air of the boat.

Eye affections.—A large number of cases of asthenopia or eye strain prevailed toward the end of a series of patrols. It is believed that this situation resulted from four factors, i. e., (*a*) excessive use of the eyes, (*b*) defective lighting, (*c*) refractive errors, and (*d*) glare. It was noted that the refractive errors were relatively slight in some cases. Reading was excessive owing to the monotony incident to patrol. The location of light was such that the eyes usually faced a bare filament and the light was not sufficiently intense to permit of excessive use without injury to eyes not normally strong.

Intestinal stasis.—The majority of the personnel were constipated during patrol, hence cathartics were in general use. While this tendency had always been marked, it was much more widespread, in fact, inevitable, under patrol conditions, due to lack of muscular activity and excessive consumption of an overconcentrated diet.

The situation could be improved by certain changes in the diet. The chief desideratum is a proper proportion of roughage. A number of officers have adopted the use of the agar-agar on patrol with uniformily satisfactory results. Bran bread is more effective; potatoes should be partially replaced by such vegetables as beets, spinach, asparagus, cabbage, and carrots, all of which have considerable residue.

GENERAL ROUTINE OF SUBMARINE PERSONNEL.

The average personnel consisted of 25 men and 3 officers. The watches for men were generally arranged for one in three; for officers one in four.

During patrol it was not practicable to provide facilities for men to get into open air on deck. In view of the state of the sea the bridge only was accessible and sufficient space was not available for more than the number of men required for watch duties. Not over six men were detailed for bridge watches. It will, therefore, be noted that the bulk of the personnel did not have access to the open air during the entire patrol period. In fact, daylight was not seen during this time.

The depressing effect of such a routine, the extreme physical inactivity, the monotony, and the tendency for officers and men to be on edge as a result of coming to the surface with the possibility of being sighted by the enemy can be readily imagined. The situation was that of 28 persons confined in an air space of about 300 cubic feet per man in artificial light for a period of eight days.

AIR PURIFICATION.

The sodalime purifiers were found to be quite satisfactory and were utilized on all boats during the longer periods of submergence. As

a rule two units were operated conjointly from the eighth to the twelfth hour, and replaced by two fresh units from the twelfth to the sixteenth hour, inclusive. A full separate report has been submitted with reference to the efficiency of air purifiers, hydrogen accumulation while submerged, hydrogen under charge conditions, and the arseniuretted hydrogen question.

Arsine tests carried out on the *L–1*, *L–2*, *L–3*, and *L–4* with mercuric chloride papers showed a slight positive reaction when submerged from one-half to one hour. On the *L–9*, *L–10*, and *L–11* negative reactions resulted after several hours' exposure. The personnel was carefully watched for symptoms of incipient arsine poisoning. but no indications were observed at any time.

USE OF OXYGEN.

The oxygen supply carried per boat is 1,000 cubic feet at atmospheric pressure, but oxygen was not employed during submerged patrols. There were a number of reasons for this practice. It was ascertained that an oxygen supply was not carried on British submarines, the advice of Dr. Haldane being followed in this respect. In his opinion the original oxygen of the contained air of the boat was sufficent for 24 to 36 hours, reliance in an emergency being placed upon the compressed air supply. It was known that British submarines of the H class carried on 20-hour submerged patrols for long routine periods without indications of oxygen insufficiency, this class having less free air space than the AL boats of the Submarine Division Five.

The most protracted periods of submergence on patrol reached 18 hours. This would mean a gradual reduction of oxygen percentage to about 15.5, as calculated on the basis of numerous actual tests aboard submarines.

In no instance was there any physiological indication of oxygen depletion. It is therefore considered a perfectly safe course to permit a gradual drop of oxygen to 15 per cent under the conditions prevailing in a submarine. The oxygen reserve carried was therefore regarded as a supply for an emergency condition. In view of the remote situation of the base of the submarine detachment the difficulties incident to frequent shipment and charging of oxygen cylinders were such that routine use of oxygen would not have been justified unless the requirement was of a definite nature.

ALTERATIONS OF SANITARY INTEREST.

Officers' quarters.—Permanent bunks for officers have been installed in the forward battery compartment and other conveniences in the form of lavatory arrangements, a messing table, etc.

Heads.—The proper location and management of heads has long been a problem in the boats of this division. During the first refitting period at Haulbowline, the heads were removed from the forward battery compartment—the main living space of the boat—and installed in the forward section of the engine room. To provide space for this change the boiler originally installed for the steam-heating system was removed, experience having shown that it was not practicable to operate the system under patrol conditions.

An air-expulsion system operating at considerable depths was installed, based on a design in successful operation in British submarines. This arrangement has satisfactorily disposed of the question of the sanitary disposal of human sewage and the accumulation of fecal odors, thus dispensing with a hand-pumping operation.

EXAMINATION OF SUBMARINE CREWS.

The entire personnel was physically examined within a few hours subsequent to the return from patrol. This examination covered two heads, i. e., (1) *objective*—heart and lungs, blood pressure, mouth and throat, etc., and (2) *subjective*—with reference to present state of health and to any complaints as to well-being during patrol, care being exercised to avoid leading questions.

PHYSIOLOGICAL EFFECTS OF PATROL CONDITIONS.

The following discussion is based on the examination of crews following 19 patrols:

1. *Respiratory effects.*—Officers and men were carefully questioned as to elapsed time submerged when shortness of breath or panting was first noticed. The majority of persons reported slight dyspnea on exertion after 10 hours, or at 2.5 per cent of CO_2; in a few instances at six hours, or 1.5 per cent CO_2; in a very few cases not before 15 hours, or at 3.75 per cent. There appears to be a considerable variation in the respiratory regulation for excessive CO_2 in the case of a few individuals analogously to the varying response to oxygen depletion as shown also in the examination of aviators when rebreathing their own air. A small proportion complained of greater effect when in the prone as contrasted with the upright posture.

It is of interest to note that a division of the British H class of submarines, basing at Berehaven, did not carry air-purification apparatus although submerged continuously for 15 hours daily on patrol. CO_2 estimations showed 3.5 to 3.75 per cent. While panting or exertion was reported, no decided inconvenience or cumulative effect was suffered.

2. *Pulse rate.*—Table No. 1 below presents the data for pulse rate.

Table No. 1.

Submarine.	Number of men examined.	Average pulse rate.	Average systolic.	Average diastolic.	Average pulse pressure.
L-1	17	94	125	76	49
L-2	23	88	123	81	42
L-3	16	90	138	72	56
L-3	21	90	126	75	52
L-3	22	87	128	81	46
L-3	21	76	116	61	53
L-4	21	96	136	81	54
L-4	26	76	126	78	50
L-4	22	79	128	59	69
L-4	16	89	126	78	48
L-10	23	91	116	68	46
L-10	21	85	122	79	47
L-10	19	85	122	78	45
L-10	16	89	124	80	43
L-10	18	91	135	79	55
L-11	12	85	118	75	43
L-11	12	82	117	78	39
L-11	15	91	125	79	45
L-11	16	74	134	74	60
Average	19	86	125	75	50

In 19 series of examinations representing 19 patrols averages were taken of pulse standing, systolic blood pressure, diastolic blood pressure, and pulse pressure.

The average standing pulse rate in 19 examinations following patrol varied from 74 to 96, with an average of 86. There was therefore a tendency to rapid pulse, which is considered to be an expression of general fatigue and nervous tension resulting from patrol conditions.

3. *Blood pressure.*—The systolic pressure varied from 116 to 138, with an average of 125; the diastolic from 59 to 81, with an average of 75; the pulse pressure averaged 50.

The systolic pressure showed a slight tendency to increase above normal; the diastolic about normal. The data are not sufficiently positive to have any particular significance.

4. *Headache, insomnia, and loss of appetite.*—These complaints were very frequent and mainly from the older men, particularly chief petty officers who had been assigned to submarines with a long record of patrols. Such symptoms were also more pronounced in boats carrying out the longer continuous submerged periods. This situation was prominent with reference to the *L-3*, as this boat did not ordinarily come to the surface at noon. The insomnia and loss of appetite were more apt to be felt after the first three or four days of the patrol. During the earlier patrols these complaints were not marked.

The headache in many instances was symptomatic of constipation. The latter condition, as already pointed out, was the rule. Cathartics were in general use during patrol periods.

5. *Deterioration of officers and men.*—This gradually developed as patrols proceeded. While in general not of a serious nature, it was indicated by loss of weight, pallor, the expression of the features, and general loss of tone, all the inevitable result of the monotony, defective atmospheric conditions, lack of bathing facilities, environment of artificial lighting, and a state of high nervous tension incident to antisubmarine warfare. The personnel tended to return from patrol in a fatigued condition, requiring two or three days for complete recuperation. The British submarine service had early recognized this state of affairs and the need for the adequate conditioning of the personnel by proper facilities at the base for comfort and recreation as well as frequent leave periods.

It was occasionally found necessary in the case of men debilitated by digestive, bronchial, and other affections to relieve from patrol assignment although not actually transferred to the tender. In the great majority of cases complete recovery resulted in two or three months and patrol duty was resumed. The important point was to keep a sharp lookout for such individuals and begin conditioning before they became actually unfit for duty.

PRELIMINARY NOTE ON THE PREPARATION OF ANTI-HUMAN AMBOCEPTOR.

By G. F. CLARK, Lieutenant Commander, Medical Corps, United States Navy, and A. J. MOUTON, Chief Pharmacists' Mate, United States Navy.

In the routine preparation of anti-human amboceptor at the United States Naval Medical School we have made some observations which we feel may be of interest. We have immunized rabbits to the different groups of red corpuscles according to the Moss method of grouping, using cells from those falling into Groups II, III, and IV, but none from Group I.

The results were as follows:

(1) 9 rabbits immunized with cells from Group II:
- 5 rabbits furnished serum of titer 1 to 2000 (1 mm. by 5 mm. on paper).
- 2 rabbits furnished serum of titer 1 to 1000.
- 2 rabbits furnished serum of titer 1 to 750.

(2) 6 rabbits immunized with cells from Group III:
- 1 rabbit furnished serum of titer 1 to 2000.
- 1 rabbit furnished serum of titer 1 to 1000.
- 4 rabbits furnished serum of titer 1 to 250.

(3) 4 rabbits immunized with cells from Group IV:
- 1 rabbit furnished serum of titer 1 to 1000.
- 2 rabbits furnished serum of titer 1 to 750.
- 1 rabbit furnished serum of titer 1 to 500.

133354—19——15

It is realized that our series is a very small one for drawing any conclusions, but we feel that further work is at least suggested. The rabbits immunized with Group II cells gave almost uniformly good results.

The following method was used for immunization:

It consists in making weekly injections of a suspension of human red cells of the particular group. The cells must be thoroughly washed to free them from all traces of serum. If this is not done the animal may die of anaphylaxis during the course of immunization. The animal is bled five days after receiving last injection. The doses being—

First dose.—5 c. c. 10 per cent corpuscles suspension intravenously.
Second dose.—5 c. c. 10 per cent corpuscles suspension intravenously.
Third dose.—5 c. c. 10 per cent corpuscles suspension intravenously.
Fourth dose.—5 c. c. 10 per cent corpuscles suspension intraperitoneally; 2 hours later, 5 c. c. 10 per cent corpuscles suspension intravenously.
Fifth dose.—10 c. c. 10 per cent corpuscles suspension intravenously.

In the rabbits of Groups III and IV which showed low titer we tried giving two additional injections of 10 c. c. of 10 per cent suspension of Group II cells (one intraperitoneal and 1 intravenous at an interval of five days). The Group II cells seemed to cause an increase in the titer of the serum from animals immunized primarily with Group IV cells, so that the titer of the serum from two animals rose from 1 to 750 to a dilution of 1 to 1500, while two primarily injected with Group III showed no response.

We made the titrations of serum with cells of Groups II, III, IV, and no differences in the titrations with 10 different sera; that is. each serum gave the same titration with each of the three groups of cells.

REPORT OF THE PSYCHIATRIC DIVISION ON RECRUITS ENTERING INCOMING DETENTION CAMP.

By F. L. McDaniel, Lieutenant, Medical Corps, United States Navy.

The following statistical data cover only that part of the work done by this division concerned with the examination of recruits at the detention camp, United States Naval Training Station, Hampton Roads, Va. Complete and accurate records are on file for the period from July 1, 1918, to June 30, 1919, inclusive.[1] Each man was given both a neurological and psychological examination and the records of each examination were kept separate and distinct. For this reason it should be noted that in some cases the same man was held up on account of both neurological findings and for psychological reasons. This correlation is mentioned in the body of the report.

[1] See Lieut. L. E. Bisch's "A Routine Method of Mental Examination for Naval Recruits." U. S. Nav. Med. Bull., Vol. XIII, No. 2.

It is interesting to note that all these 12,750 men were volunteers and were probably of the better type, as a whole, physically and otherwise. These men had also been passed by the various regular Navy recruiting stations of the country. For this reason the fact that 247 men out of 12,750 were surveyed is relatively a high per cent. These men were all surveyed before they had been outfitted, thereby saving the Government about $100 on each recruit, or a total of approximately $24,700. However, this monetary saving occupies a very unimportant position when it is considered that these men were eliminated before they had time to become a menace to themselves and to the service. The work done in the detention camp was under the direct supervision of the neurologist, Lieutenant (T.) C. F. Graham, Medical Corps, U. S. N., the psychological work being handled by a corps of psychological testers under direction of Pharmacist's Mate, Third Class, H. F. Corrigan, U. S. Navy, who served as psychologist of the division. All diagnoses were confirmed after an intensive examination by the director of the psychiatric division.

ANNUAL REPORT OF NEUROLOGICAL EXAMINATIONS, INCOMING DETENTION CAMP, UNIT "X," FOR THE FISCAL YEAR ENDING JUNE 30, 1919.

The following is a complete statement regarding neurological tests given and work done by the psychiatric division, Unit "X" for the fiscal year ending June 30, 1919:

Men having neurological examinations	13,021
Men held for intensive examination	480
Men recommended for survey	194
Returned to duty	286
Referred to G. U. Dept.	172
Referred to hospital	1

Of the total 13,021, regular enlisted men numbered 12,750; limited service (drafted) colored mess attendants (stevedores), 271. Owing to the fact that stevedores were outfitted regardless of neurological findings and passed, work being done on them for record only, our percentages will be based on 12,750 as a total. In the case of the percentage of men referred to the G. U. department, it is based upon 9,748 men as a total, due to the fact that this division did not begin to refer men to that department until September 1, 1918.

The following is a statement in terms of percentage on total number of regular enlisted men (12,750) having neurologicals this year:

Intensively examined (approximately)	0.03764
Recommended for survey (approximately)	.01521
Released to duty (approximately)	.02243
Referred to G. U. department (approximately)	.01764

The following is a table showing different diagnoses made on the 194 men recommended for survey out of the 480 men originally

held over due to neurological findings by the psychiatric division, Unit "X," giving number for each diagnosis and also percentages on basis of those recommended for survey (194) and on basis of total examined (12,750). In the case of the last diagnosis, "malingering," patient was not recommended for survey, but is the case that was sent to hospital for observation and final disposition.

Approximate percentages on basis of those surveyed (194).	Number and conditions on account of which surveys were recommended.	Approximate percentages on basis of those examined (12,750).
0.39175	76 Syphilis (or of nervous system)	0.00596
.18041	35 Constitutional inferiority	.00275
.09794	19 Epilepsy	.00149
.09278	18 Neurosis of bladder	.00141
.08247	16 Imbecility	.00125
.04123	8 Hysteria	.00063
.03608	7 Neurasthenia	.00055
.01546	3 Paralysis of ocular muscle	.00024
.01031	2 Constitutional psychopathic state	.00015
.01031	2 Stammering	.00015
.01031	2 Stuttering	.00015
.00515	1 Facial paralysis	.00008
.00515	1 Sunstroke (chronic)	.00008
.00515	1 Psychasthenia	.00008
.00515	1 Dementia paralytica	.00008
.00515	1 Dementia praecox	.00008
.00515	1 Malingering	.00008
	194 Total—17 types of diagnoses.	

Here I wish to state that 15 of the 16 cases diagnosed imbecility and 14 of the 35 diagnosed constitutional inferiority were held over for intensive examination on account of failure on preliminary psychological tests as well as due to neurological findings. The neurological and psychological also correlated in four other cases; to wit, one constitutional psychopathic state, one stuttering, one epilepsy, and one neurasthenia. It is interesting also to note that a number of men recommended for discharge on account of imbecility and constitutional inferiority gave a weakly positive (1 to 2 plus) blood Wassermann, and also a few of the neurosis of bladder cases. In the case of the 76 diagnosed syphilis, all were held over due to neurological findings and gave a 3 or 4 plus blood Wassermann, or two successive 1 to 2 plus blood Wassermanns taken at least one week apart. This report, other than as previously stated where conjointly held both due to neurological findings and to failure on preliminary psychological tests, includes only men originally held over on account of neurological findings and does not include any referred to the division by regimental surgeons or others. The annual psychological report is to be made separately and by another member of the division. (C. F. Graham, *Lieutenant Medical Corps, U. S. Navy.*)

ANNUAL REPORT OF PSYCHOLOGICAL EXAMINATIONS, INCOMING DETENTION CAMP, UNIT "X" FOR THE FISCAL YEAR ENDING JUNE 30, 1919.

The following is a complete statement regarding psychological tests given and work done by the psychiatric division Unit "X," for the fiscal year ending June 30, 1919.

Men having psychological examinations	13,021
Men held for intensive examination	279
Men recommended for survey	86
Men returned to duty	193

Of the total 13,021, regular enlisted men numbered 12,750; limited service (drafted) colored mess attendants (stevedores), 271. Owing to the fact that stevedores were outfitted regardless of psychological finding and passed, work being done on them for record only, our percentages will be based on 12,750 as a total.

The following is a statement in terms of percentage on total number of regular enlisted (12,750) having psychologicals this year:

Intensively examined (approximately)	0.02188
Recommended for survey (approximately)	.00674
Released to duty (approximately)	.01514

The following is a table showing, by months, highest, lowest and average score on the preliminary psychological tests by the 12,750 regular enlisted men and the general average for fiscal year ending June 30, 1919:

Month.	Year.	Highest score.	Lowest score.	Average score (all scores taken into account).
July	1918	77	15	49.14
August	1918	76	8	49.11
September	1918	84	18	53.30
October	1918	80	20	51.50
November	1918	73	23	60.94
December	1918	80	18	51.83
January	1919	77	15	50.00
February	1919	80	11	47.61
March	1919	76	10	46.73
April	1919	59	16	37.30
May	1919	80	8	46.66
June	1919	84	11	46.35
General average fiscal year ending June 30, 1919	.....	84	8	49.14

EXPLANATORY NOTE.

Highest score possible	84
All designated superior above	65
All designated average	40–65
All designated inferior below	40
Failure (except mess attendants pass at 25) below	30

The following is a table showing different diagnoses made on the 86 men recommended for survey out of the 279 men originally held over, due to failure on the preliminary psychological tests by the psychiatric division, Unit "X," giving number for each diagonsis and also percentages on basis of those recommended for survey (86) and on basis of total examined (12,750):

Approximate percentages on basis of those surveyed (86).	Number and conditions on account of which surveys were recommended.	Approximate percentages on basis of those examined (12,750).
0.62790	54 Imbecility	0.00423
.30233	26 Constitutional inferiority	.00203
.03488	3 Constitutional psychopathic state	.00024
.01163	1 Stuttering	.00008
.01163	1 Epilepsy	.00008
.01163	1 Neurasthenia	.00008
	86 Total—6 types of diagnoses.	

The psychological tests and neurological state correlated in 33 cases as follows: In 15 of the 54 cases diagnosed imbecility, 14 of the 26 diagnosed constitutional inferiority, and one in each of the following: Constitutional psychopathic state, stuttering, epilepsy, and neurasthenia. The men were held over for intensive examination on account of neurological findings as well as due to failure on preliminary psychological tests. The majority of the 54 cases diagnosed imbecility were not definite imbeciles, but of the *moron type*, being diagnosed imbecility in order to conform to U. S. Navy nomenclature of diseases. This report, other than as previously stated where conjointly held both due to failure on the preliminary psychological tests and to neurological findings, includes only men orignally held over on account of failure or poor performance on preliminary psychological tests and does not include any referred to the division by regimental surgeons and others. The annual neurological report is to be made separately by the neurologist of the division. (H. F. CORRIGAN, *Pharmacist's Mate, Third Class, U. S. Navy.*)

REPORT OF BACTERIOLOGICAL EXPERIMENTS WITH ACRIFLAVINE.

By H. B. LA FAVRE, Lieutenant, Medical Corps, United States Navy.

In the laboratory of this hospital,[1] due to lack of sufficient time and the difficulty experienced in procuring the essential materials for experimentation, we did not attempt any elaborate original work on acriflavne. All of our efforts were simply directed toward sub-

[1] U. S. Navy Base Hospital No. 6, Brest, France.

stantiating to our own satisfaction the results obtained by others who have worked with the drug. Our conclusions are as follows:

(*a*) That it seems to exert a specific bactericidal action upon the gonococcus. That it, like most dyes, is selective in its action, and that this selective action extends also to the staphylococcus and streptococcus. The few opportunities which we have had to experiment with it against the Spirochaeta Vincenti seem to indicate that it has little or no affinity for this microorganism.

(*b*) That it will inhibit the growth of the gonococcus upon culture media in dilutions as high as 1:250,000.

(*c*) That it is about four times more efficient when diluted with serum than when allowed to exert its action in salt solution.

(*d*) That it has the property of penetrating rapidly the body tissues and that this penetration takes place more readily and extends to a greater depth on mucous membranes than on any other tissue.

(*e*) That, to some extent, it disintegrates leucocytes when allowed to act upon them for several hours.

(*f*) That it is nontoxic for animals and may be injected intravenously in considerable quantities without harmful effects. When so injected it is eliminated by the kidneys.

(*g*) That it seems to destroy the treponema pallidum instantaneously. In this latter experiment we observed its action under dark field illumination. A 1:100 solution of the drug when passed under the cover glass caused all motion of the spirochaetes to cease instantly, and there followed in a few minutes a complete disintegration of the organisms. We are of the opinon that further investigation of this phenomenon is justified with a view to determining whether acriflavine might not be an effective prophylactic against syphilitic infection.

The rapid disappearance of the gonococci from the secretions of patients, following injections of acriflavine, has suggested the possibility that there may occur between the drug and the proteins contained within the bodies of the microorganisms a chemical reaction, which in some way prevents their being stained by our laboratory dyes and that they thus may escape the eye of the examiner. This possibility is at present undergoing further study in our laboratory.

REPORT ON THE USE OF ACRIFLAVINE IN THE TREATMENT OF GONORRHEA.

By C. M. Burchfiel, Lieutenant, Medical Corps, United States Navy.

The use of acriflavine in the treatment of gonococcus infection of the urethra during the past two months at the U. S. Navy Base Hospital No. 5, Brest, France, has lead us to believe that this drug pos-

sesses more desirable properties and higher antiseptic values than the silver salts commonly used in the treatment of this disease. Acriflavine is highly toxic to the gonococcus and possesses a higher degree of power to penetrate the deeper structures of the urethra and the bladder. Harrell in his article, "Acriflavine in the Treatment of Gonorrhea" (The Journal of Urology, August, 1918), stated that acriflavine would inhibit the growth of the gonococcus in protein-containing media in a dilution of 1:300,000, having 600 times the strength of protargol. He also showed that this drug was nontoxic, possessed a high degree of diffusibility, and would readily penetrate through the submucosa of the urethra and bladder.

The drug used at this hospital was obtained from Poulenc Frères, Paris, and is sold under the French name of "Gonacrine." It is a diamino-methyl-acrifinum-chloride.

In anterior cases 3 or 4 c. c. were injected into the anterior urethra, the patient retaining it about five minutes. In the posterior cases there were three or four syringefuls injected through into the bladder, distending the urethra. The patient retained the dye in the urethra for five minutes and in the bladder until next voiding. Injections were given twice a day until all organisms had disappeared and discharge had become distinctly serous and then usually one injection a day until patient was considered well.

The strength of the solutions used varied from 1:1,000 to 1:10,000. With the stronger solutions there has been some smarting and burning for an hour or more, but it has never been severe and we have had no patient object to the treatment.

Our standards for cessation of treatment have been no discharge for several days, a negative prostatic smear, and the urine showing all three glasses clear, except for possibly a few shreds in the first glass.

Owing to our cases having been discharged to duty and many having returned to the United States we have been unable to follow all cases, but five were seen at times varying from one week to one month after cessation of treatment and none of the five had had a recurrence and examinations were negative.

Results.—We have frequently seen the organisms disappear from the discharge after four or five injections and the smears remain negative during the subsequent course of the disease. In a few cases the organisms have disappeared and have been found again, but have soon disappeared and remained negative under continued treatment.

The discharge is rapidly decreased and soon becomes thin and serous in character.

Some of the dye remains in the urethra for a long time, for at the end of 24 hours the urine is definitely yellow and fluorescent and the discharge is stained yellow.

Case No.	Stage of disease.	Duration of treatment.	
		Anterior cases.	Posterior cases.
		Days.	*Days.*
1	4 days	15	.....
2	3 months	.....	24
3	18 days	.....	22
4	Unknown	.....	28
5	13 days	.....	40
6	4 days	13	.....
7	2 days	13	.....
8	2 months	.....	29
9	5 weeks	.....	14
10	4 weeks	.....	16
11	4 months	.....	35
12	4 days	20	.....
13	1 month	.....	19
14	2 weeks	.....	13
15	2 months	.....	24
16	4 weeks	.....	26
17	5 weeks	.....	37
18	4 months	.....	21
19	3 weeks	.....	32
20	10 days	13	.....
21	5 days	19	.....
22	2 days	18	.....
23	2 days	8	.....
	Average	14⅛	25⅓

Case 1.—This patient gave a history of a urethral discharge of four days' duration, which began about five days after exposure. Examination showed a profuse purulent urethral discharge, which on smear showed numerous extra-cellular and intracellular Gram-negative diplococci; third glass clear. Patient was placed on anterior injections of acriflavine 1:1000 twice daily. On the fourth day the discharge was serous but moderately profuse and apeared to be largely a chemical or an irritative discharge, smears showing only epithelial cells and mucus and no organisms or pus cells. On the seventh day of treatment the discharge was slight and distinctly serous. Treatment was discontinued. Two days later the discharge was slightly more profuse and of a seropurulent character; smear positive for Gram-negative diplococci, which were few in number. He was then placed on anterior injections of acriflavine 1:5,000 twice daily. On the second day discharge was less and the smear negative for organisms and pus cells. Four days later there was only a serous "morning drop"; few shreds in the first glass; second and third glasses clear. Anterior injections 1:5,000 once daily. On the fifteenth day after treatment was first begun there was no discharge and only a few fine shreds in first glass. Treatment discontinued. Patient was seen one week later and had remained well.

Case 2.—This patient gave a history of having had gonorrhea for three months, during which time he was under treatment with injections of protargol and irrigations of potassium permanganate, except during the acute stage of epididymitis. Examination showed a profuse urethral discharge; smear positive; all three glasses cloudy. He was given posterior injections of acriflavine 1:5,000. On the thirteenth day the discharge was greatly decreased; smear negative for organisms; third glass clear. No discharge on fifteenth day; second and third glasses clear. On the twenty-fourth day of treatment patient was discharged to duty with only a few shreds in the first glass and having had no discharge for eight days.

Case 3.—Had had gonorrhea for 18 days with treatment with silvol, 20 per cent, and irrigations of potassium permanganate. Examination showed profuse discharge; smear positive; all three glasses cloudy. He was given posterior injections of acriflavine 1:5,000. On the seventh day there was no discharge; second glass faintly cloudy; third glass clear. On the twenty-second day all three glasses were clear and there had been no discharge for six days. Treatment discontinued.

Case 4.—History of frequent painful urination and a profuse urethral discharge beginning 13 days after exposure. Also history of gonorrhea four months previously. Examination showed a profuse serosanguinous discharge; smear positive; all three glassess cloudy. Patient was placed on posterior injections of acriflavine 1:5,000. After the second day smear was repeatedly negative for organisms. On twelfth day there was a moderately profuse serous discharge; second and third glasses clear. Injections were then given only once daily. On seventeenth day there was still a serous discharge negative for organisms and pus cells. Acriflavine 1:10,000 daily. On the twenty-eighth day of treatment there was no discharge and all three glasses were clear.

Case 5.—History of mild epididymitis and a profuse urethral discharge of 13 days' duration; also history of gonorrhea two years previously. Examination showed a slightly swollen left epididymis and a profuse purulent discharge. All three glasses were cloudy. Patient was given posterior injections of acriflavine 1:5,000. On eighteenth day smear was negative for organism and the third glass was clear. On the twentieth day the smear was again positive and all three glasses cloudy. On the thirtieth day of treatment there was no discharge and the second and third glasses were clear. On the fortieth day all three glasses were clear and there had been no discharge for 10 days. To duty.

Case 6.—History of gonorrhea of four days' duration. Examination showed a moderately profuse discharge; smear positive for Gram-negative diplococci; second glass contained a few shreds; third

glass clear. Patient was given anterior injections of acriflavine 1:1,000 twice daily. On third day the smear was negative for organisms. Patient complained of burning after injections and he was put on 1:5,000. On the tenth day there was no discharge and glasses two and three were clear. On the thirteenth day the patient was discharged to duty with a few shreds in first glass and having had no discharge for three days.

Case 7.—This patient gave a history of gonorrhea of two days' duration and a discharge beginning about five days after exposure. Examination showed a slight urethral discharge with numerous organisms on smear; glass one cloudy; glasses two and three clear. He was given anterior injections twice daily of 1:1,000. On the third day smear was negative for organisms but patient also complained of burning with and following the injections. He was placed on 1:5,000. On the eighth day there was no discharge. Patient was discharged to duty on the eleventh day, a few fine shreds in the first glass and having had no discharge for three days.

Case 8.—The patient gave a history of gonorrhea of two months' duration and an epididymitis of first one side and then the other. Examination showed a slight urethral discharge; smear positive and all three glasses cloudy. He was given posterior injections 1:5,000. Smears remained negative after the second day; discharge ceased on the eighteenth day, and glasses two and three were clear on the twenty-fifth day. Treatment was discontinued on the twenty-ninth day.

Case 9.—History of a double epididymitis and gonorrhea of five weeks' duration. Examinations showed a moderately profuse discharge; smears positive and all glasses cloudy. He was given posterior injections twice daily of 1:5,000 acriflavine. Smears remained negative after the tenth day; third glass clear. On the twelfth day there was no discharge and glasses two and three were clear. Treatment was discontinued on the fourteenth day; all glasses clear.

Case 10.—This patient had a history of a left epididymitis and gonorrhea of four weeks' duration. Examination showed a moderately profuse urethral discharge. Smears were positive and all glasses cloudy. He was given posterior injections of 1:5,000 acriflavine twice daily. Smears remained negative after the ninth day; glasses two and three clear on the twelfth day. On the sixteenth day all glasses were clear and treatment was discontinued. Patient was discharged to duty one week later, apparently cured.

Case 11.—History of gonorrhea for four months with intermittent treatment. Also history of gonorrhea one year previously. Examination showed slight discharge with numerous diplococci on smear. All glasses were cloudy. Patient was given posterior injections of 1:5,000 twice daily. On the fourth day he complained of intense

burning with and following injections. There was a moderately profuse serous discharge, smears of which were negative for organisms. Treatment was discontinued for two days and then started again with 1:5,000 twice daily. Smears were negative after the seventh day. There were no discharges and glasses two and three were clear after the twenty-ninth day. After 35 days of treatment patient was discharged to duty, with only a few shreds in the first glass.

Case 12.—History of gonorrhea of four days' duration. Examination showed a slight urethral discharge; smears positive; third glass clear. He was given anterior injections of 1:5,000 twice daily. Smears were negative for organisms after the seventh day. Discharge ceased on the twelfth day and treatment was discontinued on the twentieth day with all three glasses clear. Patient was seen one month later and had remained well.

Case 13.—Patient had an epididymitis of left side and gonorrhea of one month's duration. Examination showed slight swelling and tenderness of left epididymis, an urethral discharge, smears which were positive for diplococci, and all glasses were cloudy. He was given posterior injections of 1:5,000. There was no discharge after the ninth day and glasses two and three were clear on the nineteenth day.

Case 14.—Gave a history of a urethral discharge of two weeks' duration. He gave also a history of an attack of gonorrhea each year for four years previous. Examination showed a purulent urethral discharge; smears positive for Gram-negative diplococci and all glasses cloudy. He was given posterior injections of 1:5,000. Smears remained negative for organisms after the fourth day; discharge ceased on eighth day, and patient was discharged to duty on the thirteenth day with a few shreds in first glass. Patient was seen three weeks later and had remained well.

Case 15.—History of epididymitis and a gonorrhea of two months' duration with intermittent treatment with protargol. Examination showed a urethral discharge. Smears were positive and all glasses cloudy. He was given posterior injections of 1:5000. Smears were negative for organisms after the second day. Discharge became serous, and after the fifth day posterior injections of 1:10,000 were given once daily. Discharge ceased on the sixteenth day and treatment was discontinued on the twenty-fourth day with glasses two and three clear.

Case 16.—Gave a history of a gonorrhea of five weeks' duration under treatment with protargol. Examination showed a slight discharge; smear positive and first two glasses cloudy. Patient was given posterior injections of 1:5,000. After the twelfth day smears remained negative for organisms and glasses two and three were

clear. Treatment was discontinued on the twenty-sixth day, urine showing only a few shreds in first glass.

Case 17.—History of a gonorrhea of five weeks' duration with intermittent treatment. Examination showed a urethral discharge, smears of which were positive for gram negative diplococci. All glasses were cloudy. He was placed on 1:5,000 posterior injections. Smears remained negative; third glass clear after fifteenth day. Glasses two and three remained clear after the twenty-eighth day. Discharge ceased on the thirty-first day and treatment was discontinued on the thirty-seventh day.

Case 18.—Gave a history of a gonorrhea with intermittent treatment for four months. Examination show a slight discharge; smear positive and all glasses cloudy. Patient was given posterior injections, 1:5,000. On the third day smear was negative and there was a slight watery discharge. Patient complained of burning following injections. He was given 1:10,000 posterior injections twice daily. Glasses two and three were clear and discharge ceased on the fifteenth day. Treatment discontinued on twenty-first day, urine showing only a few shreds in first glass.

Case 19.—Patient was admitted with gonococcus infection of epididymis and a history of gonorrhea of about three weeks' duration. Four days later examination showed a subsiding epididymitis, a profuse urethral discharge, smears of which were positive for Gram-negative diplococci. Urine showed all three glasses cloudy. He was given posterior injections of 1:5,000. On the sixteenth day the discharge was slight and serous in character; smear negative for organisms; third glass clear but patient complained of burning following injections and the strength of the solution was cut down to 1:10,000. There was no discharge on the twenty-fourth day, and the second and third glasses of urine were clear. On the thirty-second day all three glasses were clear.

Case 20.—Gave a history of gonorrhea of 10 days' duration; had had treatment with 10 per cent silvol but no treatment for four days previously. Examination showed a moderately profuse discharge, smear showing numerous Gram-negative diplococci. Third glass of urine was clear; a few shreds in the second glass. Patient was placed on anterior injections of 1:5,000 twice daily. Smears remained negative after the third day and on the ninth day there was no discharge. On the thirteenth day all three glasses of urine were clear and treatment was discontinued. This patient was seen three weeks later and examinations were still negative.

Case 21.—This patient gave a history of a urethral discharge of five days' duration. Urethral smear was positive. There were a few shreds in the second glass; third glass clear. He was given anterior

injections of 1:5,000. Smears were intermittently positive until the fourteenth day. There was no discharge after the sixteenth day and treatment was discontinued. On the nineteenth day the first glass of urine contained a few shreds; second and third glasses clear.

Case 22.—This patient gave a history of an exposure a week previously and a discharge for two days. Examination showed second and third glasses clear, and the urethral smear positive for Gram-negative diplococci. He was given anterior injections of 1:1,000 twice daily, but on the fourth day complained of an intense burning following injections, and he was placed on 1:5,000 injections. Smears were intermittently positive until the eleventh day. Discharge ceased on the fifteenth day. Treatment was discontinued on the eighteenth day, the urine showing only a few shreds in the first glass.

Case 23.—Gave a history of a urethral discharge of two days' duration. Examination showed a slight urethral discharge. Smears were positive for Gram-negative diplococci and the third glass was clear. Patient was given anterior injections 1:2,000 twice daily. There was no discharge after the third day and the urine showed all glasses clear on the fifth day. Treatment was discontinued on the eighth day and the patient was discharged to duty, having had no discharge for five days and the urine showing all glasses clear.

CONCLUSIONS.

1. Acriflavine is highly toxic to the gonococcus.
2. It is only slightly irritating and causes a minimum of injury to the urethral membranes.
3. It possesses to a high degree the power of penetrating to the deeper structures of the urethra so frequently involved in this disease.
4. The average duration of a case of gonococcus infection of the urethra under this treatment is less than that with the usual methods.

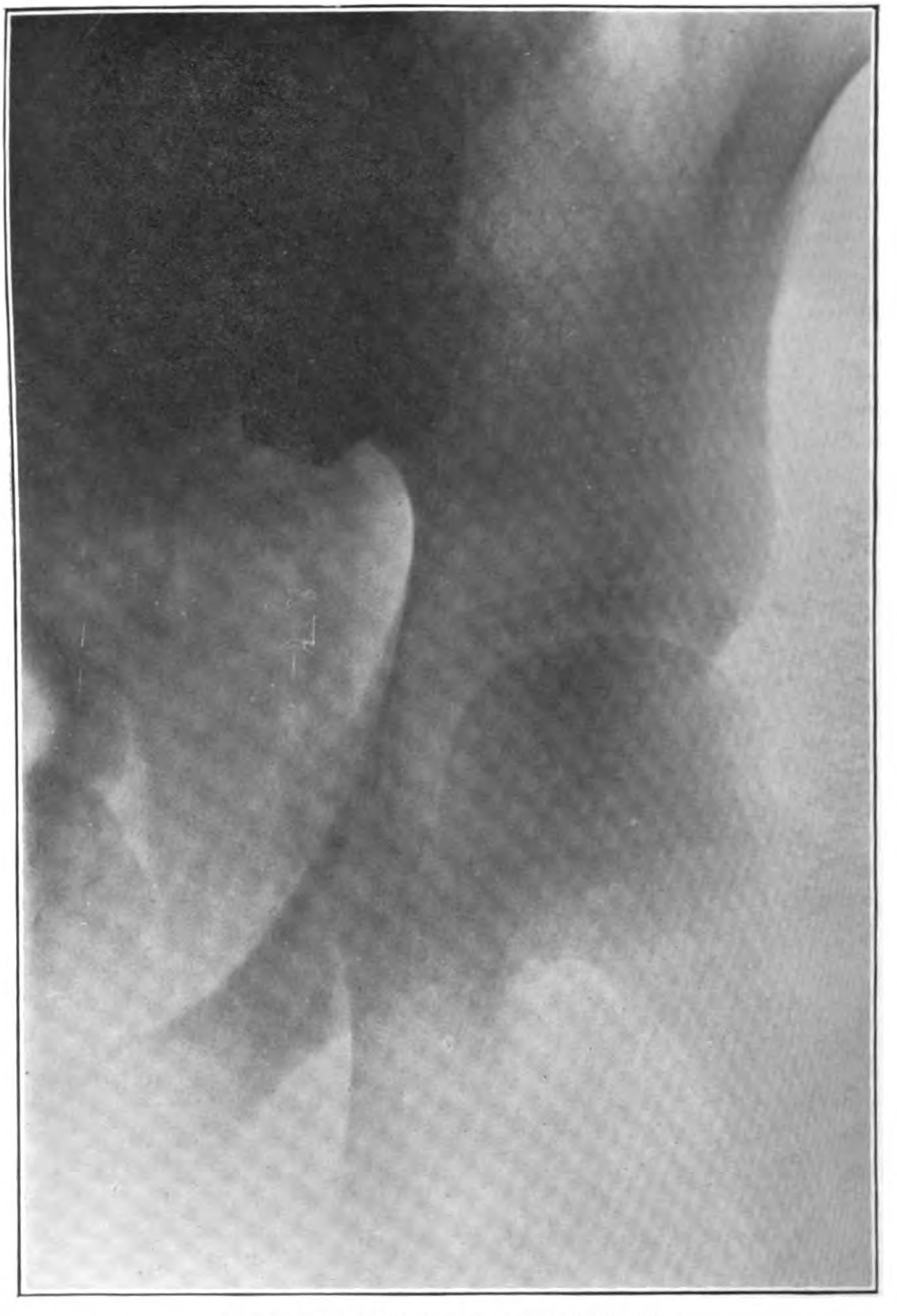
THE ARMY BEDSIDE X-RAY UNIT.

By H. R. COLEMAN, Lieutenant, Medical Corps, United States Navy.

The U. S. Army Bedside Unit is a small X-ray plant, which was devised by the Army for use in the evacuation hospitals along the front lines. This so-called bedside unit is fully described in the new U. S. Army X-ray Manual, which is just now off the press. For the benefit of those who have not had the opportunity of seeing this manual a short description of the apparatus will be given. The unit consists of a cabinet 36 inches high, 17 inches wide, and 19 inches deep, mounted on four rubber-tired castors 4½ inches in diameter. To the back of the cabinet is fastened a counterbalanced tube stand, which holds a small Coolidge tube (radiator type), devised especially to operate on this unit.

Fracture of lower leg and ankle joint shown by bedside X-ray outfit.

866-1



Hip joint and pelvis taken with bedside X-ray outfit.

866–2

The cabinet is divided into two compartments. The upper compartment contains an oil-immersed, high-tension transformer constructed to take 110 volts alternating current line current, and convert it into the higher voltages required in operating the tube. The high-tension transformer case also contains a small step-down coil for reducing 110 volts alternating current to 12 volts alternating current, the current required for lighting the filament of the Coolidge radiator tube. The lower compartment houses another small step-down transformer, which is used when the only available currents are 220 or 154 volt alternating current. It reduces this current to 110-volt alternating current, which is the required voltage for delivery to the high-tension transformer in the upper compartment. If direct current is the only available supply, the step-down transformer is removed from the lower compartment and replaced by a rotary converter, which takes 220 or 110 direct current from the supply and delivers 110-volt alternating current line current to the high tension transformer.

From the above it will be seen that this unit is devised to operate directly on a 110-volt alternating current line current, and the step-down transformer and rotary converter are really accessories. When the only available current is high-voltage alternating current, the step-down transformer is used. If the supply current is direct current, the step-down transformer is replaced by a rotary converter; thus these two so-called accessory parts make this unit available for use on all commercial currents.

The tube stand is so constructed and counterbalanced that it permits the placing of the tube in any desired position. It also permits of considerable horizontal extension, which enables the operator to place the tube either over or under the ordinary hospital bed.

The tube is a new type of Coolidge tube. It is fitted with a radiator on the anode stem and so constructed that it completely suppresses each alternate half wave, thus eliminating any mechanical rectifying apparatus. It is designed to handle 10 milliamperes with a 5-inch spark gap. The milliamperage is under the direct control of the filament current, which in turn is regulated by a German silver resistance wire connected in series with the filament current line. This Coolidge radiator tube is constructed with an extremely fine focus, giving excellent detail to bone plates.

The tube is incased in a leaded glass tube holder, which has an aperture 1¼ inches in diameter, through which the focal rays pass. The holder in turn fits into two wooden clamps on the tube stand. A 30-foot extension line leading from the cabinet for attachment to any convenient socket, a milliampere meter connected in the high-tension circuit and set in the top of the cabinet, and a push-button switch for turning on and off the current supply complete the unit.

This unit has been very useful to us [1] in the treatment of the fracture cases in our surgical wards, as it does away entirely with the transportation of these cases either by litter or carriage to and from the X-ray room. The comparatively light weight of the unit and its mounting on rubber-tired wheels facilitates its easy movement about the hospital, while the adjustable tube stand permits the tube to be placed in any position, thus allowing us to make roentgenograms of our fracture cases, which we are treating by suspension without disturbing any of that apparatus.

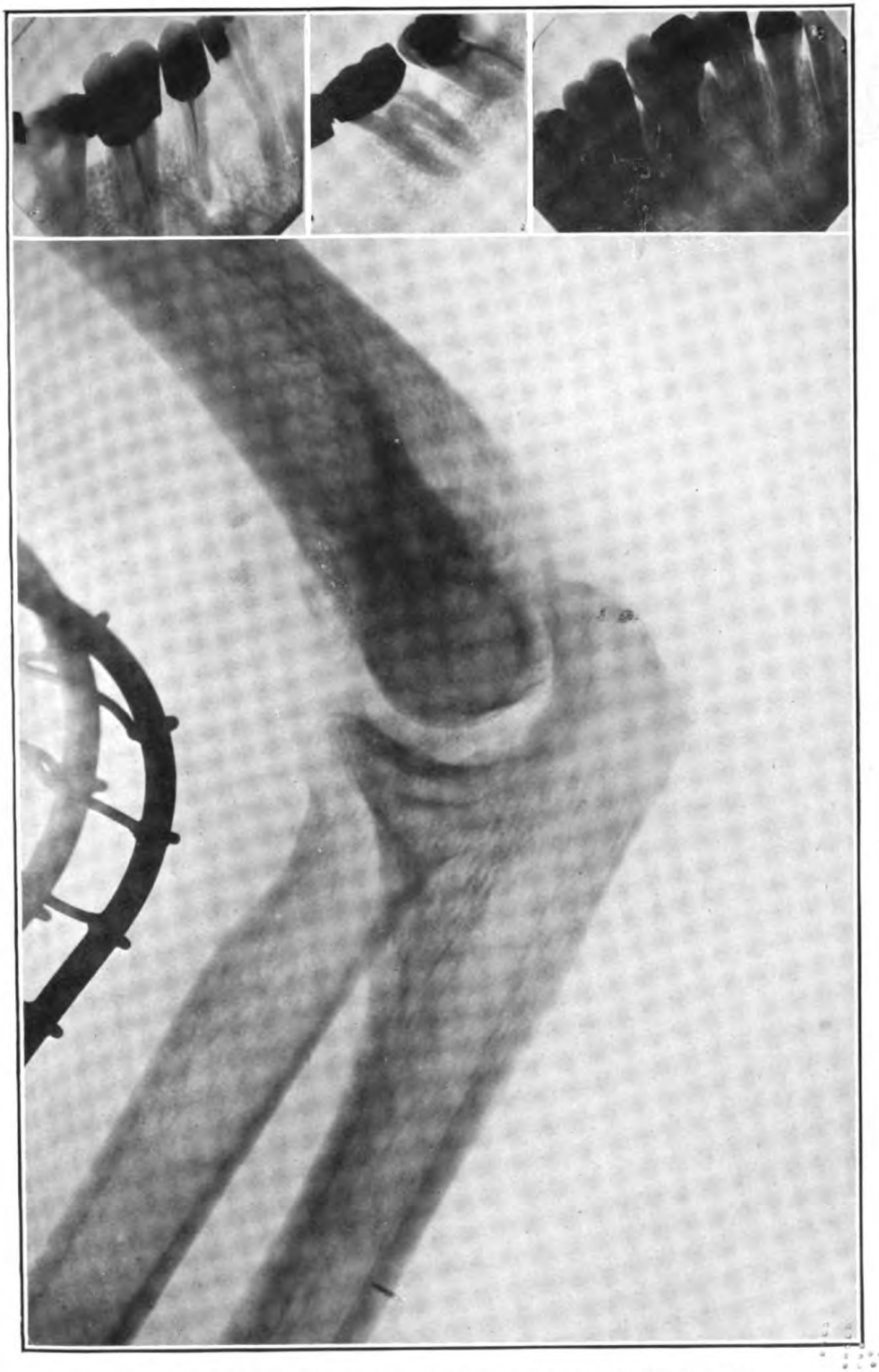
It is certainly a blessing to the patients as it does away entirely with all pain or inconvenience which they might suffer in transporting them to and from the X-ray room. It saves time for the surgeons in the wards as plates can be made without tearing down and putting up complicated suspension apparatus, and, lastly, it eliminates any possibility of change in position of the fragments during the readjustment of splints or suspension apparatus after the plates have been taken.

The roentgenograms obtained have met all the requirements of the surgeons. When we first began to use the unit we limited our work to films of the teeth and smaller bones of the extremities, but lately we have been making satisfactory plates of hips, frontal sinuses, spines, clavicles, scapulas, cervical vertebrae, or of practically any part we desired to take. We were greatly surprised and pleased to note the detail and clearness in all of these plates. This is doubtless due to the extremely fine focus construction used in the new radiator-type Coolidge tube.

In making our roentgenograms we have found that from 7 to 8 milliamperes, with a voltage approximately equivalent to a 5-inch spark gap, produce the best bone plates. Operating within these limits and at the standard distance of 22 inches, without screen, the following exposure table has given the best results. As with any other apparatus, exposure time must be varied in accordance with the thickness of the part taken. The same relationship of distance to exposure time holds for the portable as it does for the larger unit. If screens are used the usual shortening of exposure time is necessary.

	Seconds.
Hand	15–20
Forearm	20–25
Arm	25–30
Shoulder, clavicle	40–45
Leg ankle	35–40
Knee high	20–45
Teeth	12–15
Hip	80–90
Frontal sinus O. P	120
Frontal sinus Lat.	80

[1] U. S. Navy Base Hospital No. 5, Brest, France.



Dental plates and elbow-joint picture made with bedside X-ray outfit.

868–1

Another field where we have found the U. S. Army Bedside Unit to be of great value in fluoroscopy, either in the wards or operating rooms, and even in the X-ray room. It has been extremely useful in reducing obstinate, comminuted, or oblique fractures. The patient can be anesthetized, the fracture manipulated and corrected without even moving him from his bed. It has also been very useful in the examination of chests, hearts, and suspected fractures of the small bones of the extremities.

When using the unit for fluoroscopy, the German silver wire is shortened so that the tube is operating on 5 milliamperes. The operator puts on a Gesane fluoroscopic hood (5 by 7 inch screen) and after a few minutes allowed for accommodation of vision the current is turned on and he is able to observe the effects on fragments of manipulation, which he is performing with his own hands.

There are a few precautions which must be observed. Be sure that the part to be radiographed is absolutely motionless as any fine tremor will blur the plate. This can be done by packing sand bags about that part and having absolute quiet in the ward while the exposure is being made. Never allow your high-tension wires or connections to come any nearer than within 4 inches of the patient, his bed, the suspension apparatus, or operating table. Never attempt to move the unit any distance without removing the tube from the holder.

In regard to burns I am unable to give any definite tables, but we have been working within the limit time for erythema dosage of the larger units and have had no untoward results.

The members of the U. S. Army Medical Corps who have used the bedside unit are very generous in their praise of it and all think that it has a future of large usefulness.

I think that this unit should prove a valuable asset to the Navy on shipboard and at the smaller stations where the larger units are impracticable.

Its initial and operative cost are small. It can be operated on any ordinary commercial current. It is so simple and has so few parts that it is easily kept in running order. The housing and operating space are practically nil. The roentgenograms obtained in bone radiography, regardless of the part taken, compare very favorably with the larger and more expensive units in service at our hospitals, and in fluorosocopic examinations it is practically equal to any of the larger fluoroscopes now in use.

HOSPITAL SERVICE IN HAITI.

By H. F. Lawrence, Lieutenant Commander, Medical Corps, United States Navy.

In accordance with a provision included in the treaty of 1915 between the United States and Haiti providing for the development of a national public health service in the latter Republic, Com-

mander N. T. McLean, Medical Corps, U. S. Navy, was ordered to special duty in Haiti in December, 1916, and was commissioned by that Government as "Sanitary Engineer of Haiti."

During the succeeding months a basis of organization was developed and the following medical officers and hospital corpsmen were detailed for duty in this organization:

Lieutenant Commander H. F. Lawrence, Medical Corps, U. S. Navy.
Lieutenant Commander L. F. Drumm, Medical Corps, U. S. Navy.
Lieutenant D. G. Rafferty, Medical Corps, U. S. Naval Reserve Force.
Lieutenant W. W. Wade, Medical Corps, U. S. Navy.
Pharmacist V. M. Coulter, U. S. Navy.
Chief Pharmacist's Mate J. A. Neu, U. S. Navy.
Pharmacist's Mate First Class E. Kane, U. S. Navy.
Pharmacist's Mate Second Class B. T. Belser, U. S. Navy.
Chief Nurse L. D. Jordan, U. S. Navy.
Nurse J. Y. Raymond, U. S. Navy.

In the early days of the occupation (August, 1915) control of certain hospitals was assumed by the medical officers attached to the forces operating ashore in Haiti. On December 1, 1917, control of the City General Hospital, Port au Prince, was assumed by the new organization. Lieutenant Commander Lawrence took charge of this institution, relieving Lieutenant Commander G. L. Wickes, who as the brigade surgeon had been in charge.

In Febuary, 1918, Lieutenant Rafferty took charge of the Hospital of the Immaculate Conception at Aux Cayes, relieving Lieutenant Commander Borden, who as medical officer of the Gendarmerie d'Haiti had charge of this hospital. On June 1, 1918, Lieutenant Commander Drumm took charge of the Hospital Justinian, at Cape Haitien, relieving Lieutenant Commander Helm, who as medical officer of the Gendarmerie d'Haiti had charge.

The reports of the work at these institutions which follow are therefore based on the control of the Port au Prince Hospital by the Public Health Service for a full year and the others for portions only.

X-ray.—Twenty-six plates made.

Ambulance.—Motor ambulance made 626 calls.

Drugs and surgical supplies.—An attempt has been made to supply the public hospitals throughout the Republic with drugs and surgical supplies from a central supply depot at this hospital.

Nurses' Training School.—The Nurses' Training School is in charge of Chief Nurse Jordan, U. S. Navy. While it is early to draw any definite conclusions as to whether or not the Haitian women can be trained to make good nurses, the progress so far has been very satisfactory. There are at present 23 of these Haitian women, and they show earnestness and diligence in their duties. Considerable expense has been incurred to furnish them suitable quarters and equipment and to give them every advantage possible to make their training a success. As these women speak only French it is, of course, necessary to give them their instruction in that language.

General summary.—The possibilities of doing a great work at this hospital are enormous. While it is by far the largest and best hospital in Haiti, much remains to be accomplished before it can be considered a modern hospital.

New buildings and equipment are urgently needed. The X-ray apparatus is small and not capable of doing good internal work. The laboratory is small, and at present only the routing examinations of blood, feces, urine, pus, and bacteria are made. The sisters daily perform many duties that only trained nurses should do. However, some relief is soon expected in this direction by the student nurses in training in the present class. No satisfactory isolation can be made for contagious cases except in a few outbuildings which are in poor repair. Several lepers are now kept in this hospital for want of an asylum where they can be cared for. Tuberculosis cases are treated in old, insanitary buildings. It is hardly possible to secure sufficient salvarsan and potassium iodide to treat all as they should be treated. Special diets are not feasible until modifications can be made in the kitchen. The water supply is ample for present needs, but if the hospital is to be enlarged a special reservoir will be found necessary.

It has been necessary to construct septic tanks for sewage as an underground sewerage system has not been installed in Port au Prince.

Supplies must be ordered in the United States many months in advance due to war demands and shipping difficulties. It has taken a year to have some requisitions filled for ordinary hospital supplies.

While the difficulties enumerated above are many, the work done at this hospital has been large and is constantly increasing. A few years ago conditions here were intolerable, the hospital being a place for the poor to creep in and die. The death rate at present is high and it is very apparent that many of the poor are still adverse to coming here until at the point of death. However, more and more of the well-to-do Haitians and foreigners are now seeking this hospital for medical and surgical advice and treatment. Many of these do not want to be charity cases and insist on paying a reasonable recompense.

THE CITY GENERAL HOSPITAL, PORT-AU-PRINCE, HAITI.

The City General Hospital of Port-au-Prince is well located, being easily reached from all quarters but far enough removed from the noisy section of the city to insure quiet. The grounds comprise about 13 acres, are well drained, and have numerous flower gardens, grass plots, and shade trees.

There are six buildings used to house the sick. Two of these are new and well adapted to hospital wards in this climate. In all there are eight wards and they average 40 beds each. The other buildings used for the sick are very old structures and it will be necessary soon to replace them.

In addition there are a nurses' home, sisters' home, chapel, pharmacy, gatehouse, office, stables, and several outbuildings. One of the new buildings is occupied as a children's ward and maternity section on the first floor and the nurses' school on the second floor.

Personnel.—There are employed at the hospital:

One naval surgeon.
One naval nurse.
One pharmacist's mate (part of the year two pharmacists's mates).
Five Haitian physicians.
One Haitian dentist.
One Haitian pharmacist with two assistants.
Sixteen sisters (French).
One Haitian midwife.
Forty-four attendants.
Eight cooks.
Twenty-two laborers.

Fourteen others, including painter, carpenter, mason, ambulance driver, laboratory assistant, foreman, and dressmaker.

One Haitian physician is a graduate of McGill University, Montreal, and another of Temple University, Philadelphia. The others are graduates of the Port-au-Prince School of Medicine and have not had as good opportunities and instruction as could be desired.

The sisters, Soeurs de la Sagesse, are in charge of the wards and at present do most of the nursing. They also purchase most of the provisions and superintend the cooking. The attendants are for the most part unskilled and do little more than keep the wards clean.

The following is a list of admissions, discharges, births, deaths, as well as work performed during the year ending November 30, 1918.

Admissions	2,349
Discharges	2,383
Births	64
Deaths	309
Burials, including dead received from city	502
Average daily census of patients	292
Patients (average) treated daily, but not admitted to the hospital (dispensary cases)	40

Major operations 64, including 1 amputation of leg, 4 amputations of arm, 11 hernias, 22 hydroceles, 1 aneurysm, 1 elephantoid tumor of vulva, 2 hysterectomies, 2 castrations for tumor of testes, 4 enucleations of eye, 2 external urethrotomies, 1 incision of bronchial cyst, 1 appendectomy.

Numerous minor operations performed but not recorded.

Dental report.

Six hundred and eighty-one extractions.

Eight amalgam fillings during month of November (dental drills and engine were not received until late in the year).

Numerous daily treatments made for abscesses, osteitis of jaw, pyorrhea, and gingivitis.

Laboratory report.

Wassermann tests	263
Blood examinations other than Wassermann	594
Urine examinations	405
Sputum	373
Pus	95
Feces	210

Guinea pigs are kept on hand for laboratory purposes.

REPORT OF HOSPICE JUSTINIEN FOR 1918.

By L. F. Drumm, Lieutenant Commander, Medical Corps, United States Navy.

The following is the report of the Hospice Justinien for the year 1918:

	Male.	Female.	Total.
Admissions	92	63	155
Discharges:			
Cured	31	21	52
Improved	17	10	27
Unimproved	3	5	8
Dead	17	11	28
Ran	2	.....	2
Remaining	22	16	38
Deaths	17	11	28

Note:—There have been no births for the year.

The average daily census of patients has been 80 to 85. About 50 per cent of these patients are indigents who require but little medical attention but have no homes or means of support due to some chronic disease. Many of them have been in the hospital for years.

Since June 1, 1918, a clinic has been held every day except Sunday with an average attendance of 10. Since October the days for the clinic have been reduced to Monday and Thursday. Mercury is administered on Wednesday. The average attendance has been about 20 and from 20 to 25 persons have received mercurial treatment. No persons are treated at the clinic who have sufficient means to employ a doctor. If the patients are able to buy medicines, they are given a prescription; the others are supplied with medicine by the hospital. This clinic has steadily increased in attendance and the patients come from all over northern Haiti.

Major operations June 1, 1918, to January 1, 1919.

Hydrocele, radical cure	4
Hernia, radical cure	2
Repair of amputation stump	1
Circumcision	2
Pterygium, removal of	1
Appendectomy	1
Trephining skull	1
Removal, tumor of ear	2
Removal, tumor of cheek	1
Amputation at thigh	1
Amputation at ankle	1

Administration.—The administration of the hospital is actively carried on by the sisters under the direction of the administrator. However, there is a civilian hospital committee composed of the *magistrat* and other prominent citizens who supposedly carry on the administration of the hospital, but in a passive nanner.

The messing of the sick is managed by the sister superior. She is paid $120 a month and also 10 cents a day for all patients who come from outside Cape Haitien by the Public Health Service. All money derived from the rent of private rooms is also turned over for the same purpose. This branch is very well managed and very good food is served at all times.

One sister is in charge of the operating room and dispensary, one sister is assigned to each of the male and female wards, one sister to the laundry and three sisters to the kitchen. A physician is employed under the title of city physician, who visits the hospital every morning at 7 to care for patients assigned him.

During the year 1918 the pharmacy has been rearranged and new shelves built in. The operating room has been screened and running water installed. Late in December work was started on painting all of the wards and the outside of the building. According to information from the sisters no work of this sort has been done in over 20 years. All of the beds were also painted. A new building has been erected for chickens and other fowls in the rear of the hospital. Part of the land in front of the hospital has been cleared and a vegetable garden planted, which provides potatoes, cabbage, lettuce, and yams for use of the hospital. The wall in front and on the north side of the hospital, which was in a dilapidated condition, has been rebuilt. No new equipment has been purchased except that provided by the sanitary engineer.

During the coming year it is hoped to erect a morgue, which is a necessity; to erect a kitchen, as the present one is in bad condition; to provide a sanitary latrine at each end of the hospital or one large latrine at the rear of the hospital; and to construct a separate building for the use of the sisters. The construction of a latrine has been

taken up with Civil Engineer Conard, U. S. Navy, and it is thought advisable to build one large building in the rear of the hospital, with flushing sanitary closets. There is a good water supply at hand and the discharge could be piped to a septic tank below the hospital. The discharge from the tank could be run to the garden.

REPORT OF THE HOSPITAL OF THE IMMACULATE CONCEPTION, AUX CAYES, HAITI, 1918.

By D. G. Rafferty, Lieutenant, Medical Corps, United States Naval Reserve Force.

Admissions.—During the year 242 patients were admitted for medical or surgical care.

Discharges.—The number of patients discharged recovered amounted to 145. The number of patients left hospital or discharged unrecovered amounted to seven. Total discharges for the year, 152.

Births.—No facilities are available for the care of obstetric cases, therefore the hospital has been unable to admit this class of case. Plans are being discussed at the present time for building a separate group of buildings to be devoted entirely to obstetric cases. The ground is available for the purpose and the sisters are willing to add this care to their already heavy ones.

Deaths.—The deaths occurring during the year at the hospital amounted to 46. The recent epidemic of influenza increased the hospital's mortality for the year about 10 per cent.

Average daily census.—The average daily census of the sick was 48.

Daily average.—The daily number of patients treated in the outpatient department was eight. Yearly treatment totals 2,320.

Major operations.—During the year there were three major operations performed. These were emergency operations. The surgical department has been much handicapped by the failure of the sterilizer, which was alleged to have been ordered in New York about one year ago, to arrive.

Orphans.—An important feature of the hospital work in Cayes is the Orphans' Home, which is incorporated in the hospital. The sisters care for 32 homeless girls. Various kinds of industrial work as well as a common-school education are given these homeless girls. Each girl is maintained until she is of age. Almost all the girls are expert needlewomen.

History of administration.—Eight sisters of the order Les Filles de la Sagesse administer the hospital. They are under the very able direction of Mère Eustace, who has shown great administrative ability, and much of the success of the institution is undoubtedly due to her management. Many improvements have been made during

the past year in both the hospital buildings and grounds. An adjacent piece of property was purchased and added to the old plot of ground. This new property will be needed for the contemplated new buildings as well as to prevent too close proximity to undesirable neighbors. The equipment of the hospital can not be complained of in the least, in fact it is very creditable. All the patients have beds with proper bedclothing. The food is sufficient and is prepared under the direction of one of the sisters.

Among the features worthy of note are the following—a first-class surgical equipment and a good laboratory. Both of these equipments have been recently purchased in the United States. A mortuary was erected recently in the hospital grounds, supplying a long-needed want. Sun shutters are being fitted to windows at the present time and in the near future it is expected this necessary work will be completed.

The financial status of the hospital is excellent, as the institution does not owe a cent and care is taken to prevent going into debt.

ORGANIZATION OF THE U. S. NAVAL HOSPITAL, CHARLESTON, S. C.

By W. M. GARTON, Commander, and G. W. CALVER, Lieutenant Commander, Medical Corps, United States Navy.

We submit this scheme of organization as material for future reference. The scheme was successfully used at this hospital which was originally planned for 250 patients and markedly more so when the capacity was increased to 1,000 beds. As it is now presented it is the possession of each medical officer and nurse on duty at this hospital.

PREFACE.

The purpose of this pamphlet is to provide in a concise and convenient form, valuable for ready reference for the personnel of the hospital, such rules and general orders as are applicable to the hospital as a whole, together with the explanation of the organization and relationship of the various units to the whole. The entire personnel of the hospital shall become familiar with the contents of this pamphlet. By doing this, a great deal of unnecessary time and labor is avoided for all persons concerned, work expedited, and the effectiveness of the hospital as an institution for the care of the sick is increased.

GENERAL ORGANIZATION.

The hospital is divided into two separate and distinct departments—first, the administrative; second, the executive. All the administrative work of the hospital, together with the relationship of the hospital to any external naval or other organization, will be handled by the medical officer in command. The clerical work shall be the paramount duty of the stenographers of the record office, and they shall be given work by no person other than the commanding officer himself, and shall perform no other duties than those concerned with the administrative part of the hospital organization.

The executive organization shall concern itself with the internal management of the hospital, with the medical officer in command as its head and the executive surgeon as the person directly responsible for the execution of the orders of the commanding officer. With this in view, no member of the hospital personnel will at any time approach the commanding officer on any subject concerning the internal management or organization of the hospital without first having consulted the executive surgeon.

All requests for property, supplies, changes in personnel, detail, etc., will be handled only through the executive surgeon's office to reach the commanding officer.

Permission to see the commanding officer on any subject pertaining to hospital personnel or hospital matters must be obtained from the executive surgeon before seeing the commanding officer. When the medical officer in command desires to discuss matters pertaining to the hospital with any member of the hospital staff, he will send for the person he wishes to see or confer with.

RECORD OFFICE.

The record office is in charge of the chief yeoman, who is responsible for the efficiency of this office and who will see that all the records and correspondence of the hospital are forwarded or filed in a careful, systematic and painstaking manner. The register of patients, and all records and correspondence of the commanding officer will be handled in this office alone. This office will be open from 8:30 a. m. until 5 p. m. daily and from 9 a. m. to 1 p. m. Sundays. The use of the stenographers of this office by any one except the commanding officer is forbidden.

EXECUTIVE OFFICE.

The following routine for the executive surgeon's office will be rigidly adhered to, and all other work and routine, in so far as conflicting with this routine, must give way.

The executive surgeon's office will handle all matters pertaining to organization and routine in the hospital, orders for special duty and examinations. All requests for examinations to be made of men sent to the hospital for examination from other naval units will be referred to the executive surgeon, who will give the necessary orders for examination, making appointments for same when necessary.

All requests for leave, change of duty, special requests of any kind shall be made to the executive surgeon at request mast at 8.45 a. m. Except for urgent reasons, beyond the control of the man in question, no request will be received after this hour.

9.10 a. m.—Drug books, property slips, requests for repairs, and diet sheets with orders for special diets will be submitted to the executive surgeon for approval.

9.30 a. m.—Chief nurse to make report covering the activities in her department, including laundry, special diet kitchen, and linen room.

9.55 a. m.—The journal of the officer of the day will be submitted to the executive surgeon for examination, correction, and his signature, after which it will be taken to the medical officer in command by the officer of the day for his approval.

10 a. m.—The executive surgeon reports to the commanding officer the condition of the hospital, which includes accidents and incidents for the preceding 24 hours of which the medical officer in command is not already cognizant. The executive surgeon will be furnished with list of all material desired by any

department in order that he may discuss with the commanding officer at this time the desirability of ordering the same.

10.15 a. m.—Mast, at which all offenders of the preceding 24 hours will be brought up for action by the commanding officer.

10.30 a. m.—Inspection of the hospital by the executive surgeon accompanied by the chief nurse. At this inspection all medical officers must be at their stations and remain there until their section has been inspected by the executive surgeon. The executive surgeon can not be expected to anticipate the desires of the medical officers in regard to patients or become thoroughly conversant with the conditions of wards and buildings in the hospital unless the medical officer in charge of the ward is present at this inspection daily. There is nothing more important than keeping the executive surgeon informed concerning the condition of the wards as upon this is dependent the efficiency of the hospital. Medical officers must realize the importance of this and act accordingly.

11.40 a. m.—Mess inspection.

12.15 p. m.—The executive surgeon returns to the executive office for the purpose of issuing such articles as were found necessary during the inspection or which may have become necessary since the morning issue of supplies.

12.30 p. m.—All officers desiring to leave the hospital will request permission from the executive surgeon by signing liberty list at officer of the day's desk.

1 p. m. to 2 p. m. is the executive surgeon's lunch hour. Medical officers and others will refrain from calling him during this period except on most urgent business. During this period the executive office is closed so far as taking up new work and reports are concerned.

2 to 2.30 p. m.—The executive surgeon returns to office to complete the routine office work and dictate answers to correspondence received during the morning hours.

2 to 6 p. m.—The executive surgeon will make the afternoon inspection of the hospital grounds, during which time he will visit all work completed or under way.

After 8 p. m. daily the executive surgeon will make rounds of the hospital, visiting the wards for the purpose of being informed concerning the condition of any serious cases. In addition to the above functions the following special instructions will be observed.

1. In all cases where a seriously sick patient desires to see a chaplain, the officer of the day will be immediately notified, and he will endeavor to call the chaplain of the desired denomination attached to the training camp. If there be no chaplain at the camp, the officer of the day will consult the executive surgeon in regard to calling one from town.

2. Any serious change in a patient's condition will be reported by the medical officer to the executive surgeon immediately if he is at the office. If not, it will be reported to him immediately upon his return to the administration building.

COMMISSARY DEPARTMENT.

The commissary department is directly in charge of the commissary pharmacist, under the executive surgeon, who is responsible for the general upkeep and condition of his department, and who will see that at all times there are sufficient supplies on hand to meet emergencies or an unexpected increase of the hospital personnel as much as 15 per cent. The pharmacist will keep a sufficient stock of commissary supplies in the commissary store room to provide for such a period in advance as deemed advisable by the commanding officer.

Under no circumstances will the stock of staple articles be allowed to fall below the quantity necessary to last the hospital two weeks.

The pharmacist will see that the galley and mess hall are always in a clean and shipshape condition, and that the messmen and cooks have a sufficient supply of aprons and clothing to be always in clean, white clothing for the daily inspection by the executive surgeon. Blues will not be worn by any member of the commissary department on duty in the mess hall.

The pharmacist will detail the cooks and messmen to their stations, and he will be responsible for the general upkeep and condition of the department, together with all supplies and equipment thereof.

The commissary steward is responsible, under the direction of the pharmacist, for the proper issuing of all food and its preparation. He will have a member of the hospital corps as his relief, who is to be under instruction in the duties of the commissary department, and who may take over the management of the galleys and mess halls in the absence of the pharmacist and chief commissary steward.

The commissary steward and his relief will be responsible for the general upkeep and cleanliness of their department. They will see that the buildings, equipment, windows, walls, tables, benches, and the decks are always clean. Cooks and mess attendants are always to be clean, and particularly their coats, aprons, and uniforms.

The commissary steward will submit daily, at 8.55 a. m., a report book showing the time fires were started, the hours at which meals were served, the failure of any member of the department to report on time, as well as a report of absentees. In this book shall also be noted such requests for repairs as come under the cognizance of the executive surgeon.

Meals will be served as follows and at no other time:

Breakfast.—7 a. m., relief watch; 7.30 a. m., hospital corpsmen and patients; 7.30 a. m. to 7.45 a. m., officers' mess.

Dinner.—11.30 a. m., relief watch; 12 m., hospital corpsmen and patients; 12.30 p. m. to 1 p. m., officers.

Supper.—4.30 p. m., relief watch; 5 p. m., hospital corpsmen and patients; 5.30 p. m. to 6 p. m., officers and nurses.

Diet will be issued to the wards and commissary wagon will leave at the following hours: Breakfast, 7 a. m.; lunch, 11.30 a. m.; supper, 4.30 p. m.

The daily supplies—ice, eggs, milk, etc.—issued on diet sheets will be issued at 10 a. m. only, and delivered to the wards by the commissary wagon.

Sufficient food will be set out by the commissary steward, before leaving, for the night watch. It will be prepared and served by the cooks on night duty, who will leave galley and mess hall in clean condition for day watch when relieved at 6.30 a. m.

Overissues will be turned in every day. No supply of food of any kind will be left in ward diet kitchen except that necessary for the day's use.

PROPERTY ACCOUNTABILITY.

The property storehouses are in charge of the property pharmacist, who is responsible for the upkeep and condition of all articles stored therein. He will keep a set of books which show the amount of stock on hand of each article at all times, and will provide the executive surgeon with written memoranda of all articles in which the stock is running low in sufficient time to permit the executive surgeon to place orders for renewal of stock before the stock on hand is expended. The property pharmacist will endeavor to see that no stock

of articles runs out without allowing time for arrival of the new supply. The commanding officer particularly instructs that there shall never be an entry "none in stock."

With this in view, at least a six weeks' supply of all medicines and a two weeks' supply of all supplies obtained at the supply department at the navy yard should be kept on hand. The latter includes cleaning gear, soap, paints, nails, etc.

The property pharmacist will see that the property accountability cards for nonexpendable articles are always up to date.

Property will be surveyed on Monday morning, exchanging worn-out articles for new ones, after inspection by property nurse and approval by executive surgeon.

Property will only be issued on Tuesday mornings, except in emergencies, and only upon a written order of the commanding officer or executive surgeon.

The property pharmacist is responsible for the preparation of all requisitions, stubs, and public bills, and will keep the bill book posted to date at all times.

DUTIES OF THE PROPERTY NURSE.

Request for the issue to any ward of property on charge shall be made on property slips in duplicate, signed by the nurse in charge of the ward and initialed by both the chief nurse and the executive surgeon. The original shall be kept by the pharmacist in charge of the property storeroom; the duplicate shall be furnished the property nurse, who will make notation in the property book of the date and number of articles received or turned in.

The property nurse will each Sunday morning inspect worn-out property in each ward and initial the ward survey book, which will be presented to the executive surgeon for approval early Monday morning.

The property nurse will inventory all property on charge in the hospital monthly, verifying the amounts charged in the property book of the particular ward, quarters, or clinic and reporting to the executive surgeon any shortage which may exist. The property nurse will at this time also balance the property books for the month completed, showing balance on hand on charge the first of each month.

The property nurse will count weekly the blankets and thermometers, verifying the report on these articles and informing the executive surgeon of any discrepancy.

She will issue to all wards and quarters the necessary supply of clean linen, giving credit for the amount returned to the laundry. Soiled linen shall not be sent to the laundry later than 10.30 a. m. daily. The property nurse in her daily contact with the members of the nurse corps should endeavor at all times to instill the sense of responsibility and accountability for Government property, and should endeavor by her example to impress the newer members of the nurse corps and hospital corps with their duties and responsibilities in regard to property.

This applies to all departments of the hospital.

BORROWED ARTICLES.

1. Unless unavoidable, articles are not to be borrowed from other wards, and then only in the absence of the executive surgeon. If the executive surgeon is in the hospital, his consent must first be obtained.

2. Articles on charge borrowed during the night by the night nurse should be noted on slip left on the nurse's desk, both in the ward in which the

article is placed and the ward from which it was taken, together with a note on the night report book.

3. If articles are borrowed to go to places other than the wards, a slip should be left to that effect.

4. Borrowed articles are not to be retained longer than overnight without the consent of the executive surgeon.

5. Nurses will list in a book the names of all patients to whom slippers, pajamas, towels, and other articles are issued, and will see that these articles are returned when the man is returned to duty or is able to use his own articles of equipment and clothing.

PROPERTY FOR SURVEY.

1. All property worn out in use shall be returned to the property storehouse for disposition, irrespective of its condition.

2. Survey slips in duplicate, initialed by the property nurse and the executive surgeon, are required to exchange any article.

3. Articles for survey shall be sent to the property storehouse, accompanied by the necessary slip, as early as possible Monday morning of each week.

DAILY WARD INSTRUCTIONS.

1. The following daily routine will be followed by those in charge of all buildings in this hospital. Cleaning details will apply in general to all departments.

DAILY WARD ROUTINE.

6.30 a. m.—Night apprentices awaken patients.

7 a. m.—Relief watch to mess hall for breakfast. Hospital corpsmen and man on duty in diet kitchen to galley for ward breakfasts, to be served by 7.30 a. m.

7.30 a. m.—Relief watch to ward. Hospital corpsmen and all "up" patients go to breakfast in mess hall.

8 a. m.—Nurse in charge of ward and all hospital corpsmen report to the ward for duty. Convalescent patients on ward-cleaning details police the ward, under the supervision of the nurse and hospital corpsmen, following the daily and weekly schedule. The convalescent patient in charge of the head to clean all appliances, enamel and nickel to be wiped with waste dampened with kerosene. Remove the watermarks on all toilet equipment. Particular attention will be paid to all enamel ware to prevent staining. Sand or grit soap will never be permitted in this hospital for cleaning anything.

8.30 a. m.—Sick call.

9.10 a. m.—Drug book, property slips, and request for repairs to be submitted to the executive surgeon in his office for approval.

9.30 a. m.—Draw the day's supplies for the diet kitchens from the commissary steward in the galley.

10.30 a. m.—Executive surgeon's daily inspection.

11.30 a. m.—Relief hospital corpsmen mess and draw ward diets.

12 m.—Hospital corpsmen and "up" patients go to dinner.

1 p. m.—Nurse returns to ward. Ward cleaners police wards and heads.

Visitors admitted to the ward from 1 p. m. to 4 p. m. No visitors in contagious, detention, or venereal wards.

4.30 p. m.—Relief hospital corpsmen mess and draw ward diets.

5 p. m.—Hospital corpsmen and "up" patients go to supper.

6 p. m.—Ward cleaners police the ward for the evening.

7 p. m.—Sick call.

9 p. m.—Report all absentees to the officer of the day. All lights out except standing lights. Hospital corpsmen on day duty relieved by night hospital corpsmen.

10 p. m.—Afternoon nurse relieved by night nurse.

WEEKLY WARD ROUTINE.

Monday.—Survey day. Clean braces, radiators, and ventilators; do all high dusting. Sodium fluoride to shelves in diet kitchen closet.

Tuesday.—Clean beds and chairs, making bed report to executive surgeon's office, the following form to be used: "Mattresses and pillows aired; beds washed and kerosened; no bugs." If bugs should be found, report when the mattresses and pillows have been sterilized.

Fold mattresses in three thicknesses, removing mattress cover. Fold all linen, placing on top of mattress in middle of bed. Wipe off all springs thoroughly with kerosene; clean bed frames with soap and water.

Draw housekeeping supplies for the week.

Wednesday.—Clean walls, windows, and woodwork. Shades raised to top for inspection.

Thursday.—Clean toilets, lights, and lockers, having the doors of all lockers open. Clean all nickel and bright work and apply kerosene. Have all patients in ward for executive surgeon's inspection for patient's muster. Sodium fluoride to shelves in diet kitchen closet; to be removed Saturday morning. Ice box out from wall and funnel cleaned and kerosened.

Friday.—Field day. Wax floors. Prepare for Saturday's inspection. A list of convalescent patients fit for light duty to be sent to the executive surgeon's office.

Saturday.—Prepare for inspection by commanding officer. Send liquor books to chief nurse's office, showing amount of alcohol and liquor drawn, used, and on hand. Submit liberty book to executive surgeon for approval.

Sunday.—Liberty book to executive surgeon's office. Hospital corps detail to executive office. Report of blankets and thermometers on hand to executive office.

RULES AND RESPONSIBILITIES OF NURSES.

1. The commanding officer desires that nurses shall regard their details as posts of duty, from which they shall not be absent during hours of duty except by permission or on being regularly relieved.

2. The nurse will avail herself of telephone or written reports to communicate with the officer of the day, officer in charge of the ward, or the chief nurse.

3. When inspection is being made by the medical officer in command, executive surgeon, officer of the day, or ward officer, the nurse or hospital corpsmen in charge of ward shall accompany him. This is a strictly military function, and shall be so regarded.

4. Medical officers will not call nurses or hospital corpsmen from wards while they are on duty unless a relief is present in the ward.

5. The hours for nurses are: 8 a. m., nurse on morning detail reports in ward for duty; 3 p. m., nurse on afternoon detail reports in ward for duty, relieving nurse on morning detail; 10 p. m., night nurses report for duty, relieving afternoon nurses.

6. It is extremely important that nurses be present at the evening sick call.

7. Instructions from the executive surgeon, as a rule, will be sent to the nurses via the chief nurse.

8. Nurses will cooperate with the ward medical officers in the details of the ward management which do not conflict with the rules and routine of the executive surgeon.

9. After sick call, all reports regarding patients in serious condition will be sent to the medical officer in charge of the ward, via officer of the day. Written reports shall be sent if possible; otherwise telephone.

10. Money and valuables belonging to patients shall be transferred through the ward officer or chief nurse to the paymaster, who will receipt for same.

11. No food of any kind, including fruit or candy, is to be brought into the ward without the written permission of the officer of the day. Nurses will particularly observe that patients on special diets do not receive articles of this kind from extraneous sources. Smoking will never be permitted in the wards.

12. Nurses are responsible for all keys. When leaving the ward such responsibility shall be passed to the senior hospital-corps man of the ward, who is responsible during the nurse's absence for any irregularity which occurs during this time. Particular attention will be given to the poison locker and ice chest to see that they are never left open or unlocked.

13. The linen room shall always be kept locked. Fresh linen is to be distributed from the linen room only under the supervision of the nurse in charge of the ward. Towels will be furnished only to those patients who are confined to bed or are unable to properly use and care for their own.

14. All articles for sterilization should be sent to the sterilizer as early as possible in the morning and not later than 10 a. m.

15. Ward chairs shall not be taken out of the wards on the covered walkways. Wheel chairs should be used when prescribed by the ward medical officer. Every endeavor shall be made in suitable weather to have all bed patients out on central covered walkway or porches on gatch frames. Horses may be obtained from the carpenter shop on which to place these frames. Patients should be encouraged to go out of wards.

16. All occupied beds in the wards shall show the name of patient, rate, date of admission, and diagnosis in card holder at the foot of bed. If unoccupied, the card holder should be empty.

17. Each patient in the ward is to be supplied with his own drinking glass, marked by adhesive, pasted to the bottom. This glass will be kept on the man's bedside locker and shall always be clean.

18. Nurses shall instruct ward cleaners regarding the use of stretchers for transportation of bed cases in case of fire. Four stretchers are provided for each ward.

19. When an ambulance arrives with a stretcher case, a detail of hospital apprentices or convalescent patients will be sent by the nurse in charge of the ward to assist in taking patient to his bed.

20. Hospital corpsmen not on duty will not be permitted in the wards. Patients will never be permitted in nurse's office or linen room.

21. Hospital corpsmen are forbidden to play games in the ward with patients.

22. Hospital corpsmen or patients wishing special liberty must apply at the executive surgeon's office at request mast. Hospital corpsmen requesting special liberty must ask permission of the nurse and the medical officer of the ward and bring their written consent.

23. Neglect in the performance of duty on the part of hospital corpsmen or patients, after being admonished to improve, shall be reported to the ward officer or chief nurse, who will report the same to the executive surgeon. In-

solence and impertinence to the nurse by a hospital corpsman or patient will not be tolerated. The nurse is considered to be the direct representative of authority in the ward and as such represents the commanding officer. Failure to obey her directions is a failure to obey orders of the commanding officer. Nurses are enjoined to be careful and consistent in their orders to patients.

INSTRUCTIONS FOR PREPARATION OF DIET SHEETS.

1. A diet will be filled out by the ward nurse each morning, a sheet being used for the main galley and a separate sheet being used for the special diet kitchen.

2. The total number of diets so noted shall correspond to the number of patients in the ward.

3. Extras, such as bread for toast, butter, eggs, etc., will be ordered only in the amounts needed for the day.

4. Nothing will be ordered for the purpose of being cooked in the ward diet kitchen as these rooms are to be used only as serving rooms and not for the preparation of food.

5. Owing to the difficulty of obtaining supplies and provisions, nurses are cautioned to be particularly careful in ordering their diets. The sick are provided with everything necessary for their recovery, but the waste of food will not be tolerated.

6. A summary of milk will be made on each diet slip, and milk and buttermilk both will be counted in the total of milk allowed to a ward, a notation being made as to amount of total to be buttermilk.

7. A summary of milk will be placed on all diet slips, according to the following form:

Summary of milk.

	Quarts.
No. ____ Soft diets	____
No. ____ Liquid diets	____
No. ____ Special diets	____
No. ____ Eggnogs, B. I. D	____
No. ____ Eggnogs, T. I. D	____

8. Allowances of milk on soft diet: 3 glasses of milk daily = 1½ pints. Liquid diet: 6 glasses of milk daily = 1½ quarts. Eggnogs: 1 glass of milk for each eggnog = ½ pint.

INSTRUCTIONS FOR SENDING SPECIMENS TO LABORATORY.

1. All routine specimens must be in the laboratory before 8.30 a. m.

2. At least 100 c. c. of urine should be sent for examination.

3. Urine must be as fresh as possible when received at laboratory.

4. Urea and sugar determination are of little value unless the exact 24-hour amount is received.

5. Bottles for specimens must be clean.

6. All ambulatory patients must come to the laboratory for blood examination. If for Wassermann, they must be in the laboratory between 1 and 5 p. m. Monday afternoon.

7. If blood for Wassermann is furnished the laboratory, at least 10 c. c. should be sent for examination and be in laboratory before 6 p. m. Monday afternoon.

8. If blood for Widal, at least 10 c. c. must be sent for examination. Containers should be clean and sterile and may be obtained from the laboratory.

9. *Feces.*—At least a half ounce should be sent for examination.

10. *Sputum.*—At least an ounce should be sent for examination, or enough to keep from drying out before examination.

11. The laboratory should be notified immediately upon the arrival of a patient with pneumonia.

12. *Spinal fluid.*—At least 10 c. c. should be sent for examination, and the container should be absolutely clean and sterile.

13. When a chancre is to be examined for spirochaeta, the patient must be sent to the laboratory.

14. If tissue, pus, or fluid is to be examined the place from which it is obtained must be specified, as well as patient's name, rate, and the other necessary data.

15. The character of the examination desired must be specified on all requests.

16. If an immediate examination is desired, it must be specified on request.

17. The patient's name, rate, and ward must accompany all requests for laboratory examination. All requests for examination must be signed by the medical officer in charge of the ward. A separate request must be sent for each patient.

18. The laboratory will not examine any specimen in which any of the above rules are not observed without a signed statement from the medical officer in charge of the case, giving valid reasons for his inability to comply with them.

INSTRUCTIONS FOR KEEPING ORDER BOOKS AND CHARTS.

Night order book.—Orders must be signed by the officer of the day at evening sick call, and they must contain all that the night force should know about the ward and patients, particularly new patients, discharges, or absentees.

Night report.—10 p. m. Reported for duty, lights out, ward quiet or otherwise; absentees. Every half hour note the condition of the ward. Note the inspection of the officer of the day or any other officer. Note the return of absentees. Note when patients are awakened, note morning care given and specimens that have been ordered obtained, or not obtained and the reason. Note absentees. Note when relieved by day force, having the night nurse initial and take to the executive office.

Admissions and clinical records.

1. Patients on admission to the hospital will be entered on admission book, received in ward, and have admission card made out and sent to office. They will have temperature chart and clinical note chart instituted immediately by the nurse or hospital corpsman in charge of the ward.

2. These records will be maintained for the first three days of the patient's stay in the hospital, and for the first five days after an operation.

3. No chart will be discontinued on the expiration of this time without first notifying the medical officer in charge of the case.

4. Laboratory reports and the reports of the special examinations shall be attached to the clinical record of a patient, constituting the most important part of the same.

5. The diagnosis in each case, and any change of diagnosis must be noted at the head of clinical chart.

6. Medical officers will see that the nurses are provided with the necessary information in each case.

7. On the discharge of each patient, the entire chart will be turned in to the executive office for filing.

Clinical chart.—Last name first, rate, age, station or ship, name of nearest relative or friend. Day of month in black ink, day in hospital in red ink. Lines to separate days to be in black ink. Operative cases—day of operation to be ruled in red ink. On right-hand side days after operation to be marked in red ink. Day and night temperatures to be charted in black ink. Bedside notes to be kept in red ink from 10 p. m. to 8 a. m. Day notes to be kept in black ink and all notes printed. Mention everything clearly and concisely under its respective heading, viz: Narcotics, chart effect; *stimulants*, chart the effect on the pulse. Bedside notes to be totaled at midnight in red ink. Draw line across the page. Under it, in the remarks column, write the date and the words "total for 24 hours." Draw another line across the page and put the date of the new day.

Order sheet.

1. This sheet will be attached to the front of each chart.
2. The orders for the case will be copied thereon, with date when ordered.
3. No notes will be made on this sheet.
4. When an order is *discontinued*, this word will be written in red ink after the order concerned, with the date and initials of person noting the change. The new orders will be written below the old ones.
5. This sheet is never to be removed from the chart; when filled apply a new one over it. Write the patient's name and rate at the head of this sheet. Use doctor's order book to note admission and discharge.
6. When orders have been changed, a summary of those in effect will be made each day at 10 a. m.

INSTRUCTIONS FOR CONSERVATION OF SURGICAL DRESSINGS.

Owing to extreme difficulty of obtaining supplies of gauze or cotton, the following rules will be strictly adhered to:

1. No stock supply of gauze, cotton, or bandages will ever be drawn by any ward for ward use.
2. Sterile surgical dressings will be supplied to the ward by the operating room on an order signed by a medical officer when absolutely needed.
3. Gauze and cotton will not be used for cleaning purposes or as wash cloths.
4. Cotton waste will be used entirely for cleaning, where necessary, and when dust rags are not available.
5. A supply of knitted wash cloths will be issued to each ward for use as necessary. These must be carefully used and disinfected after use.
6. Cotton and gauze for poultices, etc., may be obtained from operating pavilion on order signed by medical officer, stating exact amount needed.

INSTRUCTIONS FOR WAXING THE FLOORS.

1. Thoroughly sweep the floor, removing the runners and cleaning the floor as much as possible.
2. Apply wax, using cotton waste, and rub on floor by hand. The use of long-handle spreaders in putting the wax on the floor is prohibited.
3. Let the wax dry after having been rubbed on for at least an hour; better two hours.
4. Polish with hand squeegee and electric squeegee.

INSTRUCTIONS FOR THURSDAY'S INSPECTION OF ICE BOXES.

1. Scald out ice box with boiling water.
2. Pull ice box out from wall and clean behind, leaving out until after inspection.
3. Thoroughly clean and kerosene the funnel or drip pan for box.

DIRECTIONS IN CASE OF FIRE.

1. Break the glass over the button for the fire-alarm system, giving one long ring and the number of short rings that corresponds to the district in which the fire is.
2. In case the button refuses to work, call the officer of the day over the telephone and notify him that there is a fire at your location.
3. Do not delay for any reason, as a fire in a hospital of this type of construction can not be brought under control too soon. Get the nearest fire extinguisher into play immediately, for the quicker water gets on the fire the less damage is going to result.

FIRE STATION BILL, U. S. NAVAL HOSPITAL, CHARLESTON, S. C.

Executive officer.—In charge at scene of fire, unless relieved by commanding officer.

Officer of the day.—In charge of administration building. Will see that building is secured for fire, and report by orderly to the executive officer. If the executive officer is absent from the hospital, the officer of the day will assume charge at the fire. He will see that the bill book, register of patients, medical journal, and the other official books and files in the record room are removed from danger.

Ward, laboratory, and all other medical officers.—Will see that their stations are properly manned for fire, closing all windows and providing for the removal of inflammable and valuable property from place of danger. Ward officers will see that proper details are made in their wards for the transportation of bed patients from places of danger. After securing their stations they will report immediately to the executive officer.

Paymaster.—Secure department and report to officer in charge at scene of fire.

Chief nurse.—To superintend the removal of patients from places of danger.

Pharmacists.—Stand by with the executive officer at scene of fire, providing all necessary keys to the various departments to remove property from places of danger.

Yeoman and office force on duty.—Secure administration building and stand by with all assistants and orderlies to remove records and books to places of safety.

Nurses and hospital corpsmen in charge of wards.—To close all doors and windows and see that all hospital corpsmen proceed immediately on the run to the scene of the fire. They will see that all convalescent patients report to their wards and stand by their beds until "secure" is sounded. Convalescent patients will lend assistance in removing bed patients from their wards in case of danger. Nurses will see that the ward cleaners know the location of stretchers furnished each ward to expedite the removal of patients from places of danger.

Chief commissary steward.—Will secure mess hall and galley for fire, closing doors and windows, and in case of danger will see that silverware and the most valuable portion of supplies are saved.

Hospital corpsman in charge of brig.—Will stand by and release all prisoners. The relief hospital corpsman reporting brig secure. All persons will be kept

in their cells unless the prison ward building is in actual danger of catching fire.

Chief laundryman.—Will secure laundry for fire and detail assistants to stand by to remove laundry from place of danger.

Carpenters.—Provide axes, grappling irons, saws, and report on the run to the executive officer at the scene of the fire.

Electricians.—Will stand by transformers; in the daytime pull transformer plugs supplying buildings at scene of fire; at night will turn on all available lights to assist in the removal of patients, standing by transformers to cut off electricity only upon order from officer in charge at scene of fire.

Plumbers.—Will report to the officer in charge at scene of fire. The plumbers are responsible for the upkeep of all fire apparatus of the hospital and will see that same is kept in serviceable condition.

Ambulance drivers and mechanicians.—Stand by to remove ambulances, trucks, and other motor vehicles from places of danger; the extra men reporting at the scene of the fire.

Foreman in charge of power plant.—Stand by, with entire force, reporting immediately to the officer in charge at scene of fire.

The assistant engineer on watch will see that the whistle is blown, sounding the number of districts for the scene of fire. He will sound one long whistle and the number of short whistles, up to and including six, which indicate the location of the fire.

HOURS OF DUTY.

1. No officer on duty in this hospital will leave the hospital compound during the hours from 9 a. m. to 4.30 p. m. without notifying the officer of the day before leaving and returning to the reservation.

2. The officer of the day shall keep a book, opening a new page for each day, in which he will note the time of departure of every officer from the station as well as the time of his return. This book will be signed by the officer of the day on his relief from duty.

3. The medical officer in command does not intend to be embarrassed in the future, as he has been in the past, by being unable to locate officers who have left the reservation. These instructions apply to every officer on duty at this hospital.

4. The hours for duty will be as follows: Chief of sections, 9 a. m. to 4.30 p. m.; junior officers, 8.30 a. m. to 5 p. m. These hours shall be strictly observed.

5. Lunch from 12 to 1 shall be strictly observed.

6. Officers with serious cases will be expected to make the evening and a night sick call on each case. This applies to chiefs of sections as well as junior officers.

CONTENTS OF LOCKERS.

Patients will be allowed to keep the following articles, and no others, in their lockers.

Bluejackets:		Marines:	
Suit of blue or white	1	Suit of blue or khaki	1
Suits of underclothing	2	Suits of underclothing	2
Socks, pair	3	Socks, pair	3
White hat	1	Shirts	2
Blue hat	1	Blue cap	1
Neckerchief	1	Towels	3
Towels	3	Shoes, pair	1
Shoes, pair	1	Toilet articles.	
Toilet articles.			

ORDERS FOR OFFICER OF THE DAY.

6.30 a. m.—Supervise muster and physical drill of hospital corpsmen.

6.50 a. m.—Receive report of night apprentice in charge of administration building.

7 a. m.—General inspection of entire hospital.

8.45 a. m.—Report to the executive surgeon absentees, admissions, etc.

9.30 a. m.—Report to the executive surgeon condition of patients.

9.50 a. m.—Journal of the officer of the day to be completed and submitted to the executive surgeon for inspection and signature.

10.00 a. m.—Submit journal to the medical officer in command.

Between 2.30 and 4.00 p. m.—Complete inspection of hospital by relief officer of the day.

9.55 p. m.—Hospital corpsmen on night duty report.

10 p. m.—General inspection of hospital with night nurse.

The officer of the day will not leave the desk without being properly relieved. The medical officer in command requests that the officer of the day assume the same relation to the hospital as the officer of the deck on board ship.

Medical officers leaving the hospital will leave written memorandums regarding condition and treatment of patient, with address and telephone number for call in case of emergency.

THE FOLLOWING RULES WILL BE RIGIDLY ADHERED TO.

1. The officer of the day will, at 6.30 a. m., supervise the muster of all hospital corpsmen, and will see that the physical drill is given in a proper manner and that sufficient vim and energy is used by the men to make the drill of value. At 7 a. m. he will make a general inspection of the hospital, including attention to the condition of patients, muster of hospital corps on duty, note of absentees, and see that routine orders in regard to cleaning, etc., are carried out.

2. The officer of the day or his relief will make a general inspection of the hospital at an undetermined hour during the afternoon, and at 10 p. m. another inspection, when he will be accompanied by the night nurse, relieving the nurses going off duty at this hour.

3. He will perform all of the duties called for in the instructions for medical officers, including inspections of food and meals prior to serving.

4. When men are returned to the hospital by a sentry, they will be inspected by the officer of the day as to their condition, and the circumstances of their arrest will be fully noted. Such men will be placed in the brig for safe-keeping until action can be taken on their cases by the commanding officer.

5. Attention is called to the fact that when patients detailed to light duty are put to bed by the ward medical officer, the executive office must be notified at once, giving the man's name, rate, and where detailed.

6. When a ward officer leaves the hospital or grounds, written instructions regarding his cases must be turned over to the officer of the day, signed by him.

7. Medical officers of all wards will prepare a list of men ready for discharge to duty every Thursday by 10 a. m. and have the same in the ward to meet the executive surgeon on his rounds, so that the availability of the men for discharge to duty may be determined.

8. No one will be checked out on liberty except by the officer of the day in person, or his relief. After 10 p. m. and until 7 a. m. this shall be done by the night hospital corpsman on duty in administration building.

9. The executive surgeon's luncheon hour is from 1 to 2 p. m. He shall be called only on urgent matters during this hour.

10. Officers wishing permission to go ashore shall request permission of the executive surgeon between 12 and 12.30 p. m. Permission will not be granted when requests are made after this hour.

11. Except in cases of urgent emergency no verbal orders will be given for treatment. Both a night and day book is kept in the ward for this purpose.

12. The details for liberty and light duty must be consistent with each other. It will be understood that patients recommended for liberty are available for light duty, their disease or injury being taken into account.

13. When a hospital corpsman is taken sick, the fact is to be reported at once to the executive surgeon. Whether or not he is to be placed on the sick list is to be decided by the executive surgeon.

14. Members of the hospital corps will be relieved of their regular station or duty only by order of executive surgeon.

15. No cases will be transferred from one ward to another or from the contagious section to the open wards of the hospital without first obtaining permission from the executive surgeon.

16. When patients are transferred from one ward to another, the complete chart and all records pertaining to the patient must be transferred at the same time.

17. The receiving nurse refers the above clinical record to the medical officer of the ward at sick call.

18. Nurses or hospital corpsmen in charge of wards will be held strictly responsible for the administration of drugs and treatment.

19. Poisons and liquors must be kept under lock and key.

20. Visitors are allowed in the hospital between 1 and 4 p. m. daily.

21. When patient is recommended by medical survey for discharge, the diagnosis on health record should be the same as the disability for which he is discharged.

22. Medical officers are to see that all telephone messages (official) sent or received are written in the telephone book.

23. Patients having gonorrhea, gonorrheal rheumatism, or any open venereal lesion will not be granted liberty.

24. No person admitted with severe nervous or mental diseases, as epilepsy, is to be recommended for liberty. Patients with diagnosis of constitutional inferiority are to be considered in this class, and are not to be granted liberty unless there is good reason to believe that they can handle themselves under ordinary circumstances.

25. It is strictly forbidden to take fruit or eatables of any description into the wards. This applies to patients or visitors except when they bear the signature of the officer of the day.

26. When a man returns after being absent without leave for more than 24 hours, unless there is some reason to the contrary, he will be turned over to the hospital corpsman in charge of the brig for safe-keeping.

27. Men entering the hospital as patients will not be recommended for liberty unless they have been in the hospital for one week.

28. Whenever anything is needed from the drug room or from the storeroom except in case of emergency, the requisition will be presented to the executive surgeon. Should the occasion arise where for any reason it is impossible to do this, owing to the absence of the executive surgeon from the hospital, the officer of the day will authorize the issue and will inform the executive surgeon on his return to the hospital of the order and the occasion for the order.

29. The officer of the day will muster the civil employees at such occasions as are necessary and make every effort to expedite the paying of these persons.

All payments in cash are to be witnessed by the officer of day or relief officer of day.

30. When an officer or other person comes to the hospital for the payment of money, signing of accounts, or any other purpose on official business, he shall be directed to report to the executive surgeon, or in his absence from the administration building, to the officer of the day.

31. When a man is ready for discharge the fact will be reported to the executive surgeon.

32. At 9 p. m. the nurse or hospital apprentice in charge of wards will report to the officer of the day, in writing, the names of all patients absent from the ward, whether on liberty or not. The officer of the day will pass this over to the administration building night hospital corpsman, who will account for them and under title of "absentees" at 9 p. m. will place those A. W. L. or A. W. O. L. on his night report and account to the executive surgeon the hour that they return to hospital.

33. When a message is received from any vessel that a patient is on the way to the hospital by boat, a hospital corpsman shall be sent to the wharf to receive the patient and to take charge of his transportation to hospital in ambulance.

34. Except for ambulant cases stretcher bearers will always accompany ambulance.

35. The officer of the day shall receive all patients and assign them to wards.

36. The officer of the day shall remain at the desk from 6.50 a. m. to 10 p. m. except when going to meals or on official inspections, in which case he shall leave his relief or other medical officer on watch at the desk.

37. At 9.50 a. m. the officer of the day, in company with the relief officer of the day, will report to the executive surgeon taking the medical journal.

38. Inspect the hospital at 7 a. m., again about 3 p. m., and once after 11 p. m., all of which must be entered in the medical journal.

39. The officer of the day will prevent patients (officers or others) from loafing in the halls of the administration building.

40. Make sick call in the evening in the wards of the medical officers absent from the hospital.

41. The ambulance will leave the hospital within five minutes of the time on which a call is received. Delay beyond this time will be reported to executive surgeon immediately with the reason. At night, if the ambulance drivers have turned in, a time limit of 15 minutes will be allowed.

42. The telephone will be used for official business only. Communication with outside not permitted from any ward.

43. All official telegraph messages received will be delivered to the officer of the day, who shall call the executive surgeon's attention to their arrival and and assist the expedition of business.

44. When a hospital ticket is received it shall at once be given to the officer of the day for examination and entry on journal, together with bag and hammock number. All papers accompanying all patients will be turned over to the record office.

45. Bags and hammocks shall be taken to the bag room at once.

46. Patients are not allowed on the grounds after evening sick call without first obtaining permission from the officer of the day except for going to and from the recreation building.

47. When a man is received at the hospital, inquiries will be made with reference to his bag and hammock and a note made in the journal of its receipt.

48. The medical officer having charge of the contagious cases shall see that the hospital corpsman preparing bags to go to the sterilizer will remove all

material and articles and take the proper precautions against the damage of any clothing.

49. Whenever stretchers or any small articles are to be sent to ships in the yard they will be sent to the ship and delivered to the officer of the deck. If these articles are tagged, they will be sent by first ambulance going to ship.

50. Every serious case received shall be reported to executive surgeon. The same report shall be made whenever a patient is in a critical condition in order that his parents may be notified, and a chaplain called if the patient desires him.

51. Officer of the day's inspections shall include the brig and all persons confined. Particular attention shall be given to the prisoners to ascertain their condition and whether they have received their meals.

52. He will up to 10 check in and out all liberty men, seeing that they are neat and in the uniform prescribed.

53. At 10 p. m. he will ascertain from the nurse going off duty at the contagious section the condition of patients, number of prisoners, and names of absentees.

54. He will attend all funerals and see that order is kept. The relief officer of the day will remain at the desk at such times.

INSTRUCTIONS REGARDING AMBULANCES AND TRUCKS.

1. Whenever an ambulance call is received the officer of the day will call the garage on the telephone and have ambulance report to him.

2. He will then write in this book the machine, the time of the leaving, the place to which the machine is going, and report the name of the person who called for the machine, together with the purpose of the trip and name of driver in charge.

3. The officer of the day will see that the ambulance has blankets and is carrying an extra man besides the driver whenever a call is for a stretcher case.

4. Whenever a truck leaves the hospital reservation it will be handled in the same manner and the time of its return noted as in the case of ambulances.

5. To simplify the calling of ambulances, the ambulance bell may be used, one long ring being for a large ambulance and two long rings for a Ford ambulance, the ambulance on watch being the ambulance to be used except for special reasons.

6. The officer of the day will not permit any member of the hospital corps or other member of the hospital personnel except those regularly detailed for such duty to drive any ambulance or motor vehicle belonging to this hospital. Under no circumstances will patients be allowed to drive any motor vehicle unless they are specially detailed for such duty by the executive surgeon.

U. S. NAVAL HOSPITAL,
Charleston, S. C., January 1, 1919.

Duties of the Chief Consultant.

1. The chief consultant will be in direct charge of the care and treatment of all patients in the hospital, and in direct supervision of the activities of all chiefs of sections, and other medical officers attached to the hospital.

2. He will endeavor to the best of his ability to coordinate the activities of all departments, and use to the best advantage possible the special equipment of the various special clinics to aid medical officers in providing the most efficient treatment for their patients.

3. Medical officers in charge of the wards will consult with their chiefs of sections regarding the treatment of their doubtful or serious cases, and by reporting to the chief consultant, will consult with him in regard to the best methods of handling each case.

4. A daily morning report will be made by every medical officer in charge of every ward to the chief consultant, at which time he will report the condition of all serious cases and bring to the attention of the chief consultant, the advisability of various special examinations.

5. The chief of section will be responsible for all health records, will visé them and see that medical officers have their records constantly up to date. He will examine the records of all patients about to be discharged to duty, initial them previous to approval of the medical officer in command.

6. The chief consultant will be responsible for the condition of clinical records of patients while in the hospital, and will see that the same are always up to date, and kept in accordance with the prescribed instructions.

7. Medical officers will bring to the attention of the chief consultant, all interesting cases, in order that at the Thursday night bi-monthly conference of medical officers, cases of special interest may be presented at a clinical work by all the officers attached to the hospital. It will be the duty of the chief consultant to assign medical officers to discuss cases as reported by members of other services.

8. Medical surveys, case reports and all paper work concerning the medical handling of the sick, will be submitted to the chief consultant for approval before submission to either the executive surgeon or commanding officer, and it will be the duty of the chief consultant to verify the facts in each case.

U. S. NAVAL HOSPITAL,
Charleston, S. C., January 1, 1919.

Routine for the Office of the Chief Consultant.

9 a. m.—medical officers of surgical section to report.

9.30 a. m.—medical officers of the medical section to report.

10 a. m.—medical officers of the contagious section to report.

10.15 a. m.—medical officers of the genito-urinary section to report.

10.30 a. m.—chief consultant will report to commanding officer, the condition of all serious cases in the hospital.

1. After this report, the services of the chief consultant will be considered available for any medical officer to have his assistance in reviewing or examining cases in his ward, and appointments for this duty will be made at the convenience of the chief consultant.

2. Officer cases will be in direct charge of the chiefs of sections of the various services, and will be handled by them under the supervision of the chief consultant.

U. S. NAVAL HOSPITAL,
Charleston, S. C., November 10, 1918.

Organization plan of the laundry.

1. The following divisions are created in the laundry:

First. The man in charge, who will be directly responsible for the upkeep and maintenance of the equipment and the proper performance of the work of the men under him. He will also be responsible for all material passing through the laundry.

Second. The man in charge of the receiving section will be responsible for the correct counting of all linen received in the laundry and the verification of the laundry list as sent to the laundry by the nurses in charge of wards. He will see that the count is correct in order to avoid over or under issues of linen which is on charge to the laundry.

Third. The man in charge of the clean-linen room will issue to the wards the exact amount of linen turned in—never more or less. The man in charge of the clean-linen room will be directly responsible to the man in charge of the laundry for all linen in the laundry in case of shortage.

Fourth. The man in charge of the washing machines will be responsible for the upkeep and maintenance of these machines, and will report immediately to the executive surgeon, through the man in charge of the laundry, all defects in machinery and need for repairs. He and his assistant will wash all the clothes and put them through the extractors.

Fifth. The man in charge of ironing will assist and supervise the ironing of all clothes by the flatirons. He will see that the laundry is neatly folded, stacked, and carried into the clean-linen room. He will also be responsible for the drying of all clothes in either the tumble drier or the drying chamber.

Sixth. The negro women ironing with hand irons or presser will be under the direct supervision of the man in charge of the laundry.

No member of the laundry personnel will ever tamper with or attempt to adjust any of the laundry machinery, particularly the electric controls. Breakdowns and needs for repairs will be immediately reported to the executive surgeon, who will detail a skilled mechanic to look after and make the necessary repairs.

U. S. Naval Hospital,
Charleston, S. C., November 9, 1918.

Instructions for handling laundry.

1. The nurse in charge of the ward will separate the various items of laundry, tying each item up in a bundle and counting the number of pieces in each bundle.

2. The nurse will make out a laundry slip in duplicate. The original will accompany the soiled clothes to the laundry. The duplicate will be kept by the nurse for a check on the clothes she receives from the laundry.

3. The man carrying the soiled clothes to the laundry will take them to the receiving room, where they will be counted by the man in charge and the slip O. K'd.

4. The hospital corpsman will then go to the clean-linen room at the other end of the laundry and draw clean linen in the amount equal to the dirty linen turned in, leaving the original laundry list as a receipt for the clean linen received.

5. The nurse on the return of the linen from the laundry will count same and compare the amount received with the amount sent. Any discrepancy will be immediately reported in order that it may be rectified.

6. Nurses in charge of wards will see that whenever torn linen is found, it will be sent immediately to the clean-linen room of the laundry for repair before being used. All torn soiled linen will be washed before being repaired.

7. The following times are designated at which linen will be sent to the laundry by the various services:

Genito-urinary ward, 8 a. m.

Ward A, 9 a. m.

This linen will be run through the sterilizer before counting.

Medical service, 9 a. m.

Surgical service, 10 a. m.

Operating room, eye, ear, nose and throat section and all specialties, 10.30 a. m.

All quarters, 11 a. m.—Monday, nurses; Wednesday, white employees; Thursday, colored hospital corps; Friday, tents; brig doctors.

8. For the purpose of facilitating the handling of laundry the above-mentioned hours will be rigidly adhered to.

Routine orders for the ambulance ship.

1. A watch will be maintained on board ship at all times, consisting of a sufficient number of the crew in order that the ambulance ship will be instantly available for use.

2. The ambulance ship will be in no way placed out of commission or extensive repairs undertaken without the knowledge and consent of the executive surgeon of the hospital.

3. Liberty will be granted from 5 p. m. until 8 a. m. to that portion of the crew which is not on watch. The commanding officer will be aboard from 9 a. m. until 5 p. m. and on leaving will report his departure to the officer of the day at this hospital.

4. A journal will be kept to be submitted daily to the medical officer in command of the hospital for approval, via the executive surgeon, which will show a crew on duty and their time of reporting for duty, trips of the vessel, repairs performed by the crew, time meals are served and their condition, whether satisfactory or not, ships passing up and down stream and arriving or departing from the navy yard, with the hour of arrival, departure, or passage. The names of all patients carried, together with their rates, place, or vessel received from and disposition, will be noted. All incidents of unusual interest or notes pertaining to the medical department of the ship will be kept in this journal, which will be kept by the quartermaster on watch, approved by the master of the ship, and submitted via the executive surgeon to the commanding officer of the naval hospital. This journal will cover the period from 8 a. m. to 8 a. m. of the succeeding day, when the watch on duty will be relieved.

5. The duties of the master will be responsibility for the navigation, upkeep, and general maintenance of the vessel. He will make all repairs necessary, using the vessel's crew as far as possible, and he will be personally reponsible to see that each man faithfully performs the duties assigned him, that the proper performance of the vessel's duties, and that the vessel is always clean and in a shipshape condition and available for immediate use.

6. The quartermasters will act as officer of the deck during their time on watch, and will keep the above-mentioned journal, which will be submitted to the medical officer in command. He will be always on deck during his tour of duty or will be represented by another member of the crew, who may temporarily relieve him, except during the night when a member of the crew on watch will be posted on duty for four-hour periods.

7. The machinist will be responsible for the upkeep and care of the engines as well as the electrical equipment of the vessel. They will report to the quartermaster on watch readings of storage batteries whenever taken in order that they may be logged in the journal. They will make all minor repairs and be responsible for the general condition of their department.

8. The senior hospital corpsman will be responsible for the condition of the sick bay and its equipment and all property of the medical department on

charge to the vessel through the master. He will see that medical supplies are kept aboard in sufficient amount to meet the needs of the ship, and that surgical instruments and other equipment are always in a serviceable condition available for immediate use.

9. The master will see that all members of the crew are provided with the necessary uniforms and wear the regulation uniform prescribed for the day during their periods on watch. He will see that the wharf is cleaned and that packages or articles stowed thereon are stowed in a neat manner. The landing will be policed daily at the same time, or immediately after, the daily routine cleaning on board ship is completed. Members of the crew will not be permitted to wear nonregulation clothing on board ship.

Instructions for handling baggage.

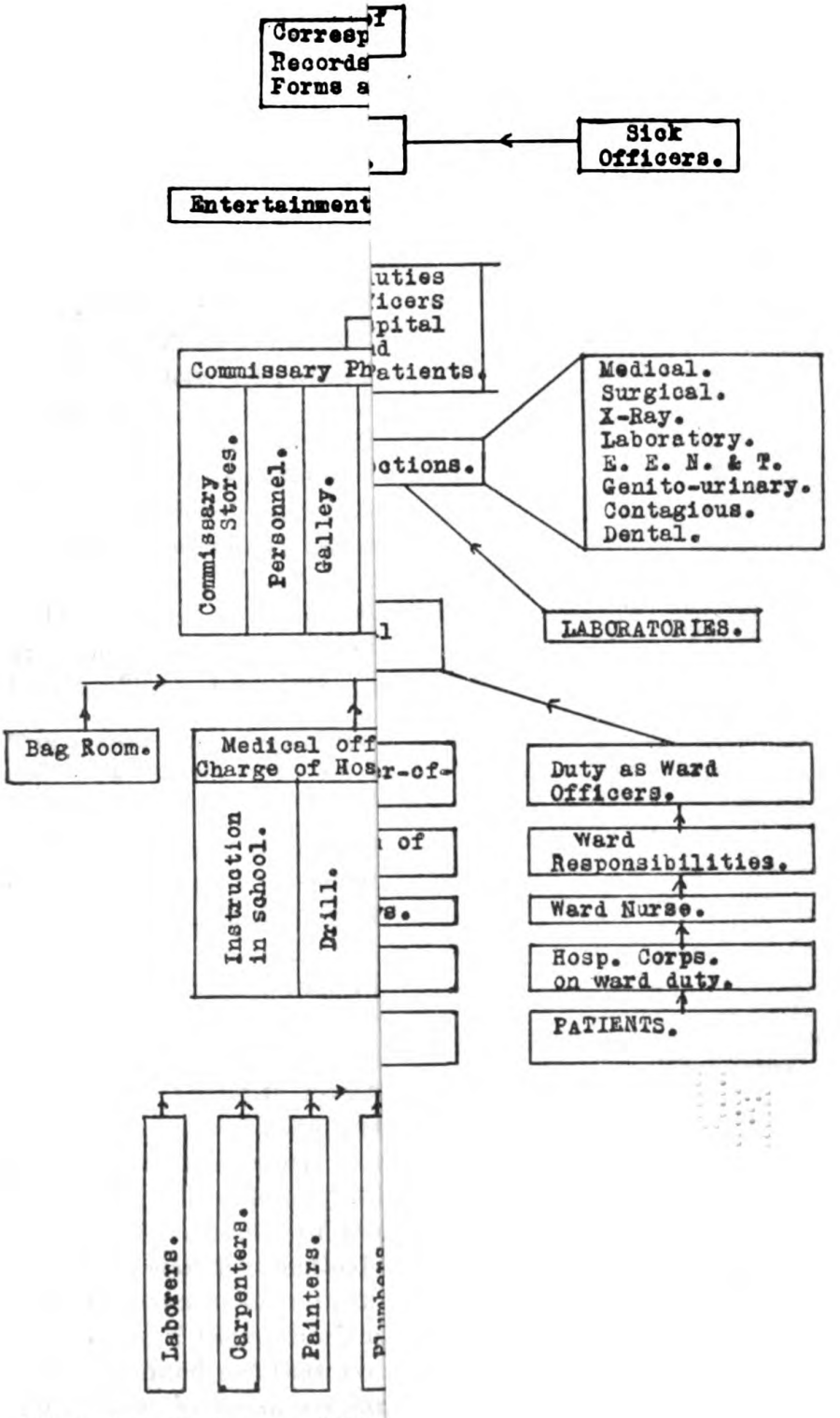
1. Upon receipt of a patient's baggage in the hospital, the officer of the day will see that the same is carefully marked and will seal the bag with a lead seal, placing the bag on the platform to be removed by the man in charge of the bagroom.

2. The man in charge of the bagroom will remove the baggage from the receiving platform, taking same to the bagroom, where he will make out a card, showing the man's name, rate, and the number of the rack in which the baggage is stowed in the bagroom.

3. Whenever a patient desires to remove baggage he will be required to sign the receipt showing the date on which he opened his bag and removed part of the contents. The man in charge of the bagroom will then seal the bag with the bagroom seal and replace it in the rack.

4. When a patient is discharged to duty, the man in charge of the bagroom will deliver all baggage belonging to the patient on signature by the patient, with the receipt on the filing card.

5. The man in charge of the bagroom will see that all baggage is plainly marked and that tags are securely fastened and will see that the seals placed on all baggage are kept intact. No one will ever be allowed in the bagroom except the man on duty. Patients will never be permitted to go and hunt for their own baggage.



133354—19. (To face page 896.)

MILK, by *Paul G. Heineman, Ph. D.* First edition. W. B. Saunders Co., Philadelphia, Pa. 1919.

This work is based on the author's experience during 13 years of service in the department of hygiene and bacteriology, University of Chicago.

Beginning with a historical survey of the use of milk and butter in ancient times, the author proceeds methodically to discuss milk in all its bearings—physical and chemical properties and examination; adulteration; enzymes; transmission of toxins and antibodies by it; microorganism content, their number and variety; bacteriological examination; milk-borne infections; pasteurization and other methods of handling milk; economic aspect of distribution; foods derived therefrom as butter, cheese, ice cream; preserved milk; the various sources of milk, etc.

The volume is fully illustrated, and the 650 odd pages of text are comprehensively indexed. It should be of inestimable value to health officers, hospitals, and general laboratories.

THE EXAMINATION OF MILK FOR PUBLIC HEALTH PURPOSES, by *Joseph Race, F. I. C., City Bacteriologist and Food Examincr, Ottawa, Canada.* 1st Edition. John Wiley & Sons, New York. 1918.

This handbook includes considerably more than the routine method of chemical and bacteriological examination required of officials charged with enforcing pure food laws, and will be of general use to students. In the section on chemistry, in addition to the official methods for the determination of fats and total solids and the detection of preservatives, alternative procedures are outlined. Selected methods are given for the determination of lactose, total proteins, caseinogen, albumin, mineral constituents, total acidity, refractive index, etc., to aid in the correct detection of sophistication. The section on bacteriological examination includes a general survey of sources of infection, an outline of methods enumerated, and a discussion of the possibility of detecting excremental and pathogenic forms. Details of standard methods of the American Public Health Association are given in some instances. Many of the illustrative tables are summaries of the author's unpublished investigations.

It is pointed out that average counts may be misleading if deviations from the mean are larger or the number of variants is small.

In these cases the median would be a better indication of the quality of the supply, but it is best to group the results into classes having a comparative small range of bacterial counts.

An appendix gives the composition of certain culture media and tables for computing specific gravity.

HUMAN ANATOMY, INCLUDING STRUCTURE, DEVELOPMENT AND PRACTICAL CONSIDERATIONS, edited by *G. A. Piersol, M. D. Sc. D.* Sixth Edition. J. B. Lippincott Co., Philadelphia, Pa. 1918.

Of all professional subjects anatomy changes the least. The multiplication of anatomies is not desirable. Most physicians and surgeons find that the best reference book on this topic is the textbook they conned, marked, and learned their way about in during the academic period of their lives. However, Piersol's anatomy is amply justified by its presentation of the subject from the surgical aspect and by the great mass of new material not found in the older and purely descriptive books. Its size and character preclude its use for medical students at college and make it the consulting book of the experienced practitioner and specialist. A few illustrations of the scope of this work will suffice. Following the classical description of the bones of the skull there are five pages of fine print on the anthropology, growth, and measurements of the skull and 13 pages of "practical considerations," which include references to hydrocephalus, microcephalus, cretinism, syphilitic disease, fractures of the cranium, and surgical landmarks.

After the descriptive anatomy of the muscles of the hand come four and one-half pages of "practical considerations." The anatomical difference in the tissues of the palmer and dorsal integuments accounts for the rarity of furuncular infections of the anterior surface. The direction taken by suppuration beneath the palmar fascia, the character of inflammatory swelling on the two aspects of the hand, the relation of annular ligaments at the wrist to tendons and tendon sheaths, tenosynovitis; the effect of structure on trauma of tendons and sheaths, the subject of palmar abscess, the difficulty of reducing dislocations of the thumb are all adverted to.

The text covers upward of 2,000 pages, interspersed with more than 1,500 illustrations.

HANDBOOK OF MENTAL EXAMINATION METHODS by *S. I. Franz, Ph. D., M. D., LL. D.* Second Edition. The Macmillan Co., New York, 1919.

A small book of less than 200 pages giving the general principles and the minute details of methods of mental examination. It is a valuable book written from a rounded knowledge of the subject and comparing favorably as to clarity with most works in this field, but the language should be simplified, long sentences and paragraphs

should be shortened, and the material be presented in a form more easy of assimilation if it is really intended for other than very advanced students.

THE BLIND, THEIR CONDITION AND THE WORK BEING DONE FOR THEM IN THE UNITED STATES, by *Harry Best, Ph. D.* First edition. The Macmillian Co., New York, 1919.

A handy volume of facts and figures relating to the causes of blindness—disease and accident, the number of the blind, their economic and legal status, their education, institutional provisions for them, their industrial situations.

The book contains a mass of references and quotations and an extensive bibliography and should be of immense value to students of the subject.

We note typographical errors on pages 255, 256, 750 as an aid to accuracy in subsequent editions.

NOTICE TO SERVICE CONTRIBUTORS.

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

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

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

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

Only the names of actual reviewers for a current number appear.

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

INDEX TO UNITED STATES NAVAL MEDICAL BULLETIN.

VOLUME XIII.

INDEX TO SUBJECTS.

(Articles not appearing in full in the BULLETIN are marked (*ab*).)

INDEX TO SPECIAL NUMBER, JANUARY, 1919.

INDEX TO AUTHORS.

(Articles not appearing in full in the BULLETIN are marked (*ab*).)