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UNITED STATES NAVAL MEDICAL BULLETIN

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THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT

DIVISION OF PLANNING AND PUBLICATIONS
CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY
IN CHARGE

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

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NAVY DEPARTMENT,
Washington, March 20, 1907.

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
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PREFACE

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

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

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

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

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

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

NOTICE TO SERVICE CONTRIBUTORS

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

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

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

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

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.*

U. S. NAVAL MEDICAL BULLETIN

Vol. XXI JULY, 1924 No. 1

SPECIAL ARTICLES

U. S. NAVAL PHARMACIST'S MATES SCHOOL; ITS DOCTRINES AND POLICIES

By the Staff of the School

INTRODUCTION

By George Pickrell, Captain, Medical Corps, United States Navy

The problem of producing a supply of hospital apprentices to meet the needs of the naval service is one that requires a great deal of consideration. There are several factors which govern the success of a school having this duty to perform.

The intensive drive for the enlistment of new men to fill up the Navy is one of the greatest causes for trouble in the school and results in dissatisfaction in the corps. Owing to the short time necessarily given to the examination of recruits men are frequently taken in who are not suited for the service. Practically every case of discharge for inaptitude, bad conduct, or medical survey results from this reason. It is difficult for an officer on recruiting duty to judge accurately the qualities of the candidate as he first appears for enlistment, without any life history, save that which he elicits from the man at the time of examination. Were it possible to accept men for a probationary period a large number of misfits could be avoided as well as those whose latent physical indispositions do not become manifest until they are in contact with service routine.

Apparently the idea exists in many homes that when a boy becomes unmanageable he should be put in a military service. Numerous cases have come to the attention of the commanding officer where the parents have been unable to manage their sons and wish to transfer the responsibility to the naval service. They expect the service to discipline the boys and turn them out as useful members of society. Perhaps the most hopeless ones are the "ne'er-do-wells," the boys who were unable to stay in school continuously, and who could not stick to any job in civil life. These usually leave the service with a bad-conduct discharge.

In a school as large as this has been in recent years it is thought that at times there has not been sufficient personal supervision. In the opinion of the commanding officer, the commissioned and warrant officers should be especially selected for this work and the noncommissioned officers, who come more directly in contact with the boys, should be the best types of their grade. The more personal contact and personal supervision there is, the better will be the results obtained.

Discipline is fundamentally necessary in any military organization and can only be instilled when recruits are taught by adequate punishment that the price one pays for the breaking of rules is not equivalent to the extra liberty or freedom enjoyed.

A certain amount of preliminary education is necessary before a hospital corpsman can understand his scientific instruction and where it so frequently happens that a man is enlisted as a hospital corpsman and understands neither fractions nor decimals, it is small wonder that he never correctly learns how to make a percentage solution. It thus becomes incumbent upon our hospital corps school to teach elementary arithmetic, English, and spelling in order that a man may legibly record the condition of his patient of the treatment given.

In writing this article all officers have prepared short notes on the subjects with which they are concerned as instructors. They have endeavored to give the viewpoint of the instructor and the amount of instruction which is considered desirable for each student to receive. Owing to the strict limitation of time which a man can spend under instruction it is frequently necessary to transfer men from the school whose marks make one doubt of their value as hospital corpsmen.

It must be remembered that this school gives but the foundation of a corpsman's training. His future development depends upon the amount of practical instruction received at a hospital, and it must be given in a systematic and logical manner to be effective.

HISTORICAL

During the troublesome times of 1917 it was frequently the source of much worry to officers responsible to locate sufficiently well-trained and experienced hospital corpsmen for duty as members of the crews of submarine chasers and the numerous other coast-patrol boats. Hospital corpsmen were available, but the lack of men with experience was the cause of considerable difficulty for the officers involved in this duty. In several of the naval districts schools were started with the idea of preparing new men for independent duty and finally a decision was made to centralize this instruction, which resulted in the establishment of the United States Naval Pharmacist's Mates School, naval operating base, Hampton Roads, Va. The school was placed in the status of a trade school as part of the naval training station.

Men were transferred from ships and naval districts to this school where they were given an 18 week's course of instruction to prepare them for independent duty. One of the prime qualifications for these men was the previous experience in medical or pharmaceutical work. After their course of instruction men were sent to ships where they were the sole representative of the Medical Department of the Navy. The excellent record of service performed by these youngsters, considering their lack of previous naval experience, is ample proof of the thoroughness of their instruction by the officers then attached to the school.

In 1918, when it had become necessary to warrant a considerable number of pharmacists from men of small naval experience, an additional course was opened in the school and officers of the rank of pharmacist and chief pharmacist were received for instruction and they were given special courses to prepare them for their duties at hospitals and aboard ships.

Thus the school performed a dual function, developing the intermediate and highest members of the hospital corps.

In 1920, when the Naval Training Station at Newport closed, the Hospital Corps Training School at that station was consolidated with the Pharmacist's Mates School, Hampton Roads, Va. This added a third course to the curriculum of the school giving the primary or preparatory instruction of the hospital apprentice. There was then consolidated for the first time in one institution the equipment and personnel for the instruction and training of all groups of the personnel of the Hospital Corps of the Navy.

In the fall of 1920 it was believed desirable to consolidate the Medical Department activities by bringing the Pharmacist's Mates School to the naval hospital reservation at Portsmouth, Va. A group of 13 buildings in the far northwest corner of the reservation offered an ideal situation for a hospital corps school. This plan was approved by the department and in the middle of December the school moved into its present quarters. The buildings are constructed of hollow tile, two stories in height. Each barrack building provides accommodations for 70 men without crowding. In case of an emergency, the accommodations can be arranged so that 900 men could be taken care of, if two buildings now used by the hospital were devoted to school use.

The laboratories are roomy and each lecture room will provide seating accommodations for about 90 men.

The equipment of the school is excellent. Chemical, bacteriological, pharmaceutical, and other apparatus have been provided by the Bureau of Medicine and Surgery in ample amounts and have resulted in the establishment of what is said to be one of the most thoroughly equipped schools of its kind in the world.

ADMINISTRATION POLICIES

The object of all initial hospital corps instruction is to fit a man to perform his duties in the naval service as thoroughly and quickly as possible. With this in view every effort has been made to concentrate upon essentials and to endeavor to standardize courses so that each subject follows in a logical sequence. An effort is also made to instill into the student the fundamental rules of discipline and to make obedience a matter of habit so that upon transfer from the school to other military units a man will be able to give a cheerful, "Aye, aye Sir," to an order and understand what is meant by the order.

The instruction in the school must of necessity be theoretical, for a man's efficiency as a hospital corpsman depends upon his knowledge of certain basic facts. We attempt to drive home these fundamentals by the use of apparatus or the demonstration upon manikins or members of classes themselves. The *practical* instruction of a hospital apprentice is a duty which falls to the naval hospital upon his transfer from the school and in this phase of a hospital corpsman's service his real worth is truly established.

Military and hospital corps drills are included as part of the curriculum of the school primarily to give the recruit the appearance of a member of a military organization and to accustom him to obedience to command as a member of a military group.

Athletics are encouraged both as tending toward the physical betterment of the individual and to the development of the school spirit, for good morale and good athletics and other amusements are closely interdependent.

It is the endeavor of this school to keep in touch with parents of boys under training as much as possible. Reports of progress are frequently made and parents are encouraged to visit the school, that they might see it in operation. This policy has been a matter of general satisfaction to all concerned as parents have been unfailing in their cooperation after they have once become personally conversant with the conditions under which their son is serving.

THE DETENTION CAMP

Men have been transferred to this school direct from the recruiting offices since January, 1923. Prior to that time all men received had passed through their detention period at the various training stations along the east coast.

Upon their arrival the men are billeted in one of two wards in the administration building, where they are held until their outfit, consisting of a full bag of Navy clothing, a hammock, with mattress and blankets, is issued. This procedure usually requires from one to five days, depending upon the receipt of the man's records and the availability of clothing in the paymaster's storeroom. During this period the men in detention are under the supervision of the medical officer and two first-class petty officers; they are isolated from the other men on the station, marched to and from their meals in formation, are assigned to a separate mess hall, and are given their first instructions in the care of their quarters, military drills, and Navy routine in general. As soon as practicable after their arrival on the station, each man is vaccinated and given his first injection of anti-typhoid vaccine.

Immediately upon being issued clothing the men are instructed to roll or fold their civilian clothes in a neat bundle, tag the bundle with their name and rate, and place it in the "lucky bag," where it is held until the man has completed his detention period.

Upon being outfitted, the men are taken to the station barber shop where they are given a regulation hair cut, and then transferred to the detention barracks which are supervised by the same officer and petty officer personnel as the detention wards in the administration building. While serving their detention period the antityphoid inocculations are completed. Each man is examined physically and his health record checked for marks, scars, physical defects, and accuracy of name of man and next of kin.

The daily routine for the detention camp is as follows:

5.30 a. m., reveille.
5.40 a. m., physical exercise.
6 a. m., recall.
6 to 7.30 a. m., turn-to, cleaning and policing of grounds.
7.30 a. m., breakfast.
8 a. m., sick call.
8.20 a. m., drill call.
10 a. m., recall.
10 to 11.30 a. m., police grounds.
11.30 a. m., recall, get in uniform for dinner.
12 noon, dinner.
1 p. m., drill.
3 p. m., recall from drill.
3 to 4.30 p. m., instruction in blue jackets manual, and care of clothing.

5 p. m., supper.
5.30 to 6.30 p. m., scrub clothes.
6 to 9 p. m., recreation.
9 p. m., tattoo.
9.05 p. m., taps.
Wednesday afternoon, bag inspection.
Saturday morning, captain's inspection.

Upon the completion of the detention period the men are distributed among the various companies and assigned to classes at the earliest possible date. In this way they are absorbed into the organization of the school, losing their identity as a recruit promptly after leaving detention.

Despite the fact that men in detention are not permitted to go on liberty and that their daily routine is rather arduous, there have been very few breeches of discipline and the detention camp, as a whole, has caused the minimum of annoyance to the officer in charge of the school.

THE PERSONNEL OFFICE

The personnel office of the school carries on the details usually found in our naval hospitals. In addition, this office keeps the scholastic records, instruction schedules, etc., and makes the usual reports required by the Bureau of Navigation from trade schools.

The method of handling the school records may be briefly sketched as follows: The instructors furnish this office with a weekly statement of the work done by each student and the grade attained; at the end of each four-week period a mark is furnished in the same manner covering the entire period. These final averages are entered on a card provided for each student and there is thus an average showing the mark for the student for each such period. From these averages the final mark for the entire course is computed. This final mark stimulates the student to apply himself, as it entitles him to leave the school in an advanced rating if sufficiently high and also permits him to have a choice as to future assignment when such is possible. This mark is also entered on the diploma of each man who leaves the school having satisfactorily completed the course. These school records are of further value for the purpose of assisting graduates who afterwards leave the service and go to school, to secure advanced class standing on account of work done here.

THE COMMISSARY DEPARTMENT

The school commissary is conducted as a branch mess of the naval hospital. It is independent in the sense that the commissary officer of the school prepares the school bills of fare and orders the provisions required, but the vouchers for the payment for supplies, and the computations as to costs are all made by the hospital commissary department. Cost of subsistence has been reduced to the point where the charges are reasonable and a good quality and quantity of food maintained. Waste has been largely eliminated. The sufficiency of the dietary may be inferred from the fact that the average gain for a group of men for the instruction period was 13½ pounds. A copy of the current bill of fare is appended.

United States Naval Pharmacist's Mates School, Portsmouth, Va.

MENU FOR THE WEEK BEGINNING 28 JANUARY, 1924

Breakfast.	Dinner.	Supper
Fresh milk. Post toasties. Creamed chipped beef. Soft fried eggs. Bread and butter. Coffee.	Boiled sliced ham. Boiled potatoes. Boiled cabbage. Creamed carrots. Sliced sour pickles. Fruited rice pudding. Hot rolls and butter. Coffee.	Fresh fruit. Hamburger steak. Brown gravy. French fried potatoes. Assorted jams. Bread and butter. Coffee.
	TUESDAY, 29 JANUARY, 1924	
Fresh milk. Oat meal. Fresh pork sausage. Hot griddle cakes. Cane sirup. Bread and butter. Coffee.	Breaded pork chops. Brown gravy. Browned potatoes. Baked lima beans. Creamed canned corn. Stewed tomatoes. Raisin pie. Bread and coffee.	Macaroni soup. Soda crackers. Vienna sausage. Sliced creamed cheese. Mashed potatoes. Apple sauce. Bread and butter. Cocoa.
	WEDNESDAY, 30 JANUARY, 1924	
Fresh milk. Puffed wheat. Baked pork and beans. Assorted jams. Bread and butter. Coffee.	Beef, rice and curry. Candied sweet potatoes. Baked macaroni and cheese. String beans. Stewed peas. Coconut pie, brick ice cream. Bread and butter. Coffee.	Fresh fruit. Roast pork. Sage dressing. Fried potatoes. Pineapple fritters. Bread and butter. Hot tea.
	THURSDAY, 31 JANUARY, 1924	
Fresh milk. Cream of wheat. Fresh meat hash. Soft boiled eggs. Bread and butter. Coffee.	Pork pie. Candied sweet potatoes. Baked kidney beans. Boiled spinach. Stewed sugar corn. Pickled beets. Apricot pie. Bread and coffee.	Fresh fruit. Irish stew with dumplings. Cold slaw. Assorted jams. Bread and butter. Coffee.

MENU FOR THE WEEK BEGINNING 28 JANUARY, 1924—Continued

FRIDAY, 1 FEBRUARY, 1924

Breakfast.	Dinner.	Supper.
Fresh milk Puffed rice. Fried bacon. Soft fried eggs. Bread and butter. Coffee.	Fried beefsteak. Onion gravy. Hash brown potatoes. Baked lima beans. Corn fritters. Sliced dill pickles. Pumpkin pie. Bread and coffee.	Vegetable soup. Soda crackers. Hamburger steak. Brown gravy. Brown potatoes. Cake doughnuts. Bread, cocoa.

SATURDAY, 2 FEBRUARY, 1924

Breakfast.	Dinner.	Supper.
Fresh milk. Post toasties. Baked pork and beans. Assorted jams. Bread and butter. Coffee.	Breaded veal cutlets. Brown gravy. French fried potatoes. Creamed peas. Stewed tomatoes. Buttered beets. Apricot pie. Hot rolls and butter. Coffee.	Tinned pineapples. Sardines on toast. Potato salad. Cold baked beans. Bread and butter. Coffee.

SUNDAY, 3 FEBRUARY, 1924

Breakfast.	Dinner.	Supper.
Table pears. Raw fried ham. Soft fried eggs. Bread and butter. Coffee.	Roast turkey, sage dressing. Giblet gravy. Candied sweet potatoes. Cranberry sauce. Corn fritters. Hearts of celery. Cup cakes, brick ice cream. Bread and coffee.	Fresh fruit. Cold meats. Fried potatoes. Assorted jams. Bread and coffee.

ATHLETICS AS A FACTOR IN THE DEVELOPMENT OF THE RECRUIT

It has always been the policy of the Pharmacist's Mates School to encourage athletics among its personnel, as the exercise involved brings in its wake many advantages which are valuable in the extreme, including the development of an admirable and much to be desired school spirit, which in turn tends to make the student more contented and in this manner heightens his individual morale and the morale of the school as a unit.

Supervised athletics produce a young man whose muscles are better developed and whose mind is trained to act more quickly in ordinary matters and in emergencies. He is both physically and mentally more alert—a man with *mens sana in corpore sano*—the ideal for which we humans constantly are striving.

In addition it must not be overlooked that athletics, with its varied contests, offers to the entire personnel throughout the year an almost vital source of diversion and amusement, helping largely to make life worth living to the young recruit, and not merely a matter of deadly monotonous routine.

Among the sports which have been encouraged at this institution, we may mention the following: Basketball, track work, baseball, football, and boxing. In baseball and basketball the Pharmacist's Mates School always participates yearly in the contests between the various naval training units east of the Mississippi River. The football team has been very successful and our track team has won quite a number of gold and silver medals—trophies given in local contests at Norfolk. We have in addition developed quite a few boxers of note.

During the summer of 1923 each of the six companies at the school participated in an exceedingly lively contest for the pennant awarded to the company finishing the season at the head of the intercompany baseball league. During this period twenty games were played and the third company came out on top after quite a struggle.

It has been the purpose of the athletic policy followed at the school to develop a graduate who is both a man capable in a physical as well as a mental way, realizing that there is no doubt but that as a rule the brighter mind exists in the more healthy body.

METHOD OF INSTRUCTION

In order to systemize and standardize the instructions given to successive classes in this school the system of outline notes was devised.

These notes consist of the salient features of a day's lecture given in outline form on a large piece of foolscap paper. These outlines are printed on a multigraph machine and have sufficient space between headings for the student to write definitions or subheads. By this system each class covers exactly the same material in each course and instructors are prevented from overemphasizing certain topics in the beginning of a course or skipping something equally important toward the end for lack of time.

The outline sheet is explained in 50 minutes and the following period, if two come together, is spent in demonstrations. In the subjects given in only a one-hour period a day the lectures are covered in 40 minutes with a 10-minute review of the previous day's work. A sample sheet in printed form is shown under the heading of "Advanced nursing."

For a textbook the school has used the Hospital Corps Handbook, United States Navy. Men are encouraged, however, to utilize the school library. Certain books are required in certain subjects in addition to the handbook and may be obtained from the library.

The school is fortunate in having a very good library which contains approximately three thousand reference books. The library is in charge of a chief petty officer who is responsible for the issue and return of all books.

In order to assist instructors in classes, numerous large charts have been made and are used together with models, manikins and projection apparatus in explaining the subject taught.

It is believed by the staff of the school that men absorb more from a short, intensive instruction period than from a long-drawn-out period of lecture and demonstrations combined. The change of surroundings from one laboratory to another tends to maintain interest at a higher point than obtained otherwise. All military calls, such as mess, liberty, etc., are sounded on the bugle. Classes are assembled by a system of electric gongs ringing at the commencement, five minutes before the end and at the end of each period.

The daily routine gives Wednesday afternoon to a "rope yarn holiday" followed by liberty. On Friday morning a short written examination is given in each subject.

Friday afternoon is devoted to preparing the personnel and school equipment for the inspection by the commanding officer which is held every Saturday morning.

HYGIENE AND SANITATION FOR HOSPITAL APPRENTICES

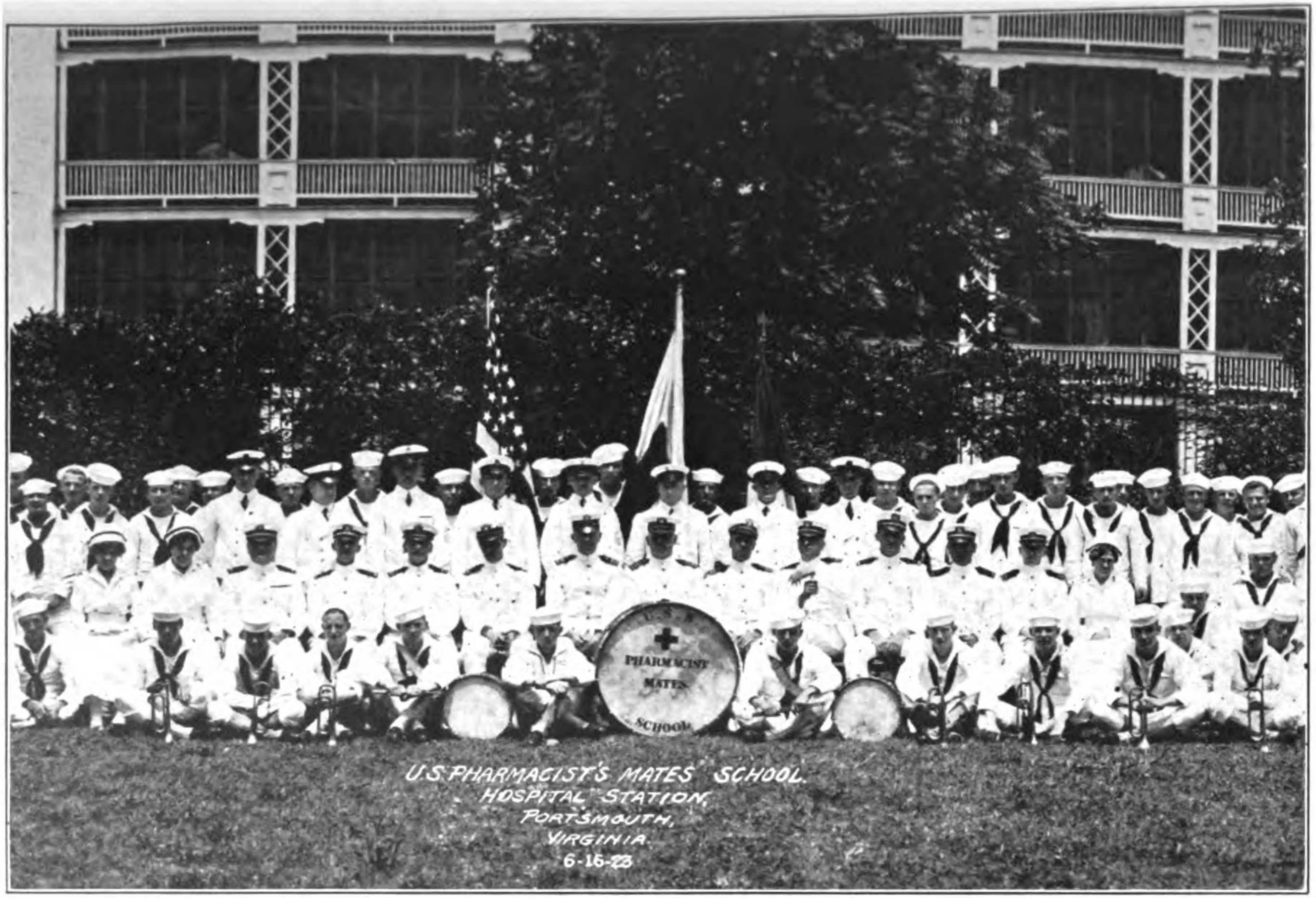
By S. J. Seckelman, Chief Pharmacist, United States Navy

The course of instruction under this heading is quite logically given the hospital apprentice as soon as his studies begin. Two factors operate to make this desirable: In the first place, as the course begins with personal hygiene it is essential that the recruit be taught to take care of his person as early as possible; also, this course is really a generalized preface to an advanced course on the same subject given during the third month of instruction.

Exclusive of the periods set apart for examinations, this course consists of two classes of 16 periods, 4 periods a week for four weeks. This will give the reader an idea of how intensive the instruction must be in order to cover so broad a field in the limited time. The ideal is to make each individual a useful factor in the prevention of the incidence and dissemination of the communicable diseases and throughout the course this idea is kept constantly before the student.

A standard instruction outline is followed as in the other courses but it is not followed so closely as to lose sight of the relative importance of the divisions of the subject treated.

The course normally begins with a preliminary consideration of the scope of the subject and is largely devoted to simple definitions:



THE STAFF OF THE PHARMACIST'S MATES SCHOOL. THE SCHOOL DRUM AND BUGLE SQUAD IN THE FOREGROUND

The Virginia State Board of Examiners of Nurses

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Superintendent Lewis-Gale Hospital
Roanoke, Virginia

Miss Ethel M. Smith, R. N., Sec.-Treas.
and
Inspector of Training Schools
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SIC SEMPER TYRANNIS.

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Mrs. Fereba B. Croxton, R. N.
Eastville, Virginia

Miss L. L. Odom, R. N.
Sarah Leigh Hospital
Norfolk, Virginia

Craigsville, Va. Feb. 2nd, 1924

George W. Calver
Lieutenant Commander (MC) USN.
U.S. Naval Pharmacists Mates School, Hospital Section,
Portsmouth, Va.

Dear Sir;-

I am glad to inform you that at the regular annual meeting of the Board of Examiners of Nurses, held in Richmond on the 25th day of January 1924, action was taken placing your School on our accredited list. This will entitle an applicant from the Naval Hospital Corps who can meet requirements, and who has had four full years enlistment in the Navy, to registration in this State by examination.

We shall require each applicant to forward to us, with application, a certified copy of his discharge and his diploma from your School.

With best wishes for your School,

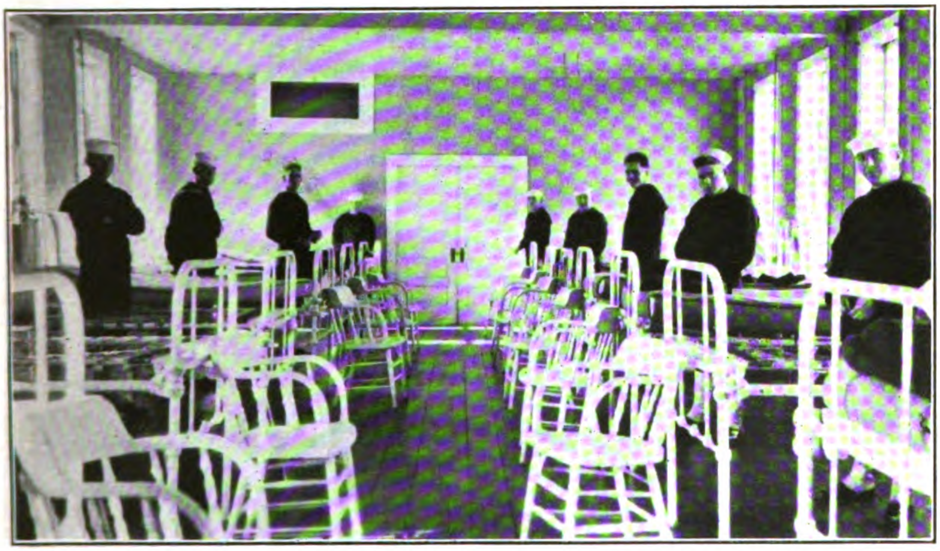
Yours very sincerely,

Ethel M. Smith

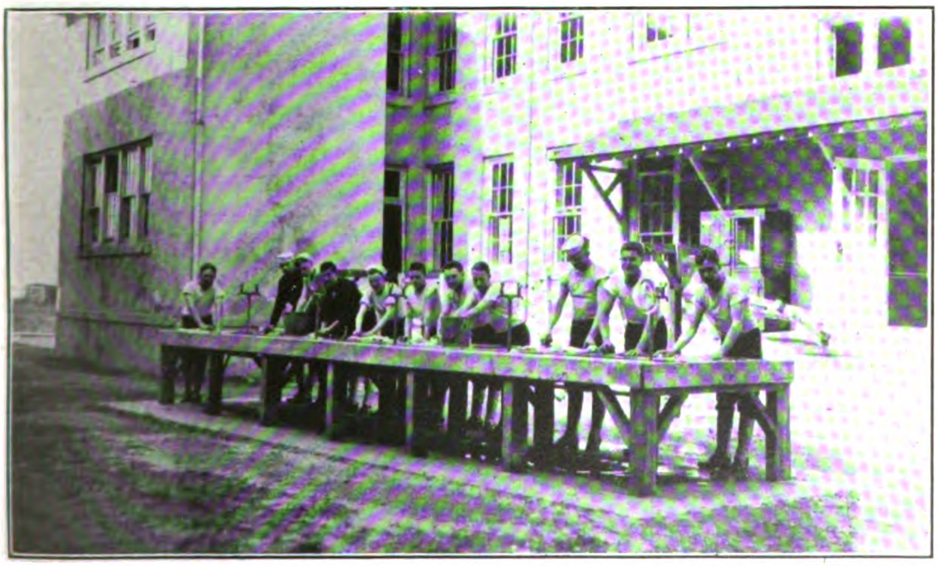
R.N. Sec. Tr.

RECEIVED
FEB 5 - 1924
U. S. PHARMACISTS MATE SCHOOL
HOSPITAL STATION
Portsmouth, Va.

THE SCHOOL COLORS. PRESENTED BY THE FO'SCLE GANG, ADMIRAL ROBERT E. PEARY POST NO. 427 OF THE VETERANS OF FOREIGN WARS

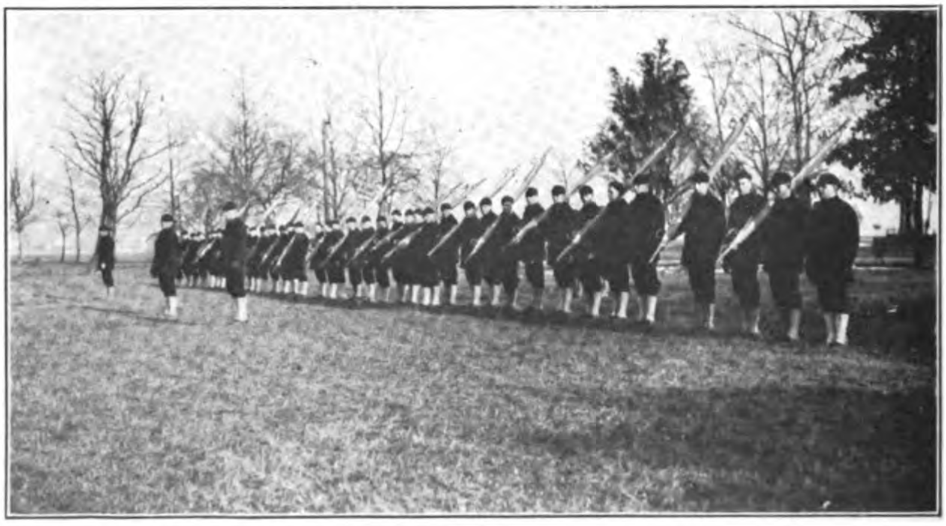


STUDENTS' SLEEPING QUARTERS



WASH DAY. EVERY STUDENT IS REQUIRED TO DO HIS OWN LAUNDRY WORK

SATURDAY MORNING FORMATION; MARCHING THROUGH THE GROUNDS OF THE HOSPITAL STATION



HOSPITAL CORPS DRILL

10—4

the preservation and promotion of health; food and drink in their bearing on health and disease; clothing; shelter, etc. Food is the first subject taken up specifically and the teaching is calculated to fit the student for the instruction in dietetics which comes at a later period of the course; the classification of foods is shown and the calorie is defined; the essential things to be observed in the preparation and service of foods; and the inspection of foods is touched on. As each student has served a probationary period as messman the principles of mess management are easily inculcated.

After the consideration of food, water is next taken up. The discussion on this subject takes up the sources of water supply, care to be exercised in preventing the use of contaminated waters, and methods of purifying, including field service methods. The construction of improvised filters is explained. The water-borne diseases are given consideration.

The consideration of air naturally includes means for assuring its proper circulation and ventilation of the different kinds, ashore and afloat; special reference to sick rooms and wards is given attention. The composition of air with special reference to carbon dioxide content and humidity is taught, and the requirements as to change of air are touched upon.

Heat and light are treated but briefly. Proper temperatures under varying service conditions are treated of, as well as methods of heating and distribution. The requirements as to adequate lighting both natural and artificial are discussed in passing.

Field sanitation is treated fully. The selection of the camp site, methods to be observed in location of camps in relation to water supply, the menace of insects (flies and mosquitoes) are considered in detail. Latrine construction is taught as well as methods for the incineration of camp refuse.

Personal hygiene of the march with special attention to care of the feet is next taken up.

Possibly more attention is given to prevention of disease and disinfection methods than to any other subject. The insects responsible for the transmission of disease are studied with their habits, breeding places, manner in which the particular infection is transmitted, together with methods of eradicating the insects and protecting the individual against them. The eruptive fevers and principles of isolation are taught.

The discussion of the part played by sera and vaccines in the treatment and prevention of disease is touched upon but lightly, as the advanced course considers immunity and specific therapy.

The rules of the Public Health Service as to quarantine are given careful study. Disinfection, with consideration of the different types of disinfectants follows, and the course of instruction closes with a talk emphasizing the importance of care when gas is used for disinfection.

HYGIENE AND SANITATION FOR PHARMACIST'S MATES

By A. B. Montgomery, Chief Pharmacist, United States Navy

This course of instruction is given pharmacist's mates in the third period of their instruction. Thirty-six hours are devoted to this subject, 24 hours being used in lecturing and oral quiz, 6 hours for written examinations, and 6 hours for practical work. Rosenau's Preventive Medicine and Pryor's Naval Hygiene are used for reference.

It is desired to give the student a knowledge of immunity as a factor in hygiene; the classification of immunity, carriers, latency, lowered resistance, host and parasite and then the mechanism of immunity, as it is believed that a knowledge of this will give him a better idea of the preventive measures of the communicable diseases.

The communicable diseases are taken up by classes, according to the source and mode of infection; those spread largely through the alvine discharges, those spread largely through discharges from the mouth and nose, insect-borne diseases, those diseases transmitted by an intermediate host other than insects, those having a special prophylaxis, and miscellaneous diseases.

The students are instructed regarding the procedures of quarantine and isolation, the agents and methods of disinfection, agents used as insecticides and methods of applying them.

The conditions influencing health are discussed in the following order:

Air; its composition and functions that are specifically concerned with health, its effect as to temperature and density, humidity, vitiation and methods of determining it, poisons, bacteria and particulate pollution of the air, ventilation, heating and cooling of the air.

Lighting requirements; sources and theories of, natural and artificial, and the effect on the health.

Soil; its relation to health, classification of, surface configuration, composition, physical properties, the nitrogen and carbon cycles, soil air, and soil water.

Water; its relation to health, composition, sanitary classification, properties, and use of by the body, sources, collection and storage, pollution, and sanitary analysis.

Food; its relation to health, general considerations, composition, classification, uses of, excessive and insufficient amounts, unbalanced diets, and salts in the food. The sources of foods; their adulteration, preservation, and preparation. Animal foods; meat, methods of slaughter, inspection of meat, meat inspection laws of the United States, milk, and milk products. Diseases caused by meats, fish, and shell-fish. Plant foods; poisoning by, diseases transmitted by, food deficiency diseases.

Sewage disposal; systems of, stream pollution, municipal and rural sewage disposal; refuse and garbage disposal; incineration and reduction plants.

Clothing and its influence on health; materials used, color of, waterproofing. Shoes; fitting and effects of ill-fitting. Headgear; requirements of.

Hygiene and sanitary measures to be taken on the march; those not qualified to go, beginning of march, distance to be covered, heat production, water required, care of the feet, food. Selection of camp site, making and breaking camp.

Personal hygiene; cleanliness of mind, body, and clothing, regularity of habit as to meals, contentment and work, recreation, effect of alcoholic beverages and habit-forming drugs, and instructions to consult medical officer.

For the practical instruction, one period is used each week. The class constructs a rock-pile crematory, a camp latrine, a soakage pit, and a double-barrel improvised water filter. Practical instructions are given in the fumigation of a room with sulphur dioxide and barium dioxide-formalin.

INSTRUCTIONS IN ANATOMY AND PHYSIOLOGY

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

The instruction in anatomy and physiology is given in the first instruction division. This division is made up of recruits who have passed through their detention period, either on the station or at other training stations, from which men are received. Their ability to adjust themselves to their new surroundings and their adaptability to the work necessarily has a bearing on their progress in the course. However, it has been found that the preliminary education is in most cases the factor which determines whether or not a man can master the work.

The course as given consists of 20 periods per week of 50 minutes each devoted to lectures, explanatory quizzing, and a written weekly review. Four weeks are devoted to the instruction in this subject, the final grades being an average of the weekly marks together with the marks on the final examination.

In order to help the men in general, and particularly those who have never taken notes from lectures, each man is provided with a printed outline of the course. On this outline are the questions which bring out the important points of each lecture and finally of the entire course. In addition to aiding the men in taking satisfactory notes these outlines also aid the instructor in that they provide for uniform progress through the course.

The equipment of the anatomy laboratory consists of an articulated skeleton, wax models, standard anatomy charts, supplemented by detailed and enlarged drawings of various organs and parts, along with a baloptican lantern for which cuts from various textbooks have been mounted on cards of proper sizes.

It is impressed upon the men that the time allowed for this course only serves to give them the groundwork for their knowledge of anatomy, and that they must continue their study as they progress in the corps in order to clarily and fix in their minds the subject matter.

The material given in the course is based on the Hospital Corps Handbook and is given in the following order: Definitions, osteology, including syndesmology, circulatory system, respiratory tract, digestive system, lymphatic system, nervous system, and special senses.

FIRST AID AND MINOR SURGERY

By K. E. Lowman, Lieutenant, Medical Corps, United States Navy

This subject, if not the most important one given in the course of instruction at the Pharmacist's Mates School, is certainly one of the most needed in the hospital corpsman's subsequent career. In giving this course it is impressed upon the student that although it is necessary for the hospital corpsman giving first aid to do so with great self-assurance, with decision and calmness, in order to obtain the confidence of the patient, nevertheless the more important thing to remember is that as a rule this first-aid treatment is only temporary until the expert aid of a medical officer is summoned.

This course is given at the school to familiarize the student with the diagnosis, symptomotology, and treatment of various surgical and medical subjects. Among the more important subdivisions of this subject considered in this course are the following: Shock, hemorrhage, wounds, poisonous snakes and insects, fractures and dislocations, foreign bodies, unconsciousness, acute abdominal conditions, and burns.

In dealing with the subject of shock, the necessity of the recognition of this condition is impressed upon the student and likewise the dangers attending shock. The treatment of this frequently noted condition is also emphasized in our lectures.

In the subject of hemorrhage, we lay stress upon its classification, the different types of bleeding, nature's methods of arresting hemorrhage, and also the treatment of each one of the types. Likewise the constitutional as well as the local treatment of hemorrhage is dealt with at length.

In the course of instruction the emergency treatment of wounds, the difference between septic and aseptic wounds, and the classification of wounds, are impressed upon the mind of the student. Nature's method of the healing of wounds, the factors which prevent healing, and the general principles underlying the treatment of wounds are taught in some detail. Of course the subject of the infective microorganisms, as applied to wounds, is dealt with thoroughly.

While dealing with the subject of poisonous snakes and insects the emergency treatment of their bites is given in detail, and in addition the method of differentiating poisonous and nonpoisonous snakes by comparing the structure of the head, teeth, and the tail, is stressed upon the minds of the men under instruction.

Fractures and dislocations are naturally regarded as two of the most important subjects in minor surgery and first aid. The definitions of the two conditions, the differential diagnosis, the different types of fractures and dislocations, and the methods of treatment as applied to both are given to the student.

Foreign bodies in the tissues and cavities of the body and their removal are adequately considered.

A consideration of the various phases of unconsciousness is no doubt one of the most important topics given in this course. The method of determining the cause of this condition is taught in as much detail as is possible. The treatment of unconsciousness and the subject of hysterical unconsciousness are likewise considered as very important. In teaching the treatment of the condition the grave necesity of realizing when to give stimulants is impressed upon the student.

Ranking in importance with unconsciousness, and perhaps even more important, is the subject of acute abdominal conditions.

The diagnosis of these conditions and the care involved in the treatment is emphasized as well as the attending dangers, such as the "masking of symptoms" and the administration of cathartics. As burns may be expected in the naval service their treatment is thoroughly considered.

The prime object in giving the course of first aid and minor surgery is to turn out a hospital corpsman who is well trained to treat minor surgical injuries and also one who can render prompt and efficient first aid in emergencies such as often arise in the naval service.

NURSING INSTRUCTION

By Miss E. L. Hehir, Chief Nurse, United States Navy

The following articles are to present briefly what we try to accomplish in the eight weeks given to instruction in nursing.

Many pupils come to us so inadequately prepared by their preliminary education, that I often wonder if their work here at this school is just studied to be forgotten, especially when one tells you that the boiling point of water is 110° F. But at this point I am reminded of the familiar sayings, "Great things from small beginnings grow," and I hope for the best. However, I would not have you draw the conclusion from the above that no one in the class knows the boiling point of water, for some of the pupils are well prepared and very apt.

It is our aim to maintain a course of instruction, in which the corpsmen may be taught to be accurate, to care for the patients by the most approved methods, and to acquire the habit of thinking about their work.

The classrooms are provided with proper equipment, such as blackboards, charts, manikins, and everything that will help to visualize what we are endeavoring to teach.

Some one has said, "A good nurse is not made in a few weeks; she is developed after months and years of carefully planned routine." May we not apply this to the pupils at this school, for it is only with cooperation of the naval hospitals that there may be any real correlation between the subjects taught here in the classroom and the actual practical work. The real development rests with the instruction and experience the corpsmen receive after they have left us. We have them only for a short time, but in that time we try to give them the fundamental training.

Our methods of teaching are three in number: 1. The lecture method, which takes the form of a talk by the instructor, and the pupils take notes on lecture sheets which have been carefully prepared for them. This method would be limited in its teaching value unless other methods were used.

2. The demonstration method, or lessons conducted by using the devices and material for demonstrating the practical work. It is only by the practical application of theory that we can expect pupils to grasp its content.

3. The study period, if time permits, is most helpful, especially for pupils who have difficulty in acquiring the habit of study. In this period they may ask questions, or the previous tests are taken up, and the errors corrected and discussed.

The pupils have a weekly test from the lectures which they have covered during the week, and a final examination is conducted on the completion of the course.

ELEMENTARY NURSING

By Miss MABEL COOPER, Chief Nurse, United States Navy

In this class the corpsmen get their first ideas of the care of a patient. A few of them may have been sick in the hospital or may have worked in a civilian or Army hospital, but most of them, like all healthy, young people, know very little about sickness and sick people. It is necessary, therefore, at this school to go into the most minute details, and, so far as possible, give a reason for doing what you are doing and the way you are doing.

The first subject that is discussed is the matter of professional etiquette and obligations. An effort is made to impress upon the future corpsmen the value of honesty, truthfulness, obedience, and courtesy. Special emphasis is laid upon the spirit of cooperation, which if carried out to the fullest extent, would make life so much happier for everyone, as has been proven in the hospitals where it flourishes. Happiness not only makes the routine tasks lighter but aids in hastening the recovery of the patients.

One of the first principles of nursing is cleanliness, so this is given due consideration. Not only cleanliness but also order and system go far toward making our efforts easier and add so much to the results.

The first practical demonstration is bed making, for which our model ward makes an ideal classroom, as by means of the beds in it each student is able to get practice in making closed and open beds and also in making a bed with a helpless patient for which the dummy is excellent. There is also a Gatch frame and head rests, so that the students are able to see what Fowler's position is, and the advantages of such a position are explained.

A fracture bed is demonstrated, and ether beds are prepared by the corpsmen, bringing out the reason why it is necessary that a special kind of bed be made for either patients and certain fracture cases.

The nursing care of the patients, such as attention to the back and mouth of all bed patients, is taught, but special stress is laid upon the necessity of extra attention to the very ill and delirious patients. The special observation to be given to very ill patients at night is emphasized.

The next subject for demonstration is giving a bed patient a bath, which can easily be demonstrated with the aid of a dummy.

The method of collecting specimens of urine, vomitus, sputum, etc., is taught, and the value of such specimens is discussed.

The taking and recording of the temperature, pulse, and respiration is the next practical demonstration, and all corpsmen have practice in the reading of the thermometer and its care. Later they are told the value of charts, and all make out a specimen chart which is dictated to them. On all practical work they are marked as to accuracy, neatness, and ability, and those marks, with the written tests which are given weekly, go to make up their final averages.

Emphasis is laid upon the types of respiration and the quality of pulse, also the value of watching for and reporting promptly any symptoms which may develop in the course of a disease. It is necessary to explain what symptoms are likely to appear in the various classes of patients.

Irrigations and douches, i. e., ear, nasal, eye, and pharyngeal, are taught in this class, having one of the corpsmen as the subject.

The soapsuds enema, being the simplest form, is the only enema considered in this class, as the more complex forms are taken up in the study of more advanced nursing.

It is necessary to spend quite a little time upon the next subject, which is counterirritants, because there are so many and they seem so hard to understand.

The prevention of the spread of communicable diseases is considered and special emphasis is laid upon the reason for disinfection and the methods used.

The last lecture in this course deals with the routine to be followed in the discharge of a patient and the care of the dead.

ADVANCED NURSING

By Miss Mary E. Hand, Chief Nurse, United States Navy

Advanced nursing instruction follows the course of instruction in elementary nursing.

It is not expected that a course of 22 lectures will prepare or train the students in advanced nursing, as it is known in the standard training schools of nursing. Our object in the classes of advanced nursing is to intruct the men in such nursing procedures as will aid them in their duties of nursing the sick when attached to the ships, to have a uniform method of nursing procedures in the naval service, and to help the corpsmen meet the needs of the community as the military service may require.

Two main branches of nursing are considered in this course, medical and surgical; and the nursing procedures are selected accordingly. The instructions are given in a series of 22 lectures. A lesson plan is made out for each class. The main points of the subject are outlined, discussed, and, when practicable, the procedure is demonstrated. With the use of the Chase doll, discussions and questions, an attempt is made to give the students a clear understanding of the procedures.

In addition to the Chase doll the classroom is supplied with the necessary medical and surgical utensils and materials, surgical instruments, a sterilizing outfit consisting of a medium-size autoclave, instrument, utensil, hot and cold water sterilizers, a hospital bed, blackboard, and chair with desk arms. Sometimes the students are used as subjects in the procedures. Many of the operating-room procedures are performed by the men with the aid of their classmates, such as the application of sterile gloves, the receiving of, the putting on, and the fastening of a sterile operating gown with all the necessary precautions taken into consideration.

A special effort is made throughout the course to have the students realize the necessity of rigid observance of the nursing procedures, the necessity of aseptic precautions, and to impress upon each student how great a part his work plays in the restoration of the patient's health and the return of the patients to duty.

The following is a specimen of the class lesson plan:

ADVANCE NURSING—H. A. COURSE

Lecture No. 7—Subject: Therapeutic bath, antipyretic measures.

1. Reaction from physiological action of cold on the body.

A. Cause.

B. Nature of reaction.

C. Condition favoring reaction.

D. Prevention of bad results.

2. Cold pack—Definition.

Indications for use.

Materials used.

Preparation of patient.

Procedure.

INSTRUCTION IN DIETETICS

By Miss E. L. Hehir, Chief Nurse, United States Navy

The general scope of the teaching of dietetics is to give the pupils a good understanding of the principles and methods of simple cookery, to make them familiar with the nutritive value of foods, and help them to administer the ordinary hospital diets.

They are taught the preparation of foods, the tray equipment for serving, and how to prepare and serve liquid diets, the classification of foods, the principles of nutrition and feeding the sick.

The diet laboratory is well equipped for cooking. Most all pupils show an enthusiastic spirit in this work and watch each other carefully, for they know that they are going to eat the results of their efforts.

The instruction is given in six lectures and a series of demonstrations. A weekly test is given and a final examination is conducted when the course is completed.

The dietetic instruction for the pharmacist's mates covers the above subjects, but is more advanced, and more time is given to the planning of diets, preparation of food and recipes that will aid them if on independent duty. The preparation and serving of diets as followed out aboard ship is outlined.

CHEMISTRY FOR THE HOSPITAL APPRENTICE CLASS

By PAUL V. TUTTLE, Chief Pharmacist, United States Navy

When instruction in chemistry is given the student in the hospital apprentice class, he has already had a two-month period of instruction in other subjects. He has before him the course in pharmacy. The chemistry instruction thus comes when he has had some education in professional subjects, and is properly a preface to pharmacy. No better or more logical arrangement for this course could be conceived.

The instruction in this subject consists of 16 assignments of 45 minutes each. With this limited time allotted to the subject, the instructors have no hope that they will be successful in teaching chemistry to the students. It is the aim, however, to provide each man with a groundwork upon which to base future study. He is introduced to the field of science, his curiosity is aroused, and his powers of observation and comprehension are developed. The subject is made as pleasing and as fascinating to the student as possible and in this advantage is taken of the current trend of magazines and newspapers to popularize science.

Chemistry, as dealt with here, while largely theoretical, is illustrated by experiments made at the instructor's desk, the students being kept advised as to what is going on and what the experiment tends to establish. The student is required to learn only a few simple laws, and all definitions are made as simple as possible. Theories that call for too deep a knowledge are let strictly alone as they tend to cause a loss of interest.

The first part of the work necessarily begins with elementary physical principles and only those which may prove of use to the student are considered. Throughout the course the physical and chemical laws are considered together and contrasted where such is advantageous to make the subject clear.

Little time is bestowed upon arithmetical processes; the student is, however, required to master the method by which percentage composition of compounds is computed. In this, the atomic weights are rounded off into whole numbers to simplify these processes.

The limit of the instruction is reached when the student has become familiar, with acids, bases, and salts; and when he understands valence and the solving of equations. When time permits, specific groups of elements are considered, the halogens, alkali metals, etc. The course is rounded off by suggestions as to future individual study.

CHEMISTRY FOR THE PHARMACIST'S MATES CLASS

This course follows that outlined for the hospital apprentices but goes more deeply into the consideration of the principles and the operation of chemical and physical laws.

Oxidation and reduction are given adequate consideration, and volumetric solutions are made familiar to the student.

When time permits, organic chemistry is taken up with discussion of the hydrocarbons, and their oxidation and halogen derivative products.

CLERICAL PROCEDURES FOR THE HOSPITAL APPRENTICE CLASS

By Paul V. Tuttle, Chief Pharmacist, United States Navy

The early instruction in clerical procedure, because of the inexperience of the student in the service, very desirably commences with a brief sketch of the organization of the Navy Department. This is developed to show the relation of this department to the other executive branches of the Government. Naturally, this discussion must show the source of authority, and descriptions of the Navy Regulations and the different bureau manuals are given. It is stressed that authority and responsibility go hand in hand. The beginner is then ready to be informed that each person clothed with authority is required to make specified reports as to how he has performed the duties with which he is charged; as these reports are necessarily based on the records kept, there is then a correct understanding as to why the records must be accurate. Once this is thoroughly understood, the instruction in the particular details can begin.

The time of instruction allowed for this subject is limited to four periods per week for four weeks—16 assignments. Can a recruit be made clerically useful in that time? It is a seemingly impossible task, and in getting the maximum of results under the conditions it is thought best to explain the uses and occasions for the use of the usual medicine and surgery, navigation, and supplies and accounts forms, and to require their preparation. Then a few of the more important forms are concentrated on.

The aim, then, is to give the recruit a broad general knowledge of the subject, and to make him actually useful in the preparation of Form F cards, the requisition forms, and the official letter and indorsement forms. He actually is taught the reason for the use of diagnosis numbers and key letters: he writes the official letter and the indorsement on same, and is instructed as to the proper method of handling inclosures and references. When the course is completed, the student knows what items can be included in the same Form "4" requisition and the order in which the items must appear. When every man in the hospital corps thoroughly understands the use of the forms particularly mentioned, those charged with filling requisitions and preparing statistical reports will find their duties much simplified.

CLERICAL PROCEDURES FOR THE PHARMACIST'S MATES CLASS

This course, as an advance on the instruction given the hospital apprentices, is calculated to fit the individual student for independent duty as well as for important clerical details in the larger medical department units.

The instruction pays more attention to details, and the forms used under the different departments are prepared by each student. Each is provided with a typewriter and is required to perfect himself in its use, as far as the time available will permit.

These notes on instruction have largely consisted in an outline of the aims; the amount of instruction assimilated by the recruit depends, of course, upon the individual, but it can safely be said that the time given this form of instruction is well spent, and the graduate is made more valuable to the service.

INSTRUCTION IN BACTERIOLOGY, URINALYSIS, AND BLOODWORK FOR HOSPITAL APPRENTICES

By A. B. MONTGOMERY, Chief Pharmacist, United States Navy

This instruction is given to hospital apprentices in their third period of training and 40 hours divided into 2 and 3 hour periods are given to this subject. This subject is made as elementary as possible, covering the routine laboratory procedure, and practical work is given whenever practicable.

It is realized that after completing this course, the students have not learned to be laboratory technicians, for it is only the exceptional ones, those above the average in preliminary education that show ability in this work, though they all show some interest. When they begin this course they have a remote idea of "germs," as they have learned in their previous instruction in hygiene and sanitation, nursing and first aid, that "germs" are the causitive agents in certain diseases, and when they see these "germs" growing on culture media, see them moving in hanging-drop preparations, and identify them by staining, then they really believe there are such things as "germs": and it is presumed that though they have not learned to be laboratory technicians, they are better qualified to understand and carry out the principles of asepsis.

They are first lectured on microorganisms, their classifications, their mode of existence, their effect on other organisms, conditions necessary for their growth, resistance to unfavorable conditions, and reproduction. Then they are instructed in the practical operation of the more important items of laboratory equipment. Depending on the number of men in the class, they are assigned one, two, or three men to a microscope, instructed in the care of the microscope, and the operation of the working parts. Each man is given personal instruction by the instructor in focusing each objective before he is permitted to handle the microscope at all. They are then instructed in the uses and operation of the autoclave, Arnold and hot-air sterilizers, incubator and centrifuge, kinds of glassware in common use, and the cleaning and sterilizing of glassware, and the making of pipettes, blood tubes, etc.

They are then instructed in the preparation and use of the more common culture media by lecture, as the time does not permit the practical work in this subject. At this time the prevalence of bacteria is demonstrated by innoculating media from the members of the class, air, water, and objects in the laboratory which seems to stimulate their interest in the subject, as these cultures are later used in demonstrating the morphological classes of bacteria, each man making a smear and staining with a simple stain. An emulsion of *B. coli* is made and each man makes a hanging-drop preparation and examines for motility.

Urethral smears are made from a gonococcus infection, a patient in hospital, and each man is given one which he stains with Gram's stain (Sterling modification) and examines, locating the organism in the field for the instructor. The students are then given a specimen of tuberculous sputum (Anderson's concentration) from which they make smears, stain with acid-fast technic and examine, and in very few instances are they unable to demonstrate the organism in the field to the instructor. Neisser's staining technic is then taken up, and each man makes a smear from the throat of another man which he stains and examines. A demonstration is given of the inoculation of a tube of blood-serum media which is later examined. Only at times is a culture of *B. diphtheriae* available and usually specimen slides and charts are used to demonstrate this organism.

In addition to the practical work of identifying bacteria by the staining characteristics of the organism, every opportunity is used by the instructor to lecture on the disease caused by the organism. The class is informed of the many other special stains for the identification of microorganisms, but the time does not permit the study of these.

The students then begin blood work by making blood films by Daniel's method and cover-slip preparations. The men are paired for this work, and when a suitable slide is made by each man they are stained with Wright's stain. Using these slides, the men are instructed in making a differential count and the malaria parasite is demonstrated by use of specimen slides and charts. Instruction is then given in the care of the hemacytometer and a demonstration is given in the making of a white-blood count; cleaning pipette and counting chamber, obtaining specimen, diluting and putting specimen on counting chamber and a demonstration of the ruling of counting chamber, and counting by use of a chart and then each man makes a count. The red-blood count is then taken up in the same manner, then a hemoglobin estimate is made by Talquist's scale and at the same time the coagulation rate is taken. A demonstration is given of obtaining a specimen for serological work.

The next work is routine urinalysis. A specimen is obtained from a member of the class for demonstration by the instructor as to color, appearance, reaction, specific gravity, albumin, and sugar. A specimen is treated with albumin, one with sugar and one with phosphates, and the positive and negative reaction of each is demonstrated and then each man is given a specimen to make each of the tests. The quantitative albumin test is demonstrated by Esbach's albuminometer and quantitative sugar by Fehling's and fermentation tests. A specimen is centrifuged and the sediment examined by all of the class for casts, blood cells, microorganisms, etc.

Practical work is then given in the examination of feces for the ova of intestinal parasites, preceded by a lecture on the common types of flat and round worms and the manner in which infection takes place and an inspection of specimen worms and charts. They are given a specimen of feces containing the ova of roundworm, whipworm, and hookworm for examination and demonstration to the instructor of the various types found by them. Members of the class coming from a locality where hookworm infection is prevalent are always willing to furnish a specimen for examination by the class.

The next and last instruction in this course is a lecture on snakes, fish, insects, and animals; identification and their relation to the health of man.

Each man is issued a copy of Stitt's Bacteriology to be used for reference in this course, but no lessons are assigned in this book for study. When this course was outlined it was presumed that 60 hours, extending over a period of six weeks, would be given, but, with the time allowed, the less important procedures are hurried over as much as possible in order that more time may be devoted to staining technic, blood cells, and urinalysis.

An oral quiz is given daily and a written examination weekly. Some men, especially those without a common-school education, soon fall behind in the class and these men are given as much personal instruction as possible by the instructor, but even with this aid they become discouraged and fail to make a passing mark. The number of these men in the different classes vary, but class records for the past year show that about 25 per cent of the men taking this subject have failed to make a passing mark.

This course as outlined above is also given to the pharmacist's mates classes, but in more detail. It has been noted that with a few exceptions the men in these classes were no better qualified in routine laboratory procedure than the hospital apprentice, the exceptions being men who have been detailed at one time to work in hospital or station laboratory.

MATERIA MEDICA FOR HOSPITAL APPRENTICES

By Thomas J. Murphy, Chief Pharmacist, United States Navy

The instruction for hospital apprentices in materia medica consists of 10 lecture periods of one hour each per week. The time allotted to the man in this division is four weeks, making a total instruction of 40 hours.

The lecture method of instruction is used. Materia Medica (Wilcox) and the Hospital Corps Handbook, United States Navy, 1923, are used as textbooks. All lectures are supplemented by demonstrations of crude drugs. Special emphasis is placed on drugs carried on the supply table of the Medical Department, United States Navy.

In connection with this materia medica the school is provided with a botanical garden from which many crude drugs are obtained. The student is thereby enabled to learn the elementary principles of botany. The drugs found, belonging to the several classes of plant parts, such as roots, stems, rhizomes, tubers, woods, barks, leaves, bulbs, herbs, flowers, fruits, and seeds are defined and exhibited.

There is also on exhibit in the materia medica museum attached to the school a collection of crude drugs, many of which are obtained from this garden, and medicines and preparations on the supply table of the Medical Department. The student has free access to this museum for study purposes.

The drugs obtained from the animal, vegetable, and mineral kingdoms are considered as to their source, composition, physical characteristics, chemical properties, preparation and administration, incompatibilities, physiological, and toxicological action.

In this course the constant aim is to stimulate interest in materia medica and thereby lay the foundation for future study in this subject.

MATERIA MEDICA FOR PHARMACIST'S MATES

By THOMAS J. MURPHY, Chief Pharmacist, United States Navy

The course of instruction in materia medica embraces nine periods per week for six weeks. The work in this subject consists of a review and elaboration of the materia medica as given hospital apprentices, the difference between the two being that in this course more attention to botany, pharmacology, and therapeutics is given.

The method of instruction used is didactic, supplemented by demonstrations in the biological laboratory. In conjunction with the lectures the botanical garden is freely used and the student is taught the principles of botany and materia medica from the time he sees the plant in the ground until it is manufactured into the finished product. This method of instruction is considered to be of inestimable value on account of the stimulating effect on the student's interest, and excellent results are obtained thereby.

In the lectures the student has explained thoroughly to him all the definitions which are common to the subject. The explanation consists in dissecting those words which are not common and thus enabling him to understand the subject matter more thoroughly than if he learned the definition in a parrot fashion. In addition each man, each day, is assigned something in connection with materia medica to investigate. The result of this investigation is turned in to the instructor.

The textbooks used are Wilcox's Materia Medica, the Hospital Corps Handbook, and the United States Pharmacopœia.

The aim of the course in materia medica is to make the pharmacist's mate familiar with drugs, their origin, action, chemistry, toxicology, and incompatibilities, in order that he may be able to perform his duty efficiently, whether serving independently or with a medical officer.

PHARMACY FOR HOSPITAL APPRENTICES

By THOMAS J. MURPHY, Chief Pharmacist, United States Navy

The course of instruction in pharmacy for hospital apprentices embraces 10 lecture periods of one hour duration per week. The time allotted is four weeks, making a total of 40 hours' instruction in the course.

The methods of instruction are didactic and practical.

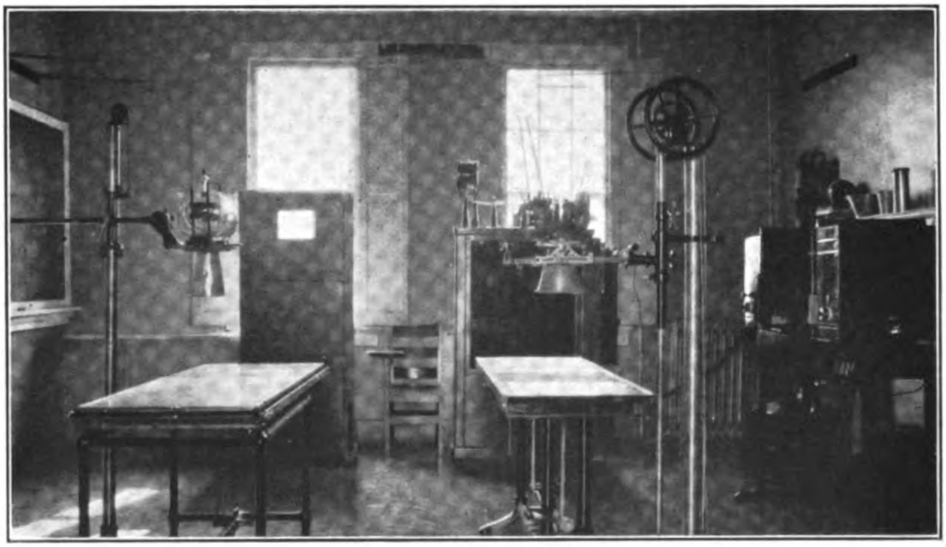
The practical method of instruction is limited by reason of two factors, first, the large amount of material to be covered by didactic methods and second the fact that the practical work in which hospital apprentices are engaged is exceedingly limited. The order in which instruction is given follows:

ATHLETIC CONTESTS BETWEEN STUDENTS AT THE U. S. NAVAL PHARMACIST'S MATES SCHOOL

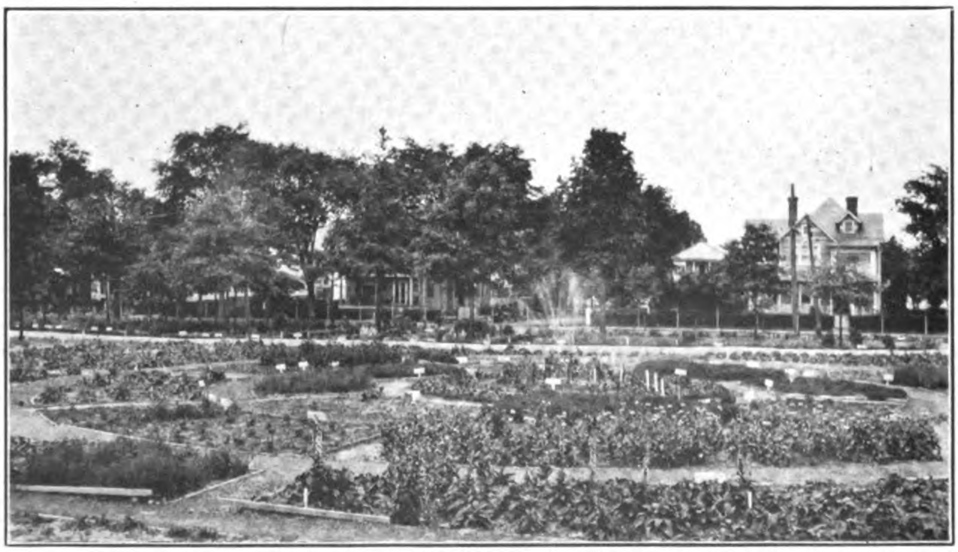
CHEMISTRY LABORATORY. CHAIRS ARRANGED FOR LECTURE BEFORE PROCEEDING WITH PRACTICAL WORK

26—1

MODEL DISPENSARY



X-RAY LABORATORY



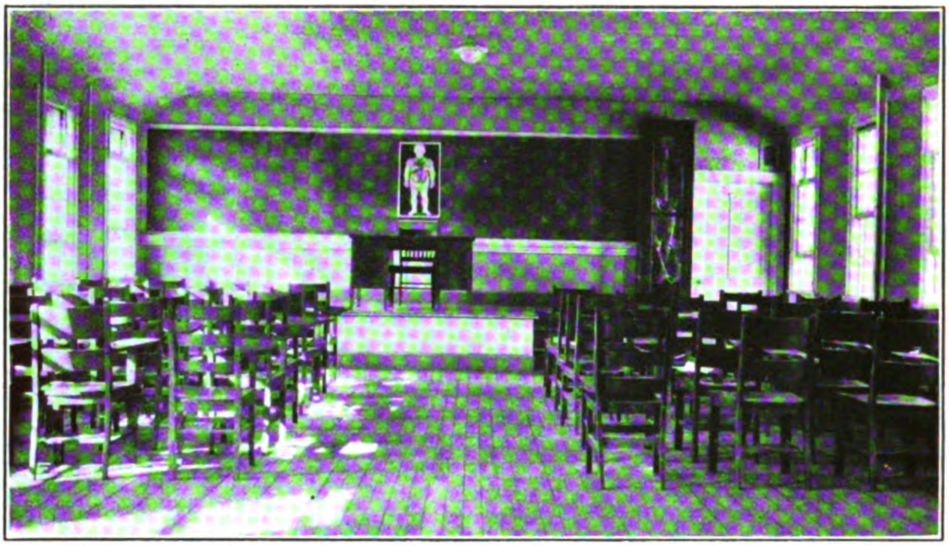
SCHOOL GARDEN IN WHICH MEDICINAL PLANTS ARE GROWN FOR INSTRUCTION PURPOSES

26—2

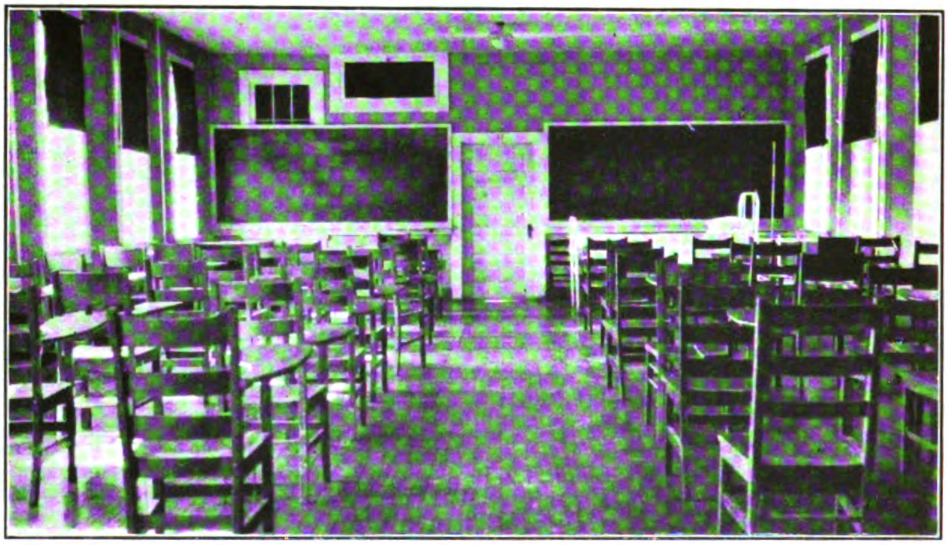
BACTERIOLOGICAL AND HYGIENIC LABORATORY

PHARMACEUTICAL LABORATORY

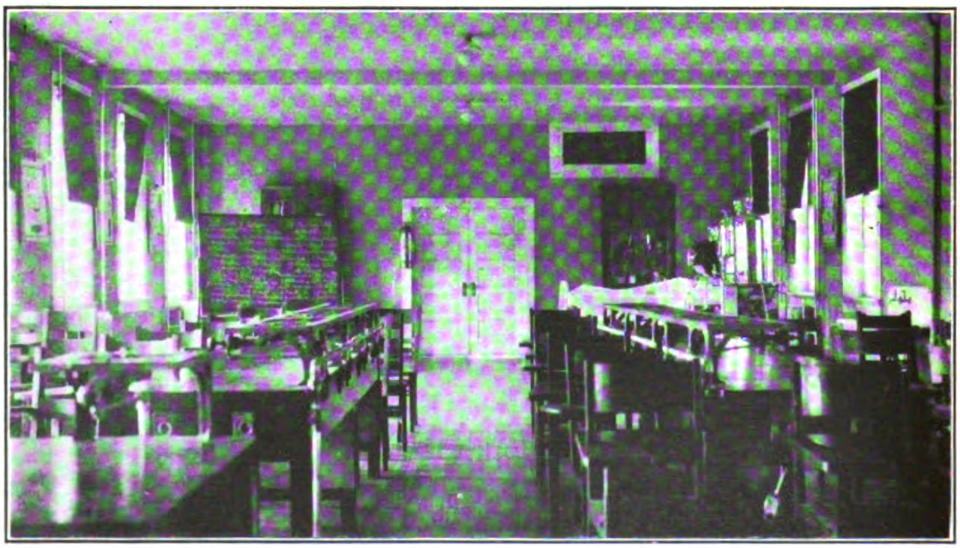
MATERIA MEDICA LECTURE ROOM



ANATOMY LECTURE ROOM



ELEMENTARY NURSING LECTURE ROOM



ADVANCED NURSING AND DIETETIC LABORATORY

The subject matter of pharmacy.

Discussion of the books used in pharmacy.

The United States Pharmacopœia, the National Formulary.

The United States Dispensatory, other dispensatories.

New and nonofficial remedies and textbooks on pharmacy are discussed as to their history and reason for existence.

Definition of pharmacy, its practical and theoretical branches.

Metrology. Measurement in general, basic units of measurement. Measurement in one, two, three directions (linear, square, and cubic). Discussion of the common systems of weights and measures.

The avoirdupois system of weight.

The apothecaries' system of weight. Comparison of troy weight with the apothecaries' system.

Measurement of liquids.

Apothecaries' liquid measure (United States wine measure).

Common domestic liquid measures are discussed.

The metric system of weights and measures.

Historical data in connection with the metric system are given.

The derivation of the primary units.

The derivation of unit names and numerical prefixes.

Problems in the conversion of metric to apothecaries' system.

The prescription balance is discussed in the following points: Construction, material, bearing, forms of weights used in weighing, use of paper on the scale pans, checking of the weights on the scale pan before and after weighing. The student is given practical work in the use of the balance, each is required to weigh accurately a certain amount of a powder. The result of the weight being expressed in grammes the student is required to change the quantity to the apothecaries' system.

The vessels used in the measurement of liquids are discussed. The importance of clean glassware in a laboratory or dispensary is brought before the mind of the student. The correct way of pouring from a bottle to a graduate is given. The attention of the student is called to the meniscus and the use of the meniscus in reading measurement of liquids.

Definition of specific gravity, the importance of specific gravity in pharmacy, the apparatus used in the determination of specific gravity are discussed.

Rule for the calculation of the specific gravity of solids insoluble in, but heavier than water is given.

Specific volume and its relation to specific gravity and specific volume are worked out by the students.

The method and procedure in making percentage solutions are discussed.

Alligation as applied to pharmacy is discussed, rule for alligation is given, and practical problems are worked out.

Discussion of heat, its nature, heat unit, thermometers and thermometer scales. Comparison of the centigrade and Fahrenheit scales. Problems in the conversion of thermometric readings.

PHARMACY FOR PHARMACIST'S MATES

By THOMAS J. MURPHY, Chief Pharmacist, United States Navy

The instruction of pharmacist's mates in pharmacy embraces 60 hours, 30 hours being devoted to lecture periods and 30 hours to practical pharmacy in laboratory.

The methods of instruction are didactic and practical.

The object of instruction is to derive the maximum benefit from a short course in a limited period of time; for that reason the practical work in the laboratory is exactly the same as the theoretical, in regard to time consumed.

It is considered that by this method of instruction the pharmacist's mate becomes thoroughly fitted for independent duty and competent to perform his duties while serving with a medical officer, whether on shipboard or in the field. As an aid in examination for promotion to higher rating the course of instruction is deemed exceedingly valuable.

The beginning of instruction for pharmacist's mates is a review of the course outlined for hospital apprentices. The review having been completed, instruction continues with the various processes in pharmacy which involve the application of heat, as calcination, ignition, deflagration, carbonization, incineration, torrefaction, fusion, vaporization, distillation, sublimation, exsiccation and desiccation. The apparatus used in connection with each of the processes is discussed. A practical distillation and sublimation are demonstrated to the class.

The processes of solution, lotion, decantation, colation, filtration, clarification, decolorization, and the separation of immiscible liquids are discussed. The apparatus used in connection with each of the processes is discussed.

Precipitation, granulation, crystallization, and dialysis are discussed.

The process of extraction is taken up in detail.

Percolation is discussed in detail; special methods of percolation are discussed.

Having completed all the processes used in pharmacy, the student is now ready to study the application of these processes in the manufacture of pharmaceutical preparations.

In the practical work of pharmacy the reason for the modus operandi is made clear and all peculiarities of the class to which the preparation belongs are brought out. Particular stress is laid upon the Pharmacopœial requirement of a finished U. S. P. preparation The laboratory work includes the following:

Manufacture of camphor water, aromatic spirit of ammonia, solution of iron and ammonium acetate, mucilage of acacia, aromatic elixir, glycerite of tragacanth, oleate of mercury, infusion of digitalis, tincture of iodine, brown mixture, emulsion of cod liver oil, sirup of ferrous iodide, black lotion, yellow lotion, n. f., camphor liniment, compound menthol inunction, compound chalk powder, pills of ferrous carbonate, glycerin suppositories, a fluid extract of the U. S. P. made by percolation, compound menthol spray, n. f. Preparation of volumetric solutions of acid and alkali. Determination of arsenic by U. S. P. test. Demonstration of the saponification value of fats and oils, determination of the iodine number of fats and oils, detection of methyl alcohol in a sample of ethyl alcohol, assay of iodine, assay of hydrogen peroxide.

THE BOTANICAL GARDEN

By Thomas J. Murphy, Chief Pharmacist, United States Navy

The botanical garden is situated in the immediate vicinity of one of the main entrances to the hospital. The area devoted to the cultivation of medicinal plants is extensive, so that all plants required for instruction purposes by the school have adequate space and are not unduly crowded. The greenhouse is situated in a central location. This house, in which the early life of many of the plants is spent, is spacious and thoroughly adaptable for its purpose. The gardeners are hospital corpsmen. The garden is in charge of the instructor of materia medica under the direction of the commanding officer of the school.

The arrangement of plants is made with a view to increasing the viability of the plant in question, and also for the purpose of adornment. Assignment of plant beds is made by natural orders as far as practicable; thus plants of the Solanaceæ group and plants of the Umbelliferæ group have separate and distinct beds, and so with the other natural orders. Such plants as are used for foods have a section assigned to their cultivation on one side of the garden. Each plant bed is fitted with a wooden marker on which is plainly stenciled the name of the plant, natural order, part used, and action. Data on the growth of individual plants is kept in a book provided for the purpose.

The purpose of a botanical garden in connection with a pharmacist's mates' school is to give the student an opportunity to study plants as they grow, thereby increasing his knowledge of botany, stimulating his interest in the subject of materia medica, as well as broadening his knowledge of pharmacognoscy.

About 85 medicinal plants are growing in this garden.

INSTRUCTION IN THE USE OF THE X RAY

By S. J. SECKELMAN, Chief Pharmacist, United States Navy

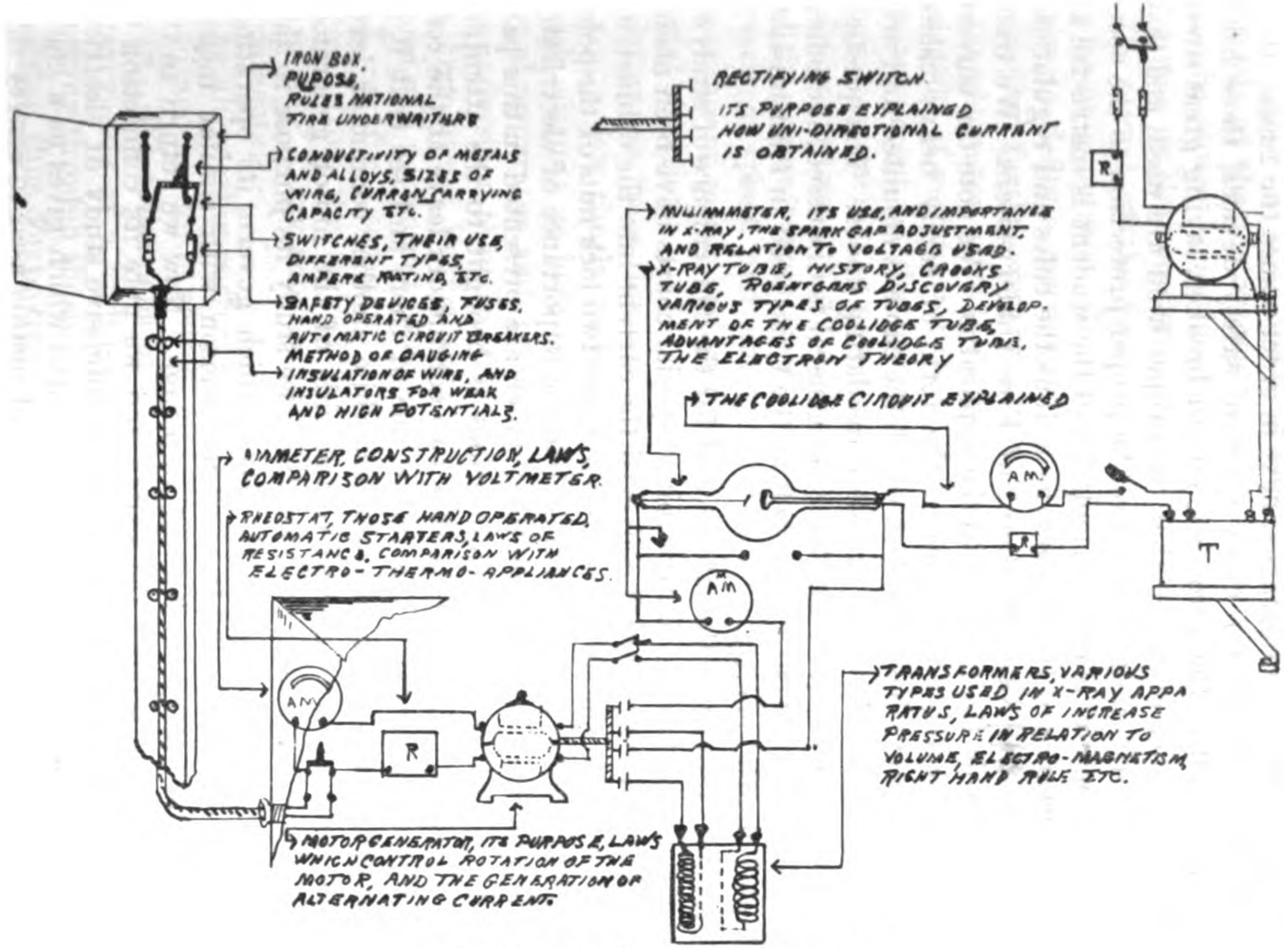
The course in the subject of X ray as given at this school differs so greatly from any other subject that a great deal of the time allowed for the instruction of X-ray technique is really taken up with the study of the elementary laws of electricity. One can plainly see the necessity for this study in connection with a course of this kind. Should this important part be left out, and we merely treat on the technique of the X-ray apparatus and the developing of radiographs without knowing the actual principles involved therein, the work could be nothing other than a failure, as well as a great danger to the patient and operator.

The average pharmacist's mate coming to this school for instruction has gained a knowledge of those subjects that are required for the rating which he holds, giving him the groundwork in many of the subjects taught at this school. The course in X ray, however, proves an exception. The writer knows of but two cases in which men previously to entering the service had experience in electrical work, a great advantage to them in understanding the course. The object of this article is to give a description of the methods best adapted and the field covered in this course.

For the convenience of study this course is divided into five main groups, and these subdivided in the number of daily lectures covering the entire period of 60 hours. These groups consist of the following: (1) An introductory lecture, in which the student is given the early history of electricity, the observations of the ancients, and the use of loadstone by the Chinese. Natural magnets are compared with artificial magnets, and the nature, source, and value in the scientific and commercial world of the two kinds of electricity is explained; (2) the four circuits as used in X ray; (3) X-ray technique; (4) dark-room technique; (5) a summary lecture.

The four circuits used in X ray.—The first of the four circuits starts at the point where the mains from the power house enter the X-ray laboratory, and it is at this point that the instruction in electricity is started; this method has proved most desirable where time is limited and the instruction confined to this particular branch of electricity.

Ordinarily close to the apparatus there is a permanent installation on the wall in the form of an iron box, provided with a close-



THE FOUR CIRCUITS USED IN X-RAY

fitting door. Upon examination we find within, two or three heavy mains, a switch and a pair of fuses or a circuit breaker. Here the conductivity of metals and alloys is considered, those best adapted for conductors as well as the sizes of conductors to carry the various current strength. Next comes the switch, its use, the different types used for the various amperages; next in order comes the fuses. Here we stop and consider the many types of safety devices, those hand operated as well as the automatic circuit breaker, laying great stress on the importance of seeing that the proper kind are used, and that they are properly gauged to assure the proper protection to the operator. The iron box is not overlooked and the student is instructed as to the importance of this feature as well as the rules and regulations laid down by the National Board of Fire Underwriters. We trace the current from the iron box to the apparatus. We note the current is conveyed by the conductors in the form of fairly heavy cables which pass along a base board on which the cable is mounted and well secured by means of strong porcelain insulating knobs. The question of insulation of wire and insulators in general is discussed, including those used for weak current as well as the types used in transmission of high potential energy.

The cables now enter the cabinet and for the convenience of study of those circuits within the X-ray cabinet, special charts have been made. From the conductors, which conveyed the current into the cabinet, we next observe that the ends are secured under two lock nuts of the poles of a double knife switch. At this time the importance of electrically tight connections and the symptoms which are presented in this particular circuit due to loose connections is brought to the attention of the class. We further note that two conductors leave at the contact ends of the switch. We follow one of them and see that it is connected to one side of an ammeter, while another conductor leaving the ammeter is connected to one side of the motor generator. The ammeter is our next consideration; we study its purpose in this circuit, its construction and the laws which govern its operation, the standardization as well as a comparison with similar meters which register voltage instead of amperage. Now we return to the second conductor leaving the switch and we note its connection to the rheostat. Here we take up a more intensive study of electrical principles, for we have a piece of apparatus which gives us a check on the explanation of the conductivity of metals used to convey current. We see the effect of poor conductive material, which has in this place been selected to perform a special duty; here too is a fine example of the thermogenic effect caused by electric energy and poor conductive material; briefly we mention some of the many pieces of apparatus based on this principle in use with electrotherapy, but our main point is the purpose of the rheostat. In connection with the hand operated type, we consider the automatic starting box and the self-releasing starter. Proceeding in our course we note a conductor leaving the rheostat and connecting to the motor side of the motor generator. At this point the first circuit of the X-ray apparatus is complete, although we have not considered the principle of the motor generator but merely state that the current from the power house has been used to provide mechanical energy by giving us the rotation of the motor generator.

The second of the four circuits starts at the generator side of the motor generator. In view of the fact that we have previously given no definite instruction on this important apparatus, before proceeding further we give in sufficient detail the explanation of the motor generator as well as the principles and laws which gives us the mode of rotation of the motor, and in turn the generation of a new current on the generator side. We explain in detail why alternating current is necessary in this circuit and demonstrate the difference between direct and alternating currents. Electrical units and the several types of instruments for motor and generator observations, speed, and horsepower are touched lightly, while the symptoms of motor and generator troubles and remedies are given special attention.

Before we trace this circuit from one side of the generator and return, a few timely remarks should be mentioned: First that the simple circuits as here represented have not been taken from any special apparatus and, noting the presence of the motor generator, it is understood that the service mains mentioned at the beginning of the first circuit deliver direct current. The time allotted to this course will not permit inserting in the circuits the many devices used in X ray for discussion; hence the simplest method of tracing the current from the main line coming from the power house to the energizing X-ray tube is utilized and this gives a groundwork of fundamentals.

The alternating current provided by the motor generator again is led to another knife switch, and we briefly mention its use in this circuit. We follow one of the conductors and find it entering the primary side of a high-tension transformer, the opposite primary returning through the switch and back to complete the circuit of the generator, thus completing the second of the four circuits in X ray.

The third of the four circuits used in X ray starts with the secondary winding of the transformer, but in view of the fact that the primary winding is in the second circuit and the secondary in this circuit, we wait until we have demonstrated the whole transformer. We now take up the laws concerning the construction of several types of transformers, step up and step down, the laws of increase pressure, and the relation of the volume of current, potential difference, the right-hand rule, electromagnetism, and the many other features in connection with transformation of current. The high-potential current leaving the secondary of the transformer meets the rectifying switch, the function of which is explained and demonstrated. The spark gap and the milliammeter are now explained, which finishes the circuit of high-tension current delivered at the tube terminals.

We now take up the tube, and in doing so we start with a brief history of the experiments with the Crooke's tube, Röntgen's discovery, and the development of the various types of X-ray tubes, including the Coolidge tube, which is the latest development. The advantages of this tube over the gas tubes is explained, and practical demonstrations are given in order that the student may have a better understanding of the subject. The essential points of the electron theory are explained, and thus we end the third circuit.

The fourth circuit used in X ray needs but little explanation and men taking the course at this school with the knowledge gained in the tracing of the first three, and the understanding of the laws which control these circuits, find no difficulty in understanding the last circuit. Everything therein has been explained in the previous lectures so that the fourth or commonly called Coolidge circuit is self-explanatory. It will be seen from the sketch that the Coolidge circuit also has three distinct circuits, but in view of the fact that these three are referred to as the Coolidge circuit we treat it as a fourth or complete unit, thus completing the four circuits used in X ray.

Having completed the elementary study of electricity, we proceed to the instruction of the technique of handling the apparatus. Safety precautions are first explained. The student is instructed as to the distance the patient should be kept from the high-tension current. A detail explanation of the cause of X-ray burns, as well as the method of resuscitation from electric shock is then given the student.

We now start the demonstrations of simple exposures of bones and joints. The spark-gap milliammeter is explained. Positions and fixations of the parts, distance, and time of exposure is next treated in detail.

After completing bones and joints, the following are taken up in the order named: Sinuses and mastoids, thoracic viscera, urinary tract, gastrointestinal tract, and the use of the intensifying screens and stereoscope.

Fluoroscopy is now taken up and the following work is treated: Difference between current for fluoroscopy and that used for making radiographs; the desirability of the fluoroscope for certain class of work; method of operation in darkness, sensitizing the retina, etc.

Localization of foreign bodies is taken up in connection with the floroscope. Methods of localization and triangulation are explained, also the importance of proper fixation to the part, preparing the charts, and reports.

With the aid of the large well-ventilated dark room which we have at this school, the instruction of dark-room technique may be treated in detail. The time and temperature method of development is taught. The chemistry of the photographic plate, as well as a method of carrying out this work in the Tropics, is explained. The care in handling films and intensifying screens is also taken up, also the care of stock, making various solutions used in photography, and tests for defective films.

The remaining time for instruction in this subject is devoted to lectures on records, filing of films, and a method of cross filing according to anatomical structure. The student is also reminded of the necessity of making a careful study of the apparatus and the methods used in laboratories in which they may be detailed after leaving the school and before attempting to operate the equipment.

The finish of this subject is usually in the form of several stereoptican lectures. With this method we are able to bring to the student's attention the various modern apparatus which could not be treated in detail during the course of electricity and demonstrate the more typical pathological pictures.

A MOVE TO STANDARDIZE THE QUARTERLY MARKS OF THE HOSPITAL CORPS, UNITED STATES NAVY

By O. J. MINK, Commander, Medical Corps, United States Navy, and J. A. McCORMACK, Chief Pharmacist, United States Navy

Very little has been written or even suggested toward standardizing the system of marking hospital corpsmen of the Navy for proficiency in their respective ratings. It is a well-known and established fact that the system now in vogue is unfair both to the hospital corpsman and his future commanding officer. As an example, the following is set forth: A medical officer reports to a ship to relieve another member of the medical corps and in the course of "turning over," a résumé of the activities of the various hospital corpsmen attached is usually given by the departing medical officer. In the course of his remarks, he will state that "Brown is an exceptionally good man," "Smith is about average," "Jones the average," and "White far below the average." The newly arrived medical officer, in order to satisfy himself, sends for the service records of all the hospital corpsmen attached to this vessel, and, upon examination, finds that the marks awarded all hospital corpsmen are about the same, there being no decided difference in the mark assigned to the best man and that assigned to the poorest man. Another detracting phase of the present system is that the quarterly mark usually represents the impression the work of a few weeks prior to marking time has produced in the mind of the marker and does not give a fair idea of his value during the quarter.

This article is presented to the Medical and Hospital Corps of the Navy with the view of, in a small measure, establishing a uniform method of determining a fair and just mark to be assigned members of the Hospital Corps for entrance upon their service records. A brief outline of the system which has been in effect at the United States Naval Hospital, Great Lakes, Ill., for the past year, and previously at the United States Naval Hospital, Fort Lyon, Colo., is herewith submitted for comment, criticism, and adoption, providing it meets with the approval of the Bureau of Medicine and Surgery. It is based upon a weekly expression of opinion which is later given a value on the scale of 4.

Upon the arrival of a hospital corpsman at this hospital, he is assigned to some one of the various departments. The person in charge is required to submit a weekly report to the executive officer of the manner in which this hospital corpsman is performing his duty. This report is either submitted by the medical officer, chief pharmacist, pharmacist, chief petty officer, chief nurse or nurse in charge, preferably the one most closely associated with the man being marked. These weekly reports are compiled and a monthly statement is issued to the Hospital Corps showing the average mark of all hospital corpsmen for the period. The monthly marks are averaged and the average mark for the quarter is published and assigned as the quarterly mark of the hospital corpsman. Hospital ships could carry out the same procedure as hospitals, and seagoing units would be obliged to take the marks of the senior and junior medical officers and the chief petty officer directly in charge of the sick bay. In addition to the above, the result of examinations held in classes conducted for instruction of hospital corpsmen are considered also in determining the monthly and quarterly marks.

It is believed that by the system outlined, a fair, unbiased opinion would be expressed, owing to the fact that there is a constant change of hospital corpsmen from one department to another, a constant change of medical officers, pharmacists, chief petty officers and nurses, giving not only the opinion of one individual, but that of the several within whose jurisdiction a hospital corpsman might pass in the course of three months.

The assignment of marks should be in accordance with the Navy scale from 4.0 representing high, to 0.0 representing low. While a man is seldom considered to be perfect in all respects, to obtain the mark 4.0, a man should be required to be very conscientious, painstaking, accurate, dependable, and at all times very attentive to his routine duties, the foregoing applying to the particular rating which the individual is holding. This could be applied equally as well to hospital apprentice second class, as to chief pharmacist's mates. A man in the rating of hospital apprentice second class would, of course, not be expected to be of the same benefit to the naval service as a man of higher rating, and each class should be considered within itself. "Fair" and 2.5 are considered in the Navy as passing marks. From this point it is easy to construct a scale such as follows:

Excellent	4.0
Very good	3.5
Good	3.0
Fair	2.5
Poor	2.0
Very poor	1.0
Undesirable for the service	0.0

The assignment of a figure does not offer the problem which might at first be expected. A few samples will illustrate the method used:

CORPSMAN REPORT, JANUARY 31, 1924

WARD E

Corpsmen	Reliability	Efficiency	Conduct	Personal appearance	Maintenance of discipline	Attention to patients	Attention to detail	Mark assigned
Davis	Ex	Ex	Ex	Good	Ex	Ex	Ex	3.8
Cassidy	Ex	Good	Ex	Good	Ex	Ex	Good	3.6
Leland	Poor	Fair	Good	Fair	Good	Good	Fair	2.7
Turnon	Poor	Poor	Poor	Poor	Poor	Poor	Poor	2.0

C. Hoover.

WARD 17

Tracey [1]	Ex	Ex	Good	Ex	Good	Ex	Ex	3.7
Bayer [2]	Good	Good	Fair	Good	Good	Fair	Good	2.8

G. Jamison.

[1] An excellent corpsman and adapts himself well to his work.
[2] Becomes surly when criticized and argues with patients.

Markers should be encouraged to use additional expressions of their own in giving their opinions, as:

Very reliable and a willing worker,
A good corpsman but lacks initiative,
Slow to grasp but willing,
A very poor corpsman,
Work during the period unsatisfactory,

Is showing marked improvement,
Does not cooperate with the nurse in charge,
and similar expressions.

In the preparation of the weekly report it has been found more satisfactory to use words rather than figures to express the opinion of the marker. Many nurses will assign a mark of 3.5–4, but will hesitate to say the one marked is "excellent" or "exceptional." It can not be denied that words express opinion while figures do not. A marker often expresses his opinion of a poor hospital corpsman by a mark of 3. This may be poor compared to other marks of 4 but in reality according to the Navy efficiency scale it much overmarks the man's ability.

While it is not necessary to adhere strictly to the subjects in the sample report, it is believed that the marker will be able to observe the hospital corpsman weekly in relation to these subjects. Certain modification of subjects may be advisable in special details. For the man in the dispensary, office, laboratory, or storeroom, "attention to patients" might be interpreted as courtesy and promptness and dispatch in supplying the wants of those who come to him on business. It is noted that no provision is made for marks under special branches as "pharmacy," "first aid," etc., as provided in the service record. This loss does not appear of great importance when it is realized how seldom such marks are based on observation in the special branches. Their worthlessness is apparent when the medical officer remembers how infrequently he consults them in the service record and when he does how poorly he feels repaid for his time and trouble, as in most cases the original heading of "seamanship," "signaling," etc., are unchanged. A single figure expressing a man's general worth is more accurate and more valuable.

The work of tabulating marks requires about 15 minutes a week. The value of the system to the executive officer soon begins to appear. He begins to know the names and faces of the very good and very poor. Later he begins to know the middle class. A change in the type of mark often suggests an interview and the hospital corpsman's side of the story is heard. The hospital corpsmen begin to show interest in their marks and call to inquire about them and to explain poor marks. Gradually the executive officer begins to appreciate that there are many men of ability who are quietly doing very satisfactory work only to be "damned with faint praise" by a nominal mark carelessly given at the end of the quarter. The executive begins to lose his old classification of excellent, worthless and others, of those who are on report, and those who are not, and begins to realize that the work of the Hospital Corps is really done by the big group who are quietly attending to business in a creditable manner, but whose possibilities are only apparent after considerable study.

A study of the marks for the past year leads to some interesting conclusions. Hospital corpsmen with regard to marks fall into three groups:

A. The group who obtain high marks consistently regardless of duty to which assigned.

These men report from the school and after a few weeks getting accustomed to their work begin to receive high grades. The following weekly grades illustrate this point:

Rosen: 3.0–3.0–3.1–3.0–3.0–3.0–3.3–3.2–3.7–3.4–3.2–3.9–4.0–4.0–3.4–3.4–3.4–3.4–3.5–3.5–3.6–3.6–3.5–3.6. At this point he was selected for X-ray work and is doing very well.

Beaver: 3.9–3.9–3.8–3.8–3.8–3.8–3.9–3.8. Selected for duty with Dental Department.

Nason: 3.2–3.1–3.3–3.3–3.0–3.0–3.1–2.9–3.2–3.5–3.5–3.4–3.3–3.6–3.3–3.2–3.8–3.7–4.0–4.0. Selected for duty in main operating room.

B. The group who are influenced by surroundings.

This group does well if they like the duty, if they like the nurse and the doctor. If mishandled they may start down hill. They are favorably or unfavorably influenced by their associates, male or female. They are at the mercy of bad company. The following series represents the influence of an ill-advised matrimony:

He was dropped from radio school for inaptitude.

Wilson: 3.0–3.3–3.5–3.7–4.0–4.0–4.0–4.0–3.9–4.0–3.4–2.7–2.9–2.5–2.7–2.7–2.7–2.8–2.9.

This man required a very diplomatic nurse to get any results whatever.

Cambridge: 3.5–3.4–3.5–3.3–3.5–3.5–3.5–2.8–3.0–3.3–2.6–3.0–3.0–3.0–2.0–3.6–3.7–3.3–3.4–3.1–2.5–0.0–2.5–2.5–0.0

This erratic record is caused by bad associations.

Tifis: 3.0–3.0–1.0–4.0–2.8–1.0–3.0–3.2.

C. The group who only momentarily rise above a level of fair.

This group are frequently seen at the mast. Very frequently they are attempting to establish a reputation of worthlessness in order to be discharged from the Navy.

The following series represents a rather brainy individual who desires to leave the Navy:

Wilbur: 1.5–3.5–3.5–1.0–2.5–3.0–2.0–3.4–2.9–2.6–3.1–3.3–2.8.

This man seldom rises above a fair mark. His difficulty seems to be mediocre ability, combined with a surly temperament:

Cotton: 3.0–3.0–2.7–2.6–1.0–2.7–1.5–2.5–1.0–2.7–2.8–2.7–2.6–2.7–2.6–2.9–2.7–2.7–3.0–3.1–2.6–3.0–1.0–2.5–2.5.

Bilson was a worthless type whose transfer with or without relief was requested after each new detail: 1.0–2.6–2.5–2.7–2.5–2.6–2.5–

2.6–2.5–3.1–2.0–0.0–1.5–2.0–2.0. Matrimony failed to increase his usefulness as a hospital corpsman, and he was discharged as undesirable.

By such system of conscientious marking, it would be very easy to establish a list of those hospital corpsmen who are not desirable for retention in the service, and also a list of those well fitted for advancement in rating, special assignment, and training. With little inconvenience the monthly marks could be added to the monthly roster report of the Hospital Corps, N. M. S. H. C. (4), thus keeping the bureau constantly informed of the efficiency of all hospital corpsmen.

The following table shows the number and percentages of hospital corpsmen who fall into the various rating groups:

	July		August		September		Quarter		October		November		December		Quarter	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
4.0–3.6	8	18. 6	21	33. 9	17	25. 0	11	16. 2	27	40. 3	21	27. 6	20	24. 7	16	19. 8
3.5–3.1	20	46. 5	26	42. 0	30	44. 3	39	57. 3	28	41. 8	39	51. 3	34	42. 0	44	54. 3
3.0–2.6	12	27. 9	14	22. 5	13	19. 0	16	23. 5	10	14. 9	13	17. 1	22	27. 1	18	22. 2
2.5–2.1	3	7. 0	1	1. 6	5	7. 3	1	1. 5	1	1. 5	3	4. 0	5	6. 2	3	3. 7
2.0–1.6	---	---	---	---	3	4. 4	1	1. 5	1	1. 5	---	---	---	---	---	---
1.5–1.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	43	100	62	100	68	100	68	100	67	100	76	100	81	100	81	100

The per cent receiving the highest grade from 3.6 to 4 is irregular and quite high by months, ranging from 18.6 per cent to 40.3 per cent. This difference is eliminated to a large extent in the quarterly marks, the two percentages for the two respective quarters being 16.2 per cent and 19.8 per cent.

The monthly percentages in the second group are much less variable. The percentage for the quarter is higher than the monthly percentage due to the fact that this group is increased by a certain percentage who drop from the group above. The third group (2.6 to 3) varies somewhat but to a very limited extent.

The other group (below 2.5) appears erratic due to small numbers, but as shown by the quarterly per cent apparently about 3 per cent are below 2.5 in value.

It would be fair to assume that the percentage in the various groups is roughly as follows:

	Per cent.
2.6 to 4	18
3.1 to 3.5	56
2.6 to 3	23
Below 2.5	3

Upon the basis of this table it is interesting to note the requirement for promotion from H. A.–2c. to H. A.–1c., and from H. A.–1c. to PhM–3 c., namely, a mark of not less than 3.5 for the quarter preceding advancement.

It is evident that 18 per cent could be advanced to the next higher rating provided this percentage was not reduced by inadequate marks in sobriety and obedience. It must be remembered that these carefully selected individuals are only rated after a severe examination.

In view of the above, there can be only one conclusion: Either the system of marking is entirely too severe or the standard for promotion is much too high.

That the former is not the case and that the latter is true seems evident beyond a doubt. A mark of 3 or 75 on a scale of 100 is almost universally accepted as a passing mark. Upon this scale 26 per cent of the men fail to obtain the right to take the examination. This seems a high percentage under any system of practical instruction.

However, on a passing mark of 3.5 or 87 on a scale of 100, 82 per cent fail to obtain a grade for the quarter which would permit them even to take the examination. It seems impossible to believe that 82 per cent of all hospital apprentices are failures to this extent.

CONCLUSIONS

1. That the present system of marking is inaccurate and does not express the worth of the person marked.
2. That the described system of marking is accurate is shown by the constant percentage of hospital corpsmen in various groups when two quarters are compared.
3. That the marks required for advancement in rating are too high.
4. By adding these marks to N.M.S.H.C.(4), the bureau would have on file recent information concerning the efficiency of each individual hospital corpsman.
5. Quarterly marks and examination marks should be the basis for advancement in rating.

A SUGGESTED PLAN FOR PROGRESSIVE HOSPITAL CORPS INSTRUCTION

By G. W. Calver, Lieutenant Commander, Medical Corps, United States Navy

PART I

One of the many difficulties facing the Medical Department of the Navy to-day is the development of properly trained hospital corpsmen. Hospital Corps instruction as now carried out in a great many places involves a repetition of previous instruction to such an extent as to become monotonous and uninteresting to the student. It is with this point in view that the following method for development of personnel is submitted for comment and discussion.

The first step in the improvement of our method of instruction should be the division of the instruction into three periods: First, elementary training; second, practical training; third, advanced training or specialization to meet the needs of the Medical Department of the Navy.

The elementary training should consist in that instruction given in the Hospital Corps Training School and should be theoretical, with only enough practical work to drive home, by actual demonstration, the points of the lectures given to the students. This would mean, for instance, that in anatomy and physiology the theoretical course of instruction should teach the mechanics of the body by means of demonstrations on the skeleton, by models and the living body. In nursing, a definition and explanation of the duties of a hospital corpsman can be given, but here, of necessity, practical work must be limited to instruction in bed making, principles of sterilization, the Murphy drip, lavage, gavage, catheterization, enemata, operating room technic, anesthetics, the use of the clinical thermometer, and the administration of medicines ordered by the medical officer and the method of preparing certain articles necessary for the sick. The instruction should then be carried on or developed in the larger hospitals, forming the second period of instruction.

On the arrival of a man at a naval hospital for duty, he should be examined on his preliminary work in order to determine his knowledge of the subjects taught at the Hospital Corps Training School. A man who satisfactorily passes this examination should then be put in a more advanced class. The proposed plan of detailing a nurse to the larger hospitals to have charge of the work of practical instruction in nursing and allied sciences is a most excellent one. These hospitals have an average of four pharmacists on duty, two of whom could be detailed each to give instruction two hours a week, covering the subjects of pharmacy and clerical work, while two junior medical officers could be detailed each to give two hours a week to instruction in first aid and minor surgery and hygiene and sanitation. This would give, as shown in Schedule B, a course of instruction comprising two periods a day for each hospital corpsman and would allow a progression through the course instead of the usual repetition in hospitals of the instruction now given in the training school.

By examining men in the subjects taught during the preliminary part of their training we raise the standard of instruction of the hospital corps in hospitals to a higher plane. We could have three classes under the most favorable conditions: First, those needing a repetition of their elementary work; second, an intermediate class for pharmacist's mates, second and third class, and, third, an advanced class, or the third period of instruction for chief pharmacist's mates and pharmacist's mates, first class, designed to train them for independent duty on board destroyers or other small craft.

The third period of instruction should be limited to those men who have completed four years' service or who have had special opportunities in civil life for development in some special subject such as X-ray technic, physiotherapy, or laboratory work.

We must remember that the prime reason for having hospital corpsmen go through periods of duty in naval hospitals after finishing the course at the training school is to give them practical experience in caring for the sick, and unless they receive this training, when they are transferred to sea they will be useless appendages to the ship's medical department or even a menace. The routine nursing procedures, taking of temperatures, giving of treatments or medicines, and nursing of special cases should be done by hospital corpsmen under the supervision of the medical officer, senior hospital corpsman, or nurse. Such common things as antidotes for poisons and the maximum dosage of common drugs should be at the finger tips of every pharmacist's mate.

Special instruction can best be given by special detail to the laboratories, X-ray room, etc., or in advanced classes at our schools, but specialists as master-at-arms or bag-room keepers are not needed, because the duties of these details naturally follow as part of the responsibility of a petty officer rating, and men on these details should be rotated at least every three months. A pharmacist's mate, second class, should not be made to perform the duties of a hospital apprentice in the sick officers' quarters simply because he is a good worker. This causes discontent and should be carefully avoided. A man's duties and responsibilities should be proportionate to his rating. Responsibility tends to develop ability in those to whom it is given. It is most unfortunate for a man to be rated a pharmacist's mate, third class, put on a special detail and kept there for a year or so. Such a man becomes unable through lack of practice to meet many of the emergencies he encounters when sent to sea.

We must not lose sight of the cardinal principal in the rating of men, which is that as a man advances in rate he advances in responsibility and authority and unless he is competent to perform the duties which fall to a petty officer and assume the consequent responsibility he should never be rated. A petty officer who can not handle men and who can not exercise with more or less judgment the authority vested in him by his rating should never have been made a petty officer for he will create discontent and undermine discipline among the patients and corpsmen in his charge.

In conclusion the following summary of ideas is presented: First, the training of men in the Hospital Corps Training School, which must in a large part be along theoretical lines; second, training in the larger naval hospitals in the practical care of the sick, amplified by such lectures as the experience of the instructor may indicate; and third, the development of the specialist from the men of longer service who have had some general experience and who, if necessity demanded, could be of some use to the general service other than in their own particular field of work should they be transferred to independent duty.

The following instruction schedule is suggested for use at naval hospitals:

Schedule "A."—*Hospital corpsmen needing review in training school subjects*

	Monday, port watch	Tuesday, starboard watch	Wednesday, port watch	Thursday, starboard watch
1 to 1.45 p. m.	Nursing	Nursing	Nursing	Nursing.
1.50 to 2.35 p. m.	Hygiene and sanitation.	First aid	Clerical	Anatomy and physiology.

This allows for two periods during which intensive instruction can be given with a five-minute rest between classes. The watches, by reason of the change of liberty, gives the port watch the class on Monday of one week and the starboard watch the same instruction in the next week in subjects other than nursing, in which subject Monday and Wednesday lectures are repeated Tuesday and Thursday, respectively.

Schedule "B."—*Hospital corpsmen having satisfactorily passed the primary subjects*

	Monday, port watch	Tuesday, starboard watch	Wednesday, port watch	Thursday, starboard watch
1 to 1.45 p. m.	First aid	Hygiene and sanitation.	Pharmacy and materia medica.	Clerical.
1.50 to 2.35 p. m.	Nursing	Nursing	Nursing	Nursing.

This schedule allows for two periods a day for those men in each watch while not on duty, the same instructors giving instruction for both this class and Schedule "A."

A course should be divided into two 3-month periods, each independent more or less of the other, so that men could be taken in every three months and complete their theoretical instruction in this period in a total of six months.

Schedule "C."—*Higher rated men to prepare for independent duty*

	Monday, port watch	Tuesday, starboard watch	Wednesday, port watch	Thursday, starboard watch
1 to 1.45 p. m.	Practical pharmacy in hospital dispensary.	Clerical M. and S. forms.	Hygiene and sanitation.	First aid.
1.50 to 2.35 p. m.		Clerical navigation forms.	First aid	Hygiene and sanitation.

Instructors in this class should preferably be officers with the experience of at least one cruise and preferably in destroyers or similar craft, who are experienced in the needs of men on independent duty.

PART II

As the second section of this paper, this part, is intended to develop the primary course for hospital apprentices or pharmacist's mates who have just returned from sea duty and who are not up on their fundamental subjects. This course is not intended as a primary instruction course but as a review course. It should be given as a review using the new Handbook as a textbook and covering those fundamental subjects necessary before a hospital corpsman can take up the course which will be outlined for the second period of hospital instruction.

The course comprises five subjects. The principal one is nursing, and an arrangement is made which will give the student the most necessary parts first and specialities later. Hygiene, first aid, clerical work, and anatomy are reduced to fundamentals, a knowledge of which is believed necessary before further advancement in the Hospital Corps can be made.

The following outlines for each period in each subject are directly corelated to the lectures given in the Pharmacist's Mates School, hospital apprentice's course. This work should be amplified by those in charge of instruction by practical demonstrations to the men in the wards.

NURSING

Lectures No. 1: Professional etiquette.

- A. To service.
- B. To officers and nurses.
- C. To patients.
- D. To coworkers.

Lecture No. 2: Care, cleaning, and disinfection of ward equipment.

- A. Utensils.
- B. Dishes.
- C. Linen.
- D. Beds.
- E. Hands.
- F. General rules for preservation of rubber articles.

Lecture No. 3: Routine for admission of patients.

- A. Records.
- B. Clothing and valuables.
- C. Baths.
- D. Care.
- E. Precautions.
- F. Physical examinations.
    1. Assistance to medical officer.
    2. Position and protection of patients.

Lecture No. 4: Bed making.

A. Airing beds.
B. Closed bed.
C. Open bed.
D. Ether bed.

Lecture No. 5: Bed making, continued.

A. Fracture bed.
B. Fowler's position.
C. Air beds.
D. Supports.
E. Changing of linen.

Lecture No. 6: Bed sores.

A. Cause.
B. Danger to patient.
C. Prevention.
D. Treatment.

Lecture No. 7: Delirious cases and special cases.

A. Need of constant watch.
B. Prevention of injury to patient and attendant.
C. Restraining appliances.
D. Medication, feeding, treatments.

Lecture No. 8: General care of patients.

A. Handling of patients for change of position.
B. Care of patient's mouth.
C. Preparation of patients for the night.
D. Care of patients during the night.

Lecture No. 9: Baths.

A. Cleansing tub bath.
B. Cleansing bed bath.
C. Sponge for reducing temperature.
D. Alcohol rubs.
E. Cleansing of patient's face and hands.

Lecture No. 10: Packs.

A. Cold packs.
B. Ice pack.
C. Hot pack.
D. Sitz bath.
E. Foot bath.

Lecture No. 11: Collection of specimens, rules.

A. Urine.
B. Feces.
C. Vomitus.
D. Sputum.

Lecture No. 12: Collection of specimens, continued.

A. Blood.
B. Smears.
C. Cultures.

Lecture No. 13: Symptoms of patients.

A. Objective and subjective.
B. Temperature, methods of taking.
C. Pulse, relation to temperature.
D. Respiration, rate and type.

Lecture No. 14: Douches, definitions.

A. Purpose.
B. Kinds.
 1. Ear.
 2. Eye.
 3. Nasal.
 4. Pharyngeal.
C. General procedures.

Lecture No. 15: Enemata, definition.

A. Kinds.
B. Position of patient.
C. Size.
D. Temperature.
E. Precautions.

Lecture No. 16: Precautions against the spread of disease.

A. Excreta.
B. Attendants.
C. Linen.
D. Room.

Lecture No. 17: Medications.

A. General precautions.
B. Records.
C. Methods of introducing medicines into the circulation.

Lecture No. 18: Medicines for local effects.

A. Wet dressings.
B. Irrigations.
C. Mouth washes.
D. Liniments.
E. Ointments.
F. Plasters.
G. Powders.
H. Stupes.

Lecture No. 19: Rules for the care and administration of medicines.

A. Calculation of dosage from stock solutions.
B. Calculation of dosage from tablets.

Lecture No. 20: Percentage method of calculation of strength of medicines.

A. Metric system and relation to percentage method.
B. Conversion of doses from apothecary to metric system.

Lecture No. 21: General nursing measures.

A. Lavage.
B. Gavage.
C. Nasal feeding.
D. Test meals.

Lecture No. 22: General nursing measures, continued.

A. Enteroclysis.
B. Proctoclysis.
C. Nutrient enemata.

Lecture No. 23: Catheterization, definition.

A. Purpose.
B. Preparation of patient.
C. Preparation of equipment.
D. Precautions.

Lecture No. 24: Bladder irrigations, definition.

A. Purpose.
B. Apparatus and its preparation.
C. Procedures.
D. Precaution.

Lecture No. 25: Preparation of patient for operation.

A. General preparation.
B. Local preparation.
C. Final preparation.

Lecture No. 26: Preparation for operation of emergency cases.

A. Hypo.
B. Enema.
C. Catheterization.
D. Local preparation.

Lecture No. 27: Postoperative care of patient.

A. Handling patient, transportation to ward.
B. Bed.
C. Position.
D. Thirst.
E. Gas pains.
F. Bladder.
G. Diet.

Lecture No. 28: Prevention of surgical complications.

A. Hemorrhage.
B. Shock.
C. Retention of urine.

Lecture No. 28: Prevention of surgical complications—Contd.

D. Infection.

E. Pneumonia.

F. Embolus.

ANATOMY

This course is presented in a most condensed form as a short review, using the Handbook as a textbook.

Lecture No. 1: The skeleton.

A. The types of bones.

B. General types of articulations.

C. Divisions of the skeleton.

D. The skull.

Lecture No. 2: The skeleton, continued.

A. The large bones and their articulations.

B. The mechanics of joints.

C. Tendons and ligaments, types and functions.

D. The pelvis.

Lecture No. 3: The muscles.

A. Muscle structure.

B. Types of muscles.

C. Muscle balance.

D. Muscle nutrition.

Lecture No. 4: The muscles, continued.

A. Groups of muscles of head.

B. Groups of muscles of trunk.

C. Groups of muscles of arm.

D. Groups of muscles of leg.

Lecture No. 5: Nervous system.

A. General divisions.

B. Purpose of parts.

C. Relation to muscle tone.

D. Special senses.

Lecture No. 6: Circulatory system.

A. General divisions.

B. Heart structure and function.

C. Arterial structure.

D. Venous and capillary structure.

E. Physiology of blood and respiration.

Lecture No. 7: Digestive tract.

A. Component parts and function.

B. Digestion and absorption of food.

C. Elimination of waste products.

1. Via intestinal canal.
2. Via genito-urinary system.

FIRST AID

Lecture No. 1: General principles of first aid.
- A. Cardinal rules.
- B. The approach to the patient.

Lecture No. 2: Clean wounds, cause in service.
- A. Treatment and dressings.
- B. After treatment.

Lecture No. 3: Dirty wounds.
- A. Cleansing methods.
- B. Dressings.
- C. After-treatment.

Lecture No. 4: Fractures, types.
- A. General rules for fracture cases.
- B. Splints.
- C. Transportation of cases.
  - 1. Dangers.

Lecture No. 5: Hemorrhages.
- A. Types.
- B. Causes.
- C. Treatment.
- D. Tourniquets and their dangers.

Lecture No. 6: Resuscitation.
- A. Shafer method.
- B. Sylvester method.
- C. Advantages of each.
- D. Cases where indicated.

Lecture No. 7: Poisons.
- A. Common poisons encountered in the naval service.
- B. General principles of antidotes.
  - 1. Most easily accessible sources of each.
- C. Treatment of case of unknown poisoning.
- D. Food poisonings, cause, treatment.

CLERICAL WORK

Lecture No. 1: Ward records.
- A. Temperature chart.
- B. Clinical record.
- C. Notes, importance.
- D. Medication records.

Lecture No. 2: Ward reports and requests.
- A. Report of patients, absentees, etc.
- B. Request for supplies.
- C. Request for diets.
- D. Liberty lists.

Lecture No. 3. Routine for transfer of patient to hospital.

A. Permission from commanding officer.

B. Preparation of patient.

C. Transfer papers, inventory of effects.

D. Notification to hospital.

Lecture No. 4: Transfer from hospital.

A. Selection for transfer.

B. Transfer papers prepared.

C. Inventory of effects.

D. Responsibilities of hospital.

Lecture No. 5: Statistical reports.

A. The combined F. and K. form.

B. Form I.

C. Form X.

Lecture No. 6: The general organiztation of the Navy Department.

A. The different bureaus.

B. Routine through official channels.

C. Organization of the Bureau of Medicine and Surgery.

Lecture No. 7: Requisitions for supplies.

A. Ashore.

B. Afloat.

HYGIENE

Lecture No. 1: Personal hygiene.

A. Personal cleanliness.

B. Personal protection by immunity.

Lecture No. 2: General hygiene.

A. The limitation of the spread of disease.

B. Prevention of disease.

C. General sanitary principles.

Lecture No. 3: Air.

A. Composition.

B. Humidity.

C. Relation to clothing.

Light.

A. General rules for light and color.

Lecture No. 4: Food.

A. Purpose.

B. As the cause of disease.

C. The Navy ration.

Lecture No. 5: Water.

A. Relation to body structure.

B. Relation to body function.

C. The transmission of disease.

Lecture No. 6: Shipboard hygiene.

A. The reduction of the theory to practical application.

1. Limitations.

B. The duties of the Medical Department.

Lecture No. 7: Field hygiene.

A. General rules.

B. Camp sites.

C. Precautions in selecting men for expeditionary duty.

D. Precautions on the march.

PART III

As the third section of this paper, this part is intended to develop a course for hospital corpsmen who have graduated from the Hospital Corps Training School and are in a naval hospital for their period of practical training. This course is intended to extend instruction given in the schools and to cover the ordinary run of hospital corpsmen's duties while in the rating of pharmacist's mate, second class, or below.

This course is divided into five subjects. The major course is nursing and the instruction as outlined is based upon the standard curriculum required in the instruction of trained nurses, and, secondarily, as an advanced course supplementing the instruction given in the Hospital Corps Training School. The textbooks recommended for this work are the Hospital Corps Handbook, Maxwell-Pope's Practical Nursing, and Practical Nursing by Harmer, a book which has been recently published.

The outlines given herewith have been so divided as to give an equal amount of instruction in each lecture as far as practicable and still stay within the limits which must be prescribed for any course of this nature. This class of work should be amplified by those in charge of instruction by giving practical demonstrations after each lecture is completed, either in the wards or under special conditions mentioned. Instruction in pharmacy should be made as practicable as possible within the bounds set by the individual hospital's equipment. It is believed that the clerical and first-aid subjects could be readily demonstrated as part of the lectures.

HYGIENE

Lecture No. 1:

A. Application to daily existence.

B. History of development.

Lecture No. 2: Water.
- A. Sources.
- B. Potability.
- C. Necessity in human life cycle.

Air.
- A. Composition.
- B. Respiration cycle.
- C. Rate of ventilation change.

Lecture No. 3: Light.
- A. Sources.
- B. Amount for work.

Clothing.
- A. Types of material.
- B. Effect of color.

Lecture No. 4: Food.
- A. Composition.
- B. Amounts of each class necessary.
- C. Inspection.

Exercise.
- A. Purpose.

Sleep.
- A. Physiology of sleep.

Lecture No. 5: Disease transmission and function.
- A. Air.
- B. Food and drink.
- C. Insects.
- D. Carriers.
- E. Endemic factors.

Lecture No. 6: Quarantine.
- A. Purpose.
- B. Diseases officially quarantined.

Bills of health.
- A. Method of obtaining.
- B. Information necessary.

Practique.
- A. General principles.
- B. Rules governing.

Lecture No. 7: Field hygiene.
- A. General purpose.
- B. Camp location.
- C. Troops on the march.
- D. Selection of personnel for expeditionary duty.

PHARMACY

Lecture No. 1:
- A. History of pharmacy.
- B. Principles of drug manufacture.
- C. General definitions.
- D. Weights and measures.

Lecture No. 2: Crude drugs.
- A. Definition.
- B. Examples.
- C. Collection and preparation of those used.

Lecture No. 3: Extracts and fluid extracts.
- A. Definition.
- B. Preparation.
- C. Uses.
- D. Those in naval usage.

Lecture No. 4: Tinctures and infusions.
- A. Definition and difference between.
- B. Procedure.
- C. General use.
- D. Those in common naval use.

Lecture No. 5: Powders.
- A. Definition and types.
- B. Manufacture.
- C. General purpose.
- D. Commonly used powders.

Lecture No. 6: Pills.
- A. Definition.
- B. Manufacture.
- C. General purpose.
- D. Official pills.

Lecture No. 7: Prescriptions.
- A. Rules for prescription work.
- B. Incompatibility.
    1. Chemical.
    2. Physiological.
- C. Dosage.
- D. General appearance of finished product.
- E. Cooperation with physician.

CLERICAL

Lecture No. 1: Work of administration office.
- A. Reports for hospitals.
- B. Surveys, medical.

Lecture No. 2: Work of the administration office (continued).
- A. Correspondence, routing.
- B. Receipt and routine transfers of patients, records, etc.
- C. Service records.
    1. Notations made thereon.

Lecture No. 3: Executive officer's office.
- A. Issue of supplies and property.
- B. Liberty and leave.
- C. Report books.
- D. Civilian employees of hospital.
    1. Reports thereon.

Lecture No. 4: Commissary office.
- A. Special requisitions.
- B. Supply office contracts.
- C. Order slips.
- D. Commissary ledger.
- E. Ration allowances.
- F. Payment of bills.

Lecture No. 5: Material office.
- A. Requisitions.
- B. Property surveys.
- C. Accountability for property on charge.
    1. For departments of hospital.
    2. For hospital as a whole.
- D. Allotment system.
- E. Public bills.

Lecture No. 6: Statistical reports.
- A. General report of maintenance.
- B. Admission of patients to hospital.
- C. Calculation of sick days.
- D. Morbidity and admission rates, etc.

Lecture No. 7: Recruiting.
- A. Clerical reports necessary.
- B. General type of desirable men.
- C. Difficulties confronting recruiting personnel.

FIRST AID

Lecture No. 1:
- A. The science of first aid.
- B. Emergencies met in the naval service requiring aid of hospital corpsmen.

Lecture No. 2: Injuries.
- A. Causes.
- B. Classes.
- C. Treatments.

Lecture No. 3: Burns and scalds.
- A. Classification.
- B. Treatment.
- C. "Gasoline burns."
- D. Dangers of open containers of oil and gas.

Lecture No. 4: Poisoning.
- A. From decomposition.
- B. From nature of food.
  1. Poisonous fish.
  2. Poisonous plants.

Lecture No. 5: Comatose cases.
- A. Method of examination of case.
- B. Possible cause.
- C. Diagnosis of case.
- D. Treatment of comatose conditions.

Lecture No. 6: Battle dressing and first aid.
- A. Equipment of dressing station.
- B. Gun pouches.
- C. Standard battle dressings.
- D. General precautions for battle.

Lecture No. 7: Field first aid, in action.
- A. Equipment of men.
- B. General purpose of field work.
- C. Application of dressings.
- D. Transportation of the injured.

NURSING

WARD MANAGEMENT

Lecture No. 1: Patients.
- A. Admission of patients, types and their care.
- B. Assistance in the examination of a patient.
- C. Precautions.
- D. Respect for religious, racial differences and peculiarities.

Lecture No. 2: Special problems.
- A. Discharge of patients.
- B. Dying patients, care and what to do.
- C. Care of body after death.
- D. Care of delirious patients.
- E. Night care of patients.

Lecture No. 3: Records and record keeping.
- A. Daily reports.
- B. Orders.
- C. Charts.
- D. Ward inventory.
- E. Necessity for accuracy.

Lecture No. 4: Upkeep of ward.
- A. Supplies.
- B. Repairs.
- C. Disposal of waste, garbage.
- D. Schedules of work, daily and weekly cleaning of ward, diet kitchens, lavatories, and dressing rooms.

Lecture No. 5: Preparations and serving of food.
- A. General principles in the feeding of sick people.
- B. Selection of foods, handling and preservation, consideration of taste, variety, nutritive value, and economy.
- C. Tray equipment.
- D. Principles of tray service.

CARE OF PATIENTS

Lecture No. 6: Mental and nervous cases.
- A. General principles governing the care of mental and nervous cases.
- B. Precautionary measures against suicide and injury.
- C. Care of patients in convulsions.
- D. Observation of symptoms, mental and physical.
- E. Necessity for accuracy in records of all occurrences and observations.

Lecture No. 7: General care of chronic and convalescent patients.
- A. Position and care in chronic heart trouble.
- B. Care of rheumatics.
- C. Care of convalescents.
- D. Care of paralytics.
  1. Care of involuntaries.

Lecture No. 8: Nursing measure in communicable diseases.
- A. Isolation.
- B. Precautions in care of linen, dishes, and excreta.
- C. Bathing, local applications, and dressings in skin diseases.
- D. Care of room and belongings after an infectious case.

Lecture No. 9: Orthopedic nursing.
- A. Bed-making, bathing, and general nursing care.
- B. Application of apparatus and extensions, precautions, and care.

Lecture No. 10: Nursing in diseases of eye, ear, nose, and throat.
- A. Application of medication.
- B. Treatments and examination.
- C. Precautions in communicable diseases.

Lecture No. 11: Minor surgical procedures, preparation, and after care of local incisions for abscesses, empyema, lumbar puncture, and aspiration.

SPECIAL TREATMENT

Lecture No. 12: Preparation and requisitions for hypodermoclysis, transfusion, and saline infusion.

Lecture No. 13: Special treatment.
- A. Proctoclysis.
- B. Enteroclysis.

Lecture No. 14: Special treatment.
- A. Lavage.
- B. Gavage.
- C. Test meals.

Lecture No. 15: Quiz.

OPERATING ROOM

Lecture No. 16: The operating room and equipment.
- A. Care and cleaning.
- B. Temperature.
- C. Manipulation of tables and apparatus.

Lecture No. 17: Sterilizing room.
- A. Operation and care of autoclave and sterilizers.
- B. Sterilization; fractional and single.
- C. Preparation of solutions in the operating room and their use.

Lecture No. 18: Anesthetics.
- A. Types, local and general.
- B. Equipment of anesthetic table and stimulant tray.
- C. Nurse's care of the patient before and after and during anesthetic.

Lecture No. 19: Instruments.
- A. Care.
- B. Sterilization.
- C. Cleaning.
- D. Use and names of instruments.

Lecture No. 20: Dressings and supplies.
- A. Preparation and sterilization of dressings.
- B. Linen supplies, preparation and sterilization.
- C. Utensils, sterilization and care.

Lecture No. 21: The operating room.
- A. Preparation of room.
- B. Preparation of assistants.
- C. Preparation of patient, draping and supports.

Lecture No. 22: Operative procedure.
- A. Positions.
  1. Surgical procedure.
  2. Closing.
  3. Dressing.

Lecture No. 22: Operative procedure.—Continued.

B. Preparation of site.

C. Operative steps.

D. Removing patient from table.

Lecture No. 23: Antipyretic measures.

A. Cold sponge.

B. Cold pack.

Diaphoretic measures.

A. Hot baths.

B. Packs.

C. Medicated baths.

Lecture No. 24: Massage.

A. Requisites.

B. Fundamental manipulations.

C. Swedish movement.

Lecture No. 25: General massage.

A. Preparation of patient.

B. Care during and after treatments.

C. Time.

D. Procedure.

Lecture No. 26: Local massage.

A. Procedure in various conditions.

B. Precautions.

Lecture No. 27: Quiz.

Lecture No. 28: Examination.

PART IV

As the fourth section of this paper, this part is devoted to advance instruction of the higher rated men whose records show the satisfactory completion of the previous courses. This instruction is highly technical and will be of the greatest value if supervised by officers with practical experience in the subject taught.

Reference books recommended for the various subjects are: Besides the Hospital Corps Handbook, Hygiene, Pryor, Rosenau; Pharmacy, Arny, Wilcox, together with the Pharmacopœia and National Formulary; First Aid, Morrow, or the Army First Aid Manual by Mann, or Knavel's books on First Aid. In clerical work, copies of regulations, Bureau of Navigation, Manual of the Medical Department, should be available for each man.

This instruction is represented by the schedule as needing approximately three months to complete. The amount of material covered in each period will depend upon the capacity of the individual. We must, however, realize that some men can not successfully complete this cource as a broad foundation of preliminary education, and considerable experience in the service will give better results than the pure application of theoretical knowledge.

HYGIENE

Lecture No. 1:
- A. Application to daily existence.
- B. History of development.

Lecture No. 2: Water.
- A. Sources.
- B. Potability.
- C. Necessity in human life cycle.

Air.
- A. Composition.
- B. Respiration cycle.
- C. Rate of ventilation changes.
- D. Factors governing.

Lecture No. 3: Light.
- A. Sources.
- B. Amount for work.
- C. Overlighting; effects.

Clothing.
- A. Type of material.
- B. Effects of color.

Lecture No. 4: Food.
- A. Composition.
- B. Amounts of each class necessary.
- C. Inspection.

Exercise.
- A. Purpose.

Sleep.
- A. Physiology of sleep.

Lecture No. 5: Disease transmission and prevention.
- A. Air.
- B. Food and drink.
- C. Insects.
- D. Carriers.
- E. Endemic factors.

Lecture No. 6: Quarantine.
- A. Purpose.
- B. Diseases officially quarantined.

Bills of health.
- A. Method of obtaining.
- B. Information necessary.

Lecture No. 6: Quarantine—Continued.
  Pratique.
    A. General principles.
    B. Rules governing.
Lecture No. 7: Field hygiene.
    A. General purpose.
    B. Camp location and sanitation.
    C. Troops on the march.
    D. Selection of personnel for expeditionary duty.

PHARMACY

Lecture No. 1:
    A. History of pharmacy.
    B. Principles of drug manufacture.
    C. General definitions.
    D. Weights and measures.
    E. Practice in use of each.
Lecture No. 2: Crude drugs.
    A. Definitions.
    B. Examples.
    C. Collection and preparation for use.
Lecture No. 3: Extracts and fluid extracts.
    A. Definitions.
    B. Preparation.
    C. Uses.
    D. Ones in naval usage.
Lecture No. 4: Tinctures and infusions.
    A. Definition and differences between.
    B. Procedure.
    C. General use.
    D. Those in common naval use.
Lecture No. 5: Powders.
    A. Definitions and types.
    B. Manufacture.
    C. General use.
    D. Commonly used powders.
Lecture No. 6: Pills.
    A. Definitions.
    B. Manufacture.
    C. General purpose.
    D. Official pills.
Lecture No. 7: Prescriptions.
    A. Rules for prescription work.
    B. Incompatibility.
        1. Chemical.
        2. Physical.

Lecture No. 7: Prescriptions—Continued.
- C. Dosage.
- D. General appearance of finished product.
- E. Cooperation with physician.

CLERICAL

Lecture No. 1: Work of the administration office.
- A. Reports from hospitals.
- B. Surveys, medical.

Lecture No. 2: Work of the administration office.
- A. Correspondence.
- B. Routine; receipt and transfer of patients, records, etc.
- C. Service records.
  1. Notations made therein.

Lecture No. 3: Executive officer's office.
- A. Price of supplies and property.
- B. Liberty and leave.
- C. Report book.
- D. Civilian employees of hospital.
  1. Reports thereon.

Lecture No. 4: Material office.
- A. Requisitions.
- B. Property surveys.
- C. Accountability for property in use.
  1. For departments of hospital.
  2. For hospital as a whole.
- D. Allotment system.
- E. Public bills.

Lecture No. 5: Commissary office.
- A. Special requisitions.
- B. Supply office contracts.
- C. Order slips.
- D. Commissary ledger.
- E. Ration allowances.
- F. Payment of bills.

Lecture No. 6: Statistical reports.
- A. Annual report of maintenance.
- B. Admission of patients to hospital.
- C. Calculation of sick days.
- D. Morbidity and admission rates.

Lecture No. 7: Recruiting.
- A. Clerical reports necessary.
- B. General type of desirable men.
- C. Difficulties confronting recruiting personnel.

FIRST AID

Lecture No. 1:
- A. The science of first aid.
- B. Emergencies met in Naval service requiring aid by hospital corpsmen.

Lecture No. 2: Injuries.
- A. Causes.
- B. Classes.
- C. Treatments.

Lecture No. 3: Burns and scalds.
- A. Classification.
- B. Treatment.
- C. "Gasoline burns."
- D. Dangers of open containers of oil and gas.

Lecture No. 4: Poisoning.
- A. From decomposition.
- B. From nature of food.
  1. Poisonous fish.
  2. Poisonous plants.

Lecture No. 5: Comatose cases.
- A. Method of examination of case.
- B. Probable cause.
- C. Diagnosis of case.
- D. Treatment of coma conditions.

Lecture No. 6: Battle dressings and first aid.
- A. Equipment of dressing stations.
- B. Gun pouches.
- C. Standard battle dressings.
- D. General precautions for battles.

Lecture No. 7: Field first aid.
- A. Equipment of men.
- B. General purpose of field work.
- C. Application of dressings.
- D. Transportation of the injured.

In completing this article it is desired to give an expression of appreciation of the work of the personnel of the teaching staff of this school, who have tried and retried the various outlines and used them in practical instruction classes in order to prove their efficiency and purpose. The standardization of Hospital Corps instruction in progressive steps is an imperative necessity to comply with the requirements of State board examinations in nursing as well as to provide interesting and systematic classes for our men. A note on the educational sheet of the service record will permanently record a man's progress. By starting all classes at the same time at all hospitals, transfers of personnel will not interfere with class work, and the development of our men will be truly progressive.

CLINICAL NOTES

SOME OBSERVATIONS ON DIRECT VISION CYSTOSCOPY

By REYNOLDS HAYDEN, Lieutenant Commander, Medical Corps, United States Navy

During a recent tour of instruction at the Mayo Clinic, Rochester, Minn., through the kindness of Dr. W. F. Braasch and his assistants, the writer was enabled to make, to him, valuable clinical comparison between direct vision cystoscopy and indirect vision cystoscopy as generally used in the service and to which he had previously been accustomed. The direct vision cystoscope is in constant and general use in the urological department of the clinic, the indirect instrument being used only rarely. The direct vision instrument is understood to be coming into more general use everywhere.

Direct vision cystoscopes have been greatly improved during the past 20 years. At first used almost entirely for women and depending upon atmospheric pressure to distend the bladder, as in the well-known method of Howard Kelly, a simple and excellent direct vision cystoscope, using water to distend the bladder, is now on the market.

The first direct vision cystoscope of the modern type was presented by Bransford Lewis in 1900. He employed an air pump to distend the bladder instead of depending upon atmospheric pressure. Direct vision air cystoscopes of a similar type to that of Lewis then appeared in rapid succession but none were generally used because of the awkwardness and pain of air distention of the bladder and because water was generally recognized as being the best cystoscopic medium. The use of water in this type of cystoscope is responsible for its revival and its value was first demonstrated by the late M. C. Millet of the Mayo Clinic.

The Braasch direct-vision cystoscope used in the Mayo Clinic consists of a metal tube of 24 French caliber and 21 cm. long. It has the usual beak at one end and a round, expanded base at the other. The beak is small, facilitating its introduction. The posterior surface of the beak is open and contains an electric light bulb. Necessary connections for light and water are provided at the base. An obturator is provided for use during the introduction of the cystoscope. When the instrument has entered the bladder, the obturator is withdrawn and the electric and water attachments connected. No preliminary irrigation or filling of the bladder with water is necessary. A circular eyepiece, called the ocular window, is then fitted into the opening at the base. The window is fitted with plain glass, no lens being used in this instrument. This fits closely, prevents water from running out except when desired, and allows the observer to see in the bladder.

After an inspection of the bladder has been made, if it desired to catheterize the ureters, the ocular window is removed and a different one inserted. This latter has two small metal tubes called catheter guides, or more frequently "guides," attached to it. The guides are for the ureteral catheters. They lie along the floor of the cystoscope when in place, leaving the greater part of the lumen available for observation purposes, and also allow a flow of water from the bladder when desired. Ocular windows provided with both double and single catheter guides are used. The double guide will take a No. 6 catheter. In addition, larger single guides are used, taking Nos. 7, 9, and 11 catheters. These latter are also used for fulguration of the bladder. This cystoscope may readily be used as an operating instrument and can be furnished with an operating window if desired. A female cystoscope of 28 French caliber and 12 cm. in length is also on the market, but is unnecessary in a place doing general work, the male instrument being adaptable to either case.

It is considered important that a cystoscope of smaller size be also available for use in many cases. A smaller instrument, No. 20 French, is therefore provided. This smaller cystoscope is especially available for examination of cases having hypertrophied prostate, in intolerant individuals, and in those cases where the trauma must be minimized as much as possible. In the smaller cystoscopes the catheter guides used are single and their walls necessarily very thin. Especial care should therefore be taken to avoid damaging these guides when being sterilized or stored.

The advantages of the direct-vision cystoscope, as given by Braasch, are: (1) Its simpler mechanism; (2) a clearer view of the field in case of hemorrhage; (3) the field is natural, requiring no interpretation; (4) use as urethroscope as well.

The indirect-vision instrument gives a field of greater circumference, permits a clearer view of the anterior wall of the bladder, and offers a more detailed and more magnified view of the bladder mucosa.

The simpler mechanism of the direct-vision cystoscope allows it to be more easily sterilized and cleaned, renders it much less susceptible to injury and permits cystoscopic examinations to be made without preliminary irrigation of the bladder.

The direct-vision cystoscope enables one to readily make cystoscopic examination in cases of hematuria or pyuria in which examination is almost or quite impossible by the indirect method in spite of the most copious irrigations. With the direct-vision instrument the observer may look through a constantly running stream of clear water washing the area under observation.

With the direct vision cystoscope, no lens is used and there is no distortion of the regions examined. No matter how inexperienced the abserver may be, all the pictures are seen alike by different observers, and there is no question of personal interpretation involved. There is no confusion because of the magnification of a frequently blurred field. While the latest indirect vision cystoscopes do not give an inverted field, the magnification of a frequently blurred field is confusing. With the direct vision instrument, a profile view of the bladder mucosa may be readily obtained by turning the instrument at an angle to the bladder wall. This enables the observer to detect changes which would frequently not be seen otherwise. The actual color of the mucosa is seen, whereas with the indirect vision cystoscope an artificial anemia may be produced by the distention of the bladder. Inflamed or contracted bladders which can not be distended sufficiently for indirect cystoscopy may be readily examined with the direct vision instrument. The direct cystoscope gives only a very small view of the anterior bladder wall, whereas a complete view of this may be obtained with the indirect vision instrument. This is of but slight clinical importance, however, as only occasionally is any pathology found on the anterior wall.

When used as a urethroscope, the magnified view obtained with the usual lens urethroscope is not obtained, but everything of practical value is clearly visible. This permits the observer to examine both sides of the neck of the bladder, vesical and urethral, and permits direct inspection of the prostate from the prostatic urethra. In addition, and of especial value to the gynecologist, the direct vision cystoscope is the only instrument for the examination of a bladder having a fistula, as a vesicovaginal fistula. It is impossible to make an indirect cystoscopic examination of a bladder which can not hold water.

Naturally, a certain amount of special training or experience is necessary to enable anybody to make intelligent cystoscopic examinations; but in the opinion of the writer the present-day direct vision cystoscope, as exemplified by the Braasch instrument, is better than the indirect instrument for general use, especially under service conditions, for the following reasons:

(1) Cystoscopic examinations and ureteral catheterization are more readily made by the trained urologist and should be more so by the average surgeon.

(2) It may be used as a urethroscope as well as a cystoscope and is of special value in gynecology.

(3) Its simpler mechanism renders it much less liable to damage, more easily sterilized, and much more easily and more cheaply repaired.

(4) Its original cost is about one-half that of the indirect vision cystoscope and maintenance costs still less in proportion.

GENERAL PARESIS

By C. J. Stuart, Lieutenant (Junior Grade), Medical Corps, United States Navy

Various synonyms have been used in describing this disease, namely, general paralysis of the insane, chronic meningoencephalitis, parenchymatous cerebral syphilis, dementia paralytica, and "softening of the brain." Some of these designations are rather confusing, if not actually misleading. Stephens goes so far as to give the points of differential diagnosis between cerebral syphilis and paresis.

Paresis is cerebral syphilis or cerebrospinal syphilis, in which the chief point of destruction is cerebral rather than spinal. Sections of the brain tissue show the characteristic reaction to infection by the spirochæta pallida; that is, a perivascular infiltration of lymphocytes and plasma cells, making the blood vessels show up well in sections as larger than normal, giving an aspect described by some writers as a "coat sleeve" appearance. This perivascular inflammatory reaction starts first in the small vasa vasorum, thus depriving the larger vessel walls of a portion of their blood supply—the resulting lack of nutrition leading to degenerative changes in the intima or lining of the vessels, with later an obliterative endarteritis.

More important, however, than the inflammatory reaction observed in the brain tissue about the vessels is the actual demonstration of the spirochæta pallida; improved staining methods have removed all doubt as to the presence of the causative agent of syphilis in paretic brain tissue. Noguchi first demonstrated the spirochætes in brain tissue in 1913, and present staining methods disclose the fact that the organisms are not only present, but that they are present in great numbers. Rapidly fatal cases, the so-called fulminating cases of paresis, show enormous numbers of the spirochætes about the smaller blood vessels and out in the brain substance.

The time intervening between the initial lesion and the onset of paretic symptoms is variously estimated; thus Osler gives the average as 12 years; Hazen gives it as 5 to 15 years, but he describes cerebrospinal syphilis as usually appearing 2 to 3 years after infection, and there is no especial demarcation between this form and paresis, since he states that dementia may come on in this condition and the picture of general paresis be evident.

The prognosis in paresis is extremely grave; practically all cases die in 2 to 6 years, as a rule, though there may be remissions; these, however, are followed by relapses, and a progressive destruction of the brain substance is to be expected.

Treatment.—Much has been written on the treatment of paresis, but all writers seem to indorse the sentiment that all forms of treatment "are very unsatisfactory." The Swift-Ellis method of intraspinal injection of salvarsanized serum is said to be one of the best methods. (D. C. Smith, "Treatment of Syphilis of the Central Nervous System," Virginia Medical Monthly, 1921–22, Vol. XLVIII, 561–563.)

Others claim equally as good results from the use of salvarsan intravenously only, instead of combining intraspinal medication with it. Good results have been obtained by repeated spinal punctures in connection with intensive intravenous medication, and since the pressure of the spinal fluid is usually increased, this method of treatment would seem to be indicated; the fluid is reformed in a few days; and if the body fluids are well salvarsanized, we may expect the spinal fluid to partake of part of the medication.

Report of a case.—J. S., white, single, 27 years of age, a Veterans' Bureau patient, was admitted to the United States Naval Hospital, Chelsea, Mass., June 13, 1923, complaining of pain in the left lumbar region, stating that his "mind is not quite right," and that he feels quite weak.

History.—Father died of appendicitis at 45, unoperated. Mother is alive and well. One brother alive and well; one died in infancy. Two sisters died in infancy. No history of tuberculosis, insanity, diabetes, or epilepsy.

Measles and chickenpox in childhood. Jaundice in 1922, at which time he was sick about two weeks. Tonsillectomy at age of 17. No other operation. No history of injuries. History of a sore on the penis in 1915, while in the Army. The sore was treated only locally and it healed in about three weeks; no history of rash on the body at any time. In 1921 his blood Wassermann was found to be positive at the Boston Dispensary, and he was given 8 injections of salvarsan and 16 of mercury. No other salvarsan had been given.

Present illness.—Patient states that he has been having pains in his back for the past three weeks, but that at present he has no pain. He says that his "mind is not quite right" and that he has been told so by others. Sleeps well, has a good appetite, and has had no vomiting; bowels regular. Present weight, 145; best weight, 187; lowest weight, 143.

Physical examination.—The patient is a tall, poorly developed, poorly nourished man who has quite an apathetic expression, and slow speech.

Eyes.—The right pupil is larger than the left; pupils do not react to light. No nystagmus or strabismus.

Mouth.—Mucous membrane of good color. Teeth in good condition, few missing. Pharynx clear; tonsils have been removed.

Glands.—No enlargement of glands.

Thorax.—Thin and flat; patient is quite round shouldered; expansion poor, but equal.

Lungs.—No areas of dullness; bronchovesicular breathing at both apices. No rales heard.

Heart.—No enlargement; no murmurs heard; sounds of good quality.

Abdomen.—Negative.

Extremities.—Knee jerks present and active. No flat foot. Fingers slightly clubbed. No varicose veins. Positive Romberg sign.

Genito-urinary.—No hernia, hemorrhoids, or varicocele. No fissure of fistula.

Laboratory work.—June 20, 1923, blood Wassermann negative. Hgb. 85 per cent; red blood cells, 5,060,000. Urinalysis negative; leucocytes, 8,200.

On June 28, patient had a convulsive seizure lasting about 15 minutes; no frothing at the mouth; body rigid; condition apparently normal after two hours. Spinal fluid examination: Wassermann 4 plus in all dilutions. Globulin shows slight increase. Colloidal gold curve—44233300000; 6 cells per cubic millimeter. Antisyphilitic medication inaugurated.

July 4, 1923, six injections of salvarsan 0.5 gm. and 6 injections of HgCl 2 gr., one-half being given.

July 25, spinal fluid examination: Wassermann negative with 0.1 c. c.; Wassermann 4 plus with 0.2 c. c.; Wassermann 4 plus with 0.5 c. c.; 2 cells per cubic millimeter, Globulin, very slight increase. Colloidal gold curve 55522100000.

August 6, blood Wassermann negative.

September 6, spinal fluid examination: Wassermann negative with 0.1 c. c.; Wassermann 2 plus with 0.2 c. c.; Wassermann 4 plus with 0.5 c. c.; 2 cells per cubic millimeter. Globulin, slight increase. Colloidal gold curve 55543210000.

September 26, second series of salvarsan and mercury injections started.

October 31, blood Wassermann negative.

November 13, spinal fluid examination (fluid under considerable pressure as at time of other lumbar punctures): 170 drops per minute at start; 72 drops per minute at end of removal of 16 c. c. Fluid contains some flakes. Wassermann 3 plus with 0.1 c. c.; Wassermann 4 plus with 0.2 c. c.; Wassermann 4 plus with 0.5 c. c.; 3 cells per cubic millimeter. Globulin increased. Colloidal gold curve 55533200000.

November 21, spinal puncture, 20 c. c. removed, and 3 mg. salvarsan dissolved in 10 c. c. spinal fluid injected into spinal canal.

December 5, 3 mg. salvarsan intraspinally. General condition of patient seems considerably improved.

December 15, patient had several convulsions and passed into a deep sleep; was quite disoriented when he aroused and had to be confined for safe-keeping. Next day patient was apparently normal.

December 28, patient observed to be having incontinence of urine; complains of no pain and is unaware of his incontinence. The bladder appears as a large tumor, reaching 1 finger's breadth above the umbilicus; catheter easily introduced and 1,450 c. c. urine removed; complained of pain only toward latter part of the procedure. The patient continued to have incontinence of retention until January 12, 1924, when an indwelling catheter was installed. Strychnin sulphate, gr. 1/30 t. i. d. On two occasions patient had involuntary passages of feces during this period.

January 1, 1924, spinal fluid examination (20 c. c. removed): Wassermann 4 plus with 0.1 c. c.; Wassermann 4 plus with 0.2 c. c.; Wasserman 4 plus with 0.5 c. c. Globulin negative. 9 cells per cubic millimeter. Colloidal gold curve 34322211000.

January 9, spinal fluid examination (20 c. c. removed): Wassermann 3 plus with 0.1 c. c.; Wassermann 4 plus with 0.2 c. c.; Wassermann 4 plus with 0.5 c. c.; 1 cell per cubic millimeter. Globulin, very slightly increased. Colloidal gold curve 22200000000.

January 15, patient able to empty bladder without use of catheter.

January 16, third series of injections of salvarsan and mercury started.

February 12, no further difficulty with urination. Patient seems somewhat improved. He now weighs 150 pounds, as compared with 138½ at time of admission. Appetite and digestion good.

Discussion.—This case of paresis gives a history of an initial lesion six years before any antisyphilitic treatment was inaugurated. It is of interest to note that in that there was no observed secondary eruption, and hence the case seems to be one of those infections caused by a type of spirochæte responsible for nervous involvement. The blood Wassermann was negative on admission but spinal fluid has been persistently positive, the blood having remained negative throughout patient's stay in hospital. The case presents the Argyll-Robertson pupil, active knee jerks, speech and memory defects.

There has also been a marked change in the general demeanor of the patient; persons who knew him well state that he was formerly quite bright, active, and alert. His whole habitus is now one of apathy, dullness, and immobility. There have been no "delusions of grandeur" in this case.

A relapse in general improvement occurred while under treatment, manifested by loss of control of the bladder for two weeks, and of the rectum on two occasions. At the present time, patient's general condition seems somewhat improved, but there has been no appreciable betterment of the spinal fluid findings so far as the Wassermann is concerned; the paretic curve has lowered considerably since spinal injections have been used.

A FEW NOTES ON THE WASSERMANN REACTION

By C. F. Behrens, Lieutenant, Medical Corps, United States Navy

No little confusion exists in the minds of many medical men regarding the tests for syphilis. They appear to be in doubt as to how far they can trust them. This is perhaps little to be wondered at when one considers the multiplicity of techniques and their varying reliability, but none the less, the doubt and confusion should be replaced by certainty as far as possible. It is, then, with the hope of shedding a little light on points that may be obscure to some of us, that these notes are contributed.

The most widely used test is the complement fixation or Wassermann test. (The term "Wassermann" properly should perhaps be restricted to a certain technique, but it has come to be applied to all complement fixation tests for syphilis as a sort of generic designation and so we will use it in this sense.) This test when properly done is one of great reliability. Unfortunately it is also a test of some technical intricacy requiring careful and conscientious work together with nice quantitative adjustment of the various reagents. It is hardly surprising then, that it is often poorly done, and the results of doubtful value. Nor is it surprising that various simpler modifications have been introduced. These modifications though ingenious and of some value have not proved as reliable as the older methods. Therefore, before we accept a Wassermann report at its face value, we should be acquainted with the reliability of the laboratory performing the tests and also with the technique used.

The question of what constitutes a satisfactory technique naturally arises here. A good technique, I believe, should be characterized by the use of inactivated test sera, the employment of guinea pig serum as the source of complement, the use of a reliable antigen and the careful adjustment of the hemolytic system. Further one would naturally demand that the tests be run by a thoroughly competent technician and would feel still safer if they were closely supervised by a physician who has had experience in that work.

By inactivation of the test sera we mean heating in a water bath at a temperature of 56° C. for 20 or 30 minutes. This destroys various thermolabile substances which may cause false positives and also diminishes the amount of luetic reagine (the substance which in the presence of antigen fixes complement). The net result of this process is a far more reliable but somewhat less sensitive test. A test on unheated serum is desirable only in the case of a patient with clinical symptoms indicative of syphilis, who has a negative Wassermann with heated serum.

In regard to the source of complement, guinea pig serum has been found most satisfactory. Tests in which the native complement in the sera to be tested, is utilized, are open to fallacies both from the unsatisfactory behavior of human complement and the use of inactivated serum (heating the serum would destroy the complement). Therefore the results of such tests should be accepted only with great reservation, as false positives are apt to occur.

As to the antigen, probably the most satisfactory single one is that consisting of acetone insoluble lipoids. Cholesterinized antigens are more sensitive, but should be controlled by the less sensitive insoluble variety, as false weak positives occur at times with it. It would seem that the greatest field of usefulness of this antigen would be in checking up on treated syphilitics.

The proper adjustment of the hemolytic system is a feature we can not be sure of except indirectly by knowing that the tests are being run by competent individuals.

If we grant now that our tests are being done by experienced workers using a good technique, the question presents itself as to the limits of the reliability thus obtained. False negatives most of us know about. A very occasional untreated syphilitic will give a negative reaction, and quite commonly a treated syphilitic will run negative though still in need of more treatment. In regard to false positives, however, there is much discussion and often conflicting assertions. My own experience has been that false positives occur only under special circumstances, namely, some very intense physical reaction such as high fever or hard chill. Thus I found that some pneumonia patients while in the febrile stage would give a positive reaction (usually weak) and later on in convalescence become negative. Again a patient who was having a severe chill from intravenous foreign therapy ran a two plus Wassermann and a few days later became negative. Recently Lieut. R. F. Sledge, Medical Corps, United States Navy, now in charge of the laboratory at the Naval Hospital, Norfolk, has had a false positive in the case of a malarial patient in the febrile paroxysm (temperature 105). No particular disease was found responsible although we were on the lookout, especially in the case of malaria, as this disease has been made much of as a cause of false positives. For about two years the malarial history of almost every patient subjected to a Wassermann test was taken (about 7,000 in all), and it was found that malaria had no effect on the tests, except during paroxysms as in the case noted above.

It would seem then that false positives should be rare occurrences even without precautions, since the conditions under which they occur are hardly of a nature to call for a Wassermann test at that time. Certainly if one bears in mind the facts stated above and acts accordingly, he need have no concern about the reliability of positive findings.

In conclusion there is one more point. Even with great care it is possible that occasionally there will be an error somewhere in the long series of steps between the collection of the blood and the forwarding of the report. Tubes may get mixed, a reagent may possibly be left out accidentally, or a typographical error may be made, etc. Thus it is always well to have a test repeated, if the result is different from what the clinical features would lead one to expect.

THE COLOR TEST NOT RELIABLE AS A MENTAL TEST

By R. H. Hunt, Lieutenant, Medical Corps, United States Navy

It takes quite a lot of courage to admit a failure, but there is a little comfort in the hope that some one may profit by the failure.

In the examination of recruits at a training station it was quite evident at the time this experiment was performed that no particular endeavor had been made to determine the mental capacity of the applicant other than the "size up" during the physical examination. As this observation was variable it was thought that some part of the procedure of the physical examination could be tried out, standardized at a training station, and a mental test developed.

On considering the procedures of a physical examination, the test for color perception seemed to be the best adapted for this purpose as it was a sort of a comprehension performance test that presented a new and unprecedented situation. The Jennings self-recording color test was selected for this experiment.

The hypothesis was that the candidate of average intelligence would complete the test in an average length of time; those of superior mentality would be able readily to comprehend and adjust themselves to the new situation and complete the performance in a shorter time than the average. The dull recruit of course would distinguish himself by the manner in which he attempted the test and the length of time consumed in completing it.

The problem was to standardize the method of giving the color-perception test, to establish time limits into which would fall those of superior intelligence, those of average mentality, and also the boundaries into which the dull would fall, where later they should be further examined to determine their mental level, as it was not presumed that this test alone would definitely grade them.

The test was conducted as follows: The candidate was given one of the record sheets of the Jennings self-recording color test and told to put his name, age, and date on the lines provided for the same. He was then told to give his paper to the examiner who put it in the box and covered it with frame No. 1. He was then shown the test skein (apple green) and told: "You are to find colors like this and punch a hole in your paper with this sticker; finding all the light and the dark patches of this color." After these directions he was given the stylus and the stop watch was started. Upon completion of the test with the first color, the frame was quickly changed to frame No. 2, and he was shown the second test skein (old rose); again directions were given: "You are to find colors like this and punch a hole in your paper with the sticker, find all the light and dark shades of this color." At the completion of the test the time was recorded on the sheet.

To get average subjects no better group could be had than the recruits reporting at a training station. To amplify this group an afternoon class of Y. M. C. A. boys were examined, all the pupils of a country school and a group of neighborhood children. These were considered an average group of normal subjects and the results of the test on these groups might be considered as normal. It was felt that there was needed a group of definitely dull or feeble-minded to check against the average; this was obtained through the courtesy of a State school for feeble-minded where a selected group was given the test.

The group of over 500 recruits was divided into four classes; superior, high average, low average, and inferior. This was done by the use of the group test that was arranged by A. W. Stearns, lieutenant, Medical Corps, United States Naval Reserve Force (United States Naval Medical Bulletin, February, 1924), which is an excellent group test.

After the records were completed an attempt was made to fit them to the hypothesis but they would not fit, juggle them as I would. Some of the superior took nearly five minutes to complete the test and some of the feeble-minded finished in less than one-half minute, these not being inhibited in the mechanical performance by cerebration. Green was green to them and all they had to do was to find green, with those of superior intelligence it was necessary to determine whether there was more green than brown in the olive drab.

Should the records be mixed up it would not be possible to pick out those of superior intelligence or segregate those who were in the class which would require further examination to determine whether they were too stupid to become recruits. Therefore it was necessary to conclude that the experiment was a failure.

Now, when it is demonstrated that such an apparently good performance test does not work as an intelligence test, is it not possible that more than the casual observation of an applicant during his physical examination should be required in order to get something definite, more definite than an opinion, whereby facts and findings are recorded.

An arrangement of the material gathered is set forth in the following table. For convenience the time was divided into six periods, the first, all those who completed the test in less than 35 seconds, then four periods of 50 seconds each, and a final period of those who consumed more than 225 seconds.

	Under 35 seconds	Between 36 and 85 seconds	Between 86 and 135 seconds	Between 136 and 125 seconds	Between 186 and 225 seconds	Over 226 seconds
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
All of the recruits	3. 5	32. 7	46. 6	7. 7	6. 7	2. 6
Class of Y. M. C. A. boys	0	15	20	35	10	10
Pupils of country school	0	0	25	25	30	20
Neighborhood children	0	10	20	35	15	20
Feeble-minded	0	25	30	35	10	0
Recruits of inferior mentality	2. 3	16. 3	50	14. 2	11. 3	5. 7
Recruits of low average mentality	1	34	52. 1	6. 5	5. 4	1
Recruits of high average mentality	3. 5	43. 3	45. 3	4. 4	3. 5	0
Recruits of superior mentality	6. 8	43. 6	39. 3	2. 5	5. 1	1
Composite of whole group	2. 9	29. 9	43. 4	11. 4	8	4. 5

It is obvious from a casual perusal of the table that no one group stands out as distinctive. Those classified as superior do the test in less time than the dull or feeble-minded, but there is not enough difference to give the test any particular value as a mental spotting test.

LUDWIG'S ANGINA FOLLOWING DOUBLE PERITONSILLAR ABSCESS

By H. S. Cragin, Lieutenant, Medical Corps, United States Navy

Ludwig's angina was first described by Ludwig of Stuttgart in 1836. The disease is an acute septic infection about the submaxillary gland and in the cellular tissue beneath the mucous membrane of the mouth and of the upper portion of the neck. The source of the infection is apparently any infectious process within the mouth or pharynx. Tonsillitis, pharyngitis, dental caries, alveolar abscess, abrasions, and ulcerations may be mentioned as possible conditions causative of the disease.

The predominating symptom is the characteristic brawny induration of the tissues below the body of the jaw. There usually is tenderness over part or all of the area. The overlying skin may be dusky red or creamy in color. The temperature is usually only slightly elevated. The infection is due to streptococci associated with staphylococci.

Spontaneous opening within the mouth may occur. The cellular tissue may become gangrenous with ulceration of large blood vessels. The mortality is high. Thomas records a series of 106 cases of which 43 died.

The treatment is removal of any infective focus within the mouth or pharynx. Free incision and drainage of the indurated area is advised. Deep incision down into the submaxillary gland is beneficial even though no pus is evacuated.

The patient, a well-developed seaman, reported in the morning at the sick bay of the U. S. S. *Camden* with a large right-sided peritonsillar abscess. The left tonsil was also slightly swollen. The pharynx was sprayed with 4 per cent procaine solution. The anterior pillar of the right tonsil was dissected from the tonsil. A large amount of foul-smelling pus was evacuated. The patient was instructed to use a warm alkaline antiseptic gargle hourly. The following morning the patient's temperature was 102° F. and the characteristic boardlike induration extended over the whole area beneath the body of right jaw. Tenderness was present, particularly in the region of the tip of jaw. The skin over the swelling was creamy white in color. No isolated swollen glands were felt. No fluctuation was present. The mouth could only be opened about three-fourths inch. The following morning the patient's temperature was normal. The induration was more brawny on the right side and extended to left submaxillary region. A large amount of pus was freely draining from behind the right tonsil. It was apparent that the swollen right tonsil was mechanically blocking the exit of pus to some extent, although the incision had completely freed anterior pillar from tonsil.

The patient was lightly anesthetized with chloroform. The right tonsil was removed quickly with a snare. The following morning the patient was much more comfortable, temperature was normal, and the indurated areas had not increased.

The second day following this, it was apparent that an abscess was present behind the left tonsil. Induration of a brawny character was equally marked below the left jaw. Under chloroform anesthesia the left tonsil was quickly removed by the snare method. A large amount of pus behind the capsule was evacuated at this operation.

The following morning the patient was quite comfortable, and his temperature was normal. Slowly the bilateral induration beneath the jaw lessened. Within 10 days it had completely disappeared without rupture into the floor of the mouth.

The treatment of this case may appear extremely radical. An inhalation pneumonia might easily have resulted. The patient, however, was in a very toxic condition, and I believe that the tonsils acted as block to proper drainage of abscess cavity. Certainly they were the source of infection of the Ludwig's angina. It is not good practice to remove tonsils during the acute stage of a peritonsillar abscess. Yet in cases of large peritonsillar abscesses the tonsil is almost completely dissected out of supratonsillar fossa by the pus itself and the tonsil will be found to be adherent only at the margins of the pillars. Incision and drainage, occasionally, does not drain satisfactorily the area posterior to the tonsil in the region of the posterior pillar as the tonsil acts as a plug. The important point, I learned from the case, is that as usual the removal of the cause cures the disease.

A SPECIFIC TREATMENT FOR CHANCROID

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

No originality is claimed for the treatment of chancroids about to be described. With few exceptions the drugs and technique advised are those of Rosenwald, as outlined in the Urologic and Cutaneous Review of September, 1923.

This treatment has been so uniformly successful as applied by the writer and others in the dispensary of Brady Institute, Johns Hopkins Hospital, for the past five months that it has seemed worth while to acquaint the naval service with it, especially so as chancroids are still quite common in naval practice despite increased prophylactic measures.

The drugs used are made into two prescriptions, and for want of better names have been called 616A and 616B.

In order to obtain the best results it is necessary that the compounding be done by following instructions very carefully.

Formula 616A by volume:

	Ounces
Calomel	1
Zinc sulphate	2
Paregoric	2
Lime water	8

The preparation is made in a glass-stoppered bottle by mixing the calomel and lime water. This is thoroughly shaken several times a day for two or three days, then the zinc sulphate and paregoric are added. The mixture is then ready for use. It should, however, be shaken before each application.

The method of application is as follows: The affected area is cleansed with soap and warm water. A thin layer of cotton, cut to correspond to the region to be treated, is laid on the palm of the hand and thoroughly saturated by inverting the bottle and giving it a few shaking movements. The moist surface of the cotton is now placed against the area to be treated and held in place by gauze and adhesive. Should the lesions be in the coronal sulcus or its immediate proximity it is only necessary to draw the foreskin over the cotton.

The patient is instructed to leave the cotton in place and return the next day, at which time every chancroid is usually clearly outlined and limited. The intervening healthy tissue is unaffected. If, as sometimes happens, the lesions are not clearly defined after the first treatment, repeat and have the patient report the following day. In very stubborn cases it may be necessary to make a third application.

Formula 616B by weight:

	Ounce
Zinc oxide	1
Starch	1
Boric acid	1
Gum camphor	1
3 per cent carbolated vaseline	12

As a rule after the second or third day the chancroids begin to disappear, leaving a clean, granulating surface which heals with remarkable rapidity. The ointment, however, should be applied daily until complete healing takes place.

Chancres are not affected in the least by this treatment.

Early application of 616A and 616B will tend to greatly reduce inguinal complications. Should they arise and the glands break down use same treatment as for original lesion.

In view of the fact that many patients complain of considerable pain immediately following the application of 616A, it has seemed advisable to apply a pledget of cotton soaked in 5 per cent procaine for about 10 minutes to the area to be treated, just previous to using the specific.

NOTES AND COMMENTS

THE VALUE OF WAR COLLEGE TRAINING FOR MEDICAL OFFICERS[1]

To one who is not familiar with the course of study at our war colleges it is quite natural to ask why a medical officer—a non-combatant—should be given this training. When we know the scope of the course in general and the method of instruction in detail we are better prepared to answer this question. Rear Admiral W. L. Rodgers, United States Navy, in a lecture at the Naval War College, December 21, 1923, states that the real value of war-college training is sound *military character*, and that "such professional character rests largely if not chiefly on the moral courage to be aggressive in war and to do right against opposition, promptly and unhesitatingly in administrative matters in peace and war." He answers those critics who compare themselves to a war-college graduate and know they are better men, although they have not taken the course, by saying they should compare the *man himself*, before and after he has taken the course, as this is the real question at issue. The essentials of military character are those which spell success in civilian life, only under different conditions and on a higher plane. To a great degree it depends on the subordination of the individual to the good of the whole organization. He must have the moral courage to do right for the good of the organization and his country. Character is largely a matter of habit of action along accustomed lines, and the subordinate must work well and harmoniously with his colleagues. His mind and will should be ready to carry out *loyally* the intentions of his superior, i. e., loyalty to the plan.

Military character is not limited to the line officer and combatant branches but also includes all those connected with the military service. At the United States Naval Academy every midshipman is carefully observed and a mark assigned in military character. One often hears of "service reputation," and this plays no small part in assignments to duty, and in selection for promotion. It includes not only military character but professional ability.

The Bureau of Medicine and Surgery has for many years recognized the value of Naval War College training. The medical officer

[1] Reprinted from the Military Surgeon of April, 1924.

graduate is indoctrinated with the general principles of warfare and has learned to think and speak the same language as the commanders with whom he will serve as medical advisor. Problems of evacuation and hospitalization of the sick and wounded can be solved more intelligently if the medical officer can visualize the probable conditions to be encountered. The collateral reading necessary to prepare the required theses at the War College broadens the horizon of the medical officer and crystallizes his knowledge for future use. The principles governing successful leadership and command and of organization and administration are quite as important for the medical officer as for the line officer. One of our naval medical officers, Capt. W. H. Bell, Medical Corps, United States Navy, made one of the most valuable contributions to the study of organization and administration in an article entitled "Principles of Administration," read before the summer conference at the Naval War College, 1913, and published in the Proceedings of the United States Naval Institute, June, 1917.

All officers are not naturally endowed with the gift for organization and administration. More efficient service can be rendered, however, by a study of the underlying principles. There is usually confusion as to any distinction between the two, and often a splendid organization is ruined by faulty administration. It is recalled that Admiral Sims on his return from England after the World War addressed the officers at the Navy Department and described the organization of the naval force under his command. With his customary vigorous emphasis, he advised "the building of organizations that can run themselves." He, of course, did not mean that there should be no administration, but rather that the efficient organization needs only the supervision and wise guidance following the general principles taught at the War College, i. e., a single controlling authority and subdivision of delegated authority. Those who have served under Admiral Sims's command realize that he understands and gives the "loyalty from above" which is quite as necessary as "loyalty from below" for any organization. One of the fundamental principles of administration is the recognition of the "area of discretion," of the individual's part in the organization. It is after all not "butting in" on some one else's job unless it becomes absolutely necessary. Human nature is so constituted that everyone resents it, from the lowest to the highest in rank. The executive of the work for the end in view should not be interfered with so long as the individuals "deliver the goods." It has been said that the recognition of the individual's "area of discretion" is "the gentle art of minding one's own business." This is the secret of developing the initiative of the subordinate and prevents his becoming an automaton, a mere cog in the machinery of organization.

Successful leadership and command may be attained by force of character and practical experience, combined with common sense and the natural gift of understanding of mankind. On the other hand by studying the mistakes and failures of others we can learn what to avoid. The course of reading at the War College comprises biographies and histories of campaigns. There are certain accepted principles of leadership and command which are taught and produce greater efficiency.

The training in detail that all officers receive at the War College is perhaps best exemplified in the study of "logistics" which concerns all provisions for supply and transportation. Also in the quest for data to support a plan in the solution of a strategical problem, hours if not days of careful study and work are required. There has been developed at the War College a systematic and logical method of reasoning which is used for the solution of any problem. It is called "the estimate of the situation" and medical officers recognize in it an old friend under a different guise. At the medical school we are taught to follow a similar, systematic method of arranging information in taking the history of cases in order that we can reach logical conclusions. The diagnosis calls for our decision as to treatment.

At the War College the medical officer is constantly thinking of the potential sick and wounded in every problem. It might be well if this factor was included among the conventions for every game at the Navy War College as is done at the Army War College. The average line officer is so intent on developing methods how best to give blows that he fails to realize he will also receive them. There are also vital problems of sanitation for the command in different areas of operation which the medical officer can help solve. Failure to consider sanitary factors have led to many instances of disastrous campaigns, a recent instance being the river expedition in Mesopotamia where sanitary recommendations were ignored.

The medical officer graduate of the War College can use this training for the more efficient administration of his own department whether afloat or on shore. The general principles of warfare are the same for both the Army and Navy. The difference in the arm and the tactical units involved necessarily require methods of training suitable for each service. At the Naval War College we have Army officers as students and the same is true of the Army War College with Navy and Marine Corps officers as students. By this means the services are kept in touch with each other for joint campaigns.

The Bureau of Medicine and Surgery has a planning division in charge of an officer who is a Naval War College graduate. All questions concerning the Medical Department's relation to war plans are carefully considered and answered. In order to avoid confusion at the outbreak of hostilities it is well to foresee the needs and have on hand detailed plans for the care of the sick and wounded. The knowledge acquired at the War College will enable the medical officer to visualize the special situations and to estimate the demands on the Medical Department. The Surgeon General of the Army's office also includes a planning division similar to that of the Bureau of Medicine and Surgery. The medical officers in charge of both divisions maintain contact to keep in touch with the work of the respective medical departments. Those of us who were at the meeting of the Association of Military Surgeons at Carlisle last October will recall with much interest the demonstration of the method of solving an Army medical problem. The preparation, solution, and final critique of the problem followed the accepted methods taught at the War College.

There seems little reason therefore to argue the value of War College training for a medical officer. It is a self-evident proposition and is worth the work involved. Any medical officer who has the opportunity for this training should quickly grasp it, for it will render him more efficient in his specialty—that of a military surgeon.

SOME HINTS FROM THE OLD PHYSICIANS

The past has much to teach us and we owe it to our profession to know something of the long and toilsome path which medical science has traveled. We ought to know something of its pioneers, its seers, its heroes and its martyrs, for we can derive much encouragement from their labors, sacrifices and successes, warning from their mistakes and failures. In an address recently delivered before the Bradford Medico-Chirugical Society, Dr. James Alexander Lindsey reviewed briefly the growth of medical knowledge from the time of Hipprocrates to the day of Sydenham. The following portion of this address which appears in full in The British Medical Journal of December 8, 1923, may be of interest to our readers.

" Scientific medicine begins with the Greeks. They were the first to study medicine as a lay subject, to free it from superstition and priestly authority, to practice bedside observation on scientific lines, and to develop a sound therapeutic. Whether they owed much or little to Egypt, Babylonia, or Crete, we have no certain information When the darkness which enshrouds early Greek history lifts, we find a cult of the God of Healing—Asclepios—and a society of physicians, the Asclepiadæ. The chief centers of this cult were at Trikka in Thessaly, in the island of Cos, at Pergamos in Ionia, and at Epidauros in the Peloponnesus. The temples of Asclepios were practically hospitals and sanatoriums. They were usually placed in localities favored with climatic and hygienic advantages, and often in the neighborhood of mineral springs. The chief means of cure were physical exercises, baths, inunctions, purgatives, emetics, dietetic regulations, rest, and various modes of suggestion. It is instructive to note that in the very earliest times the Greek physicians understood and stressed suggestion. They knew well the great influence of mind upon body. In the temples of Asclepios one of the favorite methods of treatment was the temple sleep. In the silence of the night hours the physician, personating the God of Healing, visited his patients, soothed their fears, encouraged the hope of recovery, and no doubt favorably influenced the course of disease. Whether he taught them to say 'I am feeling better and better every day' I am unable to affirm; history is silent on the subject, but if the formula was different, the method and design were the same. M. Coué would have felt quite at home in a temple of Asclepios, and I am not sure that Freud, Jung, Adler, and their numerous followers might not have found some of their views and methods anticipated by the disciples of Asclepios. The wheel has come full circle, and modern psychotherapy is reverting to the practice of Cos and Epidauros.

"Hippocrates is the first great figure in the history of medicine. He belonged to the great age of Greece, the age which saw such astonishing achievements in literature and in art. Born in the island of Cos in the year 460 B. C. of a family of Asclepiads, he traveled widely, acquired all the medical knowledge of his time, practiced in various cities of Greece, and achieved great renown in his own time, and even greater fame in succeeding ages. Galen called him 'the divine,' and he is justly regarded as the father of medicine. His works cover the whole field of medicine, surgery, and obstetrics, and are an encyclopaedia of the best knowledge of his day. His *Aphorisms* is probably the only book of ancient medicine which is still frequently read. Much of it is obsolete, but there is hardly a page which does not contain evidence of shrewd observation and sound wisdom.

"Hippocrates was the first great clinical physician and the founder of the bedside method. His anatomy was weak, his physiology weaker, and his pathology weakest, but he was an observer of the first order, and he had a sane and profound intellect. He studied disease objectively, without theory, and recorded his successes and his failures with equal impartiality. He relied upon experience. Hippocrates achieved three great objects—he freed medicine from superstition; he systematized and expanded the best medical knowledge of his day; and he gave physicians the highest ethical inspiration which medicine can possess. The famous Hippocratic oath is an ideal of medical practice which can never become obsolete. Hippocrates left descriptions of the epidemic fevers of Greece, phthisis, epilepsy, puerperal septicemia, epidemic parotitis, and many other diseases—descriptions to which modern medicine has little to add. His account of wounds, fractures, and dislocations is wonderfully accurate. He was the first to compile regular clinical records. His examination of the patient included the facial expression, the pulse, the temperature (estimated by laying on of hands), the respiration, the sputum, the urine, localized pains, the movements of the body. He emphasized the importance of inspection. He noted the ominous significance of picking at the bedclothes. He described that grave aspect of disease which we still call the 'facies Hippocratica,' and that important sign which we know as Hippocratic succussion. He also described a sound in the probably pleural or pericardial friction. He recognized healing by first intention. He attached great weight to prognosis and wrote a special work on the subject.

"In his therapeutic Hippocrates relied much upon the *vis medicatrix naturæ*. He used few drugs and those sparingly. His favorite methods were fresh air, rest, careful diet, baths, purgation, soothing, drafts, massage. It is too much to say that to-day we are witnessing a turn of the tide toward the simple and gentle Hippocratic therapy, as contrasted with the violent practice of the Middle Ages and later? Hippocrates did not try to expel disease by force—rather to assist nature in her efforts after elimination. 'Natural powers are the healers of disease' is one of his maxims. He advised that wounds should be irrigated with water of the greatest purity, or with boiled water—a foreshadowing of the aseptic practice of to-day. He insisted that the hands and the nails of the operator should be carefully cleansed. His successors too often forgot or ignored these wise directions.

"Hippocrates had sound views on public health. He wrote a book upon 'airs, waters, and places,' which is the first book, so far as we know, on the subject of medical geography, climatology, and anthropology—subjects to which he attached the greatest importance. One of the 'aphorisms' affirm that 'the body can only be understood as a whole'—a hint against the possible dangers of excessive specialism.

"Hippocrates has left a message to all of us to-day—the importance of careful bedside observation; the need to study medicine in the light of experience and not to be hidebound by theory; the wisdom of helping rather than coercing the healing powers of nature; the necessity for a high ethical ideal for the healing art.

"Aristotle was the son of an eminent physician and was much interested in medicine. His work on the subject has unfortunately been lost, but he gave medicine the foundations of zoology, comparative anatomy, and embryology. He was the first great biologist. His *Historia Animalium* is a marvelous collection of facts relating to the structure, functions, and life history of nearly all the animals of his country and time. Recent work has shown how accurate was his observation.

"Alexandrian medicine, in which the two leading names are those of Herophilus and Erasistratus, made some advances in medicine, especially in anatomy. Herophilus was on the track of the correct view of the circulation of blood, but failed to solve a problem which had to wait many centuries for Harvey. The school of Alexandria developed a tendency to polypharmacy; many remedies imported from the East came into use and stimulated a method of practice which had baneful results in the Middle Ages. Toxicology occupied a prominent place in this school and probably owed its inspiration to the East. It had a somewhat sinister aspect. Mithridates, the famous King of Pontus, who probably derived his information from Alexandria, is said to have immunized himself against poisoning by means of the blood of ducks fed on poisonous materials, a curious anticipation of some modern doctrines.

"Celsus, a Roman gentleman in the reign of Tiberius Caesar, left an elaborate work, *De Medicina*, which had considerable influence upon medical thought and practice. Of his aphorisms the following may be quoted:

> It is not to be thought that he should know the remedies of disease who does not know their original causes.
>
> We ought not to be ignorant that the same remedies are not good for all.
>
> Laziness slackens and dulls the body, but labor strengthens and makes it firm. The former hastens old age; the latter prolongs youth.
>
> Idleness and luxury first corrupted men's bodies in Greece, and afterwards afflicted them in Rome.

"Galen is the greatest name in ancient medicine after Hippocrates. A Greek and a native of Pergamos in Asia Minor, he practiced at Rome in the second century of our era. A man of boundless energy and industry, of eagerness and curiosity in the pursuit of knowledge, a keen observer, he made large advances in osteology, myology, and the anatomy of the nervous system. His physiology was vitiated by the doctrine of vital spirits, and his pathology by the doctrine of the four humors. His therapeutic was largely governed by the theory that disease is something which must be expelled from the body—a *materia peccans* which must be got rid of. Hence his emphasis upon methods of elimination. Another of his theories was that disease must be combated by remedies exercising counteracting influences—for example, cold by warmth, plethora by deprivation—the doctrine of *contraria contrariis*. He attached much weight to housing, the influence of air and light, gymnastics, dietetics, cold and warmth, massage, baths. He advocated change of climate in certain cases. As forms of exercise he mentions rowing, digging, mowing, throwing the javelin, running, jumping, hunting, splitting wood, carrying burdens. He advised exercises for the cure of adiposity. He advised baths in fevers. He had sound views upon diet. He employed venesection, leeches, laxatives, emetics, diuretics, and diaphoretics.

"Galen's influence on medicine was almost omnipotent for a thousand years. His views on anatomy and physiology paralyzed research until overthrown by Vesalius. His doctrine that disease is something to be expelled from the body by blood-letting, purgation, diaphoresis, and other eliminative measures had a long career, and still has weight in medical practice. It lies behind many familiar therapeutic methods. It is the foundation for some modern medical theories. 'Toxaemia' is almost as blessed a word in medicine as was 'Mesopotamia' in the story of the old lady who found comfort and satisfaction in that geographical expression. It is worthy of reflection how far this Galenic doctrine is, or is not, too preponderant with us. Is it really true that the colon is a human sewer which nature has unhappily preserved as part of our anatomy? Is it the *fons et origo* of a large proportion of our woes? Should we get on more comfortably without it? I need hardly remind you that bacteriology has given this doctrine a new orientation. We have now the problem set to us: Are we likely to be more successful in our struggle with disease by attempting to destroy and evacuate our invisible foes, or by aiming at fortifying the patient's natural powers of resistance? Our therapeutic methods will be much affected by the answer which we give to this question. Galen stands for coercing nature. Hippocrates stands for supporting nature. A wise therapeutic will strive to find the *via media* between these two complementary conceptions.

"In the early Middle Ages medicine was largely in the hands of the Arabian physicians. In the West the healing art had been overtaken by a long night. While the Arabian physicians spoke Arabic and practiced the Moslem faith, many of them were Syrians, Persians, or Jews by race. Their medical lore was Greek in origin, but had traveled by devious routes to Baghdad, Jundi Shapur, Bokhara, Egypt, Cordova, and Toledo. Amongst the most famous names are those of Rabban, Rhazes, Ali Abbas, Avicenna, Rashid, Avenzoar, Averroes, and Maimonides. Many of these physicians were prolific authors, and the *Continens* of Rhazes, the *Liber Regius* of Ali Abbas, and the *Canon* of Avicenna long enjoyed a great popularity. The last of these works is still an authority in some parts of the East. The Arabian physicians were inspired by Hippocrates and Galen. From the latter they derived most of their ideas regarding anatomy, physiology, and pathology, while in therapeutics they were guided largely by the Hippocratic tradition with its emphasis upon hygiene. They attached much weight to diet, baths, rest, climate, cleanliness, etc. They were fully alive to the influence of suggestion. Two stories have been handed down to us which illustrate this last point. Rhazes had at one time under his care the Amir Mansur, who was suffering from some obscure malady which had resisted the ordinary methods of treatment. Rhazes determined to try a little psychotherapy. He appeared suddenly in the Amir's tent with a sword in his hands and threatened to kill him. The Amir was naturally incensed beyond measure by this extraordinary proceeding on the part of his physician, and endeavored to seize Rhazes, who escaped with difficulty. The story goes that the Amir was cured of his malady. Avicenna once had a patient who suffered from the delusion that he was a cow and ought to be slaughtered for food. Avicenna told him that he was much too thin for the butcher, and that he must be fattened before slaughter. The patient was directed to consume large quantities of milk; he recovered his physical health and lost his delusion. Rashid, who practiced at Tabriz, excelled in materia medica, a department to which the Arabian physicians made some contributions of value. He dealt largely in aromatic oils—violet, jessamine, narcissus, rose, myrtle, orange, mastic, clove, cardamoms, cassis, fumitory, betel.

"The lore of the Arabian physicians reached western Europe mainly through Spain, and there is reason to believe that the rise of the medical school of Montpellier was due in large measure to Arabian influence. The Moslem seats of learning made progress in chemistry, and this progress probably reacted upon medicine. Averroes and Maimonides represent the more philosophical side of medicine. Both were eminent philosophers as well as famous physicians.

"One of the most interesting chapters in the history of medicine relates to the rise and fame of the medical school of Salerno, near Naples. Its origin is obscure, but there is reason to believe that it owed something to the traditions of Greek medicine which had lingered in southern Italy and Sicily, something to the Arabian physicians, and something to the Jews. Its origin may be traced to the ninth or tenth century, and it became the most famous medical school in Europe during the early Middle Ages. The spirit of the school was Hippocratic. It prized clinical observation, relied upon experience, and practiced a simple therapy based upon that of the father of medicine. The emphasis was upon diet, hygiene, baths, ventilation, and such like measures. Patients flocked from all parts to this medical shrine, which was a bright spot in a dark age, and many cures were effected. Salerno was famous for its traditions and aphorisms. Of the latter I may quote one—

> Si tibi deficiant medici, medici tibi fiant
> Hæc tria; mens hilaris, requies, moderata diaeta—

an admirable piece of advice. It reminds us of Burton's recommendation of Doctor Rest, Doctor Quiet, and Doctor Diet.

"Medicine entered upon a new era with the publication in the year 1543 of the great work of Vesalius, *De Humani Corporis Fabrica*, in which he overthrew the authority of Galen and placed human anatomy upon its modern footing. His work had an immediate influence upon surgery, and was the guide of Ambroise Paré, the greatest surgeon of the Middle Ages. Paré was distinguished for his practical sagacity and robust common sense. He was influenced by the Hippocratic tradition and believed in the *vis medicatrix naturæ.* He practiced amputation on scientific lines and reintroduced the ligature of arteries which had fallen into disuse in the Middle Ages. Harvey's discovery of the circulation of the blood is the greatest landmark in the history of medicine. His *Exercitatio Anatomica de Motu Cordis et Sanguinis* was published in the year 1628. It met with early recognition in many countries, but its influence upon the practice of medicine was only gradual. Harvey himself is said not to have excelled as a practitioner, but the facts that he was physician to Charles I, and that he was chosen as Lumleian lecturer at the Royal College of Physicians, show that he was held in high esteem. One of his aphorisms may be quoted: 'I am of opinion that our first duty is to inquire whether a thing be or be not, before asking wherefore it is.' If this maxim were always faithfully observed a great many controversies would be stillborn.

"The seventeenth century, prior to the advent of Sydenham, was an unhappy period in the history of medicine. A vivid light is thrown upon it in the comedies of Molière. It was an age of dogmatism, of slavish adherence to rules, of neglect of clinical observation, and of drastic therapeutics, based mainly on methods of elimination. Pedantry, routine, blind subservience to authority, reigned supreme. Bloodletting was practiced to a frightful extent. Purgation, scarification, clysters, and other severe methods were in vogue. There was a rage for antimony, especially in France, where the drug was held to have cured the young King Louis XIV of a fever. Medical conversation was larded with tags of Latin. The following specimen is given of the medical learning of the day. Why does opium produce sleep?

> Quia est in eo
> Virtus dormitiva
> Cujus est natura
> Sensus assoupire.

"Medicine needed a reformer, and it found one in Thomas Sydenham, who earned the title of the British Hippocrates. Few men in any age have been more fully imbued with the Hippocratic temper. In his insight and sagacity, in his reliance upon clinical observation and practical experience, in his freedom from prejudice and erroneous theories, in the simplicity and thoroughness of his methods of treatment, he was a true follower of the great Greek. He achieved great fame both in his own country and abroad. Boerhaave, the famous physician of Leyden, never mentioned him without lifting his hat, and saluted him as 'Angliae lumen, artis Phoebum, veram Hippocratici viri speciem.' Sydenham wrote on many subjects—fevers, gouts, chorea, phthisis, hysteria, pneumonia, dysentery, malaria. His account of chorea was so perfect that we still speak of Sydenham's chorea. He was the first to distinguish measles and scarlatina. His account of hysteria was long held as a classic. It is interesting to recall that he thought hysteria the commonest of all diseases, and held that few women are wholly free from it. He suffered much from gout, of which he has left an excellent description. He believed that it was the only disease which included in its victims more wise men than fools. In his famous work *Hethodus Curandi Febres* he says: 'Fever is nature's engine which she brings into the field to remove her enemy, or her handmaid either for evacuating the impurities of the blood or for reducing it to a new state.' Are we quite sure even yet how far pyrexia is an irritative reaction or part of nature's defensive mechanisms? We know it can run to perilous excess, but routine antipyresis may run the risk of defeating nature's efforts at elimination and control. The subject is one to reflect over. Sydenham was a stout upholder of the doctrine of the *vis medicatrix naturæ*. He writes:

As far as I am capable of a judgment, the dictates of reason are as follows, namely, that a disease, however much its cause may be adverse to the human body, is nothing more than an effort of nature, who strives with might and main to restore the health of the patient by the elimination of the morbific matter.

"He held that some diseases 'are engendered through occult and inexplicable changes in the atmosphere.' We are familiar with waves of both ill health and good health spreading over large areas without assignable cause. Perhaps Sydenham's notion is worthy of reconsideration. Perhaps to-day we attach too little importance to cosmic and telluric conditions. Sydenham held that impurities in the air were one of the main causes of phthisis—an anticipation of modern thought. He laid much stress upon diet in the treatment of disease, made a large use of diluents, recommended plenty of fluid in fevers,

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popularized the use of Peruvian bark in ague and iron in chlorosis, advised plenty of fresh air in sick rooms, and thought horseback exercise valuable both in nervous affections and in phthisis. Like the Greek physicians, he urged the importance of studying the patient's constitution and avoiding routine treatment.

"Sydenham's writings are full of pithy axioms and aphorisms, for example: 'Experientia magistra doctorum'; 'Qui mundificat bene, bene sanat'; 'Lachrymae—certissima signa morbillorum.' 'Nevertheless, I have always thought it a greater happiness to discover a certain remedy for even the slightest disease than to accumulate the largest fortune, and whoever compasses the former I esteem not only happier but wiser and better too.' Sydenham believed much in common sense. His favorite authors were Hippocrates, Cicero, Bacon, and Cervantes. Sir Richard Blackhouse, who had commenced the study of medicine, once asked Sydenham what book he would recommend. His reply was, 'Read *Don Quixote*. It is a very good book. I read it still.'"

A NEW BLANK FORM

An average of 15 specimens of tissue are sent from the various naval hospitals each week to the United States Naval Medical School for microscopic examination. Unfortunately a majority of these specimens are unaccompanied by a history of the case and often no mention is made of the nature or location of the tissue, factors quite essential in arriving at a diagnosis.

In order to assist the pathologist who must furnish the report desired, the following blank form has been devised. This form is of a size convenient for filing and when properly filled out will obviate the necessity of writing a letter, will give the pathologist the information he desires and will eventually be placed in the permanent records of the school.

These blank forms have been sent to those hospitals which take advantage of the pathological service of the Naval Medical School with the request that they be used when specimens are forwarded for examination.

REQUEST FOR PATHOLOGICAL EXAMINATION

From: ____

____ Date ______________________

To: Naval Medical School, Department of Pathology, Washington, D. C.

1. It is requested that a histopathological examination be made of the ______ specimens of tissue forwarded in 10% formalin solution this date.

CLINICAL HISTORY

Name ______________________________ **Age** ______________
Color ______________ **Sex** ______________ **Race** ______________
Occupation ______________________________
Location and duration of lesion______________________________
____
____
Gross appearance______________________________
____
____
Blood findings:
W. B. C______________ **R. B. C**______________ **Hg%**______________
Differential ______________________________
____
Wassermann______________ **Technique**______________
Additional laboratory data: ______________________________
____
Remarks: ______________________________
____
____
____
____
Clinical diagnosis______________________________
Examination requested by______________________________
Report to be sent to______________________________
Pathological number______________
(Leave blank.)

NAVY NURSE CORPS

THE EARTHQUAKE IN JAPAN

By E. N. L. and N. E. T.

The morning of September 1, 1923, at Yokohama, Japan, dawned with one of the most brilliant sunrises that I have ever seen; the deep shades of rose made a beautiful background for the white-sailed fishing boats on their way out into the bay. Two hours later we were having a severe rain and windstorm, which lasted about two and one-half hours.

A few minutes before noon, and without any warning of any kind, the portion of the United States Naval Hospital, Yokohama, in which I was, seemed to raise and shake violently, a barely perceptible pause, and again the building shook with renewed violence. Though we were accustomed to frequent shocks, this one was quite different and seemed to tell me to get out. I was on the second floor and there was no way of reaching the stairs in the center of the building, as already the walls were beginning to collapse, so I quickly went out onto a small balcony. As I stepped out of the door, the railing shot off and the floor started downward with me. The rumble and roar of buildings breaking up is something not soon to be forgotten. I could see our roof coming down, also the British naval hospital across the way, and the theater on the corner falling. I was thrown to the ground with the balcony floor on top of me, which sheltered me from the falling débris.

After the earth stopped trembling and things stopped falling, I began to think of getting out. I could see just a little streak of daylight and after moving the loosened bricks to one side, I wriggled out. I found that I had not broken any bones and at that time was not conscious of any bruises. Such a strange looking sight! Every building in view was demolished. I went to see if any of our hospital people had escaped and in front of the ruins, found two hospital corpsmen, and heard a third calling for assistance. He had been pinned down as the annex collapsed, and was able to crawl out when the pile of timber was lifted from him. About this time, two more of the hospital corpsmen appeared and we all went in search of the missing.

The commanding officer's wife had been seen running toward the cemetery, so we felt that she was safe. The chief pharmacist's quarters were on the second floor of the main building and being near their quarters, we searched for them first. There came another hard shock while we were upon the ruins and we scrambled to the ground. We next searched for the commanding officer, who was usually in his office at this time of day. Upon calling in this locality, he immediately responded. He had started out of his office and was as far as the doorway when the building collapsed carrying him into the basement. Efforts were at once made to release him and rescue work was unusually difficult, as there was nothing to work with. It was impossible to secure any assistance, though appeals were made repeatedly to passersby, but everyone was in the same predicament. Two of the Japanese employees, and a Japanese fireman aided the four corpsmen in their efforts, and an American resident, though himself injured, rendered some valuable assistance. After three hours of strenuous effort, the commanding officer's release was effected. His wife joined us shortly after. The chief pharmacist and his wife could not be located, nor two missing hospital corpsmen though every effort was made to find them that time permitted.

Looking down over the city all was desolation. The Grand Hotel was a mass of ruins, having caught fire and burned all afternoon. Fires had started in various parts of the city and our own galley which was a separate building, burned immediately, but fortunately for us the wind carried the fire down the hill. The wind blew a gale all afternoon. By 3 p. m., the fire was close at hand, the wind bringing it up from the bluff, the heat was intense, and the smoke made breathing very difficult. As soon as the commanding officer was released we made preparations to leave. Our only avenue of escape was through the British hospital grounds and down the side of the bluff. Everyone had been too busy to save any personal belongings so we were not hampered. Two of the hospital corpsmen assisted the commanding officer and the other two, the injured hospital corpsman. On our way to the edge of the bluff the fire was very close, and the air was full of smoke and cinders which made our eyes very painful.

We went down the side of the bluff on ropes and by clinging to grass roots and shrubs, and where there were none of these, by digging into the earth itself, finally reached the reclaimed land down near the water. We lay on the ground the rest of the afternoon, while fire raged and roared up above us on the bluff, and shocks continued every few minutes all the afternoon. About 6 p. m., we were told that a boat was taking foreigners to one of the ships, so made our way to the point where the boat came in. From there we were taken to the *Empress of Australia*, a Canadian liner, arriving at 7.30 p. m., where we found Mrs. T. and a missing hospital corpsman.

Mrs. T. continues:

A friend had been visiting me and I had gone down to the dock to see her off and as I stood on the pier among a gay, happy throng, the earth began to shake, the concrete pier collapsed in less than a second and I was thrown into the water. I could not swim and would have been drowned or crushed to death but for Pharmacist's Mate F. who came to my rescue.

Finally we came to a stairway used for the gang plank of the liners and climbed upon it. Perched on the banister of the stairway was a tall man trying to keep his feet out of the water. Then for the first time I could look up and see what was going on around me. The entire city was in flames, and the terrified people on the *Empress of Australia*, safe and secure, were so helpless just then to the drowning people about them.

Standing on the pier before the disaster, I had raised my umbrella for protection against the sun and in the confusion I threw it away. Now, as I stood looking around, it came floating along, handle in air; I asked a Japanese astride a log near by to hand it up to me which he did. The only belonging I saved.

Soon after we got into a sampan. The bay had become very rough so Lieutenant Commander Z., the man of the stairway, took command as many were losing their heads. He was a language student in Japan. There were 10 people in the sampan, 6 nations being represented. The heat and smoke from the burning city was unbearable so we climbed aboard a Japanese freighter anchored there. The only other white woman in the party was an English woman, a Mrs. McKinley, whose baby was on the bluff.

There were explosions of tanks of oil, gas, and ammunition around us all the afternoon, and at one time I counted six sampans loaded with lumber and all on fire floating around us. The birds looked white and acted bewildered, the sun was like a ball of fire, and it seemed there was no future for any of us. About 6 p. m. we prevailed on some Japanese in a motor boat to take us to the *Empress of Australia;* we wanted them to take us ashore, but they only laughed at us. People ashore had jumped into the bay to keep from burning to death. A neighbor from the naval hospital told me that everyone from the hospital had been killed, but about 7.30 p. m. all survivors from the hospital came aboard. The captain and crew deserve great credit and praise for the thousands of lives they saved and the kindness shown to all. Water was becoming very scarce, so after we washed our faces and hands I washed my clothes in the same water.

The next morning we were in as much danger as the day before, for the water inside the breakwater was covered with thick, black oil which soon ignited and the flames were spreading rapidly. The

Empress of Australia had rammed the *Steel Navigator* and wrapped the anchor chain around the propellor. The situation was very tense for awhile. It looked as though we were going to be trapped in the midst of flames. It was noon before the chain was cut and we were outside the breakwater and out of danger from the burning oil. Then the McKinley baby was brought aboard alive and well. The *Empress of Australia* delayed sailing and after a couple of days was taken over by the British authorities. This ship cared for thousands of refugees.

On Wednesday morning, September 5, the first American destroyer steamed in, and such a welcome sight. In the afternoon, four more appeared. There were many Japanese ships in the harbor, as they were not long in getting there after the disaster.

On the morning of September 6, Miss L., two of the hospital corpsmen, and I went aboard the *West Arowa*, a freighter belonging to the Canadian & Pacific Steamship Co. This ship was taking 1,500 refugees to Kobe and was in charge of Dr. Bently Squires of Columbia University. There was a German doctor who could not understand us, and we couldn't understand him. The refugees were mostly Chinese, and there were many burns and fracture cases, but we reached Kobe on the morning of September 8 without a death. One young Chinese brought his 35-day-old baby to me on this trip. The baby had cried a great deal, and no wonder, for its bottle was a beer bottle with a nipple on it, filled with cold milk, which the baby was supposed to take whenever he wanted it. I gave it a bath in a dish pan, and how he did enjoy that bath. It was a beautiful baby and soon became a favorite. I put it with a young Chinese mother whose baby had been taken by relatives on another boat, and it was hard to tell which was the happier, the mother or the baby.

We went ashore in Kobe, and at a relief station there were given some much-needed clothing. On our return trip to Yokahama, we prepared for the next lot of refugees which were to be taken to Kobe. There were on board two British nurses, two Russian, and two Japanese, besides the two American nurses. We reached Yokahama on the afternoon of September 11, and were met by the fleet surgeon, who took us to the *President Wilson*. We slept in the social hall that night, and the next day the commander in chief of the Asiatic Fleet gave us orders to proceed to Kobe on the *President McKinley*, and to sail for the United States on the *President Grant*. Before we left Yokahama, we were paid in good American gold, which had survived the earthquake and was in the commanding officer's safe. With the aid of a little Dutch Cleanser, the gold pieces were as bright and shiny as new.

The *President McKinley* reached Kobe the morning of the 14th, but no one was allowed ashore, as the sea was very rough. The

Grant was expected to sail at any time, so on the morning of the 15th of September we were lowered in a lifeboat from the boat deck and were drenched on our way to the *Grant*, which sailed at noon on the 16th. As we again neared Tokyo Bay, a destroyer came along to help us, as there was a fire in the hold of the *Grant*, the damage being slight.

We sailed from Yokahama on the 19th of September at 5 p. m. Mount Fugi was beautiful as we left the harbor, and we stayed on deck watching the fading light on the Sacred Mountain of Japan until dark.

BOOK NOTICES

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

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

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

HERNIA. ITS ANATOMY, ETIOLOGY, SYMPTOMS, DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, PROGNOSIS, AND OPERATIVE TREATMENT, by *Leigh F. Watson, M. D., associate in surgery, Rush Medical College, Chicago, Ill.* C. V. Mosby Co., St. Louis, 1924.

On starting to read the opening chapters, which treat of the history and general considerations of hernia, one is led to regard this very excellent monograph as the life work of a most industrious student, a man who has spent his days in libraries seeking to trace to its original source each detail of our knowledge of hernia. On progressing to the chapters on diagnosis, treatment, and complications one realizes that the author has also spent years in ward and operating room. Many things are here that the author did not learn from books and there are many practical points of great value not seen in other works on the subject.

The historical introduction shows the development of our knowledge of the subject from the earliest records of surgery, about 4000 B. C., to our own time. Chapter 1 covers nomenclature, anatomy, etiology, symptoms, diagnosis, prognosis, principles of operative treatment, and complications in general terms. Subsequent chapters consider strangulation, partial enterocele, hernial tuberculosis, hernia and volvulus of the omentum, fatty hernia, local anesthesia, inguinal hernia (151 pages) and femoral hernia (38 pages). Fourteen chapters are devoted to as many types of the rarer hernias and the closing chapter treats of the medico-legal aspects of hernia. Some 36 pages are used in a very complete and valuable discussion of all phases of strangulation.

The author is a strong advocate of the use of local anesthesia in operations for hernia and gives a very good description of the method on page 212 and following pages, though one looks in vain for it in the index under "anesthesia." The important Howship-Romberg sign, mentioned on pages 455 and 463, is absent from the index, as is also the gubernaculum testis, the only reference being to its existence in the female.

One feature worthy of special mention is the excellent quality of the illustrations. They really clarify the text. Certain ones, such as Figure 37, on page 162, would be much more valuable to the student if the important anatomical landmarks were indicated. Also, Figure 109, on page 290, "A cross-section of the femoral region," has nothing to indicate the structures and so is of little value. Figure 1 is an excellent illustration of the hernial openings in the abdominal and pelvic walls.

The reviewer admits with chagrin that, in a careful reading of the book from cover to cover, he was unable to find a misspelled word or important typographical error; even the foreign proper names are properly spelled and accented, a tribute to the careful work that has been done in the preparation of the book.

On the whole, it is a very creditable work which should be of value alike to student and surgeon. It would be found a very useful addition to the libraries of naval hospitals.

METHODS IN MEDICINE, *the Manual of the Medical Service of George Dock, M. D., Sc. D., formerly professor of medicine, Washington University School of Medicine; formerly physician-in-chief Robert A. Barnes Hospital, St. Louis,* by *George R. Herrmann, M. D., Ph. D., instructor in medicine, University of Michigan; formerly house officer, Peter Brent Brigham Hospital, Boston; formerly assistant in medicine, Washington University; formerly resident physician Robert A. Barnes Hospital, St. Louis.* C. V. Mosby Co., St. Louis, Mo., 1924.

This is a unique book which should prove of great value to medical students, internes, and general practitioners, and it should be of no little value to specialists in internal medicine, especially those having hospital connections.

The book presents a system of management of a hospital medical service which Prof. George Dock found successful at the Robert Abbott Barnes Hospital, St. Louis, and it embodies many of the ideas developed in the medical service of Prof. Henry A. Christian at the Peter Bent Brigham Hospital, Boston. As the author states in the preface, the volume is "intended to be a practical ward or bedside guide, an outline of sound minimal requirements in the complete, systematic diagnostic study; a system of essential emergency, scientific, therapeutic, and dietetic management; and directions for the ever important and vital preservation of the valuable data in the record of each patient."

The subject matter is divided into five parts:

Part I is made up of administrative methods, rules, and detailed regulations as they have been developed in the Barnes Hospital to insure prompt, careful, complete, and uniform handling of each case. These methods include a system of the duties of the resident staff from the resident physician down to the clinical clerks; notes and suggestions for history taking, physical examination and laboratory work, with the routine requirements for each type of medical case and the details of the ordinary clinical laboratory procedures.

Part II consists of the special methods of clinical laboratory investigation applied in a more complete study of cases, such as the special procedure to be applied in gastrointestinal cases; the renal function tests; hematologic studies; certain miscellaneous methods and tests to be used in cardiological, endocrinological and immunological study; the physiological chemistry methods; routine bacteriological and serological methods.

Part III outlines the various dietetic measures in use, including general ward diets, high and low caloric diets, diets in infectious diseases, diets in gastrointestinal diseases; the important organic and inorganic chemical constituents in diets; the principles governing the diet in nephritis; the treatment of diabetes mellitus.

Part IV consists of acceptable therapeutic methods and emergency measures. In this section of the book the treatment of poisons, the emergency measures to be followed in general diseases, the management of infectious diseases, hydrotherapy, and 20 drugs which Professor Dock found essential to a medical service are discussed.

Part V contains examples of the various recording and graphic methods used in the Barnes hospital in connection with the history of the patient and the subsequent course of the case.

THE ANTIDIABETIC FUNCTIONS OF THE PANCREAS AND THE SUCCESSFUL ISOLATION OF THE ANTIDIABETIC HORMONE—INSULIN, by *J. J. R. Macleod, professor of physiology, University of Toronto, and F. S. Banting, research professor, University of Toronto.* The C. V. Mosby Co., St. Louis, Mo., 1924.

A few years ago the Wayne County Medical Society, Detroit, Mich., instituted a series of lectures in memory of William Beaumont, the Army surgeon who at the military post on Mackinac Island, Mich., made his famous study of the processes of stomach digestion on Alexis St. Martin, which he communicated to the Michigan Medical Society in 1827. These lectures, which are delivered annually, are known as the Beaumont Foundation lectures.

The first of these lectures was delivered by William G. MacCallum, professor of pathology, John Hopkins University, in January, 1922, on the subject of inflammation.

This little book contains the second series of the Beaumont Foundation lectures. The addresses are three in number and in them are recorded the historical events in the development of our modern knowledge of the pancreas, the function of this organ in relation to carbohydrate digestion and metabolism, and the story of the discovery and isolation of insulin and its employment in the treatment of diabetes mellitus.

INTRANASAL SURGERY, by *F. J. Pratt, M. D., F. A. C. S., asssitant professor, eye, ear, nose, and throat, Medical School University of Minnesota, and J. A. Pratt, M. D., F. A. C. S., assistant professor, eye, ear, nose, and throat, Medical School, University of Minnesota.* F. A. Davis Co., Philadelphia, 1924.

This book is a very concise, well written treatise on the nose and its more common corrective surgical procedures. A chapter on the general anatomy of the nasal chamber is followed by a brief discussion of the functions of the nose. Then follow descriptions of the commoner diseases and miscellaneous conditions with the generally accepted methods of treatment.

Consideration is given in turn to the septum, deformities of the nasal bridge, the turbinates, the ethmoidal cells, the sphenoidal, frontal, and maxillary sinuses.

Each subject treated begins with a brief embryological sketch of the region under discussion, followed by the commoner pathology, the etiology and diagnosis, and surgical treatment, illustrated step by step.

The entire work is profusely illustrated with clear-cut drawings from actual specimens, is well arranged, and written in a pleasing manner.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. Phelps, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

FOOD IN ITS EPIDEMIOLOGICAL ASPECTS—FOOD POISONING

By J. R. Phelps, Lieutenant Commander, Medical Corps, United States Navy.

From the standpoint of prevention the subject of food poisoning can not yet be treated categorically. However, in considering all possible ways and means by which substances commonly recognized to be suitable for consumption as food may cause disease or poisoning it is not customary now to include ptomaines among the probable causes of serious symptoms. In referring to an outbreak of food poisoning the term "ptomaine poisoning" had best not be used. Although the last word has not been written on the subject there is quite general agreement among those who have made dependable investigations that we must dismiss from consideration not only the ptomains, which are alkaloidlike crystalline substances, but likewise all other supposedly poisonous products resulting from the spoilage or decomposition of meats and vegetables.

To quote from Rosenau: "The term 'ptomain poisoning' is a misnomer. A study of this subject for over three years has convinced me that there is no such thing." "Chapin states that 'ptomaine poisoning' is a good term to forget." "It is not *decomposed* but *infected* food that may be dangerous." As Rosenau points out, all organic substances are subject to decomposition. The word "decomposition" may be used in an ordinary sense or it may have a technical meaning. In the pure food and drugs act it has the ordinary everyday meaning—it means spoilage. Just where technical decomposition ceases and objectionable decomposition begins is often difficult to determine. Certainly, the line can not always be drawn on the basis of appearance, odor, or taste, for game or strong cheese that might be highly objectionable to one individual may be greatly relished by others.

So far as meats and vegetables are concerned, the practice in the public-health world to-day not to regard decomposition changes as sufficient to cause an outbreak of food poisoning appears justifiable on the evidence available. Despite pure-food laws, sanitary supervision, and inspections, decomposition changes go on, and first and last a great deal of spoiled food must be consumed in our large cities, especially among the poor, and yet, apparently, few persons are seriously affected thereby. One can not be certain that decomposition changes are not sometimes responsible for such intestinal symptoms as transitory discomfort and hastened peristalsis resulting in one or more loose bowel movements, but such upsets do not ordinarily bring the term food poisoning to mind. We are less certain about fish and shellfish. It does not pay as a rule to disregard a universal popular belief that has been held by generation after generation unless scientific evidence to the contrary is conclusive. From the nature of things it has seldom been possible to make careful and adequate laboratory examination of the suspected article in cases where the symptoms of poisoning were supposed to be due to spoiled sea food which if decomposition changes had not set in would presumably have been perfectly safe. It is just as well to be suspicious of fish and shellfish meat that has an unpleasant odor, appears to have undergone softening, or does not taste right after cooking. But in all probability, with fish and shellfish, as in the case of land animals, poisoning when it follows the ingestion of decomposed tissue is not due to decomposition products resulting from the growth or action of the microorganism that caused spoilage, but to the fact that the food was also contaminated with some member of the *B. enteritidis*—paratyphoid group. In other words, it is altogether probable if there is any poisonous substance present that it is a toxic product manufactured by microorganisms capable of causing disease in man and not a ptomaine or other product derived from the meat of fish protein as the result of deçomposition changes brought about by the action of putrefactive bacteria, or, more broadly, not by microorganisms concerned with causing spoilage.

The question of polluted water is important. Fish, and especially shellfish, taken from polluted water have been exposed to possible contamination with the *B. enteriditis*—paratyphoid group of bacteria from the intestines of man or animals as well as putrefactive bacteria. It is possible, of course, for fish and the meat of shellfish to be contaminated with microorganisms of this food poisoning group without undergoing decomposition. However, the opportunities for contamination with the decomposing bacteria are so great that these foods usually do undergo decomposition promptly unless great care is used to protect them and keep them refrigerated. The chances that contamination will occur are naturally much greater in warm weather, when exposed to dust, and where such foods are not handled with scrupulous cleanliness.

The only safe rule is to avoid eating sea food that shows any evidence of spoilage. It may not cause symptoms if eaten, but decomposition is evidence of contamination, and it may also be contaminated with bacteria that do yield toxic products.

Fish poisoning cases are not likely to occur in the form of large outbreaks as is the case with meat poisoning. Besides the occurrence as single cases or in isolated instances, suspicion is likely to fall on fish or shellfish at once if such has been eaten, whereas hash, meat pies, salads, etc., may not attract attention as the probable cause of poisoning until a differential study is made and the process of eliminating one article of food after another is begun.

Before considering any of the well-understood causes of food poisoning it is well to summarize the various ways in which food may cause illness. The word, "illness," is used for the want of a better term correspondingly broad that will include disease as well as the manifestations of so-called poisoning of one kind or another. We may thus classify all conditions from the epidemiological standpoint under five headings, and say that food may be responsible for illness:

1. Because of the presence of living organisms or their toxic products which may cause poisoning, although the organisms themselves have been killed.
2. Because the substance taken for food is intrinsically poisonous.
3. Because of poisonous substances intentionally added as preservatives or adulterants or accidentally from the container.
4. Because of an idiosyncrasy.
5. Because of deficiencies in the diet—vitamins, essential amino-acids, essential mineral elements, etc.

Contamination by living organisms.—These include the causative agents of communicable diseases, members of the Bacillus enteritidis group, *Bacillus botulinus*, and the animal parasites—*Entamoeba histolytica* and other pathogenic protozoa, trematodes, nematodes (*Trichina spiralis*), and cestodes.

Contamination by pathogenic bacteria.—The microorganisms may come from human sources, from animal sources, and from the soil or unknown sources.

From human sources contamination may occur at any point along the line from the production of the food to its preparation for cooking or final preparation for serving. The food may be directly contaminated by an infected sick person or healthy carrier; indirectly by polluted water or the use of night soil, or by flies, rats, cockroaches, and ants. Milk and ice cream are preeminently the foods liable to convey pathogenic bacteria from human sources, but celery and lettuce must be remembered in seeking the source of infection in typhoid fever and other diseases of the intestinal group. The possibility of contamination after cooking must not be lost sight of, and since surprisingly little penetration of heat to the center of some dishes takes place during the cooking process, cooked foods must not be ruled out without making pertinent inquiry, although salads and other foods to be served cold after preparation and handling are naturally to be thought of first in connection with the possibility of contamination by a carrier.

The diseases most frequently spread by foods contaminated with microorganisms from a human source are typhoid fever, paratyphoid infections, cholera, the dysenteries, tuberculosis, diphtheria, scarlet fever, and septic sore throat. Milk, of course, has a prominent place in the epidemiology of all these diseases. Foods other than milk or ice cream are not likely to be concerned in the transmission of diphtheria, scarlet fever, and septic sore throat. Meat or poultry flesh, especially if kept over for hash, meat pies, salads, or to be served cold in slices may cause so-called meat poisoning if contaminated by a cook or other food handler whose fingers soiled with his intestinal discharges transfer the paratyphoid bacillus or some member of the Bacillus enteritidis group. The living microorganisms may be ingested, or if the food was cooked after contamination occurred the resulting symptoms may be due solely to the presence of toxic products. This group of bacilli is more fully discussed below. Contamination of meat by one or another of the several members of the group which are chiefly concerned in causing meat poisoning occurs more often from animal sources than from human sources.

The principal pathogenic microorganisms from animal sources with which milk may be contaminated are the tubercle bacillus (diseased animal), micrococcus (Brucella) melitensis, streptococci from an infected udder of the cow, and the causative agents of milk sickness (Trembles), and hoof and mouth disease. Meat, of course, may convey the animal parasites. Meat is of the greatest importance, however, from the epidemiological viewpoint, because of the fact that it may be contaminated with some member of the Bacillus enteritidis group. The bacilli may gain access to the muscle tissues either by a general infection of the animal before death or as a result of accidental smearing with intestinal contents after slaughter while the carcass is being cut up. Healthy animals often carry one or another of these organisms in their intestines.

From the soil and other sources in the inanimate environment of man, the Bacillus botulinus is the only microorganism of recognized importance likely to contaminate food.

Food substances intrinsically poisonous.—These include inedible species of fish—trigger fish, file fish, and puffers—certain species of mussels, poisonous mushrooms, sprouted potatoes containing solanin, and rhubarb leaves. It is not intended here to go into more detail than is necessary to refer differentially to the various substances which have been known to cause poisoning.

In cases where fish of a possibly or presumably inedible species is involved there is always the fish in question as a starting point in the epidemiological study. With regard to doubtful species it can readily be ascertained as a rule whether or not the fish in question is commonly used for food, and if so, whether it is regarded as safe to eat it at all seasons of the year.

Inedible mushrooms likewise need only be mentioned. Symptoms usually make their appearance several hours after the ingestion of a poisonous species but may be delayed for the greater part of 24 hours. Symptoms caused by muscarine, an alkaloidlike substance, consist of respiratory and circulatory depression, nausea, vomiting, and muscular depression. Symptoms of muscarine poisoning may appear within half an hour after ingestion. Symptoms caused by the poisonous albuminoid substance, *phallin*, found in some species of poisonous mushrooms consist of choleralike diarrhea, great respiratory and circulatory depression followed by collapse. There is frequently fever; sometimes jaundice and hemoglobinuria. There may be active delirium. Therefore, a sudden intense acute infection may be suspected. Phallin symptoms may be delayed for the greater part of 24 hours.

Potatoes belong to the deadly nightshade family, Solanaceæ. The potato is scientifically known as the *Solanum tuberosum*. Potatoes normally contain a very small amount (about 0.06 per cent) of the poisonous principle solanin, an alkaloid found in certain plants of the genus Solanum. This alkaloid causes diarrhea and cramps, often accompanied by great prostration and sometimes fever, seldom lasting more than two or three days provided a fresh attack is not brought on. It is doubtful whether potatoes in good condition are ever poisonous, but potatoes which during growth have lain partially exposed above ground and potatoes which during storage have become well sprouted may contain solanin in amounts sufficient to cause poisoning. The increase in solanin production is thought to be due to the action of at least two species of bacteria, *Bacterium solaniferum noncolorabile* and *Bacterium solaniferum colorabile*. Osler states that an extensive outbreak of potato poisoning occurred in 1899 in a German regiment, 56 members of which, after eating sprouted potatoes, were seized with chills, fever, headache, vomiting, diarrhea, colic, and great prostration. Many were jaundiced and several collapsed, but all recovered. Samples of the potatoes yielded 0.38 per cent of solanin, indicating that a full portion must have contained about 5 grains. Solanin is not destroyed by cooking. In most reported instances of poisoning gastroenteritis came on after partaking of cooked sprouting potatoes. It is safest not to use sprouted potatoes but in case of doubt care should be taken to peel the vegetable thoroughly and cut the "eyes" out deeply, thus minimizing the danger.

Very little trouble has been experienced in the Navy from potato poisoning. During the war an epidemic of cramps and diarrhea occurred on board the U. S. S. *Minnesotan* on an eastbound trip, which was considered to be due to sprouted potatoes after eliminating other possibilities. In the case of one other vessel during the war potatoes were probably responsible for 70 cases of colic and diarrhea. There were scattered cases numbering from 1 to 3 a day during a period of 12 days, followed by an outbreak of 61 cases on the twelfth day. It was not possible to rule out meat poisoning altogether. The potatoes were found old and deteriorated and were surveyed and destroyed, after which no more cases occurred.

Little need be said about rhubarb. The leaves yield oxalic acid. Instances of oxalic acid poisoning after eating excessive quantities of rhubarb have been recorded.

Poisonous substances intentionally added to food as preservatives and accidental contamination from containers.—To-day, under the pure-food and drugs act, with the Federal Government exercising control over all foods and food products shipped from one State into another, preserved foods are perhaps the least likely of all foods to cause poisoning. So far as preservatives and accidental contamination from the can or other container are concerned, the danger is practically nil in the case of food prepared under supervision of the United States Department of Agriculture by a reputable firm engaging in interstate commerce and processing its goods in accordance with the technique recommended by the research laboratory of the National Canners Association.

The public health is protected by permitting only the so-called natural methods of preservation, smoking, drying, heating, refrigeration, and the use of the natural preservatives, salt, vinegar, and sugar. Fumigation of dried fruits with sulphur dioxide is permissible, and benzoic acid may be used to preserve certain articles, such as tomato catsup, that are liable to ferment provided the amount used is so small that sound and clean products must be used to insure preservation.

Salts of tin are about the only foreign matter liable to contaminate canned goods. The so-called tin can is made of thin steel coated with tin. Next to iron, tin is about the safest element that can be placed in contact with food. Certain vegetables, particularly asparagus, string beans, pumpkin, and squash, attack the tin lining of the can. The tin is converted into salts of tin, the steel is exposed, and the surface is blackened or discolored. These changes are regarded as harmless. Recent studies seem to show that the dissolved tin tends for the most part to form insoluble salts rather than soluble salts, and that the insoluble salts are taken up by the contained foods in such combination that when freed in the intestinal tract of the consumer little or no absorption takes place. The salts of tin remain insoluble and are eliminated with the indigestible food residue.

With the types of tin cans now used the danger of lead poisoning is almost nil. For some years there has been practically no danger and the recent adoption of cans manufactured by the crimping process has still further reduced the amount of lead that can get inside the can. Other metals are not used.

Food idiosyncrasies.—Under some circumstances it may be difficult to decide whether severe symptoms of poisoning are due to an existing idiosyncrasy or to some condition of the food itself that would have made it equally poisonous for another person. Usually there is a history of previous indications of sensitization to food even if the patient is not certain of the particular item, and the skin is usually affected by urticaria or other type of rash in addition to gastrointestinal disorder. There may be dyspnea in severe cases. Idiosyncrasies have been recorded for such common foods as eggs, cheese, and even milk, as well as for pork, buckwheat, oysters, clams, lobsters, shrimp, strawberries, and gooseberries.

Deficiency diseases.—It is beyond the scope of this paper to discuss deficiency diseases, although brief mention of the conditions that come under this heading may not be out of place. Experiments with animals seem to show that any deficiency in diet must continue over an appreciable percentage of the life span of the animal in question before symptoms attributable to the deficiency appear, and in the case of human beings, the inference is that the diet must be deficient in one or more essential constituents for a considerable length of time, months rather than weeks, to cause symptoms.

There is fairly good evidence, chiefly epidemiological in character, that deficiency of fat soluble vitamin "A" lowers resistance to the common infectious diseases, communicable diseases as well as infection by pus-producing cocci. The corneal changes resulting from deficiency of this vitamin are well known. In spite of the fact that cod-liver oil, which is estimated to be about two hundred and fifty times richer in fat soluble vitamin than butter, is of recognized value in the treatment of rickets, this disease is believed by recent investigators not to be due primarily to a lack of fat soluble vitamin in the diet, but rather to insufficient exposure to sunlight in the open air and perhaps also to deficiency in some other constituent of the diet, possibly some not yet understood active principle contained in fresh milk, or some essential protein constituent, and possibly to a deficiency in mineral elements.

Deficiency in the water soluble "B," vitamin definitely causes polyneuritis, of which the symptom-complex known as beriberi is the outstanding example. Among the poor in some parts of the world, especially during periods of food shortage, cases of neuritis mixed with the manifestations of other deficiencies are not infrequently seen.

A diet which does not include sufficient amounts of fruits or vegetables containing the active principle now called the water soluble vitamin "C" is certain to lead to the development of scurvy.

Pellagra is primarily caused by deficiency in some dietry constituent other than the fat soluble vitamin formerly suspected; probably by the lack of certain essential aminoacids, for it appears that by adding fresh beef muscle or milk or buttermilk to the diet the symptoms can be relieved and the disease prevented without any other therapeutic measure or change in diet.

A diet deficient in iodine is now believed to cause simple goiter. Deficiencies in other mineral elements produce effects which are obscured in the general picture of defective nutrition.

Deficiency diseases are of epidemiological interest not only because they as well as infectious diseases affect large numbers of people and can be prevented or controlled by organized public health measures, but also because epidemiologically and clinically they may closely simulate communicable diseases or chronic poisoning.

In the past certain investigators have been confused because the disease under study seemed to have a special geographical distribution and to be limited quite definitely to certain areas within the region of distribution; to have an apparent seasonal prevalence; to attack a large number of people at or about the same time, suggesting infection and a common source of infection, and very often it appeared that one case because of the relationships in the community or household must have come through contact with a previous case. Frequently there was found to be a striking similarity of living conditions and habits among those affected. It is important to remember that all these conditions and circumstances are explainable on the grounds of common deficiency in some essential active principle of the diet as well as by the assumption of communicability.

OUTBREAKS OF COMMUNICABLE DISEASE TRACEABLE TO FOOD

Whenever several or many cases of typhoid fever, dysentery, cholera, diphtheria, scarlet fever, or septic sore throat occur at or about the same time in an institution or in some other population group under such circumstances that a common source of infection could have been responsible, the milk supply of course falls under suspicion, but the possibility that some other food was contaminated must be kept in mind from the beginning of the investigation in order that such evidence as it may be possible to obtain regarding food shall not be lost. The incubation period of the disease in question is one of the first things to be considered, bearing in mind that where the source of infection is milk or some other food in which the microorganisms have had opportunity to multiply, the incubation period may be short as a result of the massive dosage. Without being influenced by preconceived ideas or the opinions of others, and with due precaution against being misled by any apparently obvious cause of the outbreak such as an unsafe water supply, in the case of one of the intestinal group, or apparent opportunity for unusually great exposure to carrier transfer in the case of the respiratory group, the investigator should endeavor, as soon as the epidemiological data have been collected for each case, to sort the persons who have been attacked into a group having as many circumstances in common as possible. With regard to the possibility of infection by food, the first point to determine is whether all of those attacked ate food which came from the same source during the period in which infection could have occurred. The conditions and circumstances relating to the control group should also be investigated. This group comprises the persons who apparently ate the same food (or drank the same milk) under similar circumstances with those attacked. All circumstances should be studied with care to make certain that no important detail is overlooked with regard to such points as the handling of the food by different individuals prior to cooking; whether or not the food was all handled by the same cook; and whether after cooking, or at any time in the case of uncooked food, different dishes or portions were handled by different individuals. Close study is sometimes necessary to avoid missing an unsuspected carrier.

On the other hand, the circumstances are sometimes such as to lead an investigator who does not begin systematically to collect the data to jump to the conclusion that a particular food handler is a carrier, and in concentrating all efforts toward testing that probability to lose valuable time and overlook even such a probable source of infection as milk.

The incubation period of the cases that have occurred should be considered in relation to the dates on which the earliest symptoms appeared in each case to determine if possible whether infection occurred in groups from day to day or at intervals of several days over a considerable period or whether all of the sick were probably or possibly infected the same day.

When food is responsible many persons will be found to have eaten the contaminated food without becoming infected. The attack rate ordinarily varies from 5 to 20 per cent of those exposed.

An attack rate higher than 10 per cent strongly suggests milk rather than some other food. The average incubation period is likely to be shorter where milk is responsible, and usually the prodromal stage of the disease is hastened. Clinically, the cases may be of a severe type, but the tendency is toward mildness because the microorganisms have multiplied in the milk to such an extent that those ingested are subcultures, the descendants several times removed, from the microorganisms which actually came from the clinical case or carrier. The milk supply should of course be traced back to the producing farms in the search for a patient or carrier. Incidentally, evidence should be collected regarding persons other than those in the group attacked who have used milk from the same source. In attempting to differentiate between milk and some other food it is helpful to sort the group in which the outbreak occurred into those who were accustomed to drink milk freely and those who used little or no milk other than in coffee or cooked food, to determine whether the attack rate is higher among the milk drinkers. If only pasteurized milk was used it is not probable that milk was responsible unless contamination occurred after delivery. Nevertheless, the pasteurization process should be investigated. The ice cream question should likewise be studied.

To fix responsibility on some other food it is necessary that the epidemiological data secured from each case shall be complete enough to point to some particular food that was eaten in common by all who were attacked and to exclude all other foods. The fact that all did eat the same food does not necessarily suggest that the food was contaminated. The fact that one patient did not eat any of the suspected food makes it doubtful if that food was responsible. However, coincidence is possible and the patient may have been infected in some other way. When it is found that two or more patients did not eat the suspected food further suspicion is hardly justified in the absence of other evidence pointed to multiple sources of infection. In the case of an explosive outbreak a single source of infection is probable. In many institutions, including naval organizations, it may not be possible entirely to exclude all other sources, but the circumstances will probably make such exclusion reasonably safe. At any rate it is necessary to assume a single common source of infection for the working hypothesis, and even if this can not be tested and ultimately confirmed by laboratory work, as in diphtheria, or positive clinical evidence, as in the case of scarlet fever, the cause of the outbreak may be established beyond reasonable doubt, or at least sufficiently to indicate what preventive measures are required, and when, where, and how they should be applied, which after all is the practical reason for epidemiological study.

So-called food poisoning.—Here we have to consider the cases formerly thought to be ptomaine poisoning and still popularly or thoughtlessly spoken of as ptomaine poisoning. These are, on the one hand, the toxic or infective action of food contaminated with some member of the Bacillus enteritidis—paratyphoid group of microorganisms, and on the other hand a preserved food contaminated with Bacillus botulinus.

With regard also for the work of Jordan and other investigators, the articles by J. C. Geiger, epidemiologist, United States Public Health Service, which have appeared from time to time in Public Health Reports, are freely quoted here, and likewise his article, "The Status of Bacterial Food Poisoning in the United States," which was published in the American Journal of Public Health for April, 1924.

In over 80 per cent of the cases where food poisoning was suspected and diagnosed on suspicion, where it has been possible to reconstruct the histories of the outbreaks or where subsequent autopsies were performed and investigations made, there were indications of other conditions than food poisoning or evidence that the food primarily blamed was not at fault.

Letters from medical officers describing their cases, when asked for an explanation in the case of each Form F card that records food poisoning, seem to indicate that a high percentage of these diagnoses made in the Navy are likewise incorrect. Too often the letters of explanation are altogether unsatisfactory and lead to the inference that the diagnosis was merely based on a guess that food was the cause of the illness. In some cases the failure to present pertinent facts bearing on the case can only leave the impression that the medical officer was either too indifferent to study the case or that he did not know enough about the subject of food poisoning to make an intelligent study of the case.

POISONING DUE TO THE B. ENTERIDITIS—PARATYPHOID GROUP

In the great majority of all instances in which food is responsible for poisoning it is because of contamination with microorganisms belonging to this group. The short incubation period in food poisoning of this type, short duration of symptoms, low case fatality rate, and absence of continued fever and other usual indications of infection, even when the food ingested contains living microorganisms of this group, are suggestive evidence that the symptoms are due to the toxic products of the bacteria. Symptoms also occur with great intensity in the instances where presumably all living microorganisms have been killed in the process of cooking the food.

The members of this group which are of recognized importance are the *Bacillus enteritidis* itself (Gartner bacillus) the *Bacillus aertrycke*, *Bacillus choleræ suis*, otherwise known as *Bacillus suipestifer*, and the paratyphoid bacilli, A and B. *B. aertrycke* was named for a town in Belgium where it was isolated as the causative agent in an outbreak of food poisoning. It has been accepted and included in recent bacteriological classifications as a separate organism, although it may be a strain of *B. suipestifer*.

Rosenau states that these bacilli belong to a group of organisms which has the typhoid bacillus at one end and the colon bacillus at the other, the intermediate forms including *B. psittacosis*, *B. icteroides*, *B. typhimurium*, *B. paracolon*, and others, as well as the above-mentioned bacilli usually concerned in food poisoning cases.

B. proteus has also been reported as a cause of food poisoning. This is doubtful, although these organisms have been isolated in certain infection under circumstances indicating that they were pathogenic.

The toxic products of *B. enteritidis*, *B. aertrycke*, and *B. suipestifer* resist the degree of heat which ordinarily penetrates to the interior of pieces of meat in cooking. According to Geiger it has been demonstrated that the poisonous filterable substances produced by these microorganisms are occasionally thermostabile since they resist boiling at 100° C. for 10-minute periods.

With regard to the time required for the production of toxic products in meat contaminated with these organisms it may be said that the bacilli grow rapidly and a considerable spreading of the growth through the meat may take place in a few hours. It has been determined by *intraperitoneal* inoculation of animals that poisonous filterable substances are rarely produced by the bacilli in broth cultures in as short a period as six hours, but cultures may retain toxicity for as long an incubation period as 10 days. Feeding experiments with presumably toxic filtrates and cultures have invariably been negative, and Geiger states that there are no records of such filterable substances being demonstrated in outbreaks of food poisoning when organisms of the paratyphoid-enteritidis group have been isolated from the food.

According to Park if the bacilli have had an opportunity to multiply freely and produce large amounts of toxin in meat, the meat will cause poisoning even though the bacilli be killed during cooking. However, cooking can not be relied upon to render contaminated meat safe for consumption even though there be no preformed toxin, for unless the cooking be very thorough bacilli may survive in the center of the meat. The bacilli are not any more resistant to heat than the nonspore-bearing pathogenic bacteria in general. That is, they succumb to the pasteurizing temperature, 145° F., in less than 30 minutes and are killed by wet heat at 200° F. in less than one minute.

Although meat, fish, or poultry may be contaminated by a food handler who is a carrier, meat poisoning is usually due to contamination before or shortly after slaughter. One piece of meat may be contaminated by coming in contact with another. The toxins are preserved in frozen meat. The bacilli do not multiply at low temperatures and tend to die out in a few days at 10° F., but they may remain viable for several weeks just as the typhoid bacillus may survive in ice.

With regard to human carriers, Rosenau quotes Bainbridge to the effect that contamination of meat by human carriers of *B. suipestifer* is unknown. That probably includes *B. aertrycke.* Human carriers of *B. enteritidis* are judged to be exceedingly rare. Carriers of *B. paratyphosus B.* are occasionally discovered. Fish and shellfish may of course be contaminated in polluted water. Rats and mice may harbor *B. suipestifer* and *B. enteritidis.* Contamination of food with rat or mouse excrement is more likely than contamination by human carriers, and the fly, ant, or cockroach may act as an intermediary carrying agent. Rosenau points out that there is abundant opportunity for such contamination in the slaughterhouse, in refrigerator plants, in transportation, and in the home.

Flies, cockroaches, and ants must be reckoned with as agents that may carry the bacilli to meat that is kept overnight at warm room temperature in the galley or butcher shop, or to meat that is held over after cooking to be served cold or used for salads, meat pies, hash, etc. It is important to remember that cooked meats and fish require protection as well as uncooked food.

It is important also to note that meat contaminated with microorganisms of this group is unaltered in appearance. These bacilli in their growth do not cause recognizable changes. If there is evidence of spoilage, and as a rule there is not, it is due to the presence of other bacteria.

The danger of poisoning is not limited altogether to animal foods. Rosenau states that of 112 British outbreaks, in 21 the vehicle was a nonflesh food—that is, milk, 1; cream, 1; ice cream, 6; potatoes, 2; pineapple jelly, 1; canned peaches, 1; rice cooked in fat, 1.

In this country the danger seems greatest from beef and veal. Pork has been a not infrequent cause in England, and severe attacks have followed the eating of pork pies. In Washington an extensive outbreak of poisoning was caused by contaminated chicken. It is possible for the toxins to persist in underprocessed canned foods. Geiger says: "In the type of food poisoning due to the paratyphoid group (B. enteritidis-paratyphoid group) always suspect freshly cooked or 'warmed-over' food, especially if there has been some period of incubation." We might add, always suspect this type of poisoning as soon as it appears probable that the food responsible for the attack was ingested only a few hours before the onset of symptoms.

The incubation period may be less than two hours, but as a rule symptoms appear in from two to eight hours after ingestion. Occasionally the onset is delayed for the greater part of 24 hours. This short period is in strong contrast to that in cases of botulism, wherein the symptoms seldom appear until after the lapse of at least 24 hours, the incubation period for the action of a true soluble extracellular toxin.

The clinical manifestations of meat poisoning also differ from those of botulism. In B. enteritidis-paratyphoid poisoning the onset is sudden. There is nausea, vomiting, and abdominal pain, accompanied or quickly followed by prostration and diarrhea. There may be a considerable rise in temperature but many of the cases are afebrile. According to Geiger, the case fatality rate varies from 0 to 1 per cent. Park describes an outbreak of 50 cases with 4 deaths.

In the outbreak which occurred on board the U. S. S. *North Dakota*, October 29, 1921, with more than 200 cases and likewise in a similar outbreak on board the U. S. S. *Idaho*, March 25, 1923, with 295 cases, several of the patients were so much prostrated that death appeared likely. However, all recovered. These outbreaks were described in the Bulletin for August, 1923. Beef hash served for breakfast was the food responsible for poisoning in both instances. In all probability both outbreaks were caused by *B. enteritidis* or some other member of the group, although the causative agent was not isolated in either instance.

The following outbreak is cited by Park as a characteristic example of this type of poisoning:

An apparently healthy calf was slaughtered. Two days later a baker made 160 meat pies. Over 50 persons were made sick. Of these, 4 died. These 4 ate pies that had been kept 10 days or more. *B. enteritidis* was isolated. The bacilli were believed to have multiplied greatly in the meat during the two days' storage at a moderately warm temperature. Symptoms began in from 5 to 14 hours after eating.

The Washington high school outbreak followed a dinner at the McKinley High School given in honor of the cadet corps. About 500 pupils attended. Between 6 and 24 hours after dining, some 300 of the students showed symptoms of acute gastroenteritis—nausea and vomiting, abdominal cramps, diarrhea, and some degree of prostration. In some of the cases there were chills and slight elevation of temperature. The symptoms appeared to vary in severity in direct proportion to the infection; chills and fever were not recorded among those who were but slightly affected as evidenced by mild gastrointestinal symptoms. Creamed chicken was the food responsible for the poisoning. No creamed chicken could be obtained for examination; it had all been served, but samples of the chickens which had been used were obtained. *B. enteritidis* was isolated in pure culture from specimens of the meat of one of the chickens. The chicken was supposed to have been freshly killed, but this could not be substantiated. A member of the faculty under whose supervision the café was operated stated that the chickens appeared to have been in storage, one of them having turned dark in color. Half of the chickens used were cooked on the evening preceding the dinner and kept in a covered container on the stove. The remainder were prepared and cooked during the morning of the day of the dinner. Feces and urine of all workers in the café were examined and proved negative for *B. enteritidis*. No one of them was or had been ill.

Specimens of feces and urine were collected from five of the patients. They were the five whose symptoms were most severe. *B. enteritidis* was isolated from all five specimens of feces and from four of the five samples of urine examined. Urine and feces from these five patients were collected and examined again as soon as all symptoms had disappeared and they were apparently normal again. No one of them appeared to harbor the organism at that time. The duration of symptoms in those most severely affected was from 4 to 8 days. The highest temperature recorded was 100.2° F. about 36 hours after the dinner. This outbreak was studied with unusual thoroughness from the epidemiological standpoint by John A. Noble, bacteriologist, District of Columbia health department, under the direction of W. F. Landon, chief bacteriologist. The statements relating to the outbreak as presented here were taken from the report prepared by Noble.

BOTULISM

According to Geiger, botulism is at present and perhaps always has been a comparatively rare disease in the United States. From the data available he concludes that there have been reported a total of 129 single or group outbreaks in the United States since 1899; a total of 435 people poisoned with 290 deaths, giving a case fatality rate of 67.1 per cent. Of these outbreaks, 45, or approximately one-third, were proved toxicologically and bacteriologically. The average in recent years has been about 15 outbreaks annually. The number of outbreaks occurring in 1922, 21, was the largest number reported in any one year.

The causative agent of botulism is *B. botulinus*, of which two types, A and B, are recognized. Type A is by far the predominating type demonstrable as the cause of poisoning in the United States. Geiger states that type B is exceedingly rare as the cause of the disease in humans. The great number of samples of soil that have been found in recent years to contain *B. botulinus* spores indicate that the spores are widely distributed. They are probably present in the soil in all States in the United States. The spores have been found in the greatest abundance in uncultivated mountain soils and in the least abundance in soils that had been intensively cultivated. Geiger and Benson have demonstrated an intensive distribution in certain localities, particularly in the State of Washington. They were able to demonstrate experimentally that both type A and type B bacilli may exist in the same soil, type A predominating in cultures when vegetables such as corn and string beans were planted together with the soil in the culture medium. The experimental findings, together with the studies of soils, seem to indicate that *B. botulinus* spores were present where the foods that have caused outbreaks of poisoning were grown. The danger that *B. botulinus* spores may get into and survive in preserved food can not be ignored in any State or country, although in the United States most of the commercial foods responsible for poisoning have been put up in western States. The danger is especially great in the case of home canned or glassed vegetables. From February, 1922, until a few weeks ago no outbreaks of botulism traceable to commercially canned food occurred. During the same period there were 26 outbreaks attributable to home canned foods as follows: Canned string beans, 10; canned corn, 6; canned asparagus, 3; canned spinach, 2; home preserved chilli sauce, 1; home canned pimento, 1; home canned beef, 1; home canned figs, 1; and home canned chicken, 1. Recently an outbreak of botulism has been traced to commercially canned ripe olives, the article which has figured so prominently in botulism cases in recent years. These, presumably, were underprocessed and not in accordance with standards recommended by the research laboratory of the National Canners Association.

The name botulism means sausage poisoning, and in outbreaks of poisoning on the Continent of Europe sausages have not infrequently been the contaminated food. Ham preserved in brine has also been the cause of poisoning. Rosenau quotes Savage as stating that not a single outbreak has come to light in England, Scotland, or Wales.

Commercially preserved foods that have been responsible in the United States are: Canned ripe olives, canned asparagus, canned spinach, canned beans, and canned clam juice.

The *Bacillus botulinus* is a spore-bearing facultative anaerobe. The bacillus is not infective for man but produces its characteristic and highly poisonous extra cellular toxin when growing in food under anerobic conditions as in canned foods. Ingestion of spores free from toxin is apparently harmless. The spores of both type A and type B are very resistant to heat. The question of which type is most resistant is not of particular interest here, and it may simply be said that something like six hours' exposure of food to heat at the boiling point of water, 212° F., is required to kill *B. botulinus* spores. In the canning industries the sterilization process with a retort under pressure requires temperatures from 115° to 140° C. (240° to 285° F.) maintained for 20 or 30 minutes to 40 or 50 minutes, depending upon the character of the vegetable and the rapidity with which it permits heat to penetrate to the center of the can. Allowance must also be made for the hydrogen-ion concentration of the product. Selection of only fresh, clean, and sound products for canning is very important, and likewise the maintenance of good sanitation in the canning factory to insure cleanliness at all times and absence of dust, spiders, and cobwebs.

According to Geiger, the epidemiological data of the numerous carefully investigated outbreaks of botulism indicate that the poisoning has always been preceded by the ingestion of toxin containing preserved food. He states that there is every indication that botulism *infection* never occurs in the human being and that the symptoms are due to performed toxins in the food. However, certain experiments indicate the possibility of absorption of the toxin from fresh wounds and mucous surfaces other than the gastrointestinal tract. This is a remote possibility, perhaps, but the danger is sufficiently great to deserve mention. Great care should be taken in handling suspected food and packs. Absorption does not occur on the unbroken skin.

Symptoms of botulism.—In the majority of cases the incubation period is more than 24 hours. Geiger states that the earliest onset in recent outbreaks investigated was 16 hours and the latest 48 hours. In one outbreak the amount of the toxic food consumed was practically the same, yet there was a difference of 24 hours in the onset of the cases.

The attack rate in the case of persons who have eaten food containing the toxin is practically 100 per cent. Geiger explains the occasional apparent escape from poisoning after eating such food as follows: (1) There may have been a greater concentration of toxin in some parts of the preserved food in the container than in others; (2) perhaps only one can of several served was toxic; (3) some individuals may have a little antitoxin immunity—enough to neutralize sufficient toxin to prevent symptoms when only a little of the toxic food is ingested.

The symptoms consist of secretory disturbances and motor paralysis. The former may be evidenced by suppression of the salivary secretion and dry mouth or by excessive mucous secretion. The latter, as a rule, is evidenced by eye symptoms such as ptosis, diplopia, and disturbances of accommodation, difficulty in swallowing, aphonia, and difficulty in breathing. Great muscular weakness is a prominent symptom. There is usually obstinate constipation. The pulse is usually rapid and the temperature subnormal. In fatal cases death results from asphyxia due to respiratory paralysis. There is rarely any pain and consciousness remains unimpaired until the onset of asphyxia.

The disease is highly fatal and a very small quantity of the contaminated food may contain enough toxin to cause a fatal outcome. Edmunds and Long state that all the truly characteristic symptoms can be explained by the peripheral motor paralysis. Increasing weakness in the legs, relaxation of the abdominal wall and early respiratory symptoms due to paralysis of the diaphragm all have the same origin, and the final failure of respiration is due to the failure of the nerve endings in the respiratory muscles. Geiger states that gastrointestinal symptoms are not as rare as is sometimes thought but are delayed much longer than in poisoning caused by the B. enteritidis-paratyphoid group.

Treatment.—Rest and quiet are indicated. Edmunds and Long recommend the careful administration of physostigmin. Early administration of antitoxin is desirable, but the antitoxin even if potent to neutralize the toxin must work under a handicap. Fixation of the toxin by the body tissues occurs early after ingestion of the poisonous food, and the disease usually is not recognized for 48 hours after the food has been consumed. As in the case of tetanus, to save life the antitoxin must be used very early.

Laboratory procedures in cases of suspected botulism.—The suspected food should be tested for the presence of toxin by inoculating mice, guinea pigs, or rabbits. The food should also be cultured for the *B. botulinus*, but to prove absolutely that the food was the cause of poisoning it is of first importance to demonstrate that it contains preformed toxin. Examination of the patient's stools is not worth while. Geiger states that 50 stool specimens of people who had eaten raw vegetables and fruits which had shown the presence of *B. botulinus* proved negative.

The food in cases of suspected botulism.—In the majority of outbreaks of botulism investigated the preserved food responsible for poisoning has been noted to be visibly spoiled. Preserved food that gives any evidence of spoilage should never be used under any circumstances. Sausages and canned goods that are suspicious should never be tested to determine whether they are spoiled. Evidence of spoilage can not be relied upon to indicate danger. On the other hand, fortunately, although the spores are very heat resistant, the toxin is quickly destroyed at the boiling point of water. Therefore, if absolute safety is desired canned goods should be boiled before serving, even if the food is to be served cold.

Studies of canned foods artificially contaminated with *B. botulinus* spores in the research laboratory of the National Canners Association seem to indicate that with toxin formation spoilage is constant in corn, peas, salmon, and pumpkin; irregular in asparagus, beets, ripe olives, spinach, string beans, and evaporated milk, and absent with moderate toxin formation in acid fruits and berries, tomatoes, and sauerkraut.

EPIDEMIOLOGICAL PROCEDURES IN OUTBREAKS OF SUPPOSED FOOD POISONING

The symptoms in a single case may of course suggest food poisoning. However, unless the circumstances are such as to indicate some particular food and the findings concerning it are of definite value, the diagnosis, food poisoning, should not be made without first considering all possible conditions that could have caused the symptoms. Food poisoning is not very common and most diagnoses based as they are merely on a guess that some food was responsible are incorrect. The medical officer should not allow himself to be led into fallacious *post hoc ergo propter hoc* reasoning by the patient's conclusion that it was something he ate that caused his symptoms.

When several or many men report at the sick bay at or about the same time with gastrointestinal symptoms, prostration, disturbances of vision, or manifestations of peripheral nerve involvement, food poisoning at once becomes a probability. One of the first things to do is to send some one to the galley to put a stop on any food left over from the previous meal, so that it will be possible to make such examination of the food as later events may indicate.

If the number of cases appearing during the first hour is large and especially if the number of new arrivals are increasing toward the end of the hour the medical officer is in for an extensive outbreak and steps should be taken to secure the services of at least two other medical officers if they are available, as well as extra hospital corpsmen who should bring their hammocks or blankets with them in case it is necessary to remain overnight. If other medical officers are not available, division officers may be employed to interview the patients and healthy controls to secure the necessary data regarding the foods that each man did and did not eat during each of the meals that may fall under suspicion. The quantity of each article eaten should be ascertained and recorded as much, moderate portion, little, or very little. A suitable questionnaire should be quickly prepared and placed in the hands of each interviewer, to be followed to the letter. Interviewers should be cautioned against suggesting replies to the questions asked and against accepting offhand answers without cross-questioning that will make it fairly probable that the man really remembers what he ate. It is especially important not to make any mistake among the sick. One man with symptoms of poisoning who sticks to it that he did not eat any of a suspected food makes it very doubtful if that food can be held responsible.

The last meal eaten is probably the one responsible for the outbreak, although the other meals served within 24 hours can not be ruled out at this time. If the symptoms suggest botulism it is necessary to look back more than 24 hours. The probability in advance of any evidence is that the outbreak is due to poisoning by some member of the B. enteritidis-paratyphoid group of bacteria, although potato poisoning must be kept in mind and also fish, shellfish, and mushrooms if served.

As a rule, those most severely poisoned will appear first, probably within two or three hours after ingesting the poisonous food. Cases following in close order and in increasing numbers after the first few cases also point to a short incubation period. Conversely, where the onset in the first case is delayed for several hours the other cases are more likely to be scattered and not likely to report in large groups in the early hours.

As soon as practicable the supply officer should go over the menu for the week and verify it with the assistance of the chief commissary steward, cooks, etc.; that is, he should ascertain that all meals were served exactly as the menu called for or note any exception. He should also begin to assemble the evidence relating to the appearance and condition of each food served according to the ideas of all who were concerned in handling and preparing the different foods. As soon as the medical officer can leave the sick bay he should go over this evidence with the supply officer; look at such samples of the food as it has been possible to secure for examination; look into the question of spoilage in the case of all canned foods served; and arrange for the collection of samples for subsequent examination. At the same time he should determine whether any of the galley force or any other man who was engaged in the preparation or serving of the food is sick or has recently been sick with gastro-intestinal symptoms or has a history of typhoid fever (possible carrier of *B. paratyphosus*). Consideration should also be given to the possibility of contamination of the food, especially meat, by cockroaches or rats, while it was hung in the butcher shop to thaw out, or during the night if it was kept overnight in the galley in tubs or pans.

As soon as all required data have been secured from the men with symptoms, those mildly affected, as well as the severely poisoned, and from as many men as possible who ate the various suspected foods without developing any symptoms, an attempt should be made on the basis of the evidence secured to sort those attacked into a group having as many circumstances as possible in common. Then the data should be studied for circumstances that are common to the affected group but not to the various groups of those not affected, if it is not possible, as usually it is not, to place the latter in one group with respect to the conditions and circumstances surrounding the outbreak. No case of poisoning may have occurred in any officers' mess. Mess attendants in the various messes may have escaped. There may have been no case among chief petty officers. There may have been liberty; and if so it is necessary to determine early in the investigation whether the poisoning occurred only among those on board or only among those who were on liberty. The cases that occurred among the crew must be grouped to show whether the cases were scattered throughout the general mess or were limited to some part of the ship or station. In one outbreak on board a transport the cases were limited to one group of messes in which only about a third of the crew were fed. The food for all messes has been prepared and cooked in the ship's galley apparently under identical circumstances. The cause of the outbreak was not traced. Localized distribution of cases makes it necessary to search with great care for circumstances surrounding the handling and serving of the food to the affected messes that did not exist for the other messes.

In all cases of food poisoning an effort should be made to prove the cause by isolating the causative agent. When possible, cultures should always be made to detect *B. enteritidis* or other member of that group if present. Every effort should be made to demonstrate the presence of filterable toxic substances in the suspected food, and samples for that purpose should be sent without unnecessary delay tot he nearest naval hospital laboratory or to the United States Naval Medical School if within reasonable distance. In any event, wherever the circumstances permit, bacteriological examination should be made of the food and of feces and urine specimens from representative cases selected from those showing the most intense symptoms. Samples of the meat or food may be forwarded in sterile tubes, bottles, or jars for examination, with a request specifically stating that a search for microorganisms of the B. enteritidis-paratyphoid group is desired. Specimens of urine may be forwarded in similar manner. It is not practicable to forward feces for bacteriological examination, but if agar culture medium is available, shake cultures may be made in melted agar and the media allowed to solidify at once. This may be forwarded to the laboratory. Endo-media plates are preferable if they can be obtained.

These should be inoculated with suspensions of the food and feces rubbed up in sterile water or salt solution. If a naval hospital can be reached by messenger the opportunity of getting specimens there in time to make satisfactory examinations should not be lost. Stools should be examined as early as possible; negative results will probably be obtained if such examinations are not made within 48 hours after the ingestion of the contaminated food, and it is highly desirable that feces passed during the first 24 hours after the appearance of symptoms be examined. As a matter of fact, living microorganisms may not have been ingested. In the case of meat contaminated at the slaughter house in cutting up the carcass, or meat from infected animals, or meat contaminated by contact with other meat and subsequently refrigerated and held in storage the microorganisms may have died out. And, finally, the microorganisms may have been killed in the cooking process which, however, has not destroyed the more heat resistant toxic products. It is important, therefore, that experimental animals be inoculated with samples of the food if they can be obtained to determine the presence of filterable toxic products.

Testing the sera of affected individuals for agglutinative power against the various members of the food poisoning group is not practical. Navy personnel have been vaccinated with the paratyphoid organisms and group agglutination can not be ruled out. Moreover, the extent to which agglutinin production occurs in food poisoning cases has not yet been satisfactorily determined, and standards indicating the reactions of normal individuals to these organisms have not been worked out.

In isolated instances of suspected food poisoning the Bureau of Medicine and Surgery desires the following information:

1. Name and rate of the affected individual. Character of duty performed at the time the supposed poisoning occurred.

2. What was the suspected food? Where and under what circumstances was it eaten?

3. What other foods were eaten during the period when poisoning could have occurred (within 48 hours for practical purposes)?

4. How long after eating was it before the first indications of illness appeared?

5. Were others made ill at the same time? If so, who?

6. Did any person or persons eat the same food without becoming ill?

7. What was the first indication of illness?

8. Was the onset sudden? Had there been any previous disease or symptoms? Could this attack have been a relapse or recurrence of any disorder? How long had the patient been ill when first seen by the medical officer?

9. How long did the attack continue? Was convalescence repaid?

10. What was the general appearance of the patient? Was there any pain? If so, was it continuous or spasmodic?

11. Was there vomiting? For a short period or continued for a day or more?

12. Was there intestinal colic or abdominal distension?

13. Was there diarrhea? If so, describe.

14. Was any toxicological or bacteriological examination made of the vomitus or stools?

15. Was the urine examined? What were the findings? Was a culture made from the urine?

16. Was there a chill?

17. Was there any fever?

18. Was there headache? Frontal or occipital?

19. Was there general aching or soreness?

20. Was there prostration? Sudden? Marked?

21. Was the mouth dry? Was there excessive salivary secretion? Was there a continued bitter taste?

22. Were there any ocular symptoms—ptosis, blurring, diplopia, disturbances of accommodation? What was the condition of the pupils and pupillary reflexes?

23. Was there alternate flushing and pallor?

24. What was the pulse rate? Was the pulse persistently rapid or slow? Was it regular or intermittent? What was the blood pressure?

25. What was the rate of respirations per minute? What was the character of the breathing?

26. Was a blood count made?

27. What are the ascertainable facts regarding the purchase, condition, storage, handling, preparation, cooking, and serving of the suspected food?

28. If canned goods, did the can appear to be in good condition before opening? How long had the can been opened before the contents were used? Were the contents kept cold? Was the food heated or boiled before it was eaten? Was the food served hot or cold? Was there any evidence of spoilage? Give name of brand and manufacturer.

29. Was any of it fed to experimental animals and if so did it make them sick? What laboratory examination was made of the food?

A DEATH ATTRIBUTED TO POISONING BY LOBSTER (CRAWFISH)

An enlisted man, B. M. 1c., age 42, who gave a history of eating lobster (presumably crawfish) ashore in San Diego, Calif., at about 9 p. m., while on liberty, reported sick at 2 a. m. the following morning, 5 hours after eating the lobster. He complained of slight pains in his chest, and nausea. His temperature was 97.4; pulse, 68; respirations, 24. Nine hours after the suspected meal he was slightly cyanotic. Vomiting and diarrhea were present, and there was some difficulty in breathing. Thirteen hours after ingesting the lobster his pain eased up after vomiting. Twenty-three hours after ingestion his condition seemed better but he was still cyanotic. He rested easily during the night. At 7.20 a. m., about 34 hours after eating the lobster, the attention of the hospital corpsman on special duty with him was attracted by the fact that he was not breathing. He had died while asleep at about that time.

It may well be that the suspected shellfish was the cause of poisoning. If so, it was in all probability because of contamination with some member of the B. enteritidis-paratyphoid group of bacilli. In view of the profound poisoning one would suspect that the food in question had been kept over for several days after contamination occurred, under circumstances that permitted rapid multiplication of the microorganisms. It appears that no effort was made to detect the causative agent by examining the patient's stools or urine or sending specimens to a laboratory for examination. It is not known whether or not the case was reported to the health department of San Diego. That should have been done with a view to securing a proper inspection of the place where the food was served and the institution of preventive measures that might save others from similar hazards.

CASE REPORTED AS FOOD POISONING—CANNED SHRIMP

This case occurred at the marine barracks, Eighth Regiment, United States Marine Corps, Port au Prince, Haiti.

Upon the receipt of the Form F card in the case the medical officer was requested to furnish additional information. He wrote as follows:

"On the afternoon of January 10, 1924, I was called to the barracks about 2.30 p. m. to see the above-mentioned man. At that time he was vomiting incessantly and had had 8 or 9 liquid stools. I sent him immediately to the field hospital where the following facts were noted: Temperature, 96; pulse, rapid and weak—markedly irregular—160 at heart by stethoscope; respiration, 36. Vomiting continuously, at 3.30 p. m. vomitus was flecked with blood; bowels moving constantly with mucoid results. At 5 p. m., man had a rectal hemorrhage of about 4 ounces of blood. He was pallid. Pulse already impossible to count, in fact man was in state of total shock. Shock treatment—morphia, adrenalin, and continuous saline solution by rectum, external heat. At 6 p. m. he passed small amount of blood by rectum. About 6.30 p. m. he began to show some improvement, pulse 128. During night vomited 4 times: vomitus contained no blood.

"January 13, 1924: Put on soft diet: patient is weak.

"January 15, 1924: To mess hall.

"January 17, 1924: To duty.

"The etiological factors ascertained are that the man purchased at the post exchange one can of raw shrimp, and ate, about 12.30. the entire contents of the can. Shortly after, he began to feel sick and took some castor oil himself. The shrimp arrived in Haiti on December 20, 1923. Only one other can was sold. The purchaser used can same day but cooked the shrimp. Examination of the shipment showed no blown cans or other external signs of spoilation but as a precautionary measure the whole shipment was condemned.

"*Conclusion.*—The writer is of the opinion that the condition resulted from some toxic substance in the shrimp, possibly botulism rather than bacterial infection."

Comment.—From the evidence presented it is by no means clear that the can of shrimp had anything to do with the patient's illness. It does not appear that any attempt was made to differentiate between bacillary dysentery and food poisoning or that any other food eaten by the patient was taken into consideration. The writer refers to the suspected food as one can of raw shrimp. In canning, shrimp are processed for a considerable period of time at a temperature above the boiling point of water, so they were not raw. Wet pack shrimp are held at 240° F. for 10 minutes in processing, and dry shrimp at the same temperature for 70 minutes. This was a standard brand and it is not at all probable that any of the cans was seriously underprocessed. If the shrimp were toxic, which is not likely, the toxin to be thought of was that produced by some member of the B. enteritidis-paratyphoid group. These organisms are quickly killed at 212° F. Their toxic products may escape destruction for 10 minutes at the boiling point, but not at 240° F. There is, of course, the bare possibility that the can was underprocessed, but, in general, canned shrimp is one of the safest of canned foods universally used. The incubation period and symptoms in this case do not suggest botulism.

EXAMPLE OF LACK OF KNOWLEDGE REGARDING THE SUBJECT OF FOOD POISONING

About noon on a certain day a patient, 30 years old, complained of pain in the region of his stomach and lower part of the chest, and he vomited what was thought to be food eaten during the previous evening. The pain continued as the day wore on and he took a dose of salts in the evening. During the night he vomited twice and was reported to have had slight diarrhea. The following morning he awoke at 8 a. m. feeling very ill, and stated that he was going to die. In a few minutes he became unconscious, and his breathing became slow. The respiration rate dropped to 5 per minute and he died about two and one-half hours later.

The health record in the case indicates that the patient was seen by several medical officers who decided that his condition was due to ptomaine poisoning. Whether or not any particular food was suspected is not stated. The death report is likewise without value. It reads: "No. 2107, poison, food, acute. Acute attack of ptomaine poisoning involving principally the respiratory centers. Autopsy not considered necessary."

It is difficult to believe that anyone having sufficient knowledge of the subject of food poisoning to make a logical differential diagnosis in a case of suspected poisoning could write a report without giving the reader some idea of the circumstances and conditions contemplated in constructing the premises which led to the conclusion that the illness was caused by food poisoning.

In this case, apparently, the possibility of acute hemorrhagic pancreatitis was not considered.

CONTROL OF VENEREAL DISEASES IN DESTROYER SQUADRONS, BATTLE FLEET

The following instructions regarding exposure to venereal diseases, put into effect by the commander of destroyer squadrons, Battle Fleet, are quoted from the Medical Bulletin for the quarter ending 31 December, 1923, published by the commander of the squadrons:

"It is directed that men be given an opportunity to report exposure, that the hospital corpsman, when on board, be required to administer and record the treatment; during liberty hours, or absence of hospital corpsmen, that the exposed individuals be sent to division guard ship where the treatment be administered by a hospital corpsman, recorded, and report made by name and rate to ship concerned of those treated.

"Ports at which venereal diseases were contracted during the year 1923:

Name of port	Gonorrhea	Chancroid	Syphilis	Days in port
Puget Sound district	49	8	2	46
San Francisco district	36	6	0	13
Los Angeles district	4	1	1	1
San Diego district	66	8	2	221
Panama Canal Zone	38	19	2	33
Mexican ports	6	4	1	3

"The above data have been gathered from the information supplied on venereal questionnaire but do not include all cases of venereal disease developing in the squadrons. It is evident that a large number of cases are not reported by venereal questionnaire and it is therefore directed that every case of venereal disease developing in the squadrons be reported by venereal questionnaire to the commander destroyer squadrons regardless of the port or city in which a venereal disease may be contracted."

EPIDEMIOLOGICAL REPORT OF AN OUTBREAK OF SCARLET FEVER IN MILD FORM AT THE UNITED STATES NAVAL TRAINING STATION, NEWPORT, R. I.

A mild outbreak of scarlet fever occurred on March 12, 1924, among the men of the several organizations quartered in Barracks "B" under conditions which bid fair to be the source of an epidemic of this disease throughout the station. The disease was of unusually mild type with ambulatory and *sine eruptione* cases intermingled with the more or less characteristic cases.

The origin of the infection was by way of liberty parties in Newport, R. I., where scarlet fever has been mildly epidemic for several weeks.

The presence of the disease was first definitely ascertained on March 14, 1924, when a case occurred presenting fever, angina, coated tongue, and typical eruption on the skin. At this time information was received that symptoms of scarlet fever had appeared in three cases at the naval hospital, Newport, R. I., that had been transferred from this station on March 12 and 13, each under the diagnosis of tonsillitis, acute. These cases had shown no definite symptoms of scarlet fever at the time of transfer. A fifth case transferred on March 12, 1914, with the diagnosis, catarrhal fever, acute, presented no rash but subsequently desquamated and infected a hospital corpsman with scarlet fever. The sixth and last definite case of scarlet fever was transferred on March 15, 1924. In addition, three suspected cases were transferred in which no definite symptoms of the disease have developed.

The mild type and the presence of ambulatory cases without eruption complicated the problem of controlling the spread of this disease which had already obtained a foothold in Barracks "B." All organizations in the barracks were contacts, cases having occurred in the thirty-ninth and fortieth companies and in the third battalion.

Preventive measures were instituted on March 14, immediately following recognition of the disease. Barracks "B" and all contacts were placed under quarantine.

The following santitary instructions and regulations were published by the commanding officer:

1. Scarlet fever is a disease accompanied by a *sore throat* and a rash on the body resembling sunburned skin.

2. Scarlet fever occurs principally in the young. The initial symptoms are chill, headache, and vomiting. In mild cases sore throat and rash on the body are the only symptoms. Some cases are so mild that sore throat is the only symptom.

3. The contagion of scarlet fever is present in the secretions of the nose, throat, and respiratory tract and is most virulent during the period of the eruption on the skin.

4. Scarlet fever is less contagious than measles and chicken pox. It is contagious in the same proportion as diphtheria.

5. The disease is transmitted to others in the majority of instances by direct contact. It is less frequently carried by "carriers" and articles that have been infected by a person ill with scarlet fever.

SANITARY REGULATIONS

1. Quarantine all contacts for a period of eight days.

2. Company commanders will be alert and watchful for the presence of men with "sore throat." When found, such men will be sent to the dispensary immediately for examination, regardless of what duty they may be performing at the time.

3. All recruits are to be carefully instructed in the meaning of "droplet-infection" and the means of preventing disease transmitted in this way.

4. Air bedding thoroughly and as frequently as the weather will permit.

5. Sanitary drinking cups in all occupied barracks are to be burned out with gasoline torch every hour daily.

6. Occupied rooms in all barracks are to be thoroughly ventilated at all times.

7. Make certain that the orders directing the sterilization of mess gear are being efficiently carried out.

8. Under the supervision of the medical officer of the day an examination of the throats of all contacts in quarantine will be made morning and night of each day until quarantine is released.

In addition to these regulations the medical officer of the day was directed to inspect all contacts twice daily for the presence of skin eruption.

A total of six cases of scarlet fever occurred. The last definite case occurred on March 15, 1924. The last suspect was isolated March 17, 1924. The quarantine of Barracks "B" was continued for eight days after the removal of the last suspect and was raised on March 26, 1924, there being no further cases of scarlet fever and no suspects. The disease was limited in location to Barracks "B" and did not extend to the personnel in other barracks and buildings.

EXTRACTS FROM THE ANNUAL SANITARY REPORT OF THE U. S. S. "RAPPAHANNOCK" FOR THE YEAR 1923

During the stay at the New York Navy Yard a small epidemic of measles occurred. There were six cases over a period of 35 days. All cases were immediately transferred to the naval hospital as soon as diagnosed. The first case was a man returning from leave. Except in one instance only one contact case developed from each case until the disease disappeared. In most instances the contact case was a man who swung his hammock next to the man who had previously developed the disease. Mess gear did not seem to be a factor in causing spread of the disease as subsequent cases were in nearly every instance from different messes. One case of pneumonia followed a measles infection after the man had been transferred to the hospital. Especial care was given to the sterilization of mess gear at this time. All men reporting to the sick bay were examined for a rash or Koplik's spots. The entire crew was examined at the time the first contact cases reported but no additional cases were found. All were told to report as soon as coryza, fever, headache, or a rash appeared.

Twenty-one scattered cases of influenza were diagnosed from the symptoms and course of the disease. All were mild. There were never enough cases at one time to constitute an epidemic. Tonsillitis cases appeared at intervals, mostly during inclement weather. Spread by contact aboard the ship is not believed to have been a factor in most instances. Two cases of epidemic conjunctivitis reported on the same day. One later developed a keratitis and was transferred to the hospital. This was the third case of serious involvement of the cornea. The other two followed foreign body trauma to the cornea itself. Furunculosis cases were quite frequent but seemed to develop independently. Scabies and ringworm were seen at intervals, but no new cases traceable to those under treatment developed.

The venereal diseases were constantly present. Pamphlets were distributed, posters continually displayed, and lectures were given to the crew in small groups. The provisions of General Order 69 were made known to all. Prophylactic packets were given to all requesting them.

The protargol solution and the calomel ointment were always available for the men returning from liberty. The value of the various preventive measures is not known. Upon arrival at Panama City, after several weeks at Guantanamo without general liberty, the commanding officer gave a talk to the whole crew assembled at quarters. He especially cautioned them as to the dangers of the venereal diseases and the prevalence of those diseases in Panama City, urging all to avoid exposure. No mention was made of the medical prophylatic measures. When the liberty party assembled a few hours later, however, considerably more than half had secured prophylactic packets from the dispensary and others reported for prophylactic treatments on their return after a five-hour liberty ending at 6 p. m. It seems doubtful if the rate of exposure, or intended exposure, would have been greater without the lecture.

Prophylactic packets were not so frequently asked for when the ship was in a port in the United States. It is believed that in such ports visited prostitutes are now relatively hard to find and that men going ashore on liberty therefore seldom definitely expect to meet such women and so do not provide themselves with prophylactic packets. Many men, however, form more or less lasting alliances with immoral women in any port where the ship remains for a considerable period. Such alliances often result in infection with veneral disease, as prophylactic measures are never undertaken or are soon neglected. In spite of all warning such men will not believe that attractive girls may be infected with venereal disease. The prophylactic packet has not been found to be an incentive to exposure except possibly in foreign ports where prostitutes of the lowest type are patronized and the chance of infection comprehended. Under such circumstances the resulting number of the infections are believed to be considerably reduced.

One reinfection with syphilis occurred with a primary sore, secondary rash, and a positive (4 plus) blood reaction. Two relapses were noted after what is usually considered adequate treatment to cure the disease. One man began treatment in the early secondary stage, took 18 injections of neosalvarsan and 36 injections of mercury and had negative blood tests for two years. After the second year a rash developed typical of secondary syphilis and a positive (4 plus) blood reaction was present. The rash showed a typical Herxheimer reaction after the next dose of neosalvarsan and rapidly disappeared.

The other relapse occurred in a negro mess attendant eight months after a course of six salvarsan and six mercury treatments. Soft palpable lymph glands were present and a suspicious sore in his mouth. In this case no yellow syphilitic abstract sheet had been inserted at the naval hospital at Norfolk where the case had been first diagnosed and treated. In several instances the data on the yellow abstract sheets did not correspond with statements made by patients as to the amount of treatment received and Wassermann reactions made.

Of the late manifestations of syphilis one case of locomotor ataxia and one case of cerebrospinal syphilis without symptoms were diagnosed. The latter patient had taken treatment at intervals for about 10 years. But his blood and spinal fluid still showed positive reactions. He had received about 46 injections of neosalvarsan and considerable mercury.

There were three cases with purulent urethral discharge in which no gram negative diplococci could be demonstrated but all showed numerous other types of organisms, especially gram positive bacilli. As two of these were married men who denied extramarital sexual intercourse a diagnosis of gonorrhea was not made in either case. Routine treatment was given and the men were warned as to the possibility of gonorrhea being present. The use of condoms was advised.

Several unusual accidents and injuries of serious nature occurred. One man while asleep fell out of his hammock and sustained a fracture of the neck of the femur. Two men received sprained ankles from stepping on the edges of ditty boxes left on the deck below the hammocks. It seems that the men who are not sufficiently athletic to get easily into a hammock made a practice of placing a ditty box on the deck and using it to step up on.

A chief pharmacist's mate stepped into an open hatch and fell about 30 feet to the steel deck below, being seriously injured. In this case the hatch was unguarded and in an unusual location just inside the door of the pay office and had never been open before. However a man had been detailed to watch the hatch and to warn anyone approaching while other men were removing canvas. The chief pharmachist's mate in his haste failed to understand the warning and pushed the man aside who was stationed there to prevent his entrance.

No serious accidents occurred while handling cargo, but in two instances there were narrow escapes.

In one case a side of beef fell out of a sling striking a man in the hold below. He was only slightly injured. In the other case a section of the heavy portable galvanized iron life rail was brushed overboard and struck a man who was working in a motor sailer alongside. He was fortunately only slightly injured.

Several tips of fingers were badly lacerated by machinery. Two men fell overboard at the New York Navy Yard, one when the ship was getting under way. Both were immediately rescued.

It is difficult to see how any of the accidents could have been anticipated or definitely prevented. The possibility of accidents is constantly being kept in mind and measures that would tend to prevent injuries recommended when apparent.

A permanent rail on the second deck around the hatches to No. 1 and No. 2 holds is to be installed at an early date. There is danger of men falling into these hatches when the hatch boards are off for handling cargo or ventilating the hold. One such instance has occurred. The proximity of the sick bay, laundry, canteen, clothing and small stores room, carpenter shop, athletic locker, armory, mess attendants' lockers, G. S. K., and other storerooms, venereal prophylaxis and treatment rooms, ladders to the main deck, and anchor watch billets necessitate considerable traffic along this deck both day and night. The hatch boards are frequently not in place. A line fastened to temporary stanchions has been put around the hatch as soon as opened, but this is insecure and inadequate.

The posters relating to accident prevention which the bureau has sent out from time to time have been conspicuously displayed. Men have been frequently warned when danger was apparent. The first-aid lectures have included accident-prevention warnings.

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO MARCH, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and March 31, 1924, notifies injuries and poisonings as follows:

	Within command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work or prescribed duty		
Injuries	670	318	172	1, 160
Poisonings	2	11	4	17
Total admissions	672	329	176	1, 177

Of these admissions 85.05 per cent were for injuries or poisonings occurring within the command, and 14.95 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 67.13 per cent were connected with the actual performance of prescribed work or duty, and 32.87 per cent were not so connected. Of the total admissions for injuries and poisonings only 57.09 per cent were connected with the actual performance of work or prescribed duties, i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases are worthy of notice from the standpoint of accident prevention:

Traumatic hematoma of the scrotum.—Caused by stumbling on an unilluminated ladder leading to a darkened sleeping compartment.

Sprained ankle.—Result of missing the last step and falling on stairs which were not lighted.

Lacerated wound of the scalp.—Caused by fall down hatchway. The standing lights were out and there was no "safety device" around the hatch.

Burn of face.—Two cases on the same ship caused by draining gasoline into bilges of power boat which ignited from back-fire when engine was started.

Lacerated wound of hand.—Caused by inadequate protection afforded by safety device installed on a circular saw.

Contusion of back.—Caused by falling through an open ammunition hatch. There was no protection around the hatchway.

Contusion of chest.—The victim stumbled into an unprotected open manhole.

Punctured wound of leg.—Occurred at a naval station. A cartridge exploded when thrown into an incinerator with waste paper. The cartridge had been placed carelessly or maliciously with the waste paper.

Burn of arms.—Result of contact with unprotected steam pipe.

Compound fracture of fingers (crush).—Failure to protect cogs on a lathe.

Sprain of knee.—The injured man fell down an oily ladder while wearing oily shoes. There was no handrail installed.

Fracture of tibia and femur.—Due to fall. The life line had been unrigged to facilitate the loading of stores and insufficient precautions were taken to prevent falls during this time.

Lacerated wound of knee.—Caused by radio propeller blade; lack of safety device reported.

EXPLOSION HAZARDS, STORAGE BATTERIES IN SUBMARINES

The information regarding accident hazards in connection with the liability of storage batteries to produce hydrogen gas under various conditions of operation, as presented in the following letter from the

Secretary of the Navy to the commanders in chief of the United States Fleet and Asiatic Fleet, will be of interest to medical officers:

1. In a period of less than five months there have been three explosions in the main storage batteries of submarines, to wit:

(*a*) 15 October, 1923, U. S. S. *S-37:* Caused by insufficient ventilation. Blowers were operating at but one-half speed when battery was gassing. Three lives lost.

(*b*) 17 January, 1924, U. S. S. *S-19:* Caused by insufficient ventilation. Blowers were operating at one-half speed when battery was gassing. Charging rate was not cut down to the finishing rate prescribed. Readings were recorded at intervals of one hour. Also the board of investigation found that the storage battery record book had not been kept up for a period of about one year.

(*c*) 6 February, 1924, U. S. S. *S-50:* Charging was started with knowledge that a 90-volt ground was present on the after battery. This ground finally developed into a battery fire, necessitating sealing of the compartment. Battery was gassing heavily and being charged at 300 amperes in excess of prescribed rate. After three hours compartment was opened, and in a few minutes blowers were started at slow speed. An explosion followed almost immediately.

2. The Bureau of Engineering's instructions for the operation of the ventilating system during battery charging calls for full suction on all ventilating blowers as soon as the gassing point is reached. They also prescribe that pilot-cell and switch-board readings be taken every half hour until the finishing rate is reached, when readings are to be taken every 15 minutes. All of these instructions were not followed at the time of the battery explosions on the *S-19* and *S-27*.

3. The charging rates to be used during the different stages of the charge for each type of submarine battery are prescribed. They were ignored on the *S-50*. In addition the charge should not have been started until the heavy ground on the after battery had been removed. Furthermore, on the *S-50*, charging at a rate in excess of the prescribed finishing rate generated hydrogen in excessive quantities, which hydrogen remained in the ventilation system while the compartment was sealed. When the compartment was opened a very rich hydrogen mixture was present, which needed only a spark to set it off. Although no specific instructions have been issued by the Bureau of Engineering to cover the handling of a case of this character, it must have been known that hydrogen was present in considerable quantity and that utmost precaution was necessary. Instead of starting blowers a few minutes after opening the compartment, natural ventilation should have been given for a period of at least 24 hours before any electrical machinery in this compartment was used. Battery ventilation blowers on submarines are designed with sufficient capacity to keep the hydrogen mixture at not over 2 per cent. A higher finishing rate than that specified on the charging curve increases the amount of hydrogen given off and therefore increases the possibility of an explosion. A necessary spark to ignite this hydrogen mixture is always present on board submarines coming from either cell connectors, brushes of motors, switches, or other electrical apparatus. It is not possible to make the ventilation of storage batteries absolutely foolproof. The personnel must be thoroughly conversant with the ventilation instructions and safety precaution necessary during the charge.

4. In all boards of investigation on recent explosions, testimony has shown that inexperienced personnel has frequently supervised the battery charging.

5. The direct causes to which the above-mentioned explosions can be attributed are either failure to follow specific instructions issued by a material bureau for the use of the apparatus under its cognizance or to lack of knowledge on the part of the operating personnel.

6. While disciplinary action has been taken by the respective force commanders in the case of two of these explosions, the department does not consider this sufficient to impress upon the entire submarine personnel the absolute necessity for rigid compliance with established instructions in these matters. It is, therefore, directed that immediate steps be taken to insure the required compliance and to maintain proper officer supervision on board submarines at all times when submarine batteries are being charged.

HEALTH OF THE NAVY

This report is for the month of May. The general admission rate, based on admissions for all causes, was somewhat lower than the expected rate. It was 586 per 1,000 per annum. The median rate for May, computed for the last five years, is 609.

Practically summer health conditions now obtain. The incidence of acute respiratory diseases in general was 33 per cent less than in April. Mumps is the only communicable disease that has been especially prevalent in recent weeks, and admissions for that disease decreased about 33 per cent during May. Cases have been about equally distributed among the personnel ashore and forces afloat, and of the cases occurring ashore about half were reported from the United States Naval Training Station, Hampton Roads, Va.

Two cases of smallpox occurred in May; one on board the U. S. S. *Oklahoma* at San Pedro, Calif., and the other on board the U. S. S. *Noa* in the Asiatic Fleet.

Only 15 cases of scarlet fever were reported during the month, a satisfactory figure in view of the rather wide prevalence of scarlet fever in the United States earlier in the spring.

A sharp increase in the admission rate for venereal diseases was commented upon last month. The increase was mainly accounted for by visits of vessels belonging to the Battle Fleet in New York and other ports on the Atlantic coast. The resulting peak in the incidence curve has been followed by somewhat lower rates in recent weeks, but the admission rate for May was 136 per 1,000 per annum, a figure considerably above the five-year median rate for May, 106.

The following table shows rates per 1,000 per annum for the principal communicable diseases, May, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive:

	May, 1919–1923	May, 1924
Cerebrospinal fever	0	0
Diphtheria	1. 17	0. 41
German measles	. 87	1. 83
Influenza	22. 40	15. 25
Malaria	12. 89	4. 88
Measles	3. 58	1. 73
Mumps	13. 66	20. 63
Pneumonia	4. 73	3. 15
Scarlet fever	1. 58	1. 52
Smallpox	. 21	. 20
Tuberculosis	4. 20	3. 56
Typhoid fever	0	. 10

VITAL STATISTICS

The Monthly Health Index, which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the Monthly Health Index.

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$ or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.—E. R. STITT.

TABLE No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of May, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	78, 973	39, 072	118, 045	29, 947
All causes:				
Number of admissions	3, 325	2, 443	5, 768	895
Annual rate per 1,000	505. 24	750. 29	586. 32	555. 45
Disease only:				
Number of admissions	2, 995	2, 227	5, 222	815
Annual rate per 1,000	455. 09	683. 96	530. 82	505. 80
Communicable diseases, exclusive of venereal disease:				
Number of admissions	847	702	1, 549	252
Annual rate per 1,000	148. 70	215. 59	157. 45	156. 39
Venereal disease:				
Number of admissions	1, 030	313	1, 343	169
Annual rate per 1,000	156. 52	96. 13	136. 52	104. 88
Injuries:				
Number of admissions	326	213	539	80
Annual rate per 1,000	49. 54	65. 42	54. 79	49. 65
Poisons:				
Number of admissions	4	3	7	0
Annual rate per 1,000	. 61	. 92	. 71	0

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of May, 1924*

	Forces afloat, Navy and marines (strength, 78,973)		Forces ashore, Navy and marines (strength, 39,072)		Total, Navy and marines (strength, 118,045)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Disease	2,995	455.09	2,227	683.96	5,222	530.82
Injuries	326	49.54	213	65.42	539	54.79
Poisons	4	.61	3	.92	7	.71
Total admissions	3,325	505.24	2,443	750.29	5,768	586.32
Class II:						
Varicocele	11	1.67	11	3.38	22	2.24
Class III:						
Appendicitis, acute	54	8.21	38	11.67	92	9.35
Autointoxication, intestinal	4	.61	9	2.76	13	1.32
Cholangitis, acute	24	3.65	9	2.76	33	3.35
Colitis, acute	2	.30	1	.31	3	.30
Cholecystitis, acute	1	.15	4	1.23	5	.51
Constipation	12	1.82	12	3.69	24	2.44
Enteritis, acute	25	3.80	26	7.99	51	5.18
Gastritis, acute catarrhal	13	1.98	12	3.69	25	2.54
Gastroenteritis	35	5.31	20	6.14	55	5.59
Hemorrhoids	12	1.82	21	6.45	33	3.35
Ulcer, duodenum	2	.30	2	.61	4	.41
Ulcer, mouth	1	.15	0	0	1	.10
Ulcer, stomach	2	.30	1	.31	3	.30
Total	187	28.41	155	47.60	342	34.76
Class V:						
Laryngitis, acute	4	.61	6	1.84	10	1.02
Pharyngitis, acute	12	1.82	25	7.68	37	3.76
Rhinitis, acute	3	.46	2	.61	5	.51
Total	19	2\89	33	10.13	52	5.29
Class VIII (A):						
Cerebrospinal fever	0	0	2	.61	0	0
Chicken pox	9	1.37	11	3.38	20	2.03
Diphtheria	0	0	4	1.23	4	.41
German measles	10	1.52	8	2.46	18	1.83
Influenza	90	13.68	60	18.43	150	15.25
Measles	9	1.37	8	2.46	17	1.73
Mumps	119	18.08	84	25.80	203	20.63
Pneumonia, broncho	6	.91	5	1.54	11	1.12
Pneumonia, lobar	12	1.82	8	2.46	20	2.03
Scarlet fever	5	.76	10	3.07	15	1.52
Smallpox	2	.30	0	0	2	.20
Total	262	39.81	200	61.42	462	46.96
Class VIII (B):						
Angina Vincent's	19	2.89	38	11.67	57	5.79
Bronchitis, acute	180	27.35	114	35.01	294	29.89
Catarrhal fever	54	8.21	68	20.88	122	12.40
Tonsillitis, acute	273	41.48	213	65.42	486	49.40
Total	526	79.93	433	132.98	959	97.48
Class IX:						
Dysentery, bacillary	1	.15	2	.61	3	.30
Dysentery, entamebic	2	.30	1	.31	3	.30
Typhoid fever	1	.15	0	0	1	.10
Total	4	.60	3	.92	7	.71
Class X:						
Dengue	21	3.19	14	4.30	35	3.56
Malaria	16	2.43	32	9.83	48	4.88
Pappataci fever	3	.46	0	0	3	.30
Total	40	6.08	46	14.13	86	8.74
Class XI:						
Tuberculosis, all forms	15	2.28	20	6.14	35	3.56

TABLE No. 2.—*Number of admissions reported by Form F cards, etc.*—Contd.

	Forces afloat, Navy and marines (strength, 78,973)		Forces ashore, Navy and marines (strength, 39,072)		Total, Navy and marines (strength, 118,045)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class XII:						
Chancroid	331	50.30	86	26.41	417	42.39
Gonococcus infection	573	87.07	169	51.90	742	75.42
Syphilis	126	19.15	58	17.81	184	18.70
Total	1,030	156.52	313	96.13	1,343	136.52
Class XVIII:						
Pleurisy, acute fibrinous	4	.60	6	1.84	10	1.02
Class XX:						
Hernia	26	3.95	29	8.91	55	5.59

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for April, 1924, and from various shore stations for the four-week period, May 4 1924, to May 31, 1924*

	Annual rate per 1,000 April, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	193.14	1285.71	0	193.49	1255.81
Battleship division:						
Battle Fleet	42.92	161.67	411.38	57.88	134.46	348.56
Scouting Fleet	36.78	205.73	348.36	90.57	173.43	192.93
Asiatic Fleet [1]	0	324.32	1107.69	80.00	395.73	565.66
Light cruiser divisions—						
Scouting Fleet	0	223.92	911.70	39.47	223.92	582.73
Destroyer squadrons—						
Battle Fleet	0	237.97	857.14	0	167.35	355.92
Scouting Fleet	0	119.46	400.00	0	212.65	535.71
Asiatic Fleet [1]	0	277.51	1285.71	73.17	328.02	1255.81
Miscellaneous:[2]						
Battle Fleet	0	239.34	852.07	27.46	213.06	359.55
Scouting Fleet	0	167.66	658.25	0	213.58	564.70
Asiatic Fleet [1]	0	183.21	521.74	0	331.13	359.22
Naval forces, Europe	0	245.61	571.43	83.92	224.66	724.64
Special service Squadron (based on Panama)	302.84	373.70	497.24	186.87	219.09	337.79
Naval transportation service	0	178.41	550.46	43.16	180.40	341.05
Special duty	0	69.99	269.66	0	181.51	285.43
Miscellaneous and district vessels	0	52.10	800.00	30.00	155.58	491.80

	Annual rate per 1,000 May 4 to 31, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	49.67	191.18	0	60.98	213.86
First naval district	0	32.78	57.40	27.43	40.76	103.65
Third naval district	0	50.72	117.01	14.08	41.70	68.54
Fourth naval district	20.16	20.32	20.51	22.42	45.37	67.04
Fifth naval district	0	57.63	191.18	0	70.15	126.66
Sixth naval district	34.05	49.15	188.40	49.77	65.68	213.86
Seventh naval district	0	0	0	0	0	0
Eighth naval district	0	83.07	95.35	19.83	50.68	55.19
Ninth naval district	88.37	88.37	88.37	82.59	82.59	82.59
Eleventh naval district	8.02	44.14	121.27	37.60	61.79	82.22
Twelfth naval district	0	23.45	30.68	36.29	57.69	110.38
Thirteenth naval district	0	54.17	108.79	48.05	94.39	198.62

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for April, 1924, and from various shore stations for the four-week period, May 4, 1924, to May 31, 1924*—Continued

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASES

	Per cent April, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	51.78	9.21	61.28	7.73
Battleship divisions—				
Battle Fleet	54.15	13.66	71.25	11.47
Scouting Fleet	61.94	3.73	72.54	4.03
Asiatic Fleet [1]	43.86	21.05	47.65	15.29
Light cruiser division—				
Scouting Fleet	44.64	7.14	44.64	7.14
Destroyer squadrons—				
Battle Fleet	49.56	7.83	61.46	5.73
Scouting Fleet	49.06	5.66	58.28	3.18
Asiatic Fleet [1]	65.52	10.34	63.11	8.25
Miscellaneous—[2]				
Battle Fleet	35.90	9.40	56.31	6.82
Scouting Fleet	46.07	3.37	57.02	4.75
Asiatic Fleet [1]	18.18	9.09	38.73	8.45
Naval forces, Europe	48.57	17.14	49.25	7.96
Special service squadron (based on Panama)	70.37	5.55	70.30	5.94
Naval transportation service	65.04	8.69	59.49	8.72
Special duty	75.00	10.00	67.17	8.68
Miscellaneous and district vessels	0	0	48.39	3.22

	Per cent May 4 to 31, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All naval districts in the United States	73.08	10.58	74.62	11.34
First naval district	77.78	0	88.33	3.33
Third naval district	80.00	10.00	82.22	15.56
Fourth naval district	100.00	0	84.00	16.00
Fifth naval district	60.47	16.28	67.16	12.69
Sixth naval district	63.33	0	80.70	3.51
Seventh naval district	0	0	0	0
Eighth naval district	66.67	33.33	70.00	15.00
Ninth naval district	88.89	11.11	77.27	18.18
Eleventh naval district	80.00	0	74.32	8.11
Twelfth naval district	100.00	0	78.95	7.90
Thirteenth naval district	100.00	0	76.92	17.95

[1] Month of March, 1924.
[2] Vessels of train, base, air squadrons, etc.

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the four-week period, May 4–31, 1924, inclusive*

	Navy (strength, 97,098)		Marine Corps (strength, 20,947)		Total (strength, 118,045)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of blood	3	0.40	1	0.62	4	0.44
Diseases of circulatory system	38	5.09	13	8.07	51	5.62
Diseases of digestive system	296	39.63	61	37.86	357	39.31
Diseases of ductless glands and spleen	4	.54	1	.62	5	.55
Diseases of ear	327	43.78	67	41.58	394	43.39
Diseases of eye and adnexa	64	8.57	24	14.89	88	9.69
Diseases of genito-urinary system (nonvenereal)	93	12.45	18	11.12	111	12.22
Communicable diseases transmissible by oral and nasal discharges (A)	361	48.33	46	28.55	407	44.82
Communicable diseases transmissible by oral and nasal discharges (B)	690	92.38	162	100.54	852	93.82
Communicable diseases transmissible by intestinal discharges	3	.40	3	1.86	6	.66
Communicable diseases transmissible by insects and other arthropods	32	4.28	36	22.34	68	7.49
Tuberculosis (all forms)	21	2.81	5	3.10	26	2.86
Venereal disease	993	132.94	169	104.88	1,162	127.96
Other diseases of infective type	253	33.87	70	43.44	323	35.57
Diseases of lymphatic system	64	8.57	9	5.59	73	8.04
Diseases of mind	26	3.48	9	5.59	35	3.85
Diseases of motor system	88	11.78	32	19.86	120	13.21
Diseases of nervous system	22	2.95	5	3.10	27	2.97
Diseases of respiratory system	51	6.83	5	3.10	56	6.17
Diseases of skin, hair, and nails	71	9.51	26	16.14	97	10.68
Hernia	43	5.76	8	4.96	51	5.62
Miscellaneous diseases and conditions	112	14.99	26	16.14	138	15.20
Parasites (fungi and certain animal parasites)	62	8.30	14	8.69	76	8.37
Tumors	14	1.87	1	.62	15	1.65
Injuries	382	51.14	80	49.65	462	50.88
Poisons	6	.80			6	.66
Dental diseases and conditions	21	2.81	4	2.48	25	2.75
Total	4,140	554.26	895	555.45	5,035	554.45

TABLE No. 5.—*Deaths reported, entire Navy, for the four-week period, May 3–31, 1924, inclusive*

	Navy (strength, 97,098)	Marine Corps (strength, 20,947)	Total (strength, 118,045)
Pneumonia, broncho	1	0	1
Pneumonia, lobar	2	0	2
Syphilis	1	1	2
Tonsillitis, acute	1	1	2
Malignant growths	1	0	1
Other diseases	10	2	12
Drowning	2	1	3
Other accidents and injuries	8	2	10
Total	26	7	33
Annual death rate per 1,000, all causes	3.48	4.34	3.63
Annual death rate per 1,000, disease only	2.14	2.48	2.20

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NAVY DEPARTMENT

DIVISION OF PLANNING AND PUBLICATIONS

CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY

IN CHARGE

EDITED BY

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

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NAVY DEPARTMENT,
Washington, March 20, 1907.

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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

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Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
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PREFACE

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

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

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

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of conspicuous merit and will recommend that copies of such letters be made a part of the official record of the officers concerned.

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

E. R. Stitt.
Surgeon General United States Navy.

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

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

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U. S. NAVAL MEDICAL BULLETIN

VOL. XXI AUGUST, 1924 No. 2

SPECIAL ARTICLES

NEUROSYPHILIS

By T. W. RAISON, Lieutenant Commander, Medical Corps, United States Navy

It is believed generally by physicians that a negative blood Wassermann, or a series of negative blood Wassermann reactions, following an intensive course of treatment is presumptive evidence of an arrest, or cure, if this word may be used, of the disease process in the primary stage and the secondary stage, and to a less degree, in the tertiary stage of syphilis.

In the Navy the problem of dealing with syphilis is slightly different from that met with in civil life. While in the Navy the man who is known to have syphilitic infection receives rather intensive treatment, and careful records are kept of his case, and the response to treatment as shown by serological examination and clinical symptoms, the neurological examination does not receive the same attention, and the incidence or percentage of neurosyphilis is unknown. The large majority of the cases of syphilis in the Navy do not complete sufficient time in the service to develop clinical symptoms showing involvement of the central nervous system. Therefore little neurosyphilis is seen, comparatively, in the service. In civil life, in the vast majority of cases, treatment is not as intensive, and as good diagnostic facilities are not available as in the service, but the patient is under observation for a longer period and clinical symptoms of neurosyphilis develop. Therefore neurosyphilis seems to be observed relatively, more frequently in civil life. This fact was forcibly brought to my attention while attending a course in neurosyphilis in one of the large hospitals in New York. Many cases presented themselves for diagnosis and treatment showing positive neurological symptoms of syphilitic infection of the central nervous system who had been discharged from either the Army or Navy with negative blood Wassermann at time of discharge. Some of these cases had had negative blood Wassermann reactions made at regular intervals since their discharge; some had received subsequent treatment; all showed positive evidence of syphilitic infection of the central nervous system. By this statement it is not meant to infer that all cases of syphilis treated in the service will later show involvement of the nervous system; probably not more than 10 to 15 per cent do show such symptoms later. Asymptomatic cases, until they become symptomatic, do not present themselves for examination or treatment. It is desired to point out that many cases of syphilis who do not show gross evidence of neurosyphilis and are asymptomatic at time of discharge from the service will later become symptomatic.

The report of the incidence of venereal disease, as reported in the U. S. NAVAL MEDICAL BULLETIN for the months of July, August, and September, 1923, was as follows:

Number of admissions reported by Form F cards for certain diseases

Month	Total complement	Chancroid	Gonorrhea	Syphilis
July	113, 799	261	757	65
August	114, 938	167	496	29
September	116, 250	266	599	116
Average per month	114, 996	231	614	70

It is reasonable to suppose that the majority of cases of syphilis in the service are in the late primary or early secondary when diagnosed. While in the hospitals, an early diagnosis of primary syphilis is possible by dark-field method of examination and staining methods; however, a large percentage of cases are contracted where these methods are not available; therefore the diagnosis is usually made in the secondary stage. It is well known, furthermore, that many cases of chancroid turn out to be mixed infection; therefore the number of cases of syphilis is probably greater than the reports indicate. However, accepting the figure quoted, as the average incidence, it is evident that 840 cases of syphilis occur per year if the average incidence of infection is maintained.

Moore (1) states that early primary and secondary syphilis will show from 30 to 50 per cent of abnormalities in the spinal fluid and that clinical neurosyphilis is untreated or badly treated cases is generally considered to be about 25 per cent, while in treated cases 12.7 per cent showed abnormalities in the spinal fluid. After the appearance of secondary symptoms, abnormal findings in spinal fluid were the same, 12 to 15 per cent, no matter how long the disease had existed, or by what lesions it was apparent. Nicolau (2) in 51 cases of absolutely primary syphilis found that 18, or over 35 per cent, showed abnormalities in spinal fluid. Wile and Halsey (3) found abnormalities in spinal fluid in 22 per cent of primary cases of syphilis. Fordyce (4) estimates 20 per cent of syphilitics develop involvment of the central nervous system. Keidel (5) states that the central nervous system is invaded in from 25 to 35 per cent of cases of syphilis.

Major Vedder, as quoted by Fordyce (6), estimates that among the recruits of the Army, 17 per cent are syphilitic when they enter the service; 16 per cent of the white enlisted men in the Army are infected and 36 per cent of the colored enlisted men have syphilitic infection. The enlisted personnel of the Navy do not show such a high percentage among the recruits; as a rule the recruits are younger at the time of enlistment. However, there is undoubtedly a certain percentage that have syphilitic infection when recruited, and which are asymptomatic at time of enlistment.

Referring to the average admission per month on account of syphilis, if we accept the percentage of the different investigators as quoted in the foregoing paragraphs, as 20 per cent, at least 170 cases per year of neurosyphilis in the service can be prognosticated.

It is agreed, by all authorities, that the prognosis is almost hopeless after advanced clinical symptoms of neurosyphilis have developed, and the importance of early diagnosis and treatment can not be too greatly insisted upon. This is the foundation of the theme of this article.

Simpson (6) gives the following excellent description of the course of infection in syphilis: The period from infection to the chancre is about three weeks, limit 10 days to 70 days, primary incubation period. Following the appearance of the chancre and of course before its appearance, syphilis spreads along two routes, the lymphatic vessels and the blood stream, the duration of this period of secondary incubation is about six weeks, with limits of 24 to 204 days. Traveling the way of the lymph channels, the spirochetes produce the generalized lymph adenopathy and sore throat. Infecting the blood stream, the positive Wassermann reaction appears, and anaemia occurs, rheumatoid pains, malaise and fever. The secondary eruptions now appear, these are widespread involving the skin from the crown to the soles. The so-called secondary stage lasts perhaps a year and has no sharp and definite end. Various structures may be invaded, hair, nails, ears. Syphilis becomes diluted with time and sooner or later a latent period ensues. A tertiary stage may develop at an indefinite period after this. It is characterized chiefly by gummas which may appear in the skin or viscera. Tertiary eruptions are localized, contrasting with secondary eruptions which are generalized. Quaternary syphilis may appear later, consisting mainly of tabes and paresis.

The above description is a succinct account of the general course of syphilitic infection, but it should be noted how little description is given to the involvment of the central nervous system and the paucity and late development of the clinical symptoms of such involvement, for this is what really occurs. Neurosyphilis is exceedingly insidious in its onset, and the early subjective clinical symptoms are so slight that few patients consult their physician for neurological symptoms in the early stage. Persistent night headache, nervousness, lassitude, generalized neuralgic pains, slight pupillary abnormalities, slight auditory-vestibular disturbances, transient vertigo, slight deafness for low tones, indigestion, bladder weakness, obstinate constipation, loss of sphincteric control after taking a cathartic, any of these symptoms are indicative of early involvment in neurosyphilis, but too often are ascribed by the patient to some casual cause. Then, too, a very considerable degree of involvment of the central nervous system may be present in neurosyphilis in the latent stage without showing any clinical symptoms.

There has been little opportunity to study the course of syphilitic infection in man prior to the appearance of the chancre, and it is to animal study that we must turn to learn analagous pathology during this period. Brown and Pearce (7), from their investigation of clinical types of syphilis in the rabbit, have shown conclusively that the organisms may be recovered from the regional lymph glands or blood stream as early as 48 hours after experimental inoculation, and may be present for an indefinite period up to and including the first signs of infection.

As the central nervous system is, in all probability, exclusively invaded from the blood stream, and as it is impossible to conceive of a general blood stream infection without involvment of the central nervous system, it is evident that such infection does take place within a few hours after primary inoculation.

That infection of the central nervous system does take place at an early date in the infection is shown by the researches of Cornaz (8), who found on lumbar puncture in 76 cases of primary syphilis, with chancres but no secondary manifestations, and who were punctured before beginning treatment, that 68 per cent showed a positive blood Wassermann, 43 per cent showed lymphocytosis in the spinal fluid, 1.6 per cent showed a positive spinal Wassermann. Wile and Halsey (3) in 221 cases of syphilis in which only the chancre was present, found diversion from the normal in the cerebrospinal fluid in 49 cases or 22 per cent. Read in 1915, as reported by Gray (21), found only two weeks after the appearance of a chancre, which appeared 23 days after exposure, that the cerebrospinal fluid was markedly pathologic.

The cerebrospinal fluid reacts to all processes that affect the central nervous system, whether that process be infectious or toxic or mechanical. Undoubtedly all cases showing abnormal findings in the cerebrospinal fluid do not later develop neurosyphilis. Fordyce estimates that 20 per cent of all syphilitics develop neurosyphilis.

Therefore, the vast majority of cases must be able to deal with their infection and escape permanent damage to the central nervous system. The ultimate damage that syphilis causes must be sought in the autopsy room. Symmers (6) reported 4,809 necropsies performed in Bellevue Hospital during 10 years. Of this number 6.5 per cent had effects definitely attributable to syphilis. In 55.7 per cent the blood vessels bore the brunt of the infection, with disease in the liver in 37 per cent, in the nervous system in 35.6. This would indicate that 35.6 per cent of syphilitic infection involves the nervous system, as determined by necropsy, in cases showing syphilitic infection at time of death.

Wile and Marshall (9) show that the central nervous system, if uninvolved during the first months of infection, is seldom invaded later, such an event occurred in only three of several thousand cases punctured. Therefore the value of an early diagnosis and prompt treatment can not be too forcibly insisted upon.

Accepting the fact that the earliest signs of infection of the central nervous system occur in the cerebrospinal fluid, syphilitic involvement of the central nervous system is characterized by the following abnormalities:

1. Increase in globulin and serum albumen.
2. Pleocytosis.
3. Positive Wassermann reaction.
4. Changes in colloidal gold curve.
5. Increase in pressure.

No one of these abnormalities singly can be regarded as pathognomonic, any one may be present or absent without proving or disproving the presence or absence of syphilitic infection of the central nervous system. Collectively, they are as indicative, and give as much aid in diagnosis as any laboratory procedure yet devised. They are considered to be of such importance as to merit a discussion of the relative merits of each in the diagnosis of neurosyphilis.

Increase in Globulin and Albumen.—Increase in globulin and albumen is one of the earliest abnormalities found in neurosyphilis. It occurred in 25 out of 49 cases examined showing diversion from normal in primary syphilis, in which only the chancre was present as reported by Wile and Halsey (3). Normally the protein in the cerebrospinal fluid is very small. According to Levinson (9), it amounts to 0.18 grams per 1,000 cubic centimeters of spinal fluid. This is not sufficient to cause any reaction with the Pandy test or give a Nonne Phase I reaction.

As a result of any irritation to the meninges from infection or irritation, either toxic or mechanical, there is an increase in the amount of protein present in the spinal fluid. In syphilis the ratio of globulin to serum albumen is altered. An increase in globulin in the spinal fluid is therefore simply an indication of meningeal irritation.

Pleocytosis.—This is considered by many investigators to be the first positive indication of neurosyphilis. Jelliffe and White (11) state that Nonne's reaction disclosing the presence of globulin is, so to speak, always negative at the beginning of luetic infection. The presence of lymphocytes almost invariably speaks for the beginning of neurosyphilis. McIver (12) also states that increase in protein does not appear as early as the increase in lymphocytes in neurosyphilis. Dind (10) in 1914 found in 35 per cent of cases of chancre the number of cells in the spinal fluid was increased before cutaneous or mucous membrane lesions were present, or could be demonstrated. Nicolau (2) in 51 cases of absolutely primary syphilis found lymphocytosis in the spinal fluid in 18 cases. In the paper quoted, this author states that the lymphocytosis makes its appearance in the beginning of the third week; it therefore constitutes next to adenopathy the earliest manifestation of a general infection.

According to Levinson, the normal cerebrospinal fluid contains 4 to 6 cells per cubic millimeter. Cornaz set 9 cells per cubic millimeter as the upper limit of normality. The type of cells found are the small round, or slightly oval lymphocytes, nucleus never irregular, occasionally, but very rarely, a large lymphocyte.

As a result of any infection, or irritation, of the meninges the number of cells in the cerebrospinal fluid is increased; and conversely an increase in the number of cells in the cerebrospinal fluid indicates meningeal involvement or irritation. The number of cells per cubic millimeter and their type vary with the causative organism and acuteness of the process. In acute processes, polynuclear cells predominate; in chronic processes, small lymphocytes are found and tend to displace other types of cells. Large lymphocytes are very rarely found in normal cerebrospinal fluid and their presence is indicative of paresis or tabo-paresis. The number of cells found vary from an increase scarcely above normal to a thousand or more per cubic millimeter. There seems to be a definite relation between the activity of the process and the number of cells present. The cells are derived from the convexity blood vessels. As syphilis is primarily a mesodermal, or vascular, infection, in early neurosyphilis, the endothelial lining of the vessels is attacked and results in a periarteritis, giving rise to round cell infiltrations, and consequently an increase in the small lymphocytes found in the cerebrospinal fluid; later syphilis may become a parenchymatous process and gives rise to plasma cells.

Lymphocytosis, per se, is an indication of meningeal infection or irritation; it neither proves nor disproves the presence or absence of syphilis of the central nervous system.

The Wassermann Reaction.—The Bordet-Gengou, or as commonly known, the Wassermann reaction, when first applied to diagnosis, was believed to be specific; this is now known to be erroneous. However, to the majority of patients, it is still regarded as specific; that is, if the Wassermann reaction is negative, to the patient, and too often to the physician, this precludes the presence of active syphilitic infection. The exact nature of the Wassermann reaction has never been determined, therefore this reaction is founded on empiricism, and a definition can only be approximated.

McCallum (14), in discussing immunity in syphilis, gives a very clear definition of the nature of this reaction, and is quoted verbatim:

> It may be gathered from what has been said that immunity in syphilis is by no means so definite as in such diseases as smallpox or yellow fever, but that while there is relative insusceptibility, a new infection is possible in any stage. Evidences of the changed reaction of the body are made clear in various ways, however, and become useful in making a diagnosis. Thus the so-called Wassermann reaction depends upon the fact that the complement necessary for taking a sample of red corpuscles, in a mixture of hemolytic amboceptor and corpuscles, is found to have been used up if it is first treated with a mixture of syphilitic serum and a lipoid antigen, represented by an extract of a known syphilitic organ, or even an alcoholic extract of a normal heart, whereas when treated with normal serum and this antigen none of the complement is absorbed and hemolysis proceeds. This method of deviation of complement is obviously a purely empirical discovery, although it seemed at first, when extract of known syphilitic organs were used as an antigen, to be a very purposeful demonstration of a specific relation. Its real nature is to be determined, but it seems to indicate syphilitic infection very accurately.

Strickler (15) shows that the Wassermann reaction is not a specific one as it probably does not detect the true spirochete antibody but a lipoid reactionary substance elaborated by the body cells in the presence of spirochetes. Experiments by Noguchi show that the extract of *Treponema pallida*, which should be the best antigen, is in reality likely to be the poorest for the detection of the syphilitic antibody.

The most delicate antigen is an alcoholic extract of a normal organ, the heart, taken from another species of the animal kingdom, which, unless Abrams' views are accepted, is not subject to infection with syphilis. This antigen is further fortified with cholestrin, a monohydric alcohol, found in all animal cell protoplasm, but most abundant in nerve tissue.

Warthin showed spirochetes in some of the organs of individuals who had had lues, and had been pronounced cured because of a negative Wassermann reaction.

McDaniel (16) reviewed a series of 100 cases of syphilis, all in the secondary stage of syphilis on admission. All cases had received not less than one course of treatment, some as many as four courses of treatment, and all of whom had had four successive negative blood

Wassermann reactions. Spinal fluid in 16 cases gave a positive Wassermann reaction; 4 had a moderate pleocytosis and increased globulin; 12 showed definite evidence of syphilis of the nervous system; 4 were asymptomatic. Of the 16 cases, with positive spinal Wassermann, 9 had received one course of treatment, 5 had had two courses, 1 three courses, 1 four courses. Eight were in men; eight, in women.

Solomon and Klauder (17) found that the spinal fluid may be negative in cases of active syphilis of the central nervous system with clinical symptoms. The clinical types, of meningeal origin, in which the spinal fluid is often negative are: Vascular syphilis with thrombosis, cerebral hemorrhage, aneurysm, or arteritis obliterans of parenchymatous origin, tabes, cerebral gumma, cranial paralysis, Erb's spastic paraplegia, syphilitic epilepsy and syphilitic dementia. The Wassermann reaction in the blood may be either positive or negative. In a previous study of 28 autopsies, Solomon showed that colloidal gold test varied in fluid taken from different parts of the brain. Further experience has shown that this applies to the other tests, globulin content, cell count, and Wassermann reaction. In general paresis the fluid from the ventricles may be negative and the lumbar fluid positive.

Numerous investigators have reported cases of neurosyphilis with clinical symptoms in which the blood Wassermann was negative and the spinal fluid positive and vice versa.

Klauder and Kolmer (18) from their experiments, believe that the complement fixing antibody in spinal fluid is of dual origin, neural as well as hematogenous, while the Wassermann body in transudates and exudates is derived from blood plasma. The view of the hematogenous origin is substantiated by the following clinical and laboratory observations in experiments conducted by Kolmer and Sekiguchi. A positive Wassermann was obtained with the spinal fluid of dogs after injecting the animals with human syphilitic serum which yielded a four plus reaction.

For the purpose of studying the question of local formation of the complement fixing antibody, the same authors performed the test on the surface fluid from a number of chancres, and on the saline extract of syphilitic nodules removed from syphilized rabbit testicle. The test performed with chancre fluid yielded almost uniformly a four plus reaction. In some instances positive results were obtained before the test appeared positive in the blood, which apparently would preclude the possibility of the positive reaction in the chancre fluid being due to admixed blood. Positive Wassermann tests were obtained with fluid obtained directly from mucous patches.

An analysis of the above experiments would indicate that the choroid plexus, under certain conditions, may pass syphilitic antibody although not infected itself. This may be one of the explanations of positive findings in the spinal fluid in a number of cases in primary and secondary stages of syphilis, which do not later develop neurosyphilis. If the Wassermann antibody is formed at the site of infection, it is evident that it might reach sufficient concentration in the spinal fluid to give a positive reaction in cases of syphilitic involvement of the central nervous system and not have sufficient concentration in the blood to yield a positive reaction, owing to the enormous dilution by the blood serum of the small amount excreted from the cerebrospinal fluid.

Noguchi, as quoted by Stitt (19), gives the following figures as indicating the percentage of positive Wassermann reactions in different stages of syphilis, as determined by various serologists in different parts of the world: Primary stage 69.8 (extremes 38.6 to 98); secondary stage 89.4 (extremes 79.1 to 100); tertiary stage 78.1 (extremes 57.4 to 100); hereditary syphilis 94.5 (extremes 87.5 to 100); cerebrospinal syphilis 47.6 (extremes 16.7 to 88.5); general paresis 88.1 (extremes 59 to 100); tabes 62.66 (extremes 40.9 to 90). These figures represent results from testing the blood serum. With cerebrospinal fluid, general paresis gave 90 (extremes 73 to 100); tabes 56.2 (extremes 50 to 66.2); cerebrospinal syphilis 19 (extremes 0 to 50). These findings are consistently lower than those given by Nonne.

Nonne's (13) four reactions, blood Wassermann, globulin increase (Phase I), lymphocytosis, spinal fluid Wassermann, are of great importance in the differentiation of syphilis of the central nervous system, by laboratory procedures. A résumé is given below:

In paresis, or tabo-paresis, Wassermann reaction in the blood was positive in 100 per cent of cases, globulin positive in from 95 to 100 per cent, lymphocytosis 95 per cent; Wassermann spinal fluid positive in 85 to 90 per cent with original method and 0.2 c. c. fluid, positive in 100 per cent with larger quantities of fluid; pressure increased.

Tabes without paresis, blood Wassermann reaction was positive in from 60 to 70 per cent, globulin positive in 90 per cent, lymphocytosis positive in 90 per cent; spinal fluid Wassermann positive in from 5 to 10 per cent original method and 0.2 c. c. positive 100 per cent with larger quantities of fluid; pressure usually increased.

Cerebrospinal syphilis, blood Wassermann reaction was positive in from 80 to 90 per cent, globulin generally positive—rarely no increase, lymphocytosis rarely absent, spinal Wassermann positive in 10 per cent with original method, 0.2 c. c., with larger quantities sometimes negative but nearly always positive; pressure sometimes normal, frequently increased.

Ten cells per cubic millimeter is accepted as high normal.

The foregoing paragraphs were not written to cast any shadow upon the value of the Wassermann reaction. It is invaluable in the diagnosis, prognosis, and treatment of neurosyphilis, but it must be emphasized that the Wassermann reaction is only one link in the chain of diagnosis, and that too much reliance can not be placed on this link, whether the reaction be positive or negative. A negative Wassermann reaction only implies that sufficient antibody is not present in the fluid tested to give a positive reaction; it does not exclude syphilis. A positive reaction is characteristic of syphilis, with few exceptions, such as leprosy, frambesia, trypanosomiasis, relapsing fever, malaria in stage of schizogony, advanced carcinomatosis and sarcoma, which can usually be excluded by diagnostic and clinical examinations; but a positive Wassermann reaction only signifies that the fluid of the individual tested has syphilitic infection, either acquired or hereditary, and that sufficient antibody has been formed by the body cells and transferred to the fluid tested to give deviation of complement and prevent hemolysis. It does not indicate that the disease from which the patient is suffering is due to syphilitic infection.

Furthermore, the Wassermann reaction is quantitative to a greater or less degree, a small quantity of the fluid tested may give a negative reaction and a larger quantity a positive reaction; a less sensitive antigen may be negative, a more sensitive antigen positive, using the same fluid and technic. Reliable results in this reaction can only be obtained from the most painstaking technic, and far from being a simple laboratory procedure, it requires the most delicate manipulations and absolutely uniform technic if the results are to be relied upon.

Colloidal Gold Reaction.—Lange has applied the work of Zsigmundy to the protein of the cerebrospinal fluid. Normal cerebrospinal fluid, when diluted with five times its quantity of a 0.4 of 1 per cent solution of sodium chloride, does not affect the color of a solution of colloidal gold, while pathologic cerebrospinal fluid produces color changes and decoloration in different dilutions, which changes are characteristic and specific for various diseases; and furthermore, to a certain extent, diagnostic as to the nature and location of the lesion. The cause of the reaction is unknown.

Stitt (19) states that it is now generally accepted that the Lange test is more diagnostic of general paresis than any other single test. Gettler (20) states that the experience at Bellevue Hospital, shows that the colloidal gold test is as reliable in the diagnosis of cerebrospinal syphilis as the Wassermann reaction, even more so.

The direction for the preparation of Lange's colloidal gold solution are so formidable, as given in the textbooks, and the chances of failure to secure a satisfactory solution so great as to make the test seem to be almost beyond ordinary laboratory facilities.

Gettler and Jackson (20) have published a method of preparation of Lange's colloidal gold solution, which makes the process no more difficult, or even less difficult, than the performance of a Wassermann reaction. The method of preparation, with the interpolation of a few minor modifications which have been found useful, is quoted verbatim:

PREPARATION OF COLLOIDAL GOLD SOLUTION (GETTLER)

General precautions.—1. Ordinary 1½ liter Florence flasks for 1 liter quantities. Ordinary laboratory glass, special glass is not essential. Treat with aqua regia, and rinse with tap and distilled water. (Five times each).

2. Triply distilled water not necessary; to 10 liters of water in a large copper still add a few crystals of potassium permanganate and distil, rejecting the first 300 c. c. (Copper still not necessary, glass flask or still satisfactory.)

3. Ordinary chemically pure reagents give good results.

4. Temperature may be raised slowly with Bunsen burner or rapidly with rose burner. It matters little in what order the reagents are added.

5. In our experience it has been found unnecessary to titrate the strength of the formaldehyde nor to measure the amount used. Its reaction makes little difference. About 0.20 to 0.30 c. c. to each liter of solution.

6. An important factor is the care with which the mixing is done. Rapid and thorough mixing is necessary. Shake before adding the formaldehyde and add it while the solution is still in motion, then shake thoroughly from one-half to one minute. (Have the solution whirling vigorously in flask while adding formaldehyde, do not let the solution lose motion until after the color is developed.)

Technic.—Into a clean 1½-liter Florence flask place 1 liter of water distilled as outlined above. To this add 10 c. c. of a 1 per cent gold chloride solution, 7 c. c. of a 2 per cent potassium carbonate solution, and 0.5 c. c. of a 1 per cent oxalic acid solution. (If Merck's acid crystals of chloride of gold are used, it is unnecessary to add the oxalic acid, and the color develops better in the finished product. It is essential that the chloride of gold be of the highest standard, no impurities.) Heat this mixture to the boiling point and at this temperature remove the flask from the flame, holding it by means of a towel, and shake vigorously. While the solution is still in motion, add quickly from 0.20 to 0.30 c. c. of ordinary concentrated 40 per cent formaldehyde (C. P.) and at once shake thoroughly for one-half to one minute. After from three to four minutes the color begins to develop. If, however, there should be no indication of color, the solution must be again shaken well, and while still in motion an additional 0.10 to 0.20 c. c. of formaldehyde added. This addition almost invariably produces the desired change. At no time during this process should the shaking be stopped. The color should develop rapidly to a deep red. If, however, there is a delay in the appearance of this color, the mixture should be allowed to stand, and in a minute or two the color will start to develop; at this instant the solution should be again thoroughly shaken until the color reaches a deep red shade. The entire process, from the moment the solution reaches the boiling point until the color is fully developed, requires at the most about three minutes.

A satisfactory solution of colloidal gold must conform to the following requirements:

1. Five c. c. of the solution must be completely precipitated in one hour by the addition of 1.7 c. c. of a 1 per cent solution of sodium chloride.

2. It must produce no color change greater than 1/2 with a known normal cerebrospinal fluid.

3. It must give a typical reaction with a known paretic cerebrospinal fluid.

Method of performing the test.—Eleven clean, dry test tubes are placed in a rack, labeled and numbered consecutively. Place in the first tube 1.8 mils of a 0.4 of 1 per cent solution of sterile sodium chloride. Place 1 mil of solution of sodium chloride in each of the other tubes. Add 0.2 mils of the spinal fluid to be tested to the first tube, mix well. From the first tube, after mixing, transfer 1 mil to second and mix well; continue this operation until tube 10 is reached; after mixing 10 withdraw 1 mil and discard. Tube 11 is the control and contains no cerebrospinal fluid. We therefore have dilutions: 1:10, 1:20, 1:40, 1:80, 1:160, 1:320, 1:640, 1:1280, 1:2560, 1:5120, control tube. To each of the tubes add 5 mils of Lange's colloidal gold solution. Let tubes stand at room temperature overnight and read the following morning. The proper color of tube 11 is old rose-red-blue, or slightly bluish tinge is recorded as 1; a violet or lilac shade, 2; a distinct blue, 3; pale blue, 4; colorless, 5.

A minute trace of blood in the cerebrospinal fluid will give erroneous readings, generally more marked in tubes 2 and 3. The first portion of cerebrospinal fluid withdrawn should be collected separately and not used for making the colloidal gold test.

The following specific reactions are observed, reading the tubes from left to right:

Cerebrospinal lues, or luetic curve: 2223322000.

Tabes, or tabetic curve: 2221110000.

Paresis, or paretic curve: 5555432100.

Meningitis, other than syphilis, give color changes nearer the right end of the series.

Tuberculous meningitis: 0001222100.

Meningococcic meningitis: 1111223342.

Anterior poliomyelitis before paralysis, normal curve, then luetic. then meningitic.

Increase of pressure.—Increase of pressure in the cerebrospinal fluid is not at all a characteristic symptom of neurosyphilis. The pressure of the spinal fluid depends upon the posture of the patient when tapped, and the acuteness of the process. The spinal fluid pressure is higher with the patient sitting, than lying; muscular movements increase, flexion of head on chest lowers, extension raises;

inspiration lowers, expiration raises; coughing, sneezing, crying, spraying with ethyl chloride raise the spinal fluid pressure very decidedly.

The normal spinal fluid pressure is from 7 to 9 mm. of mercury—95 to 100 mm. water, according to Stitt; 40 to 60 mm. water in child to 150 mm. in adult, according to Quincke; up to 230 mm. water, Levinson.

In neurosyphilis the spinal fluid pressure may be increased or normal; usually it is increased from slightly to markedly so. Increased spinal fluid pressure indicates either a meningeal infection, irritation, or some abnormality in secretion or excretion. As a general rule, it may be stated, that the more acute the process the higher will be the spinal fluid pressure. The pressure can be ascertained by a mercury manometer attached to the puncture needle, or by counting the drops as they flow. With a small bore needle, normally, drops form very slowly, with the usual spinal puncture needle, at the rate of about 10 drops per minute. Increased pressure is indicated by increase in the rate of flow.

It has been noted, in many cases of neurosyphilis, lumbar puncture with the withdrawal of a comparatively small amount of cerebrospinal fluid, 10 to 15 mils, is followed by intense persistent headache, to a much greater degree than is found in normal cases. This may be due to inflammation of the choroid plexus, so that the fluid is reformed slower, or to a basal meningitis causing partial obstruction to the foramina in the fourth ventricle and consequent unequal pressures in the central nervous system.

Latent, or asymptomatic, neurosyphilis.—Until there is definite evidence of the positive cure of syphilis, once it has been acquired or inherited, it is impossible to estimate the percentage of latency. McDaniel out of 100 patients with syphilis, who had had four successive negative blood Wassermann reactions, found 16 with positive spinal fluid Wassermann, 4 were asymptomatic, all were negroes in which neurosyphilis is less frequent than in the white race, as shown by Zimmermann (21) who found neurosyphilis twice as prevalent in the white race as in the negro. Dejerine and Raymond report cases of tabes developing 45 years and 50 years after infection.

Solomon, as quoted by Gray (21), defined latent syphilis as "A condition in which there are no discernible lesions or manifest symptoms except the positive Wassermann reaction. Syphilis may be considered a disease of remissions and exacerbations, the latent period merely a remission following which a severe lesion is to be expected. Therefore when we treat a patient for a positive Wassermann reaction during the period of latency we are not treating the reaction but rather the patient for the purpose of curing him of a chronic disease and thus preventing a flare up." He therefore affirmed that in every case showing a positive reaction a lumbar puncture is indicated for the purpose of examining the spinal fluid. This appears to have been the earliest absolute requirement of puncture for any syphilitic condition.

Keidel and Moore (22) have grouped asymptomatic syphilis into four groups, giving the results of spinal fluid examinations in each group, the prognosis and treatment. Their classification is quoted verbatim:

Group 1. *Normal fluid.*—Neurosyphilis is not definitely ruled out, but we have no means of predicting which cases will later show abnormalities except by animal inoculation experiments. The great majority of patients in this group remain free from late clinical or serological evidences of neurosyphilis.

Group 2. *Neurological damage minimal or questionable.*—The spinal fluid shows pleocytosis and increased globulin content, but negative Wassermann and colloidal gold and mastic tests. These findings may be in some cases the expression of meningeal irritation only, without definite tissue invasion. Patients showing this type of spinal fluid uniformly do well on routine treatment without the addition of intraspinal therapy. The routine may be that for patients without spinal fluid damages.

Group 3. *Tissue invasion moderate.*—The usual early complaint is headache. The spinal fluid count shows cells from 10 to 100, usually less than 50, globulin + or + +; the Wassermann reaction is negative with small quantities of fluid and either positive or negative with larger amounts. Colloidal gold curve syphilitic or meningeal zone, mastic curve up to 3, or in some instances paretic. In general, this type of patient does well both clinically and serologically on routine treatment without intraspinal therapy. However, we believe that to obtain the best results the dosage of arsphenamin and the number of doses to a course should be increased over the routine used for patients without neurological invasion; that the interval between doses should be decreased; and that the total amount of arsphenamin administered should be relatively greater and the total amount of mercury relatively less than in uncomplicated cases. In only one instance have we found it necessary to resort to intraspinal therapy in order to accomplish a serological cure. It is probable that spinal fluid changes of this type represent future meningovascular cerebrospinal syphilis, although a minority of the patients may ultimately develop parenchymatous neurosyphilis.

Group 4.—*Tissue invasion definite.*—Complaints may be absent or may be that of nervousness, lassitude, or neuralgic pains. If careful sensory examination is omitted, neurological abnormalities are not detected. The spinal fluid shows from 10 to 100 cells, usually more than 50, globulin greater in content than in the preceding two groups, ranging from + + + to + + + +, the Wassermann reaction is positive with 0.2 c. c. or less, and the colloidal gold and mastic curve are paretic. The majority of patients in this group are not serologically cured by routine treatment regardless of alterations in the individual dose or the total amount of arsphenamin or the interval between doses. An occasional patient may be serologically improved, but the improvement is difficult or impossible to maintain. If after six months' treatment no change in the intensity of the spinal fluid is manifest, intraspinal treatment is an indispensable adjunct to routine treatment. Even when this plan is adopted, improvement, which may be looked for in a large majority of the cases, is slow and treatment prolonged. In all probability, this group represents future cases of parenchymatous neurosyphilis, paresis, and tabes. Indeed we have observed the development of paresis in two patients with such spinal fluid findings early in the course of syphilis.

In my limited experience, the class of cases in group 4 seldom or never clears up without intraspinal treatment, and it is believed that as soon as the examination of the spinal fluid indicates that a patient belongs to group 4 intraspinal treatment should be commenced immediately, as any delay allows greater opportunity for meningitic or vascular syphilis to become parenchymatous, which type is extremely rebellious to any form of treatment. Furthermore, cases in group 4 are those in which degenerative processes are already taking place, fibrosis is occurring, and damage once established is irretrievable.

Forms of intraspinal medication.—Many methods of intraspinal medication have been advocated by recognized syphilographers. Only a brief mention will be made of most of these. The details of the various technics will not be given, as these can be secured from standard textbooks.

The Swift and Ellis method consists of withdrawing the patient's blood within an hour after the intravenous injection of salvarsan and separating the clot. The next day a 40 per cent dilution of the serum with sterile normal sodium chloride solution is made; this is inactivated at 56° C, for one hour and from 20 to 40 mills injected subdurally after spinal puncture and withdrawal of from 5 to 15 mils of spinal fluid. This method is approved by the most eminent syphilographers and is regarded as the most efficient. The disadvantages of the method are the time required to prepare and give treatment, it is a hospital procedure, the dosage of salvarsan is unknown, the patient is apt to have disagreeable, sharp reactions, frequency to such an extent that further treatment will be refused.

The Ravaut method depends upon the introduction of small quantities of neosalvarsan dissolved in the patient's spinal fluid. Very severe reactions have followed this method and it is not looked upon with favor.

The Ogilvie method depends on dissolving a known quantity of salvarsan in human serum; this solution is subjected to body temperature 40 minutes, inactivated by heat to 56° C. for half an hour, and then injected. This method is a combination of the two foregoing methods.

Dercum recommends strongly the drainage of the spinal fluid immediately after the intravenous injection of salvarsan or neosalvarsan, believing that this will cause a hyperemic congestion of the choroid plexus and allow the arsenical in the blood stream to pass into the cerebrospinal fluid, or at least come into more intimate contact with the spirochetes of syphilis in the central nervous system. Jelliffe and White state that careful chemical investigation of the cerebrospinal fluid has heretofore failed to obtain any trace of arsenic when salvarsan has been given in the usual manner.

Dr. D. D. Stetson has given permission to the writer to publish his method of administering salvarsan subdurally. One decigram (0.1) of salvarsan is dissolved in 20 mils of freshly distilled water and carefully neutralized or made slightly alkaline with 15 per cent solution of sodium hydrate, 180 mils of freshly distilled water are added, 1 mil therefore representing one-half milligram (0.0005) of salvarsan. After lumbar puncture 10 to 15 mils of spinal fluid are withdrawn; a syringe with the desired dose of salvarsan, prepared as above, is now attached to the lumbar puncture needle and two or three mils of spinal fluid are aspirated into the syringe, diluting the solution of salvarsan; the contents of the syringe are then injected subdurally. Begin with small doses of salvarsan one-fifth to one-fourth milligram, in paretics start a little higher, one-fourth to one-third milligram, gradually increasing the dose until one-half milligram is given. Patient should be lying on side for puncture and injection. Following the above procedure there has been reactions, such as slight headache, in only about 1 per cent in several hundred patients injected. Doctor Stetson states that he does not believe this method is as efficient as the Swift and Ellis method, but that the advantages, especially where the patient is unable to enter a hospital, as in dispensary practice, are so marked that the loss in efficiency is more than counterbalanced by the convenience of the method and the positive results obtained. The writer has observed a large number of injections by this method and in no case did any immediate reactions occur, and the patients stated that outside of a slight headache very occasionally a few hours after the injection, they had no subjective symptoms. The headache was not a constant feature and seemed to depend largely upon the temperament of the patient. All of the injections observed were in dispensary patients, who either walked or rode in street car to the clinic and returned in the same way. It is advised, following the injection subdurally, however, that the patients lie down for the rest of the day after reaching home.

Technic of spinal puncture.—Spinal puncture for diagnostic purposes was recommended by Quincke in 1891. The technic advised by Quincke has not been improved upon. He recommended that the needle be introduced in the midline in children and from 5 to 10 millimeters from the midline in adults, at a level of the interspace between the third and fourth lumbar vertebra. Levinson recommends as a landmark to draw a horizontal line across the crests of the ilia by means of an iodine swab. Puncture should be made between the third and fourth lumbar vertebra; it should never be made higher than the second lumbar vertebra, on account of danger of injuring the cord. In children the cord is lower than in adults, and punctures should not be made above the third lumbar vertebra. The patient should be lying squarely on the side, with knees drawn up, head and shoulders bent forward, so as to arch the spine as much as possible. Puncture can be made with patient bent forward in the sitting position, but this is apt to cause syncope, and reactions are more prone to follow. Stitt states that aspiration of the spinal fluid is responsible for many of the ill effects of lumbar puncture. Obviously, the same aseptic precautions as for a surgical operation should be employed. Structures passed through: Skin, subcutaneous fascia, fat, deep fascia, multifidus spinus muscle, between vertebral arches, ligamentum flavum, dura, arachnoid. Depth from the skin to the spinal canal, at a level of the third lumbar interspace, varies from 2 centimeters in children to 10 centimeters in fat adults. Depth also varies with direction of needle, a needle inserted diagonally enters the spinal canal at a greater depth; also the canal is deeper at a higher level. Should a dry tap be obtained, and one is reasonably certain that the needle is in the spinal canal, spraying the thigh with ethyl chloride, as recommended by Levinson, is sometimes effective. Dry taps are very rare with proper technic. Leaving the first needle inserted in place and inserting a second needle one interspace higher, and gently injecting one or two mils of a normal salt solution will prove the presence of a dry tap, as salt solution will flow from the other needle if both are subdural. Care should be used against any undue force in inserting the needle. When the needle is inserted by the operator's right hand, counterpressure should be made with the left hand, resting on the patient's back, against the right hand until after the dura is pierced. It is possible to break the needle or transfix the canal by using any sudden or unregulated force. Should the needle be broken, if directly beneath the skin, it should be removed; if deeper allow the needle to remain unless severe pain or suppuration ensues; then it will have to be removed. It is possible to injure the spinal nerves; this causes excruciating pain to the patient, and is generally caused by puncturing at too high a level. If the plexus of veins on the posterior wall of the body of the vertebra are punctured the tap will be bloody.

Spinal puncture is not without danger to the patient, cases of death following puncture have been reported; these usually occur in tumor of the cerebellum or base of the brain, especially if the puncture is made with patient in the sitting position. The writer has performed, and seen performed, several hundred lumbar punctures, in only one case were there any alarming symptoms. This was a case of brain tumor punctured in sitting position, with prompt syncope and arrest of respiration following injection of air for a ventriculogram. The patient promptly revived on lying down and artificial respiration.

Using the ordinary technic, spinal puncture is frequently followed by severe headache and prostration. MacRobert (23) asserts that sometimes the arachnoid is pulled through the opening in the dura as the needle is withdrawn and that this causes a constant leakage of spinal fluid, which, by temporarily destroying the "hydraulic support" of the brain, is responsible for the headaches which so frequently follow lumbar punctures. Using the ordinary spinal puncture needle, it has seemed to the writer that dry taps were obtained oftener subsequently, where the patient had had severe headache for several days following a lumbar puncture, especially if the course of the old puncture was followed.

An improved technic for spinal puncture has been devised by Dr. Randal Hoyt (24) using a fine inner needle that can be inserted in the ordinary lumbar puncture needle. The original technic has been modified by the improvement of the needle, making the whole apparatus self-contained. The outer needle is the ordinary type of lumbar puncture needle with a set screw inserted in the shoulder to hold the inner needle so that its point is flush with the bevel of the outer needle during insertion. When the set screw is loosed, the inner needle can be projected about a quarter of an inch (6 mm.). The proximal end of the needles are arranged with a shank for a Record syringe.

After the apparatus is arranged for introduction, bevel of both needles even, lumbar puncture is made in the usual way up to the point of piercing the dura. At this place there is a distinct feeling of resistance. When the sensation of resistance is encountered, the set screw is loosened and the inner needle projected as far as it will go, making a punctured wound in the dura. The obturator is withdrawn from the inner needle, a Record syringe attached, and the spinal fluid withdrawn. If an intraspinal treatment is to be administered, this is injected by a second syringe. To remove the apparatus, the obturator is inserted in the inner needle, the inner needle drawn into the outer needle, and the whole apparatus withdrawn.

The common error is to carry the insertion of the outer needle too far and pierce the dura, thus performing an ordinary lumbar puncture. This can be obviated by stopping the insertion of the outer needle as soon as a feeling of firm resistance is encountered and then projecting the inner needle, should spinal fluid not be obtained, the outer needle can then be shoved in as far as the slide and the inner needle again projected. The dura offers scarcely any appreciable resistance to the fine inner needle and if firm resistance is encountered, it is at once evident that the technic is wrong and a bony wall encountered; the point of the inner needle would probably be broken if pressed with force against a bony wall. Should the inner needle strike a nerve root, it causes excruciating pain, therefore it should be inserted with great gentleness.

From observation of a large number of lumbar punctures using this technic, it would appear that postpuncture reactions are seldom encountered, and when encountered these are very mild, bloody taps are obviated, and the entire procedure is not much more serious than an ordinary venous puncture. Patients are advised, however, to rest quietly for the remainder of the day following the puncture; hospitalization is unnecessary.

Conclusions.—1. Every case of syphilis in which a persistent positive blood Wassermann reaction is encountered after intensive treatment should have a complete neurological examination made and a lumbar puncture with a complete study of the spinal fluid.

2. Every case of syphilitic infection, whether treated or not, after one year from date of exposure, should have a complete neurological examination and a complete examination of the spinal fluid.

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AURICULAR FIBRILLATION

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Our knowledge of the mechanism and proper treatment of auricular fibrillation has been influenced greatly by the correlation of clinical, experimental, and electrocardiographic observations during the past decade. In this paper it is proposed to review from the clinical point of view the more noteworthy contributions made to our knowledge of the mechanism of fibrillation, its manifestations, and therapy.

One hesitates to write on auricular fibrillation in the face of Sir James MacKenzie's observation that, " Writers who have only been able to recognize the condition within the last few years can not have had the time to acquire more than an elementary and imperfect knowledge of the subject." Nevertheless, as the new conception of auricular fibrillation has greatly changed the outlook for the sufferer from arrhythmia perpetua, it is believed that a short discussion of the condition would be of interest to the naval medical officer.

MacKenzie recognized delirium cordis as a clinical entity in 1890. He noted the absence of evidence of auricular activity in the jugular pulse and offered as an explanation the possibility that the auricle was paralyzed. Later he thought the condition due to a simultaneous contraction of the auricle and ventricle. He therefore termed the condition "nodal rhythm," believing that irregularly occurring excitatory impulses were formed in the auricular-ventricular node and spread both downward to the ventricle and upward to the auricle. In 1909 Thomas Lewis obtained from a dog, in which he had produced auricular fibrillation, polygraphic and electrocardiographic tracings, which were typical of the tracings obtained from patients suffering from arrhythmia perpetua.

The mechanism of the normal heart beat.—The old controversy as to whether the excitation impulse of the heart beat is of neurogenic or myogenic origin remains unsettled. Recently Andrus and Carter advanced the theory that the cardiac rhythm is due to the rhythmic building up and discharge of a difference in electrical potential between the cells of the cardiac tissue and the fluid bathing them, which is caused by the difference in hydrogen ion concentration existing betwen the two.

The excitatory impulse arises in the sino-auricular node. This is a specialized mass of tissue, oval in shape, measuring 30 by 3 mm., and situated at the junction of the superior vena cava and the right auricle. From this location the impulse spreads concentrically through the auricular tissue and the interauricular septum. On the right side of the septum near its lower margin the impulses are collected by fan-shaped fibers, radiating from the auricular-ventricular node (node of Tawara). They then pass through the bundle of His, and the right and left bundle branches to the respective ventricles. The branches subdivide until the Purkinje network is reached; this conveys the excitation wave to the muscle fibers of the ventricles.

The sympathetic nerve and the efferent fibers of the vagus are, respectively, the accelerator and inhibitor cardiac nerves. Both exert a large degree of control on the sino-auricular node. The vagi exercise an important function through the intracardiac ganglia on the bundle of His. Vagal stimulation causes a slowing of the heart rate when the principal effect is exerted on the sino-auricular node; heart block is produced when the vagal stimulation is exerted chiefly on the auricular-ventricular node.

The mechanism of auricular fibrillation.—In fibrillation, the auricles remain in diastole. Close examination of their surface reveals numerous, irregularly scattered undulations, which are limited to the muscle fibers. Systole, or the regular contraction of the musculature of the auricle as a whole, does not occur. These rapid and irregular impulses bombard the auricular-ventricular node. Many of them are blocked at the auricular-ventricular node as their rate of production exceeds the conduction capacity of the bundle of His. Some ventricular responses are more forcible than others and the strength of the beat is independent of the duration of the preceding diastole.

Excitatory impulses may also arise in parts of the heart other than the sino-auricular node. In some conditions, the auricular-ventricular node may assume the function of pacemaker. Premature contractions, or extra systoles, are due to irritable foci in either auricle or ventricle or somewhere along the conduction system, propagating contraction waves. In view of these considerations, Englemann advanced the theory of multiple foci of impulse formation as the causation of fibrillation. The numerous contractions occurring throughout the auricle were regarded as the result of the generation of contraction impulses from the many independent, unrelated foci. Some muscle fibers could respond to an adjacent impulse, others were in degrees of response to another stimulus, while still others were in the refractory or unresponsive phase, and, consequently, unable to contract. This theory explained the confused, inefficient auricular action and had the support of so careful and accurate a worker as Lewis until his studies on the action of quinidine in 1920, caused him to accept another theory advanced to explain fibrillation—the circus movement.

This theory is based on the experiment of Mines, who cut a ring of auricular tissue from a ray fish, and stimulated it in such a manner that the contraction wave spread in one direction only around the circle. On returning to the point originally stimulated, the contraction wave continued to encircle the ring. The explanation for this is as follows: The portion of the tissue at which the stimulus is applied responds by contracting and immediately enters the refractory phase in which it is unresponsive to further stimulation for a certain period of time. If the duration of this refractory period is less than the time required for the impulse to complete a circuit of the ring, the traveling wave on returning to the starting point will enter unrefractory or responsive tissue and the process of encircling will continue indefinitely.

This conception is now believed to be the explanation of the mechanism responsible for auricular flutter and auricular fibrillation. In flutter the pathway is regarded as more regular and the muscle fibers, as a whole, coordinate. Although the muscle channels traversed have never been demonstrated, it is assumed that the encircling wave in fibrillation pursues an irregular course, being deflected to either side as refractory areas develop in its course. Its rapid rate of over 400 per minute has the effect of slowing the rate of conduction through the auricles and reducing the length of the refractory period. Both of these factors are conducive to the continuation of the circus movement.

Clinical forms of auricular fibrillation.—Auricular fibrillation may occur as a complication of rhuematic, arterio-sclerotic, or thyroid heart disease. It may also appear in hearts in which there is no demonstratable disease. It may be transient or premanent.

Transient fibrillation.—Transient or paroxysmal attacks of fibrillation may occur before it becomes the permanent rhythm. Mason reported 18 cases of transient fibrillation, all of whom showed an underlying cardiac pathology.

It has been demonstrated, however, that transient fibrillation may occur in those with a sound myocardium, and that it is generally not recognized as such. Robinson found no cardiac lesion at postmortem to account for transient fibrillation in one case. Patterson has recently reported eight cases of transient fibrillation, three of whom showed no evidence of any organic heart disease. He ascribes the deranged mechanism to an acute infection (one case), anxiety and overwork (one case), alcohol alone or in combination with excessive use of tobacco or dietary indiscretions (three cases), an underlying cardiac degeneration (three cases). In the symptomatology he emphasizes that these patients show palpitation, precordial distress, weakness, dyspnœa, and nervous apprehension without the objective findings of heart failure.

Permanent fibrillation.—The onset of permanent fibrillation may be sudden or gradual. The condition may be preceded by paroxysms of transient fibrillation or be precipitated by an acute heart strain. It may be ushered in by a fluttering in the chest interrupted by thumping sensations resulting from stronger beats. Dyspnœa, precordial distress, and evidence of heart failure of the congestive type may rapidly supervene. MacKenzie states that fibrillation is present in 60 to 70 per cent of cases of heart failure with edema. In some patients it is difficult to determine just when the onset of fibrillation occurred. Symptoms from the impaired myocardium may have gradually developed, or the asthenia from an acute infectious disease may mask a phase when many symptoms appear.

The characteristic finding is a heart which is absolutely irregular in force and rhythm, and many beats fail to reach the wrist. The apical rate is usually above 120 per minute, though the radial rate may be from 40 to 90. The heart is frequently found enlarged and may present various murmurs or auscultation. A degree of heart failure of the congestive type may be present. In rheumatic mitral disease with stenosis, the mitral presystolic rumble disappears when fibrillation occurs. As MacKenzie first pointed out, this disappearance occurs because the auricle is not contracting and forcing blood through the narrowed orifice at that interval just rior to ventricular contraction. However, the low-pitched, mid-diastolic murmur, resulting from the blood stream coursing through a senosed mitral ring during diastole, may be present. It is extremely difficult to detect in a rapid, irregular heart. It is not to be confused with the third heart sound which is normally present in an appreciable percentage of young individuals.

The systolic blood pressure is quite characteristic. As one slowly descends from suprasystolic levels, while taking the blood pressure, an occasional beat is heard, and at progressively lower levels more beats come through. This blood pressure finding demonstrates graphically the uneven ventricular force.

The electrocardiogram gives pathognomonic tracings in fibrillation. The P wave, which is due to the orderly, normal course of the excitation wave through the auricles, is absent. The tracing may show no complex preceding the ventricular deflection, or may show irregular rapid waves of small amplitude arising from the larger fibrillary waves. The ventricular complex is also quite characteristic. It shows an absolute irregularity in ryhthm. Extra systoles of nodal or ventricular types may be present and are of serious prognostic importance.

The polygraph frequently gives unmistakable evidence of the condition. The A wave, caused by auricular contraction, is absent. The C wave, resulting from ventricular contraction, is irregular in rhythm and amplitude.

Lieut. F. C. Hill, Medical Corps, United States Navy, demonstrated a very valuable clinical aid to establish the nonappearance of the A wave in the jugular pulse of fibrillation. He places the patient in a position in which the jugular pulsations are most apparent and attaches a small piece of fairly stiff paper over the pulsating jugular at right angles to the neck. The excursions are amplified by the paper and the slight wave caused by the normal auricular contraction is conspicuous by its absence, in auricular fibrillation.

It is possible to recognize the vast majority of cases of fibrillation on physical examination alone. Occasionally electrocardiographic aid is necessary and it is always a desideratum in cases under quinidine therapy.

The symptom-complex is usually most characteristic, yet cases of fibrillation occur, giving a pseudodominant rhythm, irregularly punctuated by a small beat, which has some of the characteristics of an extra systole or premature contraction. Of course, a preparture ventricular contraction is followed by the compensatory pause, which should be apparent to the examiner, but is sometimes exceedingly difficult to detect. This compensatory pause is not present in auricular premature beats, which are followed by ventricular responses, and if they are of frequent occurrence a misleading picture may result.

Auricular flutter and paroxysmal tachycardia do not offer any difficulty because of their regularity.

Prognosis.—The outlook for the patient suffering from auricular fibrillation depends on the condition and efficiency of the myocardium. The myocardium is obviously diseased in those patients in whom the cardiac reserve power is so diminished that, on a moderate demand for a greater circulatory effort, signs of congestive heart failure appear. Easily induced heart failure, then, is a serious sign.

Fibrillation occurring before the age of 35 is usually due to rheumatic heart disease; in those over 45 years it generally results from the myodegeneration of arterio-sclerosis or high tension. Adequate figures, which show that the average life expectancy in rheumatic heart disease in males is 34 years and in females 38 years, are now available.

Changes in the character of the murmur in rheumatic mitral disease offer some prognostic aid. If only the presystolic rumble was present before the onset of fibrillation, it would, of course, disappear on the cessation of auricular systole. If the degree of stenosis gradually increases, it may be assumed that myocardial degeneration advances proportionally. Careful auscultation of the heart at some later time would reveal a short, low-pitched, mid-diastolic murmur. A short but appreciable interval occurs between the second sound and this murmur. If the stenosis continues to increase, this murmur will have a longer duration. The systolic murmur of mitral regurgitation accompanies this murmur in practically all cases.

If aortic regurgitation is present, the prognosis is said to be more grave.

Careful observations should be made to determine if any existing cardiac enlargement increases. Continued and progressive enlargement is evidence that hypertrophy is necessary to maintain any degree of circulatory efficiency that may be present.

A persistently rapid rate has the same general significance as progressive hypertrophy. MacKenzie's vast experience leads him to the logical conclusion that an apex rate of over 90 per minute tends to induce myocardial exhaustion and dilatation.

The patient's response to adequate digitalis therapy may also offer important prognostic inference. A pulse deficit of 70 beats per minute (an apical rate of 130 per minute, with but 60 beats coming through to the wrist), which is abolished by digitalis, while the rate is slowed, offers a much better prognosis than when the pulse deficit and rate are practically unaffected.

The electrocardiograph may give invaluable prognostic aid in the demonstration of extra systoles or aberration of the ventricular complex, which when present indicate serious myodegeneration and a prognosis twice as grave as in uncomplicated fibrillators.

Treatment.—General rest is of paramount importance in the treatment of auricular fibrillation. It reduces the heart's work to the minimal point. When heart failure with congestion occurs, it is advisable to keep the patient at absolute rest in bed until, in favorable cases, the continued improvement ceases. A very practical and useful index is used by S. A. Levine. He has daily spirometric observations made and at the time when the constantly improving vital capacity fails to increase further, it is assumed that the patient has received all benefits accruing from rest in bed. In milder cases where the patient can get about, it may only be necessary to limit or avoid certain fatiguing elements in the day's work.

Diet is also of great importance. A water-logged patient may respond very favorably to the restricted fluids imposed by a strict Karell diet, which consists only of 800 c. c. of milk in twenty-four hours. This diet for a few days may aid in the elimination through the kidney of the largest part of the edema. In general, the diet should be bland and easily digested and assimilated. With a complicating kidney lesion causing chloride retention, salt should be limited or proscribed. It may be extremely difficult at first to estimate the amount of kidney involvement, as passive congestion of the kidneys may present a misleading picture.

Packs, baths, and heliotherapy are regarded as of negligible aid.

Drugs.—Digitalis and quinidine are our most important therapeutic aids in the treatment of permanent fibrillation, though the diuretics and hypnotics are often valuable adjuvants.

Digitalis.—Digitalis has a twofold action on the heart: First, an indirect one through vagus stimulation, and, second, a direct one on the heart muscle.

According to Lewis, both the direct and indirect action decrease the facility with which the impulses are conveyed across the auricular-ventricular junction. This blocking of the numerous excitatory impulses, exerted chiefly by the indirect action through vagal stimulation of the fibers in the auricular-ventricular node, is what reduces the ventricular rate with such happy results in fibrillation. The general action of the drug on the heart increases the force of contraction and slows the rate.

Eggleston has shown that a heart may be rapidly and safely digitalized by massive doses. Although there are idiosyncrasies to digitalis, it has been established that 1½ grains per 10 pounds of body weight is necessary for full digitalization and may safely be given. Pardee has determined that approximately 2⅓ grains (from 1½ to 3) are eliminated in 24 hours. Thus, it is readily seen how expediently digitalis therapy may be controlled.

Following the experimental work of numerous observers in comparing the activity of different preparations of digitalis, and the introduction of the cat-unit method by which a sample may be standardized therapeutically, there has been a great improvement in preparations. A good, fresh, powdered leaf is perhaps the best preparation. Fresh standardized tinctures, when consumed within six months of manufacture, and when kept tightly corked and in amber colored bottles, are very efficient.

Robinson, in his excellent monograph on digitalis, showed that the potency of a tincture may be diminished by 50 per cent in a year's time. As tinctures are frequently prescribed in so many "drops," it is well to recall the vast difference between minims and drops.

Strong and Wilmaers showed that 1 c. c. of Tr. digitalis contained from 36 to 65 "drops."

On the basis that 1½ grains of the powdered drug, or 15 minims of the tincture, per 10 pounds body weight is necessary to produce that degree of auricular-ventricular block which will prevent the passage of a large number of the excitatory impulses to the ventricle, it follows that 22½ grains of the powdered drug, or 225 minims of the tincture, are necessary for a 150-pound man. This is best given over a three-day period. From half to one-third of the total amount may be given in the first dose, and after 6 hours a quarter of this amount may be administered; the remainder being given in three doses per day during the next two days, with allowance made for the amount eliminated each 24 hours. The amount of digitalis required to hold the patient digitalized must be estimated from the figures given above, as it varies with individuals and preparations.

The evidence of digitalis intoxication is not particularly characteristic clinically, but if medication is controlled by electrocardiograms, the degree of digitalization may be quite accurately inferred.

Clinically, overdigitalization is characterized by anorexia, nausea, vomiting, and diarrhea. When 48 per cent of the lethal dose is administered, premature ventricular beats appear; and when 90 per cent is given, coupled beats appear. These latter are normal beats followed regularly by ventricular premature beats. Anorexia and nausea are usually the first symptoms to appear. As these may also result from the gastric congestion of heart failure, which actually requires more digitalis, an accurate estimation of the situation may be judged from the amount of digitalis administered.

Electrocardiographically, digitalis produces an inversion of the T wave. If a tracing from the undigitalized heart is available for comparison, the amplitude of the inversion and the shortening of the S-T interval will indicate the digitalis effect.

After adequate digitalization has been accomplished, the amount required by the patient should be administered daily in two or three doses. This usually must be kept up indefinitely, and no harmful effects are noted from continuous medication.

Quinidine.—Quinine was introduced by Wenckebache in 1914 to abolish fibrillation. Quinidine was found to be more efficacious by Frey in 1918. In 1920 Lewis and his coworkers studied the action of quinidine on the heart. Accepting the circus movement as the mechanism of fibrillation, they point out that normal rhythm may be restored by: (1) Increasing the duration of the refractory period. (2) Increasing the rate of conduction. (3) Shortening the pathway traversed.

They determined that quinidine increases the duration of the refractory period but also slows the rate of conduction in the auricle; so it is only when the former action is predominant (about 50 per cent of cases) that normal mechanism is restored. In the remaining cases the action of decreasing the rate of conduction is predominant, or both actions are exerted equally. In the latter instance the time of completing the circuit is increased and the number of cycles completed is proportionately reduced.

Quinidine also exerts an important action in producing a degree of vagus paralysis which increases the activity of the auricular-ventricular bundle. This causes an increased ventricular rate which may be of serious consequence in those cases in which fibrillation is not abolished. The auricular rate, while greatly retarded by quinidine (from 400–600 per minute to 200–300) may, in the presence of an active bundle, cause an excessive ventricular rate with a corresponding decrease in circulatory efficiency.

When contemplating the use of quinidine, it is desirable to determine if an idiosyncrasy exists. For this purpose two doses of 2 grains of quinidine are given at a four-hour interval. The following day, if no undesirable effects are produced, quinidine sulphate in 6-grain doses may be administered five times at two-hour intervals. This medication may be continued for a week. The favorable cases usually respond within 12 to 36 hours. However, in suitable cases the doses may be judiciously increased. Those cases requiring larger doses over a longer period of time are prone to revert to fibrillation even though quinidine is continued in daily doses of 6 grains over a period of months.

There are certain contraindications to the use of quinidine. White and his coworkers treated with quinidine a large series of unselected fibrillators. They gave very definite reasons for careful selection of the patient when quinidine therapy was contemplated. The following are regarded as contraindications:

(1) *Advanced heart failure with extensive edema.*—These cases frequently do not respond to quinidine at all. Occasionally they pass from fibrillation into fixed flutter, which may be unaffected by digitalis. When normal rhythm is obtained, the rate may be so rapid that circulation is less efficient than during fibrillation. Patients with congestive heart failure should first be digitalized; and then if normal rhythm is deemed desirable, quinidine therapy with this end in view may be attempted. Although the action of digitalis and quinidine are antagonistic, yet previous digitalization does not mitigate against the action of quinidine clinically.

(2) *In fibrillation of long duration.*—White's statistics show that the longer the duration of fibrillation, the poorer the response to

quinidine. Unless there is convincing indication to the contrary, it is deemed inadvisable to attempt the restoration to normal rhythm in fibrillation of over six months' standing.

(3) *In advanced mitral stenosis.*—When the diastolic murmur of mitral stenosis is prolonged to the point where it fills practically all the diastole, the patient may be unsuitable for restoration to the normal mechanism because of the frequency with which clots form from the relative stasis in the left auricular appendage. A tendency to stasis in this location results directly from the dilated condition of the auricles in fibrillation, and it is augmented by an advanced stenosis of the mitral ring.

When clotting is present, a resumption of auricular systole forces the clots into the general circulation, with the distressing and oftentimes fatal results from emboli.

Levy has published a very valuable contribution on the toxicology of quinidine. He regards as additional contraindications to its use great cardiac hypertrophy and multiple valve lesions. He also warns against the indiscriminate use of the drug in unselected cases and when electrocardiographic control is not possible.

Conclusions.—The study of heart disease in the naval service by Bloedorn and Roberts indicates that auricular fibrillation is not of frequent occurrence, and this is as expected.

Recruiting experience has emphasized the nondesirability for military service of the youth with a history of acute polyarthritis; so this prolific cause of fibrillation is largely limited to those who develop rheumatic fever for the first time after entering the service, when, because of the age factor, the probability of escaping heart complications is greatly enhanced.

The relative youth of the enlisted personnel, together with their physical examinations which come at least as frequently as each four-year enlistment period, and the annual physical examination of officers, largely eliminate those individuals in whom fibrillation from hypertensive or arterio-sclerotic heart disease might develop.

For the reason that fibrillation may occur in individuals subjected to prolonged and exhaustive mental and physical strain, even though their hearts may show no evidence of organic disease, we may expect cases of this type in the service.

Most frequently these cases are of the transient type, which revert to the normal mechanism spontaneously. However, the permanent type of fibrillation may also occur and, without quinidine, these patients remain victims of the disagreeable sensations and the cardiac embarrassment which fibrillation may produce, even in the presence of a sound myocardium.

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COOPERATION BETWEEN THE DENTAL AND MEDICAL PROFESSIONS IN THE SURGICAL TREATMENT OF SINUSITIS[1]

By G. B. Trible, M. D., F. A. C. S.

Tracing the evolution of the conception of the sinuses by our common medical forbears gives us a moment's amusement and possibly a moment's reflection that our ideas may be so soon held ridiculous. That, however, is to be no excuse for failure to do what our present surgical knowledge and experience teaches. Jessen and Bartholmess in 1601 believed that the frontal sinus contained a viscid liquid for lubricating the eye ball, but earlier manuscripts stated: "If from a wound in the forehead, blood and air emerges, the wound will not be fatal, but if no air emerges, the wound will

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probably be fatal." This shows a keen clinical perception of the difference in wounds of the forehead. Likewise, Paré in 1564 described exophthalmos produced by frontal sinus disease.

The ethmoids have been long known as sieve-like bodies, and Galen believed secretions from the brain were strained through these bodies and escaped from the nose. This held until Berangar in 1550 opposed this view, and held the sieve-like formation was not for straining, but for transmitting odors to the brain. This was not upset until the time of Schneider who studied the mucous membrane and discovered the functions of secretion and olfaction. As late as 1890 disease of this area was only recognized by Bosworth and Grunewald. The sphenoid was practically untouched until the time of Hajek, and his work, with modifications by Sluder, embraces all the modern knowledge of this sinus.

When we come to the maxillary antrum, we reach an area with a recognized individuality, studied and treated by Nathaniel Highmore in 1851, and ever since bearing his name. He published the history and case record of suppurative disease of this cavity, treated by extraction of a canine. This case must have been one of an extremely large antral cavity with deep hollowing of the alveolar border, and has probably led to a misconception regarding the canine's relation with the antrum which persists to this day. Cowper in 1717, Lamovries the same year, and Jourdain in 1765, all reported established operative procedure for the antrum. This is the field par excellence which is the meeting place of nasal and dental surgery, and which I feel can be handled only properly in partnership. To you, as members of a sister profession, I would state it can not be taken wholly by either, for with any sinusitis, we soon have the polysinusitis and, furthermore, the percentage of antrum infections of dental and nondental origin are in dispute. Hajek gives as low as 8 per cent of dental, while Skillern thinks 20 to 30 per cent a fair figure. Formerly, the infections of a purely nasal origin were less accurately recognized. There is also a reverse of this picture. Many clinicians feel that dental infections of the upper jaw are in many instances due to disease of the antrum floor, with rarefying osteitis and loss of vitality through destruction of the nerves leading to the pulp cavities. This resorption of bone is a physiological process in advancing life and in the aged projection of tooth roots into the antrum is not uncommon. As a rhinologist, I know any antrum work is wasted; in fact, any sinus procedure greatly endangered, without a clearing up of dental infection contiguous to the antral floor. The closure of tracts leading into the antrum from the mouth is greatly facilitated by establishing nasal drainage. The breaking into the antrum during dental extraction or in curretting the socket, if not filled in promptly by blood clot, will stir up an antrum infection and the treatment should be supplemented by nasal drainage.

Developmentally, the antrum is first noted about the seventieth day of fetal life as an evagination near the ethmoid infundibulum; there may be a double evagination accounting for the reduplication of sinus in some instances. The development proceeds downward, backward, forward and outward but not upward, because of the limiting orbit. This cavity, at time of birth, is a very narrow fossa almost slitlike, and by the second year has barely reached as far as the infraorbital canal. Growth continues away from the embryological pit so that it remains high above the cavity, and the normal drainage is poorly placed. It is not until the seventh or eighth year that it has reached and hollowed the malar bone and arrived at the alveolar process. By the same consideration the inferior nasal meatus is not in direct contact with the infantile maxillary sinus until after 8 years of age, and in exploratory punctures in children the cavity may be entirely missed and the cheek penetrated. Damage to the tooth buds must always be in mind. The most common fallacy dating back to the time of Highmore, as previously mentioned, is the belief that the canine is in normal or usual relation to the antral floor, also the first premolar and, to a greater extent, the second premolar; but according to Schaefer, whose researches in the anatomy of the nose and accessory nasal sinuses is second only to that of Zuckerkandl, the molars are the most intimately in contact. Irregularities, ridges, and partial septa are frequent in the floor and render transillumination and even a radiograph of only assisting value. Double complete antra are found due either to the evagination of two separate pits which do not coalesce or more probably to the development atypically of a posterior ethmoid cell. Gruber gives as high as 2½ per cent of reduplicated antra with complete division. Invasion of the hard palate by pneumatization may give rise to a recess, the recessus palatinus. This may be cut off from the antrum, though usually its communication is wide. The remnants of nasal palatine canals connecting in the embryo, the inferior meatus and the mouth, may be found as cystlike cavities. Dentigerous cysts are of relatively frequent occurrence.

The size of the adult maxillary antrum varies greatly and may not be the same on the two sides. According to Zukerkandl, the enlargement is produced by, first, hollowing out of the processus alveolaris of the maxillary; second, pneumatization by pushing of the recessus alveolaris between the plates of the hard palate, the recessus platinus; third, extension of the maxillary sinus into the frontal process of the maxillary; fourth, hollowing out of the zygomantic process, and to this may be added a general hollowing out and thinning of the bone in all directions. A small sinus, on the other hand, is accounted for by deficient absorption of bone of the floor, and encrouchment of the ventral wall of the cavity; a deep canine fossa, thick sinus walls, and imperfect dentition. The roof of the antrum is formed by the floor of the orbit. This consists of two layers of bone separated to permit the passage of the infraorbital nerve. It is protected by the mucous membrane of the antrum, the periosteum and a thin layer of bone. Operative procedures may injure this nerve and give rise to neuralgia of extreme persistence or antral disease alone may produce such a condition. Behind the posterior surface of the antrum separated from it by the muscles and their attachments is found the internal maxillary artery. The inner wall of the antrum is probably by far the most important. It contains the normal opening or ostium which communicates with the middle meatus just behind the processus uncinatus. This ostium is the site of the original evagination but as development has proceeded downward, forward, backward and outward, the floor has fallen away from the embryological position. Accessory ostia are frequently found and are in the membranous portion of the wall behind and below the normal opening, in fact, frequently below the inferior turbinate. The relation or angle of the ostium has a bearing on the filling of the antrum with secretions present in the infundibulum, in other words, the occasional action of the antrum as a reservoir for drainage from the ethmoid and frontal sinuses. The course of the nasal-lachrymal duct on the nasal wall is marked by a convex protuberance of bone from the anterior superior angle of the antrum obliquely downward and backward to a point about the middle of the antrum near the floor. Wounding this area may occasionally give rise to interference with the course of the tears, though much less frequently than would be supposed.

Taking up the various sources of infection, the following etological factors are to be considered. First, direct extension from the mucosa. Any simple cold may set up an inflammation of the maxillary sinus, production and retention of secretion, pressure necrosis of the mucosa, insufficient aeration and later decomposition of the retained secretions. This accounts for the development of symptoms after the original source of infection has cleared up. Infectious diseases, most commonly of that generic group known as influenza, are very important.

The recent pandemic of influenza and the persistent annual breaking out of endemics of this disease has changed the entire clinical picture of nose, throat, and ear conditions. Extension may occur from the alveolus, which may be by direct continuity from a devitalized tooth, very insidious in its onset, as you well know. There may not be direct contact or even a rupture of the infectious material into the antrum. It may set up an osteitis or periostitis with extension into the antrum. Another method is through the intimate relationship of the circulation between the antral and dental veins.

This may account for the development of the antrum suppuration following the extraction of a tooth, even though several millimeters of apparently healthy bone remain between the top of the socket and the floor of the antrum. Contamination by drainage from the superior group of sinuses has already been mentioned. Foreign bodies have been found frequently in the antrum, fragments of teeth from dental operations, or seeds, grains of corn, possibly introduced by children in play. Inverted teeth may set up sufficient irritation to cause suppuration. Autopsy findings have shown a marked incidence of sinusitis, much greater than has been recognized in life. The findings average about 30 per cent. The bacterial findings are chiefly streptococci, viridans and hemolyticus, staphlococci, influenza bacilli, or pneumococci, but any organism that invades or finds a suitable habitat in the nose, throat, mouth, or upper respiratory tract may be found in the nasal accessory sinuses. Pearce, of Boston, in autopsies on 75 children dying of diphtheria got positive sinus cultures from every case. This simply tends to confirm what is found in other portions of the body that there is no sharp limit or boundary for bacterial invasion. In general, clinically, we may divide the types of sinusitis into:

1. Catarrhal (*a*) acute, and (*b*) chronic.
2. Suppurative (*a*) acute, and (*b*) chronic.
3. Hyperplastic.
4. Atrophic.
5. Vacuum.
6. Mucocele.
7. Luetic.
8. Malignant.

And to these may be added a type or complication of other types, an osteitis or osteomyelitis of the sinus walls, due to their paucity of protection. The symptoms of sinusitis depend upon several factors, the sinus chiefly involved giving the predominate tone or color, the acuity or chronicity of infection, the physical condition and the mental make-up of the patient all influence the symptoms. Headache is probably the most universal of all symptoms, at one time or another. It may or may not be definite in its location. Skillern has given certain areas as being relatively characteristic, over the brow indicative of maxillary or frontal suppuration, frontal headache from frontal sinusitis of a chronic type, vertex pain from the ethmoid and sphenoid, pain in the occiput from the sphenoid. The eye relationships of sinus disease have been very much stressed of late, and it seems likely that we will find among the mass of superstitions a grain of truth in old supposed relationship between the teeth and the eyes; in this respect, removal of the diseased tooth tends to clear up the antrum irritation and with it the eye condition which has been secondary to sinus diseases.

Diagnosis of sinusitis.—Symptoms before mentioned, headache, eye disturbances, evidences of focal infection, are all suggestive, but all subjective symptoms are of only relative value. Pain in these cases may be far from the sinus involved, even down the neck and arm, the so-called Sluder syndrome.

The objective symptoms vary with the clinical type and should be checked by radiograph for a proper anatomical study, if nothing else. The acute and chronic catarrhal sinusitis will show merely a nasal hypersecretion, difficult to distinguish from an acute rhinitis or hypertrophic rhinitis, and not necessary so to do, for usually they are analogous conditions. No free pus, no pus on aspiration, negative transillumination in a typical case, negative radiograph, and responding to cleansing the nasal mucosa, attention to diet, exercise, and dress, and mild astringent antiseptic tamponing.

Acute suppurative sinusitis offers relatively no difficulty in diagnosis; the patient is sick; there is a mild leucocytosis, unless complicated, then the disease may be almost fulminating in its course. The severity depends upon the infective organism; there is foul pus in infections from dental origin; the speculum and head light show free pus, but needs a nonyellow light of high intensity, such as the Leitz midget arc, or Spencer microscope lamp; there is pain over the affected sinuses and local signs of inflammation; the condition usually clears on rest in bed, suction, followed by irrigation to remove secretions, and then tamponing with antiseptics or using the Arbuckle syringe, filling the recesses beneath the turbinates with 1 or 2 per cent mercurochrome solution. Transillumination shows dark areas, and X-ray examination shows partial or complete opacity, more likely partial, for X-ray changes are not necessarily due to pus or fluid, but more often to bony modifications; if uncomplicated, healing is rapid. If drainage can not be established by medicinal therapy, surgical intervention is needed, depending upon the sinus. In the antrum a preturbinal opening and lavage through a Eustachian catheter or Killian canula is indicated. In case of the upper sinus group, resection of the anterior end of the middle turbinate, and external operations are required only if constitutional symptoms are marked.

Chronic suppurative sinusitis is a sign that both nature and man's effort have failed. Drainage has not taken place freely enough, changes have occurred in the mucosa and in the bone, and surgical treatment is the rule.

Radiographs are here invaluable, and can not be replaced or substituted by transillumination. The original infective agents have often been replaced by secondary infections, and microscopic findings are not much to be relied upon.

For anatomical relationship, when the financial resources of the patient are limited, an anterior-posterior view will usually suffice, and is preferred. The white blood count is of relatively little value. There are usually a secondary anemia, pain, headache, frequent eye manifestations, and in the transillumination and radiograph findings make the diagnostic picture.

Operative interference is necessary, usually of a radical nature. For the antrum, the Luc-Caldwell or one of its modifications is indicated, bearing in mind the danger of devitalizing two or more teeth; in the case of the frontal, a Killian, Coakley, Lynch, or a modification of these methods, attempting to preserve the facial symmetry; if only the sphenoids or ethmoids are involved, the intranasal operation of Sluder affords the safest procedure.

The hyperplastic type is associated with a hyperplastic rhinitis; polypoid degeneration is frequent; grossly, there is a choking of the upper nares, from the middle turbinate upward. The mucosa shows a condition similar to that in hay fever. While no macroscopic pus may be noted, microscopic pus is found, and here is when extremely good illumination is essential, and the use of the Leitz arc lamp with its carbons or the Spencer microscope lamp is invaluable. This condition is termed by Beck hyperplastic rhinosinusitis, and can offer great trouble in diagnosis, and is of great importance in the sphenoid and posterior ethmoids. The inflammatory processes involve the nerve trunks and give the referred pain and neuralgia, and show relatively little to the usual head light and speculum examination.

The high-power arc lamp and the use of the nasopharyngoscope are here essential, and a Wappler invention with a straight trochar and canula enable an intraantral inspection as well.

Hyperplastic inflammatory changes account for the failure to relieve symptoms by surgical intervention in the posterior ethmoid and sphenoid sinuses, small areas of edematous tissue cause nerve disturbance which does not stop when the sphenopalatine ganglion is cocainized, for the pain arises in the sphenoid and the ganglion is peripheral to the seat of the pain.

Profuse intermittent discharge of a watery character simulating hay fever is frequently found in these cases. Treatment requires the greatest patience and is combined medical and surgical; resection of the middle turbinate, opening and draining the sphenoid and posterior ethmoids frequently is resorted to. General systemic treatment is always necessary and the possibility of an anaphylaxis is not to be overlooked as a contributory factor. The usual local medicinal measures cleansing solutions of an alkaline, nonirritating character, pressure massage of the inferior turbinates, packing, and occasional linear cauterization of the inferior turbinates or a shearing away of the redundant tissue of the lower border are all, at times, indicated.

Atrophic rhinitis and rhinosinusitis is characterized by an atrophy of the mucosa, a rarefaction of the bones of the turbinates, especially the lower, and is by some authorities presumed to have its origin as a sinusitis, particularly of the antrum. Treatment has not been of a highly successful nature in the true cases. The ethmoids and antrum are chiefly involved, and after the use of iodine-glycerine or ichthyol-glycerine tampons, mercurochrome irrigations, and packing, some surgical attempt is usually made to clear out the affected sinuses and reduce the gaping apertures caused by the atrophy of the mucosa. These cases complain of an inability to breathe freely and this is theoretically due to the layer of stagnant air along the sides of the nares, the current being confined to the middle. The impression of the patient is that there is an obstruction, whereas, in fact, the aperture is much larger than normal, and by means of a Glatzel mirror it can be shown that he expels a tremendous blast. Surgically, an attempt is made to clear out the diseased tissue of the antrum and ethmoids and bring the freshened edge of the inferior turbinate over to a freshened area along the septum and secure it there by heavy suture. This tends to do away with the diseased areas, make free drainage into the antrum, and reduce at the same time the widened channels.

Vacuum sinusitis affects the frontal, is influenced a great deal by a high narrow nose, high palatal arch, enlargement of the middle turbinates, or an engorgement of the mucosa of the superior meatus. The normal ventilation of the ostia is interfered with and vacuum headaches arise. In this connection, the rarity of true sinusitis among the negroes may be noted, polypoid degenerations are sometimes found, luetic bone changes are common, but a true sinusitis is rare. This is probably due to facility of ventilation and drainage with their low noses and rather wide chambers; it is certainly not due to their freedom from affections of the upper respiratory tract. In the vacuum cases, correction of septal deflections, fracturing the middle turbinate toward the septum, or removal of its anterior end is usually successful. Preliminary to that, shrinking with weak cocaine and adrenalin solutions, the application of astringents should be attempted and will usually afford, at least, a temporary relief.

Mucocele, characterized by slow progress and little pain, due to closure of the natural drainage channels and accumulation of secretions, affects usually the frontal and ethmoid cells. It may undergo secondary infection and by absorption of the water elements has been reported as becoming more or less solid or caseous. This condition can best be diagnosed by the X ray, when the large cell with thin walls will attract immediate attention; relief is, of course, by surgical measures.

Luetic involvement is protean in character, affects the sinuses as well as the other parts of the body, characterized as usual by an obliterating endarteritis and a rarefying osteitis; operative exposure may show thin crumbling sinus walls or absence of bony structure over large areas. It yields in its syphilitic phase to the usual treatment and the local condition is handled symptomatically, depending entirely upon the type of sinusitis it simulates.

Malignant diseases of the sinuses are relatively rare; probably the most commonly found is involvement of the antrum arising from an irritative focus around an infected tooth socket but may arise independently. There is often a persistent dental neuralgia, sometimes a first and always a most distressing symptom, and one which has led to grave errors in diagnosis until irreparable damage has been done. The treatment is that of malignancy elsewhere, modified by the anatomical relationships peculiar to the region involved.

In any of the suppurative conditions, there may arise an osteomyelitis, from direct extension of the infection to the bony walls. It may follow surgical intervention with the necessary breaking down of the natural protective barriers; particularly is this true in the case of the frontal where the periosteun has been stripped from the bone extensively, and this is one of the advantages of the Lynch operation and also of Coakley's modification of the Killian. Treatment of sinus osteomyelitis is the same as in other regions, removal of the dead bone, free drainage and attention to the general health. The question of vaccine therapy in suppurations of the paranasal cells has been, by the majority, answered in the negative; that is, no particular value has been found. As a means of raising the resistance and increasing the bactericidal power of the blood, there are circumstances in which it is advisable, but the low index of absorption from the sinuses is well known and probably accounts for the relative rarity of systemic infections from sinus suppurations. Large collections of pus are found that have been known to exist for years with but little apparent deterioration in the general health.

The question of the pathology found in the antrum is of special import to those dealing with such contiguous structures as the teeth and jaws and influences the surgical methods of attack and treatment. The operations purely dental in character have been the removal of the second bicuspid or the first molar tooth and an exposure and penetration of the antral floor working from the root cavities. With this, as with the occasional unintentional penetration of the antrum, recoveries frequently do take place, but either with this or with the radical alveolar operation it is impossible to inspect the cavity throughout or to remove the broken-down and hyperplastic mucosa. This is particularly true of the angles and that area of polypoid degeneration so frequently found in the recess between the eye and the ethmoid, possibly of ethmoid origin. It has the further objection of leaving a wound communicating with the mouth, and I can not feel that it is a modern, reasonable, surgical procedure except in isolated cases such as a limited neoplasm around a tooth socket. If a simple procedure will suffice, the preturbinal operation of Skillern is preferable, or the infraturbinal resection of the wall as done by Arbuckle and Sluder. In a chronic case when simple antrum irrigations have failed, or when after thorough cleansing of the antrum, the X ray and transillumination show marked opacity, indicating thickened degenerated or polypoid mucosa, bone changes, or the presence of pockets and septa, there is but one suitable form of operative procedure, and that is the Luc-Caldwell operation or one of its modifications. The more radical procedure of Denker is not often indicated, for with the removal of the anterior inferior angle, there sometimes occurs a dipping or a depression of the side of the nose, at the ala. This may also occur in the Canfield intranasal operation and in the case of women is strictly to be avoided.

There seems to be both among the medical and dental professions an exaggerated idea of the dangers of external operative methods. After the usual Luc-Caldwell operation or modification, the hospitalization is but a few days. This operation is best done under a general anæsthesia but it can be done in the average case under local, and the loss of time is not much more than a week among the industrial classes. We all know that the loss of time in the usual convalescence is measured to a great extent by a patient's ability to take that time; the spur of necessity is the greatest incentive to a speedy recovery. There is one phase of this question which lies almost entirely in your hands and that is the prevention of the sinus cases of dental origin. Whether it be only 8 per cent as held by Hajek, or the more likely 20 to 30, as computed by Skillern, still the number is tremendously large when we consider that 30 per cent of cases are shown by post-mortem to have had sinus involvement of macroscopic intensity. The advances in surgical dentistry to which you are all contributing will, no doubt, enable us to cut down a large number of these cases. The prompt recognition by the rhinologist of the importance of a clean mouth and his immediate cooperation with the dental surgeon, in convincing the patient of the necessity of treatment of teeth which to his mind give no trouble, will enable us to add a great deal to the comfort and probably appreciably to the length of life.

THE EFFECTS OF CASTELA NICHOLSONI IN THE TREATMENT OF CHRONIC AMOEBIC DYSENTERY[1]

By G. R. W. French, Lieutenant Commander, Medical Corps, United States Navy, and A. W. Sellards, M. D.

During the winter of 1923, some chronic cases of amoebic dysentery were treated at the Chelsea naval hospital. There were admitted in all 17 patients showing active symptoms of dysentery with *Entamoeba histolytica* present in the stools. These men, veterans of the World War, had been infected for periods varying from three to six years. As would be expected, the treatment of these long-standing infections proved to be difficult. In this paper we will consider, primarily, the therapy of chronic amoebic dysentery as contrasted with the earlier stages of this disease.

History of cases.—The majority of these patients contracted amœbic infection either in France or in the southern part of the United States; a few were infected in the Orient. For our present purposes we are concerned chiefly with the previous treatment which these men had received. According to their own statements, they had had extensive courses of emetine, which did them "no good," and they were almost unanimous in their opinion that they did not want any more emetine.

The authorities of some of the hospitals where these patients had formerly been admitted very kindly furnished us records of their treatment. These data are not complete for any given individual as it was naturally not possible to trace a complete series of records extending over a period of several years. The outstanding feature is that emetine had been used almost exclusively by injection in the form of the hydrochloride. In no instance was the use of emetine bismuthous iodide reported. In some instances small doses of emetine were used for only a short period of time, such as one-half grain daily for five days or a total of 5 grains during a period of one week. Other patients received more intensive treatment such as 1 grain daily subcutaneously for 10 days, this course being repeated several times at intervals of a few weeks or months. In one instance, 14½ grains of emetine were given hypodermically in conjunction with the oral administration of 450 grains of ipecac in nine days.

From talking to these patients, one might readily assume that these cases constitute evidence of the existence of the so-called emetine resistant strains of amœbæ. The data available in their records do not bear out this assumption. According to the more recently developed plan of treatment, the minimum course of emetine consists either in 3 grains daily of emetine bismuthous iodide by mouth for

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[1] From the U. S. Naval Hospital, Chelsea, Mass., and The Harvard Medical School, Department of Tropical Medicine.

12 consecutive days or, following Wenyon and O'Connor's (1) régime, 1½ grains of emetine hydrochloride daily for 12 days, 1 grain being given by injection and one-half grain by mouth.

Treatment of cases.—In the following discussion of treatment, we will consider only the effects of drugs, omitting the important accessary factors such as diet and rest. Attention will be directed principally to *Castela nicholsoni* (chaparro amargosa), emetine and, as a palliative measure, to bismuth subnitrate.

Castela nicholsoni.—For treatment with castela, we wish to emphasize the necessity of using potent extracts administering practically the maximum tolerated dosage. No consistent results can be expected from the use of weak extracts of entirely unknown strength. According to the prevailing instructions, a weak aqueous decoction or infusion of the plant should be given in liberal amounts. This method represents only the initial step in the difficult process of the development of a new drug. In practice, it probably means that dosages far below the tolerated amount have been employed as indicated by some of the unfavorable results which have been reported (2).

Standardization of dosage.—We appreciate clearly the need of some reliable method for determining the efficacy of preparations of castela. This is particularly difficult, considering that the active principle has not been definitely determined, though it is very probably a glucoside (3). In the absence of a more satisfactory procedure, we have continued a method which we have previously employed of estimating the fatal dose of a given preparation for laboratory animals.

Method of preparation.—In brief, the twigs and finer branches of the plant are ground to a fine powder. One kilo of this powder is extracted by boiling for several hours with chemically pure methyl alcohol. In the absence of commercial equipment for complete and economic extraction, we have used simply a return condenser. This alcoholic extraction takes out the greater portion of the bitter principle, the gums and the resins and the chlorophyll, leaving behind the starchy matter. The alcohol is now completely evaporated at low temperature and an abundant dark tarry residue remains. This residue is extracted with small portions of water, using a total of 100 cubic centimeters. This procedure gets rid of the mass of gums, resins, and chlorophyll. The extract is of a clear brown color, intensely bitter and intensely toxic.

Such an extract of the stock of castela which we are using will, on subcutaneous injection, kill ordinary guinea pigs (300 g.) in a day in dosages of about 0.3 c. c. Estimations have always been made on the basis of the body weight. The different lots of the extract have run almost uniformly at 1 c. c. per kilo of body weight. This extract is also acutely fatal on subcutaneous injection in rabbits and on oral administration in kittens in approximately the same amounts that kill guinea pigs, corrections being made, of course, for the difference in body weight. Kittens receiving fatal doses by mouth develop an acute diarrhea.

With preparations of this strength, we have used 3 c. c. as a dosage for adults as a routine in the cases recorded in this paper; a maximum dosage of 5 c. c. was employed for one or two exceptionally large and heavy men. On the basis of a body weight of 60 kilos, this quantity of 3 c. c. represents 0.05 c. c. per kilo of body weight or 0.05 of the dosage per kilo, which is acutely fatal for guinea pigs. In a general way, this amount of 3 c. c. was given once daily for approximately two weeks. It was diluted well in a glass of water and given with the evening meal. On account of its intensely bitter taste, food should be *immediately* available. It is stimulating to the appetite and appealed very distinctly to the imagination of the patients. We have not yet determined the maximum dosage which can be used therapeutically with safety nor the total length of time which treatment can be continued without danger.

This more or less empirical mode of preparation and treatment gave better results than were obtained with dilute aqueous extracts or tinctures. Our own work has shown that the purified bitter principle of the drug is very difficultly soluble in water (1-5000) and it is quite possible that the impurities of the crude extract may be of some advantage in keeping the active principle in solution.

Response of patients to castela.—Our observations on the effect of castela in this series of cases are fragmentary, consisting chiefly of the immediate effect of the drug in a total of 16 cases showing acute symptoms. There was extreme variation in the response of the individual patients. Symptomatic relief was obtained in the majority. However, in five patients, the stools, though free of blood, continued to show either cysts or motile amoebae. In eleven cases the stools became temporarily free of amoebae. Indeed, in six patients the immediate response was almost magical, the symptoms clearing up and the amoebae disappearing in two to three days, but cysts appeared, however, in practically all cases shortly (about one week) after the cessation of treatment. In five cases, the pathogenicity of the cysts was proven by inoculation in kittens.

The general effects of treatment with castela are shown in Table I.

Table I.—*Treatment of chronic amoebic dysentery with Castela nicholsoni*

Case No.	Duration of treatment in days	Examinations for amoebae		Remarks
		Day of disappearance under treatment	Day of reappearance after cessation of treatment	
1	10	Amoebae persisted		Changed to emetine bismuthous iodide.
2	14	do		Second course of castela after interval of 8 days.
	16	Cysts only		Symptomatic improvement.
3	18	Amoebae persisted		Second course of castela after interval of 8 days.
	6	Sixth		Transferred to emetine bismuthous iodide.
4	14	Amoebae persisted		Second course of castela after interval of 11 days.
	14	Cysts only		Symptoms cleared up.
5	17	Amoebae persisted		Symptomatic improvement.
6	16	Tenth	Ninth (trophozoites).	
7	12	Eleventh		
8	15	Seventh		
9	14	(?)	Fourth (trophozoites).	Second course of castela after interval of 6 days.
	17	Fifth		No earlier observations.
10	12	Second	Sixth (cysts)	
11	9	Third	Eighth (cysts)	
12	19	Second	Ninth (cysts)	
13	17	Third	Seventh (cysts)	
14	14	Third	Thirteenth (cysts)	
15	14	(?)	Sixth (cysts)	
16	14	Second	Sixth (cysts)	

The data concerning the individual cases is not adequate enough to justify any detailed analysis. Some striking contrasts, however, developed. Two men (cases Nos. 12 and 3) were admitted at the same time, both passing frequent bloody stools almost free of fecal matter and very rich in motile amœbæ. The duration of the disease in both of these men was of long standing, namely, four and one-half years for one (No. 3) and six years for the other (No. 12). The general physical condition of both patients was only fairly good. As far as could be determined from their general and special examinations they were in almost identically the same condition. Identical treatment with castela was started simultaneously for these two men. One (No. 12) responded almost "over night," as it were; the other (No. 3) proved to be one of the most intractable infections of this series, but eventually became free of symptoms and the amœbæ disappeared temporarily from the stools under treatment with castela.

It is difficult to avoid a little speculation concerning the important practical question of this marked difference in response to treatment. There is no real evidence of the development of "emetine-resistant" strains of amœbæ, and, fortunately, in this case it is not possible to hypothecate a "castelafast" strain. In brief, we are inclined to the view that treatment may well become much more difficult when the infection is extensive and when it has penetrated deeply into the tissues of the bowel wall. We have no direct evidence, but this view is reflected from previous experience in the treatment of acute amœbic dysentery in cats (4). The experimental disease in these animals could be controlled by early treatment, but the same therapeutic measures practically failed to influence the disease after it was well established.

One additional patient with acute symptoms is not recorded in Table I because he refused to persist in any course of treatment for more than a few days at a time. Castela was administered for six consecutive days but no improvement occurred. He represents, therefore, one more failure to obtain immediate response to castela.

In contrast to these patients, an adult in civil life was treated at the same time with the same stock of castela. He had been infected for about two years. However, the disease from the very beginning had been kept in symptomatic control so completely with emetine and emetine bismuthous iodide that the patient thought himself cured in all probability. An examination of a stool specimen showed a small amount of blood and fairly numerous actively motile *E. histolytica* containing red cells. A single course of castela was given. On the third day of treatment, constipation set in and the amœbæ disappeared from the stools. After an interval of seven months, there has been no return of symptoms and a thorough examination of fresh specimens of stool failed to show any amœbæ.

Emetine.—The preceding results show conclusively that a single course of fairly intensive doses of castela is not sufficient to eradicate long-standing amœbic infections. The primary object of this work was the restoration of these men to a reasonably good condition of health as promptly as possible. The reports concerning the eradication of amœbæ in carriers with emetine bismuthous iodide are on the whole rather favorable. Accordingly as soon as cysts appeared in the stools after treatment with castela, the patients were put on emetine bismuthous iodide. This change cost us a considerable proportion of the rather brief time which these patients were willing to remain in the hospital. The inherent difficulties in the use of emetine bismuthous iodide are sometimes considerable, especially in dealing with a group of patients who had lost confidence in this drug. Under these special circumstances we were not able to obtain any satisfactory test of the bismuthous iodide preparation.

In the first course of treatment, the usual 3-grain doses of emetine bismuthous iodide were given each evening for 12 consecutive days. We employed the salol coated pills prepared by a very reliable British firm, but one of the usual difficulties was encountered. The response of the patients was poor, and we found, as might be expected, that in many instances the pills were passing through the intestinal tract unchanged.

In attempting the use of emetine bismuthous iodide in ordinary gelatine capsules, only one patient of the series persisted in a complete course of 12 days of treatment. The other patients, after one or two days, refused treatment on account of nausea and vomiting; in a few instances the symptoms were so severe that one could not even urge continuance of the treatment.

The one patient (No. 8) who took a 12-day course of emetine bismuthous iodide in capsules was given castela simultaneously at his own request. He stood the combined treatment fairly well, except that there was some loss of weight and also of strength. The symptoms and the amœbæ disappeared promptly under treatment. Even the immediate results after cessation of treatment in this man are not known as he left the hospital on the last day of treatment. A letter from him eight months later, however, states that he has had as yet no return of symptoms.

In continuing the attempt to administer emetine bismuthous iodide, the pharmacist of this hospital prepared pills freshly and lightly coated with salol. Even with this procedure, nausea was sometimes a trobulesome factor. Only a few of the patients would persist in this treatment, but in some instances the immediate therapeutic result was excellent. Inasmuch as we have no information concerning the final results of treatment, these cases will not be described in detail, since they add nothing to the more complete records already reported concerning the effect of emetine bismuthous iodide. Indeed the majority of this group of patients as soon as they were free from symptoms insisted on leaving the hospital for business or family reasons, although amœbæ (cysts) were still present in their stools, and they were told, without qualification of the statement, that the symptoms would return.

A few attempts were made to use emetine hydrochloride by rectum (one grain in 200 to 300 c. c. of saline), but the resulting irritation proved so troublesome that the form of administration was discontinued.

Bismuth subnitrate.—Occasionally very favorable reports appear concerning the use of bismuth subnitrate in amœbic dysentary. We have used it in heaping teaspoonful doses every four hours, giving it well mixed in aerated water. It affords valuable palliative relief during the intervals between intensive courses of treatment. We have not succeeded in eradicating any amœbic infections by its use. It was employed in four cases in the series for periods of approximately two weeks.

DISCUSSION

Sixteen cases of long standing amœbic dysentery were treated during an exacerbation with a preparation of *Castela nicholsoni.* The therapeutic results varied widely. In about one-third of the cases the immediate results were almost spectacular, the symptoms and amœbæ disappearing in two or three days; in another third of this group the same improvement occurred but much less promptly; in the remaining third the results were poor. More precisely, the amœbæ disappeared in 11 of the 16 cases, but on an average of about one week after treatment was discontinued cysts were found in the stools.

We have emphasized the importance of using potent preparations of castela. We have not, however, determined either the maximum tolerated dosage of this drug nor the total period of time for which it can be used continuously. In one case effective therapeutic doses were continued for 19 consecutive days.

In contrast to emetine and its derivatives, preparations of castela can be administered easily and pleasantly by mouth. It is an excellent stimulant to the appetite and patients tend to gain rather than lose weight while under treatment.

In our opinion castela, when properly used, is equally or slightly more effective than emetine in amœbic dysentery. Moreover, it can be employed without risk attendant in the use of maximal doses of emetine. Neither drug has proved adequate in chronic amœbiasis, though castela merits much more investigation.

In conclusion, it is hardly necessary to point out that these cases emphasize very strongly the urgency of treating amœbic infections very early and intensively. In our opinion the refractory behavior of long-standing infections is probably due, in a large measure, to the extensive and deep-seated nature of the amœbic lesions rather than primarily to the existence of a drug-resistant strain of amœbæ.

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A PRELIMINARY NOTE ON A PROCEDURE FOR CLEARING UP DIPHTHERIA CARRIERS

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

So far as I know, the observations herein made are original with the writer and are passed along in the hope that other medical officers, both in the Navy and civil life, may have an opportunity to try this procedure and report upon their success with it. The original observation occurred while I was on duty at the United States submarine base, San Pedro, Calif., where in clearing up a small epidemic of diphtheria in one of the schools attached to that base, we got hold of one carrier who failed to respond to any and all of the known methods for handling these cases. While under observation by us, he developed acute appendicitis, and it became necessary to operate upon him. Following the ether anesthesia, we were never able to get a positive culture from his nose and throat.

Upon my arrival at this hospital for duty, there was carried in the sick officers' quarters, an officer patient who was a diphtheria carrier. I related my experience to Lieutenant Commander Mears, and this officer then began with ether inhalations upon his patient. Inhalations were given every morning for a period of approximately five minutes with an open method, sufficient ether only being given to produce marked drowsiness. Following the fourth inhalation, his nose and throat became negative. After a period of rest, psuedodiphtheria organisms were found in the nose and throat, and these in turn disappeared. following four other inhalations and his throat remained negative. Since that time, three enlisted men in the contagious wards persistently carried diphtheria organisms after an attack of diphtheria, and in every instance their throats and noses became negative after five mornings of inhalations and remained negative.

The writer realizes that five incidental cases do not definitely establish anything, but the importance of clearing up carriers of various sorts in the naval service is of sufficient moment that he feels that he should report the procedure in order that its merits or demerits may be determined.

THE PREPARATION OF COLLOIDAL GOLD

By C. F. Behrens, Lieutenant, Medical Corps, United States Navy

Colloidal gold, as most will recall, is formed by the reduction of acid chloride of gold in dilute solution and at high temperature by formaldehyde, following a preliminary addition of potassium carbonate solution to secure the necessary proper reaction. Now, although this process does not seem difficult, yet it has always been a troublesome and frequently an exasperating procedure. Certain experiences, therefore, of a helpful nature that we have had in the laboratory at the naval hospital, Norfolk, Va., may prove of some interest.

To begin with, it was found that the potassium carbonate was at the bottom of most the trouble experienced. Almost every time the final product was unsatisfactory, the difficulty was traced to this substance. On one occasion, when the colloidal gold failed to develop the proper color, the failure was found to be due to the carbonate solution not being freshly prepared. Again, an unsatisfactory result was obtained because of an inferior grade, and finally, on a third occasion, trouble was experienced because the solid carbonate had deteriorated, probably on account of carelessness in stoppering the bottle in which it was contained. In some of these instances it was noted that reducing the amount of carbonate would remedy the difficulty somewhat, but naturally one prefers to use standard amounts of a satisfactory solution rather than to tinker around with unsatisfactory solutions. Thus we would emphasize not only the need of using a high grade of potassium carbonate, which has been carefully preserved, but also the necessity of employing a solution not over a day old.

In regard to the water used in making colloidal gold, it was found that the triple distilled variety, usually recommended, could be dispensed with. Singly distilled water from an all metal still of the automatic type was substituted, without experiencing any trouble. The water should, however, be practically ammonia free and thus the addition of 2 c. c. of Nesler's solution to about 25 c. c. water in a Nesler jar should cause no more than an exceedingly faint yellowing. Rubber or cork connection in the distilling apparatus are accordingly not to be used.

A proper grade of formaldehyde solution can be made by distilling commercial formalin as described in the last edition of Stitt's Practical Bacteriology, Blood Work, and Parasitology. Five hundred c. c. are subject to distillation, and about the first 150 c. c. of distillate discarded to get rid of methyl alcohol. The next 100 c. c. are collected for use. This fraction of the distillate, we found could be used without a preliminary titration. It suffices to add it cautiously a drop at a time until the initial pink develops.

In regard to the acid gold chloride, a high grade is necessary, and Merck's is usually recommended in textbooks. We have never had trouble with it.

Finally, as the method used may possibly be of interest, I will state it briefly. Although it may perhaps seem crude, nevertheless, the colloidal gold thus prepared has proved quite satisfactory.

Place 1,000 c. c. water in a large Florence flask and heat rapidly to 60° C. using a Bunsen burner. Then add 10 c. c. of 1 per cent solution of acid gold chloride (Merck's) and shake the flask vigorously. Follow this by the addition of 7 c. c. of a freshly prepared 2 per cent solution of potassium carbonate, and again shake the flask well. Resume heating until the temperature reaches about 97° C. (almost boiling). Then remove the flask from flame and while shaking it vigorously add the distilled formaldehyde solution, drop by drop, until the faint initial pink develops. (Usually about 0.3 c. c. is required.) Continue shaking the substance until the color change is complete (a brilliant salmon to cherry red without purple tint and showing a slight metallic sheen by reflected light). After cooling and passing customary tests the product is ready for use.

CLINICAL NOTES

REPORT OF A CASE OF OSTEOMYELITIS OF THE DORSAL SPINE

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

The case herein reported was one which I had the pleasure of operating upon while on duty at the United States Naval Hospital, Great Lakes, Ill. The case itself was so interesting and unusual that I requested Lieutenant Commander Dallas G. Sutton to be good enough to follow the case for me and to forward me the record as progress was noted so that I could report it in the U. S. NAVAL MEDICAL BULLETIN.

The full case record is herewith submitted, and in so doing, I desire to acknowledge the assistance rendered to me by Lieutenant Commander Sutton, and by various of his assistants among the junior medical officers who from time to time have had the care of O. B. B. at the naval hospital, Great Lakes.

Name: O. B. B. Organization: U. S. N. R. F., fireman 1c. Admitted: 12 May, 1922. Nativity: United States. Age: 33, white. Occupation: Locomotive fireman. Social status: Single. Date of enlistment: 16 May, 1918. Date of discharge: 13 August, 1919. Diagnosis on admission: Paraplegia, intercostal neuritis, rheumatism. Status on admission: Patient walks with cane in right hand, complains of pain in shoulder blades, also pain in right chest, and weakness in legs.

Family history: Father died at age of 66 of heart disease. Mother living, age 60, well. One brother living and well. Patient states that there are no nervous or mental diseases in the family.

Personal history: The patient had measles and mumps when a child, no diphtheria, scarlet fever, or meningitis. Was never troubled with nightmares, night terrors, or bed wetting during childhood. Started school at the age of 6 years and finished the eighth grade at 14 years of age.

Industrial history: After leaving school, he worked as a laborer, as a seaman, as an engine watchman, and then as an engine wiper in a roundhouse for two years. He then began firing a locomotive on the road, which work he followed from 1919 until the time of his enlistment. His wages as a fireman were $27 per week. After leaving the service, in August, 1919, he began work on his old job of locomotive fireman, continuing this work until March 18, 1921. His wages during the year of 1920 averaged $2,690 for the year. Because firing on the road called for too much exertion, the patient returned to work in the roundhouse in November, 1921, where he continued working until March 17, 1922, when he was compelled to give up this position due to physical disability. He did no work from that date until the day of his admission to this hospital.

Military history: The patient enlisted in the Reserve Force of the United States Navy at Milwaukee, Wis., and was transferred to the United States Naval Training Station, Great Lakes, Ill., about May 16, 1918. While at this training station, the patient slept in a tent and caught considerable cold and suffered somewhat with rheumatism. He was later transferred to Norfolk, Va. While in Norfolk, he fell from a hammock a few days before he was transferred to the U. S. S. *Wisconsin*, on June 24, 1918, and struck the upper part of his back. From that time on this injury caused considerable pain, but on account of his being in a draft to go to another ship in a few days, the injury was not reported, as he believed it would be better in a short time. About the time of this injury, the patient also had the influenza for a few days.

Present illness: Before discharge.—The patient had rheumatism while at Great Lakes; influenza while at Norfolk, Va., and an injury to the upper part of his dorsal spine while at Norfolk, Va. This injury did not cause much trouble at the time, but later he noticed, when doing heavy work, he would frequently have a stitch in his back which would compel him to straighten up and rest. This pain was not severe, but was more or less constant. This disability was not sufficient at any time to cause the patient to seek treatment or to be placed on the sick list.

After discharge.—In the fall of 1919 the pain in his back having continued he consulted Dr. Isaac Scott of Michigamme, Mich., who, after examining him, believed that he was suffering from intercostal neuralgia and treated the case as such. In December, 1919, the pain was more severe and radiated around to the right shoulder and right chest. He was treated at this time for neuritis and rheumatism. In the spring of 1920 the pain and discomfort was greater and he began to favor himself as much as possible. This condition continued, and in September, 1920, he again consulted his doctor who made a thorough examination and no disease was found. The case was still considered to be one of intercostal neuralgia, neuritis or rheumatism.

About this time he found that the work of firing the locomotive on the road was too heavy and he was compelled to give up firing and the company gave him his old job in the roundhouse. The patient states that during this period he was so stiff and had such pain in his back and shoulder that it was difficult for him to get out of bed in the morning. He was compelled to use his hands and arms to help himself to get started. This condition continued through the year 1921.

In October, 1921, the patient entered the Mayo Clinic at Rochester, Minn., for examination and treatment. The diagnosis in the Mayo Clinic was intercostal neuralgia. He was discharged as not improved. During the winter of 1921 and 1922 he had difficulty in performing light work at the roundhouse, and toward spring of 1922 there began an increasing weakness in the legs.

There was pain in the chest, more marked on the right side, which also radiated to the right arm. Later the pain was felt in the lower right side of the abdomen and down the right leg. At this time he began to have constipation and increasing difficulty with the lower bowel. In March, 1922, his disability became so great that he gave up his position.

On admission to this hospital physical examination was as follows: The patient appeared sick, his skin was soft and moist. The skin of the face was covered with perspiration and had a greasy appearance resembling that following the sepsis of rheumatic infection. His general nutrition was good. Muscular development was good. His teeth are in fair condition. Nasal septum slightly deviated to the left. Tonsils were small and apparently not diseased. Thyroid not enlarged and no enlargements of the cervical glands.

Chest: The spine curves to the left, left shoulder was high, shape of the chest is emphysematous, intercostal muscles apparently contracted, mobility of the entire chest less than 1 inch expansion, the ribs were apparently fixed.

Lungs: There appeared to be impaired resonance in the upper half of the righ lung, posteriorly; left lung was hyperresonant. Auscultation: Right lung had fine breadth sounds, which appear distant. At the right of the fourth vertebra posteriorly, there is an area of marked bronchial breathing. Left lung gives the usual vesicular breathing, but the sounds are difficult to get because of the fixation of the chest.

Heart: This organ was slightly enlarged to the left, but a distended abdomen may cause the apparent change. Rate regular, 74; blood pressure—systolic, 142; diastolic, 95. Abdomen, considerably distended. Genitourinary system, no scars, sphincters in control, but as noted above there has been more or less constipation.

Joints and extremities: Upper extremities, no abnormal findings. Lower extremities show muscular weakness (see neurological examination).

Wounds and scars: None present; but over the third and the fourth dorsal vertebra, where the patient thought he had his injury, there is an area which shows tenderness to pressure.

Summary: The chest is fixed in expansion, probably due to pain and not to emphysema. General appearance of the face is toxic. Blood pressure a little above normal for his age. Patient uses a cane because of the weakness of the legs.

Neurological examination: The shoulders are stooped, the spine is curved to the left and forward. Facial expression one of pain. Motor symptoms: The patient shows weakness of both legs, most marked in the anterior tibials, as there is a slight toe-drag. No atrophy noticed at present. Muscle tone of the legs very poor.

Reflexes: Triceps, biceps, supinator longus, knee jerks, tendo-Achilles, are all markedly increased on the right. Slightly increased or normal on the left. Ankle clonus on the right is questionable, none present on the left. No Babinski on either side. Skin muscle reflexes, epigastric, cremasteric, and abdominal, are all absent. Plantar reflexes present. Organic reflexes: Pupils right and left are both dilated, but react quickly to light and accommodation. Rectal reflexes impaired, vesicle reflex impaired, sexual reflexes absent for over three months.

Coordination: Speech is normal, upper extremities normal. Gait, both toes have tendency for drag. No vertigo. No Romberg. Tremors: There are no tremors with extended hands. No nystagmus of the eye. No tremors of the tongue.

Sensory symptoms: General sensation—The patient has partial anesthesia for the lower extremities up to the waist. Hyperasthesia is found in the upper chest area. Thermal sense normal for the trunk and extremities. Muscle sense is retained. There is considerable myalgia of the right pectoral muscles. Special senses—Sight, smell, taste, and hearing normal. Headaches, none, unless due to constipation.

Trophic and vasomotor symptoms: The skin is moist, texture fine. There are no eruptions. Capillary circulation is normal but the patient complains of coldness in the extremities. Perspiration is excessive, there is no edema. Hair and nails are normal.

Summary: This patient shows symptoms of cord involvement high on the dorsal region but not definitely located by the examination.

Mental examination: No psychosis. Memory, judgment, mental age, etc., that of the average well-educated, observing, skilled mechanic.

Patient under observation: May 12, 1922.—White blood count 14,300 leucocytes, 78 neutrophiles and 21 lymphocytes.

May 15, 1922: Patient's condition is as noted above. Request X ray of the head and chest to show the third and the fourth vertebra particularly. Gastrointestinal series requested in order to exclude points of bowel infection.

May 19, 1922: Pain in right chest continues. Dental department reports no foci of infection in teeth.

May 19, 1922: Chest: Normal from fluoroscopic examination, heart was transverse type and showed increase to the left.

Gastrointestinal tract: There was no 6-hour residue; stomach transverse type; normal size; peristalsis very active; duodenal bulb was small, cone shaped, well defined; greater curvature of stomach was seen at level of crest of ilium; duodenal bulb filled spontaneously; there was no pathology determined in the upper gastrointestinal tract.

Twenty-four-hour examination: Entire large gut was well filled; colon appeared to be abnormally large and atonic; appendix was not seen. Summary: Condition of this man almost was that of a case of Hirsch-Sprung disease. Colon was many times the normal size.

May 22, 1922: Wassermann negative, urine normal with specific gravity 1.030. White blood count, leucocytes 14,100, neutrophiles 53, lymphocytes 47. Gastrointestinal series started. The patient is having increasing difficulty in moving about the ward.

May 24, 1922: The patient's legs are much weaker, toe drop mentioned above has increased. Flexion in the leg and thigh is easily held by the examiner's fingers. Sensation in the lower extremities still present, but diminished. Reflexes in the lower extremities are becoming very active. The patient has been placed in bed. There was a slight evening rise of temperature this date.

May 25, 1922: The patient is unable to hold his weight on his legs, but is able to move his legs about if he is in bed. With a slight temperature of 99½, the patient has profuse perspiration, no delusions, the bowels are constipated, the bladder is still under control. The appearance at the present time is one of spinal pressure, probably of inflammatory type, the exact location not determined, as sensory areas are indefinite, but the lesion is somewhere in the region of the seventh or eighth intercostal nerve. X ray of the vertebræ not taken, as recent exposure from the gastrointestinal series considered sufficient for the time.

The abdomen is tense and bloated, there is no increase of pain in the chest and no increase of tenderness over the third and fourth dorsal spine. Reflexes are much exaggerated. Some retention is present.

May 26, 1922: X ray of dorsal spine shows no pathology where patient states he suffered from an injury.

May 30, 1922: The patient continues as above noted. He is considerably distressed because of abdominal distention. Active treatment of this condition has brought some result. Reflexes are increased. Ankle clonus has become very marked for the first time, most marked in the right ankle. Babinski is also found.

There is a line of anesthesia for skin sensation not definitely limited to about the sixth rib. In testing the legs, cooperation of the patient is quite unreliable as the findings change from time to time. Spinal puncture shows marked increase in leucocytes to 125. Wassermann negative. Globulin slightly increased, colloidal gold no curve, fluid under a moderate amount of pressure.

The patient was catheterized and shows that the incontinence of urine is due to paralysis of the sphincter muscles and not due to retention.

June 4, 1922: Diagnoses considered are transverse myelitis, pressure from bone caries due to the former injury or tumor. The X ray does not bear out caries. History with unilateral symptoms point to tumor. General appearance of toxemia favors the inflammatory process. Operation not advised, while reflexes are increased and symtoms of inflammatory process, which might be within the meninges or cord itself are present.

June 12, 1922: The bowel condition is improved by medication. The bladder shows incontinence of paralysis and not of retention. Movements of the lower extremities have been reported by the nurse and these also have been noted by the medical officer. This symptom is variable and may be due to irritation.

June 20, 1922: Sensation has been lost entirely in the lower extremities and up to the sixth rib on both sides. There is increasing pain in the right chest and arm. Muscle sense is still retained in the lower extremities and body. Thermic sense is lost on above area of anesthesia. Evacuation of the bowel and bladder are involuntary. Reflexes in the legs are decreasing. There is no longer an ankle clonus.

June 24, 1922: Reflexes of the lower extremities which were present a few days ago are now entirely absent. The patient complains of pains more severe than usual in the right chest. The areas of anesthesia are not limited to that of the fifth intercostal nerve and follows its distribution, all below this point being paralyzed and anesthetic.

June 26, 1922: X ray report of the dorsal spine is as follows: Plates: Fourth and fifth dorsal vertebrae show ragged outline and there appears to be some invasion of soft tissue on right side of fourth dorsal, outline of vertebrae is slightly ragged; a positive diagnosis is not made but appearance of plates would strongly suggest a malignancy involving the fourth and the fifth dorsal vertebra.

June 27, 1922: The diagnosis of spinal tumor or inflammatory disease within or adjacent to the cord having been made, operation was considered advisable. On June 27, under ether anesthesia, through a median incision the spinous processes and laminae of the second, third, fourth, and fifth dorsal vertebrae were removed. The laminae on the right side of the second and third vertebrae appeared very friable, easily broken, and bled excessively. The dura was overlaid with what appeared to be a thick pyogenic membrane about two inches long occupying the entire width of the spinal canal.

This membrane was split longitudinally and removed. Because of the general persistent bleeding on approach, the thick pyogenic membrane, the gross appearance of the bone removed at operation, a tentative diagnosis of a low grade chronic osteomyelitis is made, due in all probability to the injury he received when he fell out of his hammock in November three years ago.

July 2, 1922: Fragments of the bone from the above operation and surrounding tissues were sent to the United States naval hospital, Washington, D. C., which reported the presence of osteomyelitis.

July 7, 1922: The patient is recovering well from his operation. There is apparently some return of sensation below the area supplied by the cord of seat of operation, but no distinct improvement is shown to date.

July 12, 1922: A review of this history would indicate that the injury was probably as given by the statement of the patient, although he was never admitted to the sick list, this condition developed into a serious stage within two years after his discharge. This patient will be totally disabled for a long period of time, and the medical officer believes that his case should be completed to date and presented to the Veterans' Bureau for an adjustment of compensation.

Board of medical survey requested.

July 17, 1922: Board of medical survey met this date and found as follows: Diagnosis: Osteomyelitis, second, third, and fourth vertebræ, with pressure symptoms on cord (paraplegia).

July 5, 1922: Incision healing. Slight serous drainage from lower angle of incision; shows slight improvement. Pain sensation on back down to level of second lumbar vertebra.

July 12, 1922: Incision healing nicely, no complications. Pain sensation down to level of fifth lumbar vertebra, slightly lower on left side than right.

July 19, 1922: Incision well healed. Condition otherwise stationary.

August 7, 1922: Sensation and muscular control showing some signs of regeneration. General condition good. Electrotherapy started.

August 21, 1922: General condition good. Suspicion of abscess forming on hip.

August 28, 1922: Buttocks red and inflamed, due to lying in semirecumbent posture. On electrotherapy treatment.

September 15, 1922: Complains of pains in back and chest, constipation, and continual dribbling of urine.

October 1, 1922: Shows some favorable signs of improvement.

October 15, 1922: Slight retention of urine. Examination of urine shows trace of albumin and pus. Placed on mild antiseptic diuretics.

November 1, 1922: S. S. enema daily for bowels. Urine showed slight retention but at times passes quite an amount. Not so much dribbling as previously. Moves lower extremities slightly.

November 15, 1922: Bladder condition cleared up. Appetite good. Moves lower extremities slightly. No pain complained of.

January 15, 1923: Bladder condition improved. Muscles response in legs improving.

February 15, 1923: Condition stationary.

March 15, 1923: Patient believes he is gaining muscular power. On continuous electrotherapeutic treatment. Up in wheel chair. Feels good.

May 15, 1923: States that he is able to get on his knees and roll over. On reeducational movements and electrotherapy.

June 15, 1923: Now able to stand on feet. On reeducational exercise twice daily. Has marked spasticity at times. Sensory areas: Loss of discrimination of temperature below the second dorsal segment, also 2-point discrimination. Loss of bone sense below the fifth dorsal segment. Loss of epicriptic touch right side below second lumbar, partial return in third lumber and first sacral left side below the twelfth dorsal segment. Motor area: Spastic paraplegia with loss of all superficial reflexes below the abdominal, and exaggeration of all deep reflexes. Babinski and clonus. Complete loss of bladder and bowel reflexes.

July 15, 1923: On daily reeducated movements and electrotherapy Condition slowly improving.

August 15, 1923: Has regained control of bladder and bowel reflexes. Condition slightly improved.

September 15, 1923: Daily reeducational movements and electrotherapy.

October 15, 1923: Condition slowly improving.

November 15, 1923: Patient shows loss of bone conduction below the sixth dorsal, loss of pain and temperature discrimination below the tenth dorsal segment. Epicritic touch is lost in the third lumbar on both sides with partial return on the right side. Almost complete return in the first sacral right side. Partial return in the second sacral left and considerable return in the second sacral on the right. Fourth and fifth lumbar practically complete return on the right side. Partial return of sensation in the fourth lumbar on the left. Sacral third, fourth, and fifth are still anesthetic. Return of bladder and bowel reflexes.

In addition to the above case record, I am taking the liberty of quoting the following from the letter of Lieutenant Commander Sutton to me forwarding the case record:

Since you wrote me some time ago B. has made very definite progress and is now able to get out of bed by himself for short periods. The main factor which we had to overcome was the spasticity of the leg muscles. Whenever any attempt was made to reeducate the legs through outlined movements the legs would cross, flex on the abdomen, and in other respects render voluntary movement impossible. Very gradual reeducation under the supervision of the medical officers and trained corpsmen soon began to get results, and now we are planning to still further rehabilitate the legs by work on a machine resembling a tricycle, which is being made. Now, I feel, however, that you may have no hesitancy in reporting the case, for, as the case history indicates, the patient has made very definite improvement and seems well on the road to recovery. The bladder and bowel function is entirely normal. The sensory involvement noted is the only very marked residual. There are no further subjective symptoms and the general physical condition is excellent.

AN UNUSUAL CAUSE FOR FAILURE OF FRACTURE AND AMPUTATED STUMP TO HEAL

By L. H. Williams, Lieutenant, Medical Corps, United States Navy

F. L., a Veterans' Bureau patient, was admitted to the United States Naval Hospital, New York, June 15, 1923, with an unhealed stump of the right leg. The leg had been amputated March, 1923, at the Hospital for Ruptured and Crippled, New York, because of failure of bone grafts to take which had been implanted for relief of nonunion while a patient in that hospital. Two attempts to make bone grafts take were made at the Hospital for Ruptured and Crippled before amputation was decided upon. No blood count was taken at the time of admission to this hospital, as it was not deemed necessary in such a case. The usual means for the healing of the stump were employed but with disappointing results. The uncovered areas over the end of the tibia and fibula would heal almost completely, with only a small sinus leading to the bone ends, remaining so for a few weeks and break down with excoriation of the skin about the sinus. He was discharged to out-patient care at his own request and remained out about two weeks.

On admission to the United States Naval Hospital, New York, he complained of dull pain in left lower chest. A friction rub was discovered over the left base. Consultation with the chief of medical section disclosed a spleen edge felt below the costal margin, hard and tender. The differential blood count showed patient was suffering from myelogenous leukaemia. The blood count at the time, September 16, 1923, was white blood count 232,000, red blood count 4,584,000, myelocytes 41 per cent, neutrophiles 40 per cent, and Hb. 90 per cent.

He was transferred to the General Memorial Hospital in October, 1923, for radium treatment where he was given radium radiation for six hours. After an interval of three months he was readmitted to the naval hospital because of pain in head and abdomen accompanied by dizziness. He also complained of hemorrhoids. He was found to have a flushed facies. The stump remained unhealed and the area of excoriation was considerably larger. The spleen was greatly enlarged, reaching to the level of the umbilicus, hard and tender. There were protruding hemorrhoids. The blood count showed: White blood count 442,000, red blood count 4,480,000, myelocytes 41 per cent, neutrophiles 20 per cent, degenerated cells 26 per cent, and lymphocytes 13 per cent.

He stated that his general condition was greatly improved following the radiation of radium and requested he be given the treatment with radium again. He was accordingly transferred to the General Memorial Hospital March 13, 1924. The stump was still unhealed when transferred.

REPORT OF A FOREIGN BODY IN THE APPENDIX

By G. A. Eckert, Lieutenant, Medical Corps, United States Navy

The patient F. C. was admitted to the hospital from the U. S. S. *Savannah* on February 21, 1924. His principal complaint was pain in the right lower abdomen which came on suddenly 11 days before admission. This pain, which was very severe and cramplike, so acute that he was doubled up, lasted about 12 hours when it eased to a dull ache with occasional shooting pains across the lower abdomen. He became nauseated and vomited one week after the onset. The nausea persisted up to the time of the operation. His temperature and pulse were normal.

He gave a history of a previous attack in 1922. The pain came on suddenly and was located in the right lower abdomen. After a few hours it became generalized then settled back in the right lower quadrant again. He had some fever at the onset, also nausea and vomiting for the first two days.

Examination on admission showed marked tenderness on deep palpation over the appendix. There was some increase in tension over the lower right rectus.

A white cell count and differential were normal with the exception of an increase of eosinophiles. This was repeated in 12 hours with the same results. Several stool examinations failed to show ova or parasites.

At operation on February 23, the following condition was found: The appendix was about 2 inches in length and considerably thickened particularly at the base where it felt like a piece of leather. There was evidence of a chronic inflammation and a constriction near the middle.

On incision the mucous membrane was found to be considerably thickened. Between the constriction and the distal end was a semisolid concretion, this proved to be a "BB shot" encased in fecal matter.

The interesting fact about this case is that the patient for several years up until 1919 was an ardent gunner. He frequently ate the birds he shot. This seems to be the only plausible explanation for the presence of the shot in the appendix.

INTERNAL DERANGEMENT OF THE KNEE JOINT

By F. G. Merrill, Lieutenant (Junior Grade), Medical Corps, United States Navy

From the standpoint of the military surgeon, sprains in the region of the knee joint are of the utmost importance.

Of the structures around this joint, the lateral ligaments, especially the internal lateral ligaments, are most apt to be injured, and with a severe sprain of the lateral ligament there is usually an associate injury of the semilunar cartilage. This point should be borne in mind in all cases of trauma to the knee joint.

In order to fully understand the mechanism of internal derangements it is necessary to study for a moment their anatomy and function.

The external meniscus is nearly circular in form with its extremities attached close together, its anterior cornua being attached to the tibia just in front of the tibial spine and the posterior horn being attached to the tibial spine and connected both with the anterior and posterior crucial ligaments. The internal semilunar cartilage, on the other hand, is semilunar in outline and its two extremities are widely separated. The anterior horn is attached to the front portion of the anterior nonarticular area on the top of the tibia and also is connected by the transverse ligament to the anterior cornua of the external meniscus. The posterior horn is attached to the posterior intercondylic fossa just anterior to the tibial attachment of the posterior crucial ligament. The peripheral border of this cartilage is firmly adherent to the internal lateral

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ligament. The external cartilage is separated from the external lateral ligament by the popliteus tendon. From this one can see that the external cartilage is the more freely movable, though both are allowed a limited degree of motion to accommodate themselves to the articular surfaces of the bones, when the joint assumes varied positions, though their normal range of motion, like that of other interarticular cartilages, is very slight. Both cartilages are wedge-shaped with the thick edge lying outward and thinning away toward their free inner margins so that in cross section they appear triangular in shape. Histologically they are seen to be composed of fibrous tissue with the fibers running transversely and longitudinally, covered above and below by white fibro-cartilage. At the outer border the transverse fibers blend with fibers from the capsule and at the cornua the longitudinal fibers are continuous with those attaching the cartilages to the tibia and at the anterior cornua a few of the fibers run from one meniscus to the other forming the transverse ligament.

The function of the semilunar cartilages is purely mechanical, acting as a buffer between the tibia and femur, for which they are admirably adapted due to their wedge shape. They each assist the opposite lateral and crucial ligaments in preventing lateral movements of the knee. In addition the joints are strengthened by the musculature, both the hamstrings and quadriceps taking on the function of the lateral or crucial ligaments in case the latter become injured.

Injuries to the internal meniscus are by far the most common, in most series the proportion being about 20 to 1. This is due to the following reasons:

(*a*) The internal semilunar cartilage is attached to the capsule along the whole of its convex margin, and is firmly attached to the strong internal lateral ligament.

(*b*) In the erect posture, body weight falls through the inner side of the knee joint.

(*c*) Internal rotation of the femur upon the tibia is greater than external rotation, due to the shape of the internal articular surface of the tibia, which allows the inner condyle of the femur to glide backward, and this causes a direct strain upon the semilunar.

(*d*) The inner cartilage is more firmly attached to the tibia than the outer.

(*e*) The strain tending to bring about a pinching of the inner meniscus is more commonly met with than that tending to bring about injury to the external cartilage.

Injuries to the semilunar are dislocation, pinching, splits, tearing away of the attachments, usually the anterior, or a rupture. Subsequent pathological changes such as a thinning of the central margin or nodules on the outer margin due to chronic irritation are frequently found at operation. One may also find a cartilage which is perfectly normal save for a laxity of its attachments.

By far the majority of cases occur with the body in the following position. The foot is abducted, the knee slightly flexed, and the femur rotating inward in the flexed tibia. A tearing of the semilunar cartilage also occurs commonly among miners working with flexed knees, in which position a wrench or twist of the tibia on the femur tends to produce a tearing of the cartilage. Rarely also cases occur when the leg is completely extended with the foot abducted and with suddenly forced inward rotation of the femur as in the case with persons alighting from a moving train or street car.

In the ordinary case, when the injury occurs, the patient falls to the ground with an exclamation of pain. On attempting to rise he finds that any weight bearing is painful and that attempted extension of the limb is accompanied by agonizing pain. When he is brought to the medical officer there is found to be marked effusion into the joint, due to the pinching of the synovial membrane, and although complete flexion is possible, extension beyond 30 degrees can not be accomplished due to the mechanical interarticular obstruction, and this maneuver is accompanied by excruciating pain and muscle spasm. On palpation tenderness may be elicited over the internal cartilage. The most intense pain is usually localized by the patient over the inner meniscus, though this is in some cases referred to the outer side of the knee.

In many cases, though injury to the cartilage has taken place, there is no primary locking, though the pain and effusion will both be present. In this type of case tenderness may be elicited over the cartilage, i. e., on the upper edge of the tibia one-half inch to the inner side of the internal border of the infrapatella tendon, and abduction of the knee will be found to be greater than normal and exceedingly painful.

In military hospitals one rarely sees such a recent case, the cases met with here being of the recurrent type. On going into the history of these cases it is usually found that the treatment of the original injury was deficient, the patient in the majority of cases having been given rest in bed for a few days until the effusion had subsided, and then discharged.

In such a recurrent case one must rely entirely upon the history, as this type of case is notorious for its lack of physical signs. Certain cases, however, will show some atrophy of the periarticular tissues, and in others a thickened cicatrix or displaced fragment of the cartilage can be palpated over the position of the anterior half of the cartilage, and in this case palpation would also elicit tenderness.

In making a diagnosis of this condition difficulty is often met with in differentiating from the following:

Loose bodies: In this condition the symptoms are sharp but not acute. The knee is often locked but this is only transitory. The loose bodies can usually be isolated by the patient and unless they are pedunculated, they occur in various positions. X ray will usually aid in their diagnosis, depending upon the amount of calcium deposited in them.

Synovial fringes: The symptoms here are due to nipping of the fringes and are usually not so acute in their primary occurrence as are those of a pinched cartilage; the pain is definitely local and not participated in by the lateral ligament. Creaking in the joint is common, and often there is a definite swelling on either side of the ligamentum patellae due to chronic thickening of the infrapatella pad.

Lipomata: This is a rather uncommon cause of locking of the joint and is accompanied by swelling about the lower part of the patella and painless effusion. Pressure on the knee will produce no pain and the locking is rarely the result of trauma.

Osteomata: These may be found by manipulation and show up clearly on the X-ray plate. Treatment of this condition must be divided into that required for recent injuries and that required for recurrent locking and the latter subdivided into palliative and operative.

In a case which is seen immediately following the primary injury it will be necessary to reduce the locking. If this has occurred, with reference to the manipulation one must bear the following points in mind.

(*a*) Reduction must be absolute, i. e., complete extension of the leg must be obtained.

(*b*) The cartilage must be given absolute rest until its attachments have united.

(*c*) The internal lateral ligament must be protected against strains of any kind until full strength is restored.

(*d*) Operative reduction should be resorted to only when all other means have failed.

In the majority of cases no anaesthesia is required. Any method of manipulation which brings about complete extension of the leg is justifiable, for when one has obtained complete extension without pain, reduction is complete. The method used here is, first, firmly to grasp the patient's ankle with the right hand and completely flex the leg with the surgeon's left wrist in the popliteal space, meanwhile rotating the foot outward, and then fully and quickly extending the leg. Opposition by means of spasm of the hamstrings may be overcome by asking the patient to kick out straight as the surgeon is extending the leg. Several attempts may be necessary before complete reduction is obtained, i. e., before the patient can voluntarily extend the leg without pain.

Following reduction in all recent cases absolute rest must be insured until the torn attachments have reunited. Our method for obtaining this is absolute rest in bed, with a back splint for a period of 10 days, with the leg fully extended.

The patient is then allowed to walk, with the boot raised on the inner sole and heel, and an ace bandage is applied firmly to prevent effusion into the joint, and massage to the thigh and knee is begun. After another week the bandage may be removed. If this treatment is strictly adhered to, and the movement of the joint controlled and increased gradually, no recurrence of the effusion should take place, and in the majority of the cases the cartilage will become bound down with adhesions and no recurrence will occur.

To the military surgeon these recent displacements are of secondary importance as they are not often met with, and the cases in which we have an especial interest are those sent to the hospital complaining of recurrent effusions, and at this time when the naval hospitals are taking over the care of the Veterans' Bureau patients these cases are by no means uncommon.

As mentioned above treatment of recurrent internal derangements of the knee joint is both palliative and operative. The type of case the military surgeon comes in contact with in nearly every instance demands operation. We will simply mention the palliative measures in passing. They consist in teaching the patient to avoid strain of the internal lateral leg, by walking with the toes turned inward, elevating the inner sole and heel of the boot, and the wearing of a Jones cage splint or the complicated apparatus devised by Shaffer.

The operative treatment consists of arthrotomy with complete removal of cartilage. Attempts to suture the cartilage in place have been abandoned and partial removal is rarely done as the results following complete excision have been so much more satisfactory. The case reported here is thought by the author to be of especial value owing to the fact that the history and physical findings were so indefinite, and yet at operation a cartilage was found which was distinctly pathological. Having seen several cases with a similar indefinite history, each one of which showed definite pathology at operation, we believe that an exploratory arthrotomy should be done in all cases where the man's livelihood depends upon his leading an athletic or physically active life. The case reported is as follows:

T. A. K., a man 37 years of age, was kicked in the left knee by a horse in September, 1918. This injury resulted in a synovitis accompanied by pain but no locking. From that time on whenever he made a misstep he found that he suffered from an acute pain over the inner aspect of his knee joint, and that he could not extend his knee beyond an angle of about 20 degrees. He found that by completely flexing his leg and then extending it slowly he could accomplish complete extension, but this was followed in each instance by a synovitis which persisted from a week to ten days. Physical examination was negative in every detail, and X-ray examination of the joint failed to reveal pathology.

Our technic of operation differs in many details from that used by the majority of orthopedic surgeons at the present time. We do not use the accepted three days' preparation of the field of operation as we feel that it devitalizes the skin. The patient is brought to the operating theater, which is one used only for aseptic cases, the field is then shaved, cleansed with ether, and then painted with either a 3 per cent solution of picric acid in alcohol, or with tincture of iodine. No tourniquet is applied. A slightly elliptical incision 3 to 3½ inches long with the convexity toward the patella is now made on the inner aspect of the knee with the leg extended. The joint is now opened, the knee flexed, and the cartilage examined to determine whether or not it is ruptured, loose, detached, split, or has tags or projections which might cause disability. Should the cartilage be found to have a definite lesion it is grasped by forceps and the anterior horn detached, the circumferential attachment divided with a fine-bladed knife, and then, while the foot is slightly rotated outward, the removal of the cartilage is completed. After making sure there is nothing left in the joint which might cause subsequent trouble the joint space is flooded with a warm sterile saline solution, to obviate any danger of introducing infection into the cavity, and the wound closed layer by layer. Sterile dressings are applied and the knee bandaged over a layer of sheet wadding, which provides a limited amount of elastic pressure. For our skin suture it is our custom to use a continuous suture of catgut, which procedure obviates the necessity of later removal. The patient is now returned to the ward with no splint applied, and after five days' rest in bed is allowed to walk a little, the time being increased daily. Also at the end of five days massage to the quadriceps is begun. At the end of a fortnight the bandage is removed and the patient should walk with freedom. Physiotherapeutic treatment is continued for a month and at the end of from four to five weeks from the date of operation the man should be ready for full military duty.

In the case mentioned above this method of treatment was followed out and now one month after the operation the man is walking with freedom of motion and no apparent disability.

NOTES AND COMMENTS

TOBACCO POISONING

It is advisable to remind medical officers from time to time that the clinical effects of the excessive use of tobacco should be considered in making diagnosis and on physical examination of officers and enlisted personnel. It is not often that one sees articles in current medical periodicals on the poisonous effects of tobacco, hence it is considered desirable to publish the following abstract of a very reasonable discussion of the subject by Surg. Commander W. H. Edgar, R. N., which appeared in the Journal of the Royal Naval Medical Service, January, 1924.

It is well to remember that experiments in this country and abroad have shown that tobacco is a far more powerful drug than tea or coffee and that the widespread use of tobacco tends to greater danger of excess. There is no doubt it may cause considerable physical disturbance, such as acid stomach, chronic irritation of the nasal and respiratory passages, heart irregularities, increased blood pressure, unsound and general nervousness.

The psychical factor of contentment in maintaining the morale of the men in the Government service is a sufficient excuse to approve the use of tobacco, but medical officers should ever keep in mind the dangers from abuse. In moderation, like tea and coffee, it adds to the comfort of life.

Surg. Commander Edgar calls to mind the well known fact that nicotine is one of the most rapid and powerful poisons known. In tobacco smoke pyridine bases and other complex bodies are present, and it may well be that carbon monoxide accounts for some of the results of overindulgence in smoking, yet, on the whole, both the good and bad effects of tobacco smoking can be attributed to nicotine. The amount of nicotine in tobacco varies from 1 to 8 per cent, according to the particular kind of leaf, and while half of this amount of alkaloid is destroyed by combustion, the rest can be found in the smoke. Once absorbed, nicotine is excreted in the urine, but there is a tendency for it to act as a cumulative poison. Nicotine is essentially a nerve poison, for, after a preliminary stimulation, the ganglionic apparatus is paralyzed by it. This action appears to be selectively applied to the pneumogastric nerve, in greater proportion than to other nerves.

Nicotine produces a depression of the pneumogastric, and in consequence one finds the pulse accelerated and the vasomotor mechanism unstable following overindulgence in the use of tobacco. The heart without vagal inhibition becomes uncontrolled and reacts unduly to stimulation, be it physical or psychic.

This vasomotor instability, with its resulting irregular blood supply to the brain and other organs, is responsible for no small amount of ill-being and shows itself on the mental side in the form of irritability and depression, and on the physical as shortness of breath on exertion, giddiness, and palpitation. A disinclination to arise in the morning is another mild result of oversmoking, and the feeling is continued into the day as a shortness of temper which gradually wears off as the overdose of nicotine is oxidized by the brisker bodily metabolism.

Commander Edgar directs attention to vagotonia, a condition which includes symptoms of irritability of the heart, submammary pain, and syncopal attacks which may have tobacco as the etiological factor.

Pain according to Edgar, is not uncommon as the result of the excessive use of tobacco: it is often called "heartburn" by the patient and may occur in the form of sharp twinges in the pericardium, or of a dull ache in the same region or in the throat, in fact in any part to which the pneumogastric nerve is distributed. These pains cease when smoking is given up.

That excessive indulgence in smoking can cause arteriosclerosis in common with other toxins by bringing about organic changes in the inner and middle coats of the arteries is generally admitted, but it is not so well recognized that a temporary functional high blood pressure can be produced by nicotine poisoning. The author cites a case illustrative of this fact.

As might be expected the gastric branches of the pneumogastric do not escape in tobacco poisoning. Many people swallow the nicotine in their saliva and so produce gastric irritation. But there are other cases in which the gastric effect is a referred one due to vagal irritation.

The salivation which is caused in some individuals by even moderate smoking is due to the stimulation of the salivary ganglions, but in excessive smoking the stimulation gives way to depression of these centers and a dryness of the mouth and lips result—a useful minor symptom for which to inquire when excessive smoking is suspected to be the cause of the patient's trouble.

In suspected cases of tobacco poisoning the use of tobacco should be forbidden for a time, not merely restricted. Fortunately the functional results of the excessive use of tobacco disappear when the poison is discontinued, so that the causal agency of tobacco in any affection can be easily ascertained, though the difficulty of giving up the habit and the resulting deception by one's patients must be allowed for. When dealing with intelligent patients in whom one wants to reduce their tobacco consumption it is better, according to Edgar, not to limit them to a given amount but to tell them to ask themselves as their hand goes to the pouch or case, "Do I really want to smoke just now?"

Those who find difficulty in stopping the use of tobacco may be assisted by painting the tonsils and pharynx with a weak silver nitrate solution.

The toxic effect of nicotine which is trying during the breaking off process may be counteracted by the time-honored Gannet's mixture which contains 1 gram of sodium bromide in 5 c. c. of compound tincture of cinchona. The dose of this mixture is a teaspoonful three times a day.

PERCIVAL POTT'S CONTRIBUTION ON HEAD INJURIES

For some time past Sir D'Arcy Power, the eminent London surgeon and medical historian, has been contributing to the British Journal of Surgery a series of eponyms—the *ipsissimae verbae* of those surgeons whose names are associated with the diseases or injuries to which they first called attention. Many of these descriptions which have now become classic are so short that they have been reproduced at length; others have been abstracted. Among the latter is Sir D'Arcy's paper on "Pott's puffy tumour," which appears in the issue of October, 1923.

Percival Pott first published his account of those head injuries complicated by intracranial hemorrhage which he had noted in his practice in 1760, under the title, "The observations on the nature and consequences of those injuries to which the head is liable from external violence." This contribution to medical literature immediately placed him in the first rank of contemporary surgeons, although we usually associate his fame with his description of the particular fracture about the ankle which bears his name. Regarding his paper on head injuries Sir D'Arcy Power says:

"The essay is original, well written, shows an extensive knowledge of surgical literature, and is full of case histories which are a perfect joy to read, for they tell of the rough and tumble life in London during the first half of the eighteenth century. When it was published Pott was 46 years old and had been surgeon to St. Bartholomew's Hospital for 11 years. Four years previously he had been confined to his bed for a considerable period with a broken leg, and this essay is doubtless one of the means he took to relieve the monotony of his convalescence. Indeed, his biographer states that 'the appearance of Mr. Pott as an author was an immediate effect of his accident. It was then not an early period of his life, and it is possible that the busy scene in which he had been engaged might have occupied his mind much longer and that without some powerful check to the train of his pursuits he might never have discovered in himself those superior powers of scientifical disquisition, that correct taste and masterly command of language, which have placed him in the first rank of medical writers. Engaged from early youth in the constant transaction of business, he probably till this period had indulged but little in the pleasures of speculative investigation, but was never afterwards long unemployed in some literary work.'

"The alliteration of 'Pott's puffy tumor' seems to have taken a firm hold of the surgical mind, although the condition is of no great importance and is now rarely seen. The passages describing it are contained in the second section of the observations which deals with the effects of contusion on the dura mater and parts within the skull. After discussing whether the cerebral symptoms due to intracranial hemorrhage can be distinguished from those due to suppuration, he says: 'If there be neither fissure nor fracture of the skull, nor extravasation, nor commotion underneath it, and the scalp be neither considerably bruised, nor wounded, the mischief is seldom discovered, or attended to for some few days. The first attack is, generally, by pain in the part which received the blow. This pain, though beginning in that point, is soon extended all over the head, and is attended with a languor, or dejection of strength and spirits, which are soon followed by a nausea, and inclination to vomit, a vertigo, or giddiness, a quick and hard pulse, and an incapacity of sleeping, at least quietly. A day or two after this attack, if no means preventative of inflammation are used, the part stricken generally swells, and becomes puffy and tender, but not painful; neither does the tumor rise to any considerable height, or spread to any great extent. If this tumid part of the scalp be now divided, the pericranium will be found of a darkish hue, and either quite detached, or very easily separable from the skull, between which and it will be found a small quantity of a dark-colored ichor.'

"The sign is referred to a little later on in the argument, when he says: 'If the symptoms of pressure, such as stupidity, loss of sense, voluntary motion, etc., appear some few days after the head has suffered injury from external mischief, they do most probably imply an effusion of a fluid somewhere; this effusion may be in the substance of the brain, in its ventricles, between its membranes, or on the surface of the dura mater; and which of these is the real situation of such extravasation is a matter of great uncertainty, none of them being attended with any peculiar mark, or sign that can be depended upon, as pointing it out precisely; but the inflammation of the dura mater, and the formation of matter between it and the skull, in consequence of contusion, is generally indicated and preceded by one which I have hardly ever known to fail; I mean a puffy, circumscribed, indolent tumor of the scalp, and a spontaneous separation of the pericranium, from the skull under such tumor. These appearances therefore following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, headache, and slight irregular shiverings, do almost infallibly indicate an inflamed dura mater, and pus, either forming or formed between it and the cranium.'

"The causes of the smart blow on the head are given in the illustrative cases appended to the essay: 'A poor fellow crossing Tower Hill got, before he was aware of it, into a mob that was endeavoring to rescue a sailor from a press gang. The man was knocked down. When the crowd dispersed he was found senseless and in that state was brought to St. Bartholomew's Hospital, where he was immediately let blood and put to bed. At the end of three days the man found himself so well as to leave the hospital and go to work. On the twelfth day from that of the accident he came to my surgery and complained of being much out of order. He looked ill, assured me he had lived very soberly from the time of his leaving the hospital. I took him into the house again, bled him, ordered him a clyster immediately, and that he should be kept in bed. On the fifteenth day after the accident the tumor of the scalp was more apparent, but yet seemed to contain little or no fluid, and was about the breadth of a crown piece. I would have removed that portion of scalp, but while I was intending it, the poor man had a very severe rigor, which disordered him so much, that he begged to be let alone for the present. The next morning the tumor was more risen, contained palpably a fluid, but was by no means tense; I took away the whole tumid piece, by a circular incision. That whole night and next day he was delirious; his skin burning hot; he had frequent spasms, which shook his whole frame, and that night (the seventeenth from the injury) he died.'

"Another case was that of 'a young fellow of about 20 years who was thrown from an unruly horse against one of the rails in Smithfield. The blow was great; he lay senseless for above an hour, and in that state was brought into St. Bartholomew's Hospital.'

"A man in the neighborhood of St. Giles's had a quarrel with his wife in which he struck her over the head with a mopstick. The blow was a smart one, but as it neither fetched blood nor brought her to the ground, it only finished the dispute, and no further notice was taken of it. The woman followed her business, which was that of crying greens about the streets, and lived (to use her own words) sometimes drunk, sometimes sober, for a week. On the eighth day from that of the blow she found herself so ill that she applied to the hospital for admission and was taken in as a physician's patient for a fever. The doctor wrote for her, and the day after this (the tenth day from the accident) the sister of the ward in cutting off the patient's hair, which was full of vermin, discovered a swelling which she desired me to look at; it was flattish, about the breadth of the palm of a hand, and lay immediately across the sagittal suture. I opened the tumor, and finding the bone bare, cleared the scalp largely and circularly. I then applied a trephine on one side of the suture and close to it, and found the dura mater altered in its natural color, and as it were smeared over with matter.' She had an attack of erysipelas, was trephined twice more, and died on the sixteenth day.

"'A lunatic threw himself from a window, two stories high, and in his fall struck his head first again a sign iron and then against a slated pent house. He was taken up senseless and remained stupid above 12 hours, but being in that space of time let blood freely twice, he recovered his senses, but showed no signs of a right understanding. He passed two days and nights in the utmost disorder and disturbance. He was confined in a strait waistcoat and kept two people constantly employed in holding him; at last by repeated phlebotomy, and taking a large quantity of opium, he fell asleep, slept near 12 hours, and then awoke perfectly tranquil and perfectly rational. He would have been permitted by his friends to have gone out a little way into the country; but lest there should be any latent mischief, I advised him to keep quiet a little longer, and to live with great caution; which advice was followed. On the tenth day from that of the accident, he lost his appetite, looked dull and languid, refused food and company; complained that his head ached, and said, that he had not slept. So little time had passed since he had been disordered in his mind that, from his aspect and manner, I suspected a return of his lunacy. I let him blood again, directed that he might be kept low, and desired his brother, who was an apothecary, to give him an opiate at going to bed.' In spite of this treatment he got worse, part of his scalp was removed, he was trephined three times, an abscess was evacuated, and he recovered.

"'A watchman whose stand was in Whitechapel, got into a scuffle with some drunken sailors, and received several wounds and blows on his head; for some of which he lost so much blood that he was the next day brought into St. Bartholomew's Hospital in a very weak low state. As he had already sustained great loss of blood and was more than 60 years old I made use of no further evacuation, but dressed his head superficially, and directed that he should be kept in bed. At the end of about a week, the general tumefaction of the head was nearly gone, and all the wounds in a healing state; the man transgressed rules of the hospital by staying out all night, and was discharged. On the fifteenth day from that of the accident he came to me again complaining of headache, giddiness, sickness, failure of strength, loss of appetite, and want of sleep. I took him into the house again, removed a circular portion of the scalp including the wound, found bare bone, perforated it in the middle and found a small quantity of matter on the surface of the dura mater. Another perforation was made on the eighteenth day and a third on the twentieth. This procured so large a discharge of pus, that I was very apprehensive that the extent of the mischief was too great for the assistance of art to prove effectual in; however, I was luckily disappointed; for in a very few days more all his bad symptoms gradually left him, and the man got perfectly well.'

"'A drayman, drunk, and sleeping, fell from his dray, and his head was so squeezed between the wheel and a post that a considerable portion of the scalp, together with the pericranium was forced from off each parietal bone. He was brought to the hospital senseless; he was largely let blood, the separated scalp was removed and the bone dressed with dry lint. The next day the man was so well and so perfectly master of what sense he had, that I was inclined to believe that a great deal of the last night's appearance was owing principally to liquor. On the thirteenth day he was so well, that having a large family to work for, he desired to be discharged from the hospital, and to be made an out-patient; but I had so often been deceived by the fallacious appearance of such cases that I persuaded him to stay another week. Cerebral symptoms appeared on the sixteenth day and on the seventeenth he was so ill that I fain would have set on a trephine, but the man would not permit me. On the twenty-third day from that of the accident he died, having been paralytic in his leg and arm from the twenty-first.'

"'On the 10th of February, 1765, John Biggs, a lad about 13 years old was driving a horse round in a grinding mill, the horse not being used to the work, ran round very fast; the boy fell and received such a blow from some part of the frame in which the horse worked, that he lay, deprived of sense, for some time—that is, until somebody came in to enquire, why the mill went so rapid. In a few hours, by the assistance of phlebotomy, he seemed to be very well again. His wound was dressed by the family apothecary for a week, during which time he did not seem to have any other complaint, except now and then having a slight headache. The wound not healing kindly, the boy being a country boy, hired only for the purpose of driving the millhorse, and the people with whom he lived being tired of keeping him unemployed, he was brought to the hospital. On the 8th of March he was seized with a fever, beginning with a kind of cold fit. On the 10th he was much disordered, complained of acute pain in his head, and his wound, which had been healed, broke out again, the pericranium separating from the bone on the 12th, he became senseless to all outward objects, was convulsed in all his limbs, and jaw-locked. On this day Mr. Crane trepanned him, in the upper, fore and right side of the frontal bone. On the surface of the dura mater was found a considerable quantity of good matter, on the next morning he died.'

"There are some further case-histories. One of 'a young man playing at cudgels in Moorfields who received a stroke on his forehead.' Another of 'a gentleman's coachman who was thrown from his box on the road between London and Richmond and received a wound in his forehead. The next day his master, who was governor of St. Bartholomew's and a timorous man, sent the patient into that house.' Another of a man who received a severe blow on his head 'in that every memorable defence made by Captain Gilchrist, on board (as I think) the *Southampton* man-of-war, against a most shameful superiority of French force. He was treated at the hospital in Gosport and three weeks later was sent to St. Bartholomew's Hospital and put under the care of Dr. William Pitcairn.' A boy belonging to a horse-dealer in Smithfield was thrown from a horse with great violence against one of the sheep-pens. Two female inhabitants of St. Giles' got drunk together and quarreled, one of them threw a stool at the other and knocked her down. The edge of the stool cut through the scalp and broke the left parietal bone. The girl was dressed that night by somebody in the neighbourhood and she was brought the next morning to the hospital. On the eighteenth day a tumour appeared on the other side of the head. A trephine was set on but on the twenty-third day she died. 'A boy about 8 years old, the son of a Jew merchant in the city received a blow on his head with a stick from his tutor. The stroke made him giddy for a few minutes but as no blood was shed and the pain soon ceased he concealed it till it was discovered by his barber that his head was swollen in that part. Mr. Serjant Amyand and Mr. Shipton were joined with me in the case. We found that the sagittal suture was broken, and that a portion of the fracture was forced into the sinus. After much deliberation and conversation about the hazard of wounding a sinus (which was indeed already wounded by the broken bone) it was agreed to set a trephine on the suture in such a manner that the whole surface should be comprehended within its circle. This was done; and the patient is alive at the time of my writing this.' 'A girl about 14 was knocked down by her mother with an iron poker of considerable weight; the latter immediately ran away and the former was brought senseless to the hospital.' She died on the seventeenth day. 'A girl about 15 years old, crossing Smithfield on a market-day, was tossed by an ox and fell with her head on the flat stones within the posts. As her dress was mean, and nobody knew anything of her, she was brought senseless into the hospital. She died on the twentieth day from that of the accident having been terribly shaken by spasms for several hours.' 'A boy about 14 years old following a led horse, was desired by the servant, in whose hand the horse was, to strike him; the boy did so, and received a blow from one of the horse's heels, which brought him to the ground senseless. On the twenty-second day he became delirious and convulsed and on the twenty-third died.' 'A woman came to my house complaining that her husband had kicked her down stairs and had broke her skull. I took her into the hospital, where she was taken all possible care of, but she became first paralytic, and then comatose and so died.'

"It is somewhat remarkable that Pott was able to obtain a post-mortem examination of the heads in each of the fatal cases; while the time that he must have devoted to the preparation of the essay is shown by the fact that he had read, and quotes Hippocrates, Celsus, Archigenes, Galen, Oribasius, Paulus, Ægineta, Rhazes, Theodoric, Brunus, Lanfrank, Gui de Chauliac, Petrus Argelatus, Berengarius of Carpi, Fallopius, Paww, Fabricius Hildanus, Andreas Croce, Peter of Marchetti, Ambroise Pare, Muys and Wiseman, Le Dran and Morgagni. It is clear that Pott read Latin and French with tolerable ease, for he quotes the originals. Greek authors he always quotes in their Latin dress, so he was probably not equally versed in Greek."

A NEW ROOT CANAL TREATMENT

Dental Items of Interest for September, October, November, and December, 1923, contain an article by Samuel Abraham, Ph. C., D. D. S., of New York, which is of very great interest in that it presents clinical and radiographic evidence of the success of a treatment embodying an entirely new physiological principle in dentistry.

From case histories accompanying radiographs in the December issue it appears that the author has been using this method since June, 1920, for root canal treatments and fillings. It is in a way a reversion to the use of iodoform and consists of three steps. The first is the thorough mechanical cleansing of the canal by the usual means, supplemented with sodium and potassium, followed by copious amounts of 7 per cent tincture of iodine to effect a chemical cleansing. The sodium and potassium reacts with the iodine to form iodoform in the canal; iodine is added until the absorbent points show iodine color, a straw color indicating that all the sodium and potassium has not been neutralized.

The next step is the use of a mixture termed by the author "Formaform," consisting of—

Iodoform	95	parts.
Paraform	2.5	parts.
Scarlet red	2.5	parts.

mixing to a paste with tincture of iodine. The paste is worked down into the root canals with root canal pluggers, and the excess iodine removed with cotton. The radiopacity of the mixture will show how far it has penetrated into the canals. This treatment is left from a week to several months, depending upon the condition of the case and the judgment of the operator. The proper placement of this dressing, in the opinion of the author, removes or obliterates the bacterial activity from the root canal, and the sterilizing properties of the formaform prevent further bacterial infection, giving nature an opportunity to repair damage done in the periapical region.

The too zealous root canal operator often has as the result of his manipulations a protuberance of material through the apical opening. Such a protuberance the author endeavors to obtain with the mixture which he uses for the final filling of the canal, for his experience has been that in the course of time the excess of filling material which lies outside of the foramen disappears and leaves the root canal filled to the apex, with radiographic evidence of obliteration of radiolucent areas. He uses for the final filling a mixture designated "Iodopercha," consisting of

Formaform	25 parts.
Pink base plate gutta-percha	75 parts

He describes the insertion of the final filling as follows: "After the formaform dressing has been removed with broaches and reamers, and the canal again cleansed with sodium and potassium and tincture of iodine, I then make a thick mix of iodopercha with chloroform to about the consistency of putty, and with the ordinary root canal pluggers work it into the dry canal, and condense it until all the chloroform of the mix has been completely dissipated. The condensation process with the root canal pluggers must be kept up until the iodopercha becomes hard and unyielding to the pressure exerted upon it. The tooth is then sealed and radiographed. During this process of condensation and thorough packing of the iodopercha in the root canal, it is almost inevitable that a portion of the iodopercha will be forced through the apical opening and subsidiary foramina."

The author claims that canals filled in this manner will lose by absorption the excess iodopercha protruding through the apical opening and leave a filling flush with the end of the canals. This statement seems to be borne out by the radiographs shown.

Prof. James Ewing expresses an opinion that it is reasonable to suppose that the gutta-percha preparation may be gradually broken up and absorbed by the phagocytic cells and thus removed. He also says "It would seem that the main virtue of the preparation of gutta-percha containing iodoform must lie in its capacity to sterilize permanently periapical root abscesses."

Radiographs of 16 cases are reproduced, with histories after treatment, of from three and a half years to five months. The rate of absorption seems to differ in different individuals, but five months was sufficient in some of the cases to note the disappearance of the iodopercha. In no instance did the filling below the foramen appear lessened in density.

EYESIGHT AND AIRPLANE LANDING

The great majority of crashes to airplanes occur while landing the machines, and the importance not only of perfect visual acuity but of good visual judgment in relation to this action has been proved, says the Lancet of February 16, 1924, by Commander E. C. Clements, R. A. F. M. S., who states that the instructors in the British Air Force are sufficiently impressed with the results as to apply at once for an opinion when a pupil shows signs of inability to land. The importance of frequent thorough examination of the eyes of airmen who crash is well brought out in the account of a case given by Maj. H. C. Neblett, of the Medical Corps, United States Army, in the Military Surgeon, December, 1923. The patient had been for three years a pilot in the Air Service and had no trouble with his eyes up to September, 1919, when he was making a flight at 8,000 feet and fell into a series of "tail spins" to within 1,500 feet of the ground. He felt a severe pain in the right side of the head and the right eye, had photophobia and blurring of vision in both eyes, so severe that he could not attempt to land for about a quarter of an hour. The left eye soon became normal, but the right eye suffered for about 10 days, and thereafter was very easily tired either by reading or flying. Pain returned six months later, and from time to time subsequently he became, from this cause, unfit for duty. In July, 1921, he crashed without history of any definitely localized injury, but was for a time unfit to fly, his eyes giving trouble. There were an unusual number of crashes and poor landings in his history. Major Neblett observed him making poor practice landings on November 20, 1921, when he ultimately broke up his plane, though he was not himself hurt. His eyes were then carefully examined; the visual acuity of the right eye was found much diminished, with lessening of the supraorbital and temporal field, and an almost complete detachment of the retina from below was found by the ophthalmoscope. Treatment for three months had no beneficial effect, and he was retired on account of practically total blindness in the affected eye. The history of this case shows the importance of carefully examining the eyes of all pilots who find a difficulty in landing.

NAVY NURSE CORPS

HALFWAY ROUND THE WORLD

By Miss LAURA HARTWELL, Reserve Nurse, United States Navy

One great advantage of duty in Samoa with the Navy Nurse Corps is the fact that the return to the United States may be made via the Suez Canal and Europe, providing one has accrued leave and enough money to pay expenses.

In May, 1923, I left Samoa to take this trip, starting out toward Sydney, Australia. Leaving Samoa was an event in itself. Steamer day is the day of days in the island, as the steamer brings four or five weeks' mail, packages, books, and papers, the latter a little out of date perhaps, but very welcome. The native band, under naval leadership, plays American music for an hour on the dock before sailing time, finishing the concert with sad farewell strains, just as the steamer pulls out.

The natives bring flower garlands and necklaces of scarlet berries down to the ship when anyone leaves, and the departing one steps on board decorated with these, and carrying six or seven bouquets of flowers, brilliant hibiscus or waxy pink blossoms, which grow wild in Samoa, but are rare and expensive in the States. Officers and their wives and the enlisted men are also decorated when they leave, while when the governor and his wife leave the island they need two or three flower bearers.

When the island was out of sight that day in May, I settled down to eight days of enjoyment en route to Sydney. Each day brought the ship nearer to the winter weather and the nippy breeze was delightful after the humidity of the island. Horizontal inertia in a deck chair seemed to be the favorite amusement on board, although there were always plenty of sports on board for the energetic ones.

Sydney is a town built on the most beautiful harbor in the world, so the Australians say. Many seaport towns claim this distinction, but Sydney people claim it a little louder than most. However, it is a wonderful harbor, with many little offspring harbors branching into the suburbs. Arriving in Sydney, I made arrangements for the next stage of the trip, which was to be a six weeks' steamer trip to London, stopping at several ports en route. Having a few days to spare before the ship sailed, I went on a trip to the Jenolan Caves, which meant a long automobile ride over the Blue Mountains, where rabbits run wild, and wallabies are seen occasionally. Red and blue parrots were chattering in the gum trees along the road. The caves are immense limestone caverns, the stalacitites and stalagmites forming weird and glistening groups of various shapes, so cunningly lit by electricity that fairy grottoes, churches, pipe organs, and groups of statuary could be visualized. In the evening the guests sat around the hotel fire and talked. It was wintertime, and how good the fire looked! After two days' exploration of the caves, came the drive back to Sydney.

The next day I went on board the steamer for London, riding to the dock in a hansom cab, a mode of conveyance still in general use in Sydney. We left at noon, and four days later reached Melbourne. We had three days on shore there, so there was plenty of time to explore. The city is beautiful, with very wide streets and some good stores. The weather there was bitterly cold, and I for one, was glad when we moved on to Adelaide, which we reached two days later on a beautiful sunny morning. We were there long enough to take an auto ride through beautiful parklike country.

Then came four days of rough sea through the Great Australian Bight, on our way to Freemantle. Almost everyone was sick, but this was all forgotten when we docked, and most of the passengers took the train to Perth, coming back a few hours later, refreshed and ready for the 10-day trip across the Indian Ocean. On the tenth day we reached Ceylon and landed at Colombo. The principal street in Colombo has European stores on one side, while under the arcades of the opposite side are the native bazaars, where one can buy all sorts of curios, jewelry, set and unset stones—garnets, topaz, and others—and very cheaply, if one has unlimited time and patience for bargaining.

We were to stay in Colombo overnight, so the first day we went up to Kandy by car, a 74-mile drive through wonderful tropical country, over a good road. Kandy is the hill capital of Ceylon, and on the way one passes through many villages where each house seems to be a one-roomed store with a convenient stone bench outside on the tiny veranda where the hard-working proprietor can take a rest between customers. Most of these stone slabs were occupied by sleepers at 10 in the morning, but a few of them supported three or four copper-colored natives smoking their pipes and wearing the circular comb that most of the Singalese men wear, possibly talking over affairs of state.

We passed rice fields, real Ceylon tea gardens, saw the elephants in their bathing pool, the great oxen hauling hay (for we had left winter weather behind us, and were wearing summer dresses again) and many other things of interest. We stopped at a rest house, where they charged us half a rupee each, for stopping, before we bought anything. The tourists are always watched for when the boats are calling at a port, and "Baksheesh!" is the cry on all sides. After lunch in Kandy, we visited the Temple of The Tooth. It contains many interesting relics, among them, a tooth of Buddha which is buried there. Here were many priests with shaven heads, dressed in flowing yellow robes. We were shown Buddha's Sacred Book, with the leaves cut from palm leaves, and later on we drove back to Colombo through the beautiful botanical gardens, where an avenue of tall palms reminded one of the beautiful pine trees near Seattle. Darkness fell as we came down to Colombo, and hundreds of fireflies danced beside the car.

The next day, we went ashore again, rode around the town in rickshaws, and did our shopping. There are beautiful modern hotels in Colombo; the one facing the ocean where the surf boomed incessantly near by was especially attractive. A few weeks there would be ideal. In the afternoon, we took another car ride to Mount Lavinia where Indian lace makers were selling their wares. We had tea in a garden of palm trees, and then went back to the steamer.

A three-day steamer trip, without any monsoons, which we had been warned to expect, and we were in Bombay. We had no time to get into the interior of India, but we had a fascinating glimpse of it here. I remained ashore one night, slept in a beautiful cool room with a stone floor, and a huge pankali or electric fan going all the time. In the early morning a shy little Indian girl served Chota Hazari, or little breakfast, reminding one of the petit dejeuner of France. After breakfast, my roommate and I went out to explore the city, riding in a gharri, which is a horse drawn vehicle very much like an American buggy. The Parsee cemetery, with the vultures hovering above it, was one of the curious and terrible places there. Outside the city were beautiful homes and palaces, where the wealthy, high-class Indians live. At the bazaars in town where the noisy natives were buying and selling, and sick and lame beggars calling for help, the general congestion of noise, color, and dirt formed a striking contrast to the homes of the rich a few miles away, and to the wide Anglicized streets near by where the modern buildings are things of beauty and both native wares and European clothes were offered at standard prices.

From Bombay we went across the Arabian Sea to Aden, a sandy, dusty place, a regular desert town, with the rugged brown hills surrounding it and the sands of Arabia stretching toward it. Camels stalked placidly along its streets and the natives brought ostrich feathers and baskets out to the steamer. From Aden we went through the Red Sea to Suez, where no one went ashore, and a little later entered the canal which is cut right through the desert between Suez and Port Said. Port Said is as cosmopolitan as New York, containing amongst all other nationalities, English, French, Egyptian, and Arabian people. Here also are the Galli-galli men, clever conjurors and slight-of-hand workers, who come on board and perform for the passengers.

On the way from Port Said to Marseille we passed through the Straits of Messina, and were disappointed at not seeing Mount Etna in action. However, the volcanic island of Stromboli, which we passed later on, was active and one wondered if the cottages built at its base were inhabited by fatalists, living as they did in the shadow of a volcano. Marseille, the next stop, was a good place for shopping as the franc was low at that time. Then we went on to Gibraltar, at the foot of the famous rock. The stores here had a Spanish touch, and had on sale beautiful shawls for $50 and upward. After a morning here we entered the last stage of the ship's journey—from Gibraltar to Plymouth, or on to London. Getting off at Plymouth lands one in Devonshire where the famous clotted cream comes from, and outside the city are the well-kept farm lands, looking like a beautiful park as most of England does.

There are numerous ruins, beautiful cathedrals, and places of historic interest all over England, and the great gray city of London is wonderful even from the top of a bus. The Tower of London, Westminister Abbey, St. Paul's Cathedral, the London Museum with its georgeous collection of royal robes, are known to most of the nurses who were overseas during the war, and of one had time and wished to do so it would be very easy to take a few weeks' tour of the Continent, although I spent most of my spare time in England. Then came the grand finale of the journey—watching for the Statue of Liberty with the comfortable feeling of coming home.

BOOK NOTICES

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

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

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

SURGICAL PATHOLOGY, by Joseph McFarland, M. D., Sc. D., professor of *pathology in the medical department of the University of Pennsylvania.* P. Blakiston's Son & Co., Philadelphia, 1924.

The author's textbooks on the pathogenic bacteria and on pathology have run through a number of successful editions. This experience, together with his close association with the work of several excellent surgeons, qualifies him to write on surgical pathology. He has succeeded in producing a book that is of scientific and practical value and as near to being interesting reading as one on this subject could be.

He first considers in Part I congenital conditions of surgical interest, this section covering 202 pages. Part II is devoted to tumors and covers 180 pages. It opens with an interesting discussion of what tumors are and how they behave. With refreshing absence of dogmatism he states that " There can be no uniformity of opinion as to what a tumor shall be called until it is more definitely known what that tumor is. At present it is not known what any tumor is." When the reviewer first studied pathology, well over 20 years ago, there was no such doubt of our knowledge of tumors. If the confession of ignorance is the beginning of knowledge, as we were taught in the copy-book days, then we should be on the threshold of knowledge of the nature of tumors. One of the most interesting statements in the book is that " Few pathologists would be surprised if definite proof of the microorganismal nature of cancer were forthcoming to-morrow."

In Part III the pathology of special organs is considered. This will probably prove to be the most valuable part of the book to the general surgeon. Sections are devoted to the thyroid gland, mammary gland, male urogenital organs, female reproductive organs, the alimentary tract, the bones and joints.

The subject matter is handled throughout in such a manner as to bind pathology to surgery in a most useful way. There is hardly a page which does not bear an important truth for the surgeon either in etiology, interpretation of pathological findings, or clarifying of symptoms. The ideas are clearly expressed. The book is well made, and while a number of typographical errors were found none of them are of a nature to confuse the meaning of the text.

It is recommended as a book to be kept always at hand on the desk of the busy surgeon.

A Manual of Gynecology and Pelvic Surgery for Students and Practitioners, by *Roland E. Skeel, M. D., A. M., M. S., formerly associate clinical professor of gynecology, medical school of Western Reserve University, and visiting surgeon and gynecologist to St. Luke's Hospital, Cleveland; fellow of American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, ex-president of same; fellow of American College of Surgeons; formerly major, Medical Corps, United States Army; member senior surgical staff, California Lutheran Hospital, Los Angeles, Calif.* Second edition. P. Blakiston's Son & Co., Philadelphia, Pa.

This is a condensed manual suitable for the use of students and for the practitioner who has an occasional case in the gynecological field. The subject is well covered, in an elementary way. The author has an enviable style of expressing an idea clearly in a few short words. The illustrations are good, many of them chosen from the standard textbooks on the subject.

Anatomy and physiology are briefly considered in the opening chapters, symptomatology and diagnosis are then covered in general terms. The following chapters treat of disease and injuries of the vulva; injuries of the perineum and pelvic diaphragm; disease and injuries of the vagina; diseases and injuries of the cervix; diseases of the uterine body; displacements of the uterus; operations upon the uterus and its ligaments; extra-uterine pregnancy; pelvic inflammation, acute and chronic; operations for pelvic inflammation; tumors of the ovary, ovariotomy; congenital anomalies; sterility, gonorrhea, treatment of menstrual disorders; gynecological therapeutics; diseases closely related to or associated with gynecological lesions; gynecological surgery; postoperative complications and sequela.

The author is not an advocate of promiscuous curettage and even goes so far as to say that, aside from diagnostic curettage, hemorrhagic endometritis gives the only clear-cut gynecological indication for this useful but much abused minor operation. Diagnosis of extra-uterine pregnancy and the differential diagnosis of appendicitis are particularly bright spots in the book, very well described. Gonorrhea, which usually is treated at great length in textbooks on this subject, is allowed a scant four and a half pages, less than 1 per cent of the book, while discussion of the various anesthetics occupies more than twice as much space.

A STUDY OF SOCIAL PROGRAMS AND ATTITUDES IN RELATION TO THE PROBLEMS OF MENTAL DEFICIENCY, by *Stanley P. Davies, Ph. D., executive secretary, committee of mental hygiene, New York States Charities Aid Association.* The National Committee for Mental Hygiene, Inc., New York City, 1923.

In this volume the author, who frankly states that he is neither a psychologist nor a psychiatrist, has well discussed the various attempts which have been made from time to time to meet the two social problems of the feeble-minded, which he considers to be: (1) To what extent is it necessary or desirable to institutionalize the feeble-minded? (2) To what extent can they find their places in society outside of institutions?

After reviewing the prevalence of feeble-mindedness, the limitations of the Binet-Simon tests for determining the degree of same, and the history of the treatment which has been accorded this class in this country up to the present time, Doctor Davies comments at some length upon the findings of the medical officers of the neuropsychiatric divisions of the United States Army, who found that "the total number of individuals seriously handicapped by mental defect (including rejections by local boards) brought to light by the mobilization reaches 26,545. * * * The mental defect was so pronounced that the bulk of these recruits were considered unfit for any kind of military service."

On the basis of the findings of mental defect by these medical officers, Dr. Pearce Bailey, chief of the neuropsychiatric division during the war, estimates that "there would be 353,210 male defectives in the United States, if mental defect ran uniform among persons of all ages; if uniform for the ages between 18 and 45, there would be 164,710 male defectives in this group."

As the result of this revelation the author discusses the 10 remedies suggested by the research committees of the eugenics section of the American Breeders' Association at Palmer, Mass., in May, 1911. These 10 remedies are:

1. Life segregation (or segregation during the reproductive period).
2. Sterilization.
3. Restrictive marriage laws and customs.

4. Eugenical education of the public and of prospective marriage mates.
5. Systems of matings purporting to remove defective traits.
6. General environmental betterment.
7. Polygamy.
8. Euthanasia.
9. Neo-malthusianism.
10. Laissez-faire.

The committee was of the opinion that the first two remedies (life segregation and sterilization) held out the greatest hope of most immediate and effective results. In practice, however, it was found that the estimated cost of taking care of 19,000 feeble-minded in New York State alone—about $15,000,000 involved in first cost for construction—was prohibitive, and the legislature, and ultimately the taxpayers of the State, could not, even under the greatest pressure, be induced to make appropriations sufficient to provide anything like complete segregation of the feeble-minded.

There seem to be several reasons why sterilization has failed, among which are adverse public opinion on humanitarian grounds, legal considerations of the infringement of the rights of the individual, the question of doubt as to diagnosis and prognosis, the difficulty of drawing the fine line between those who should and should not be deprived of procreative powers, and the doubts raised by the changing aspects of the relation of heredity to mental deficiency as to how much may be gained by sterilization.

An interesting chapter is devoted to the newer aspects of heredity and behavior. The heredity of the "Hill Folk," "The Jukes," and the famous "Kallikak family" is reconsidered and the author affirms that "the existing state of knowledge on the subject permits of reaching no final conclusions. It merely indicates the importance of much further study and investigation. At the same time it is clear that the apparently final conclusions expressed some years back are no longer tenable. The problem is a vastly more complex one than the popular heredity chart of not so long ago made it. Nor are we in a position at present writing to form definite conclusions as to the degree of social menace that resides in the marriage and parenthood of so-called feeble-minded persons. Neither are we ready to say that they should marry, and to be on the safe side, it would seem the part of wisdom to discourage marriage so far as possible."

Nearly half of the book is devoted to showing the social possibilities of the feeble-minded, as contrasted with their well-known antisocial proclivities, in the institutional work of the Massachusetts School for the Feebleminded at Waverly, and the Rome State School for Mental Defectives at Rome, N. Y. The latter institution has a colony for boys and one for girls. The results from both colonies, as shown by the author, are, on the whole, very gratifying. Many, after appropriate and sufficient training, were able to be returned to society, and were, under proper supervision and direction, able to make good indefinitely. He says:

As a result of their colony training most of the boys adapted themselves readily to farm life and work. * * * The farmer himself does not expect the boy to plan out the work and go ahead with it under his own direction. He realizes that he wil now and then make mistakes, and he allows for that, but in practically all cases he knows that he can count on having a steady worker from morning to night, day in and day out and month after month. If the boy is treated right and made to like the place he can usually be depended upon to stick. And he will work willingly and hard. The fact that the boy works best under direction suits the farmer very well. He can do the bossing and the planning so long as he has in the boy the dependable brawn that will push the work through, perhaps not rapidly, but surely. The farmer knows, too, that when the typical feeble-minded boy has learned to do the chores and other duties he will do them regularly as the sun rises and sets.

As for the girls, it was found that they were "at least 75 per cent efficient on the average, and more so in many cases." One mill superintendent, who employed many of the feeble-minded from the colony, testified that he "could set the clock by the colony girls." They were there on the dot, and they stuck until the whistle blew. They could be depended upon much more than the girls from town. During the working hours, moreover, the colony girls had their minds on their work and did not indulge in as much gossip and daydreaming as some of their normal sisters. Many of the girls, after appropriate training in the Rome institution, were paroled to work as domestics in homes, and a large number of them fully proved their worth to their employers. "A large firm in New York City, after experimenting with its messenger service, came to the conclusion that the feeble-minded youth made the most satisfactory messenger because he was likely to be the most faithful in his attendance to his duties, and was contented to hold his position longer than the normal boy."

Commenting on the feeble-minded in the social order, the author concludes that:

The feeble-minded, or those of the lower grades of intelligence with whom we have been dealing, will reflect more closely than any other elements of the population the kind of social leadership which directs them. They are almost entirely dependent upon leadership and *some* kind of leadership they *will* find. Many will doubtless find the wrong kind and become a social and political detriment unless they are afforded a strong leadership of the right kind. On the other hand, the feeble-minded may be expected to be among the most faithful followers of a protocracy if the protocracy sufficiently recognizes their special need for social guidance. * * * The majority of

the feeble-minded may be safely and profitably retained as functioning members of society, both from an economic and a social standpoint, *provided* the group exercises over them a sufficient degree of social self-control to give them, until they approach adult life, the training suited to their capacities, and continues to furnish throughout their lives the sort of leadership which will foster in them the highest social ideals.

Those who are interested in the welfare and control of the feeble-minded will find Doctor Davies's work to be a valuable and up-to-date contribution to the literature of this subject.

THE NATIONAL HEALTH SERIES, TWENTY HEALTH BOOKS, edited by *The National Health Council*. Funk and Wagnall's Co., New York, 1924.

As civilization advances science provides better and more adequate measures for the preservation of health and the prevention of disease. In order that the people at large may enjoy the benefit of these advances certain educational measures are necessary. The availability of the facilities of medical and sanitary science must be brought to the attention of the general public. Then every man may apply them for his own benefit. The public must be instructed regarding disease, its causes, and results in order that these facilities may be intelligently applied and must be advised regarding established and well-proven methods of health promotion and disease prevention. Then each individual may know how to live in order to get the most out of life and how to prolong life beyond the average, which is the aim of modern preventive medicine.

In order to make available to the general public at a moderate price authoritative books on all phases of human health, the National Health Council has arranged for the publication of The National Health Series, which contains twenty small books written by some of the leading health authorities of the country.

Titles, authors, and brief descriptions of each book are as follows:

MAN AND THE MICROBE; HOW COMMUNICABLE DISEASES ARE CONTROLLED, by *C. E. A. Winslow, Dr. P. H.; professor of public health, Yale School of Medicine.*

A description of germs and germ diseases and how they are spread, together with practical methods of disease prevention by means of sanitation.

THE BABY'S HEALTH, by *Richard A. Bolt, M. D., Gr. P. H.; director, medical service, American Child Health Association.*

How to care for the baby so that it will be healthy, will develop properly, and be strong and free from disease.

PERSONAL HYGIENE; THE RULES FOR RIGHT LIVING, by *Allan J. McLaughlin, M. D.; surgeon United States Public Health Service.*

Practical suggestions as to how to apply personal hygiene to promote health and get the most out of life.

COMMUNITY HEALTH: HOW TO OBTAIN AND PRESERVE IT, by *D. B. Armstrong, M. D.; Sc. D.; executive officer of the National Health Council.*

An outline of what the community should do for the health of its ciitzens and what each person should do to make his community a healthy place.

CANCER: NATURE, DIAGNOSIS, AND CURE, by *Francis Carter Wood, M. D.; Director, Institute for Cancer Research, Columbia University.*

The best statement about cancer ever written for the laity. It tells what it is and how to know it and have it cured.

THE HUMAN MACHINE: HOW THE BODY FUNCTIONS, by *W. H. Howell, Ph. D., M. D., LL. D.; Sc. D.; associate director, School of Hygiene and Public Health, Johns Hopkins University.*

A nontechnical, literary description of the anatomy and physiology of the human body, the most wonderful machine of all.

THE YOUNG CHILD'S HEALTH, by *Henry L. K. Shaw, M. D.; clinical professor, diseases of children, Albany Medical College.*

How to care for the health of the runabout child from 2 to 6 years of age.

THE QUEST FOR HEALTH; WHERE IT IS AND WHO CAN HELP SECURE IT, by *James A. Tobey, M. S.; administrative secretary, National Health Council.* (Tentative.)

A statement of what health is, how it may be obtained, and a description of the actual help which the Government, States, municipalities, physicians, and voluntary health agencies can give to individuals.

TAKING CARE OF YOUR HEART, by *T. Stuart Hart, M. D., president, Association for the Prevention and Relief of Heart Disease, New York.*

How to avoid and prevent heart troubles, which form the leading cause of death in this country.

FOOD FOR HEALTH'S SAKE, WHAT TO EAT, by *Lucy H. Gillett, M. A., superintendent of nutrition, Association for Improving the Condition of the Poor, New York.*

An outline of what and how to eat for maximum efficiency and health building.

THE CHILD IN SCHOOL, CARE OF ITS HEALTH, by *Thomas D. Wood, M. D.; professor of physical education, Teachers College, Columbia University.*

Promotion of health habits in children of school age and exactly how to go about it.

TUBERCULOSIS; NATURE, TREATMENT, AND PREVENTION, by *Linsly R. Williams, M. D.; managing director, National Tuberculosis Association.*

Covers the whole field of tuberculosis, the cause, spread, treatment, prevention and duties of citizens, patients, and the community.

LOVE AND MARRIAGE; NORMAL SEX RELATIONS, by *T. W. Galloway, Ph. D., Litt. D.; associate director of educational measures, American Social Hygiene Association.*

The various elements, biological, social and sexual, which make up a successful and happy married life.

HEALTH OF THE WORKER; HOW TO SAFEGUARD IT, by *Lee K. Frankel, Ph. D.; chairman, National Health Council.*

Hygiene and sanitation in factory and shop and how industrial workers can protect and promote their health.

EXERCISES FOR HEALTH, by *Lenna L. Meanes, M. D., medical director, Women's Foundation for Health.*

Illustrative material giving to individuals the type of exercise best suited to each one's personal needs.

VENEREAL DISEASES; THEIR MEDICAL, NURSING, AND COMMUNITY ASPECTS, by *W. F. Snow, M. D., general director, American Social Hygiene Association.*

A nontechnical discussion of cause, spread, treatment, cure, and prevention of each of these diseases and related social hygiene questions.

YOUR MIND AND YOU; MENTAL HEALTH, by *Frankwood E. Williams, M. D., medical director, National Committee for Mental Hygiene.*

Describes how your mind can be a friend or enemy and how it can be enlisted as your ally.

THE EXPECTANT MOTHER; CARE OF HER HEALTH, by *R. L. DeNormandie, M. D., specialist, Boston, Mass.*

The health care needed during pregnancy in order that both mother and baby may be healthy and well.

HOME CARE FOR THE SICK, by *Clara D. Noyes, R. N., director of nursing, American Red Cross.*

What to do in the home when illness is present. Practical suggestions for the care of the sick.

ADOLESCENCE; EDUCATIONAL AND HYGIENIC PROBLEMS, by *Maurice A. Bigelow, Ph. D., professor of biology and director School of Practical Arts, Teachers College, Columbia University.*

The scientific and sociological aspects of adolescence to explain the proper transition from childhood to adult life.

Each of these little books deserves more extended comment than our space permits. Written in language that is nontechnical and easily understood, each volume, as may be seen from the above list covers a subject of vital importance to the general public.

THE ESSENTIALS OF PHYSIOLOGY, INCLUDING THE PHARMACODYNAMICS OF THE IMPORTANT TYPICAL DRUGS, by *George Bachmann, M. S., M. D., professor of physiology in the School of Medicine of Emory University, and A. R. Bliss, jr., A. M., Phm. D., M. D., professor of pharmacology and director of the departments of pharmacology and physiology in the Colleges of Medicine and Dentistry and School of Pharmacy of the University of Tennessee.* P. Blackiston's Son & co., Philadelphia, Pa., 1924.

The advance in the standards of instruction in the colleges and schools of destistry and pharmacy during recent years has created a demand for a textbook of physiology specially suited to the students of these two branches of medical science. The numerous works on physiology prepared for medical students are unsatisfactory since they are too extensive and, on the other hand, the textbooks prepared for the students of general science are too elementary to meet the needs of dentists and pharmacists.

In this book the authors present the essentials of physiology in a manner specially suited to the needs of these two classes of professional men. Sufficient anatomy for a proper understanding of physiology is included and each function discussed is accompanied by a presentation of the principles of the pharmacodynamics of the drugs of major importance in relation to that function, an arrangement which should be of value as a preparation for and an adjunct to the study of materia medica, pharmacology, and therapeutics.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. Phelps, Medical Corps, United States Navy, in charge

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Notes on Preventive Medicine for Medical Officers, United States Navy

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INSTRUCTIONS TO MEDICAL OFFICERS

OUTBREAK OF FOOD POISONING ON BOARD THE U. S. S. "MARYLAND"

The following report of an outbreak of food poisoning which occurred among the crew of the U. S. S. *Maryland*, April 16, 1924, was submitted by Commander R. G. Heiner, Medical Corps, United States Navy, senior medical officer of the *Maryland:*

"Between 1 and 3 o'clock in the afternoon of April 16 a large number of the crew reported to the sick bay with symptoms of poisoning like those caused by the toxin produced in meat infected with Gaërtner group of bacilli. The symptoms were severe in 65 cases, marked in about 100 cases, and very mild in a hundred or more others. There were two cases in which the poison nearly caused death, one of which reached the stage where his pulse ran as high as 160 to the minute and was so faint that it could not be counted at the wrist. If it had not been for prompt washing out of the stomach and rectum and stimulation, this case and perhaps others might have ended fatally.

"The symptoms, which were, in the severe cases, nausea, vomiting, abdominal pain and diarrhea, prostration, thirst, and slight fever, are identical with those produced by the toxin of the Gaërtner bacillus, and this fact combined with the fact that the usual incubation period for this toxin is 6 to 12 hours, throws suspicion on something eaten on the morning of April 16. A large number of the men who were affected had not eaten any of the midday dinner this date, April 16, on account of a feeling of slight nausea, which fact rules out that meal.

"For breakfast April 16 the crew had tinned pineapple, baked corned beef hash, tomato catsup, rolled oats and milk, cinnamon snails, bread, butter, and coffee. All men poisoned, except three, stated that they had eaten both hash and pineapple, and the three excepted stated that they had eaten no pineapple, but had eaten the hash. The catsup was not eaten by 15 of those poisoned. The rolled oats and milk was not eaten by 26 of those poisoned. The butter was not eaten by 3 of those poisoned. The cinnamon snails were not eaten by 6 of those poisoned. The bread and coffee are not probable factors and the bread was used by officers without any cases of poisoning.

"From the foregoing it will be noted that the corned beef was the only food eaten by all of those poisoned, and strong evidence points to it as the poisoned article of diet. The corned beef hash in question was mixed in four batches in the galley where the potatoes and onions were stirred in, but previous to this all corned beef had been ground together in one batch, and thus was served to the whole crew as one mixture. Hence the distribution of cases among all messes. The pineapple was served from many separate cans and not mixed; hence the improbability of a general infection being caused by it.

"The three meals of the previous day, April 15, were eaten by all those who had symptoms, but careful questioning brought out the fact that no single item of diet was universally eaten by those poisoned. And again we have the question of incubation period, which would be over 18 hours from the last meal of that date. Of the possible items of the previous day's bill of fare, hash was not eaten by 4, pork chops were not eaten by 1, liver was not eaten by 8, sour krout was not eaten by 16, canned beets were not eaten by 20, canned beans were not eaten by 18.

"The probable incubation period in this outbreak was of value in fixing the time at which the poison was ingested, on account of the fact that nearly all cases were stricken suddenly and within an hour or two of each other. In a short incubation period of a few hours—six or eight—this would occur, but with a longer period between ingestion of the poison and development of symptoms there would be a longer time between cases. For instance, symptoms following carbolic acid poisoning are immediate, or within three minutes; symptoms following phosphorous poisoning, counting out early symptoms of gastric irritation, appear after five to eight days. In the first instance we have a difference of three minutes, in the second three days. This is an exaggerated example used for the purpose of making clear an important point in the subject under discussion, for if we grant a short incubation period we pin the cause on something eaten for breakfast the same day.

"The canned corned beef in question was delivered aboard at San Pedro from U. S. S. *Arctic*, December 25, 1923, and had been used at the rate of about 400 pounds a week since that date without any definite previous outbreaks of poisoning, although there were repeated cases of slight diarrhoea which were attributed to other causes.

"The question may be asked, why, when all these cans were probably filled from the same lot of corned beef, do we only get one or a few cans containing poison? And in answer to this it may be well to quote from Stitt, of the Navy, and from Rosenau, of Harvard, who state: 'It has been noted that the bacteria, or their toxin may be distributed unevenly in meat eaten, so that one person may be made very ill while others escape.' And also it will be well to quote the following from Rosenau: 'It can not be too strongly emphasized that in the vast majority of outbreaks of food infection the food affected is not noticeably altered in either appearance, taste, or smell. The prevalent idea that poisonous food must be tainted still persists, although long exploded. Bacilli belonging to the Gaërtner bacillus group can not be detected in food or water, any more than typhoid bacilli, dysentery bacilli, or cholera vibrio can be detected with our unaided senses.'

"From the foregoing I have concluded that one or more of the cans of corned beef used for hash on April 16 were infected at some time, probably while being packed, or before, with one of the Gaërtner bacillus group. My reasons for this conclusion are the typical symptoms; the incubation period pointing to breakfast the same morning; the elimination of all other items of diet by exclusion; the method of preparing and serving which makes the corned beef hash the only likely item that could have so evenly distributed the poison; the beef being the food most commonly infected with this poison; and lastly, the eating of the hash in every case of poisoning, without exception.

"The rest of the stock of corned beef aboard, of this brand, has been surveyed and recommended for destruction after it has been examined for toxins.

"I recommend that the remainder of this stock of corned beef be turned over to the U. S. S. *Relief* in the hope that the offending organism may be cultured out and that the commander in chief be notified of the strong suspicion against this particular issue of corned beef so that he may take whatever action he deems necessary."

The commanding officer of the *Maryland* commented upon the report as follows:

"The corned beef in question was purchased on contract No. 57303 from a reputable firm. The packing cases indicate that the beef was canned in March, 1923.

"The beef in question will be retained on board until some disposition is ordered made of it. In the meantime it may or may not be worth while to undertake examination for toxin.

"As stated in the report of the medical officer, corned beef has been consumed on board at the rate of 400 pounds per week, and probably has been consumed by other battleships in a like amount. The commanding officer feels that if he continues to serve this corned beef and a fatality should occur, he would be negligent; on the other hand, if a new supply of corned beef is obtained from the supply ship, having been purchased under the same contract, the *Maryland* would be undertaking a dangerous experiment in consuming it. It is, therefore, recommended that if there is any other brand of corned beef available for issue that it be supplied to the *Maryland* until the fitness of the beef in question has been settled.

"If a second attack should occur on the *Maryland* it would probably go very hard with any of those men who have already suffered one attack."

The commander of battleship divisions, Battle Fleet, placed the following indorsement on the report:

"In connection with the above it is pertinent that the fleet received a supply of corned beef from the *Arctic* on 25 December, 1923, packed by the same firm and similar in all respects, so far as is known, to that received by the *Maryland*. Many tons of this corned beef have since been consumed, and without untoward results except on the *Maryland*.

"In the *Maryland's* report no mention is made of the possibility of infection of the food from extraneous sources (that is, after the cans had been opened) by rats, flies, etc. This possibility amounts, in fact, to probability, in view of the very large quantities of this food bought from the same manufacturer under identical specifications as that on the *Maryland*, which has been and is being consumed by all other vessels of the fleet, without accident.

"The commanding officer, *Maryland*, reports that the remaining stock of this brand on the *Maryland* has already been surveyed, and recommended for destruction. It is thought that the best procedure would be to turn over the *Maryland's* entire stock to the U. S. S. *Relief* for investigation. On the other hand, the evidence submitted in the foregoing papers is not considered either complete or conclusive to the extent that would warrant any general condemnation of the stock of this food on the other ships, or this particular brand."

Discussion.—Although bacteriological and toxicological findings are lacking, this report has definite value as a contribution to the literature of food poisoning. The necessary data to determine the food that was responsible for the poisoning were carefully and promptly obtained. The information is clearly presented in the report and the reader is left with no doubt that the corned beef hash served for breakfast April 16 was the contaminated food. There can be little doubt, too, that the contaminating organism was some member of the B. enteritidis-paratyphoid group. It was a surprising coincidence that this report should have reached the bureau shortly after presenting the review of the subject of food poisoning which appeared in last month's bulletin.

One wishes that feces and urine from a few of the patients who were most severely affected might have been collected for bacteriological examination. Isolation of a bacillus of the food poisoning group in this outbreak would have served to heighten a suspicion that is justifiable, without additional evidence, that contamination of the corned beef took place after the meat was taken out of the cans. The report does not mention whether or not a search was made among the men who handled and prepared the food for an individual who might have had diarrhea or other manifestations of gastrointestinal disorder on April 15. Of course, the contamination could have been caused by a perfectly healthy carrier of a paratyphoid bacillus, but it is always well to look for evidence of illness among the food handlers. Healthy carriers of other members of the B. enteritidis-paratyphoid group are rarely found.

If contamination of the corned beef occurred on board ship there must have been opportunity for incubation. While the report does not touch upon this point the usual procedure when hash is to be served for breakfast on board ship is to grind the meat the night before and then keep it in the warm galley for 9 to 11 or more hours where conditions are favorable and the time is ample for multiplication of microorganisms and production of toxin to take place. If contamination has already been caused by soiled human hands, covering the meat will not prevent growth of the microorganisms. Only heating to the thermal death point and careful protection thereafter or transfer to a cold place until the ground meat is to be used will prevent or restrain growth. However, if rats and cockroaches are present it is important to have the meat pans or tubs in which ground meat, chickens, etc., are usually kept overnight well protected against invasion by vermin. Rats and mice have been shown to be common carriers of the various members of the food poisoning group of bacilli, and their excrement may be tracked into food by cockroaches or deposited directly upon the food by the rodents themselves. An outbreak of food poisoning traceable to rat or mouse droppings is mentioned below.

Whatever the answer may be as to the mode of contamination in this and in previous outbreaks of food poisoning which have occurred on board battleships, clearly one must emphasize the importance of close supervision of the health of the men who handle and prepare food for large groups under the conditions that obtain on board ship where it is necessary to prepare large quantities of food in limited spaces with few utensils and to cook and serve the meal expeditiously. The galley force should be impressed with the danger of contaminating food and be made to realize the necessity of thoroughly washing their hands with soap and water after visiting the toilet.

Needless to say, incrimination of the rat and cockroach in food poisoning outbreaks should give a powerful stimulus to measures undertaken for the eradication of vermin.

No mention is made of bacteriological or toxicological examination of the hash which caused the outbreak. Possibly there was no hash left to be examined. More often than not under such circumstances all food remaining from the causative meal has been disposed of by the time it is realized that an outbreak of poisoning is occurring.

It was proper to have sample cans of the same lot of corned beef examined, and the possibility that bacteriological work may result in isolation of a toxin producing bacillus can not be overlooked. But assuming that cultures will prove negative, there are several points about the corned beef that might be discussed. In the first place, the cans issued to the *Maryland*, strictly speaking, can not be regarded as comprising one lot of canned goods. The supply carried by the U. S. S. *Arctic*, although packed by the same firm and similar in all respects, was so large that it could not have been processed in one lot, and in all probability the shipment consisted of cans from the warehouse which had been processed in lots over a considerable period of time.

In the next place, issues were made by the *Arctic* to the whole Fleet and many tons of the corned beef were consumed without untoward results except on board the *Maryland*. In order to preserve the corned beef the manufacturer must necessarily have processed the cans sufficiently to prevent spoilage; that is, the cans must have been heated in a retort sufficiently to kill heat resistant sporebearing organisms. Bacilli of the enteritidis-paratyphoid group are not heat resistant. No mention is made of finding "swells" or "springers" at any time among the cans consumed or remaining for examination. The corned beef was purchased from a highly reputable firm and is one of the most reliable brands produced.

Underprocessing is highly improbable, and if underprocessing can be ruled out the possibility that the cans contained living bacilli need not be considered. There remains the remote possibility that bacterial growth had taken place in the meat before it was canned, in which event it is conceivable that although the microorganisms failed to survive, the more heat resistant toxin escaped destruction. However, even that is not probable because the temperature maintained during the "cook" in the processing retort is well above the boiling point of water and a few minutes exposure to a temperature of 212° F. has sufficed to destroy toxins produced by these organisms in experimental work. Nevertheless, assuming that the cans were underprocessed, we have on the one hand the possibility that contamination was an exceptional circumstance, the toxic meat being that from one animal only, and on the other hand the possibility that there was something radically wrong in the producing plant so that much of the corned beef was contaminated with the result that many cans contained toxin.

In the latter event the chances that toxic cans would have been issued to other ships in the Fleet are so great that the assumption need not be pursued. Presumably the cans were of the 1-gallon size. Whether the contents of a single can could have contained sufficient toxin in the absence of living microorganisms to have poisoned some 265 men generally distributed among all masses, and causing severe symptoms in 65 cases, is questionable. And to assume, under the same conditions, that more than one toxic can entered into the formation of the hash from a miscellaneous lot of cans which had been consumed on board the *Maryland* at the rate of 400 pounds per week between December 25, 1923, and April 15, 1924, as well as in other ships without a previous outbreak of poisoning, is to invoke a coincidence that is highly improbable. To be sure, the report mentions repeated cases of slight diarrhea which occurred previous to the outbreak and which had been attributed to other causes. Such cases occur not infrequently on board ship, and the cause is quite as likely to be water or food ingested elsewhere as food eaten in the general mess. Moreover, if these cases were caused by the regular ration no great suspicion attaches to the canned meat, for apparently the cases did not occur in the form of definite outbreaks but were distributed over several or many days as suggested by the word "repeated." It would be necessary to assume that several or many cans were contaminated and that each contained a very trivial amount of toxin. One might advance several explanations to cover the last point, but in any case it would be necessary to assume that many cans contained a toxic product, a rather far-fetched assumption.

These considerations lead substantially to agreement with the opinion expressed in the endorsement by the commander, battleship divisions, Battle Fleet, that contamination of the corned beef probably occurred on board the *Maryland* after the cans were opened.

When an outbreak of food poisoning occurs on board ship and suspicion falls upon a preserved food the psychological effect upon the crew is such that practical considerations make it advisable not to serve any more of the suspected food. Unless it is known to the crew that the remaining containers have been disposed of, troublesome rumors will spread and many of the crew will be suspicious of food served from time to time, resulting in trouble for the supply officer, officer of the deck, and medical officer, and the effect on morale and discipline is bad.

However, there is not sufficient evidence against the canned corned beef served on board the *Maryland* to justify condemnation of the unused cans. Perhaps the best thing to do would be to turn them into store and mix them up with unissued stock in such a way as to avoid the starting of troublesome and unfounded rumors.

With regard to the menace of rodents on board ship, an outbreak of food poisoning in which rat or mouse feces were pretty well proved to be the cause of poisoning, was reported by Charles Krumwiede and Ole Salter in Abstracts of Bacteriology, Vol. VIII, No. 1, under the editorial direction of the Society of American Bacteriologists, January, 1924.

The outbreak included a total of 59 cases in 21 families. The food at fault was cream filler, a boiled cornstarch mixture. Contamination occurred in a bakery. The filler was used in eclairs and cream-filled crumbcake.

From the stools of individuals who were poisoned a bacillus was isolated, and this was reported as *B. pestis caviae*, a member of the enteritidis-paratyphoid group. This organism has recently been identified as a distinct paratyphoid type, and is thought to be a common cause of food poisoning in man. Paratyphoid B. is not a single type of organism; probably several immunologically different bacilli pass under this title. So far as *B. pestis caviae* is concerned, it may be a paratyphoid bacillus, and it may be a strain of *B. suipestifer*, which is probably tantamount to calling it *B. aertrycke.*

Krumwiede and Salter state that this paratyphoid group, as shown previously by them, includes the majority of the paratyphoid varieties of rodent origin. The organism isolated in this instance is like the "mutton" type described by Schutze.

The presence of this microorganism suggested the probability of rodent contamination of the filler. An investigation was made and rodent feces were found on a shelf above the place where a pail of the filler had been placed to cool. The bacillus was recovered from these droppings, and therefore, in all probability, they were the source of contamination. There were cats in the bakery and it is believed that they, in jumping to the shelf in pursuit of rodents, were the means of brushing some of the droppings into the filler.

The outstanding circumstances and conditions surrounding three recent outbreaks of food poisoning in battleships are now matters of record. Several circumstances were in agreement in all three outbreaks. In each, breakfast was the meal responsible for poisoning and the particular item in each instance was hash. In all three instances the numbers of men affected, including mild cases, were upward of two hundred and the cases were quite generally distributed throughout the general mess. In the outbreak which occurred on board the U. S. S. *North Dakota* beef from the ship's cold-storage room, consisting of five quarters, four of which had been largely used the previous day in the form of steaks, roast beef, etc., without causing any symptoms, entered into the composition of the hash. In the outbreak that occurred on board the U. S. S. *Idaho* refrigerated beef was also the culture medium for the offending microorganisms. In both of these outbreaks, in the absence of bacteriological investigation, and reasoning purely on probabilities, one might conclude, as was concluded, that more weight could properly be given to chances for contamination before the meat was frozen than to the probability of contamination on board ship and growth of microorganisms during the night before the hash was cooked. In the outbreak on board the *Maryland* there was the differentiating circumstance that a preserved meat, processed at a temperature sufficient to kill heat-resistant bacteria, and thus carrying a high presumptive factor of safety, was the culture medium for the production of toxin. One is justified, therefore, in suspecting that all three outbreaks were caused by contamination of the meat on board ship during its preparation for the making of hash.

AN OUTBREAK OF FOOD POISONING CAUSED BY LOBSTERS (CRAWFISH)

Four members of the wardroom mess of the U. S. S. *Converse* were poisoned by eating lobster (crawfish) salad April 2, 1924. Nine lobsters were purchased in the market at Culebra, Panama Republic, March 30, 1924. All of them were alive and they were cooked shortly after being brought on board and then placed immediately in the ship's ice box. Five of the lobsters were served three days later for luncheon, April 2, 1924. The menu for that day was as follows:

BREAKFAST	LUNCHEON	DINNER
Bacon.	Lobster salad.	Potato soup.
Eggs.	Potatoes.	Cold ham.
Toast.	Spinach.	Mashed potatoes.
Coffee.	Pineapple pie.	Fresh string beans.
	Bread and butter.	Apricots.
	Coffee.	Bread and butter.
		Coffee.

All officers on board ate a portion of the lobster salad; some more than others. Two of those who developed symptoms of poisoning ate more of the lobster than officers who were not affected. All members of the mess also ate a portion of every other article of food served at each of the three meals that day, so the assumption that the lobster salad was the food at fault was not reached by a process of exclusion. However, the assumption is not unreasonable so long as it is dealt with merely as a probability. The cases were treated by H. M. Smith, Ph. M., 1 cl., United States Navy, the hospital corpsman attached to the vessel, and the report of the outbreak was submitted by him.

The executive officer and the navigator were most severely attacked. The former was seized with vomiting, diarrhoea, abdominal pain, and prostration shortly after midnight, or about 12 hours after the luncheon in question. The nausea and pain were overcome in the course of some six hours. The navigator was affected in the same manner and to about the same degree. Two ensigns suffered mild attacks.

The squadron medical officer reported on board the following morning and reviewed the evidence. The affected officers were improving rapidly at that time. He examined the remaining four lobsters and found no apparent evidence of spoilage and concurred in the opinion already formed by the pharmacist's mate that in view of the fact that the shellfish had been out of the water probably for about three hours before they were brought on board and had then been kept over for three days there had been ample opportunity for bacterial toxin to form.

No evidence was presented as to the thoroughness with which the lobsters were cooked. If they were still alive when plunged into boiling water and were thoroughly boiled, it is not likely that any microorganisms with which they had previously become contaminated would have survived the cooking process. Actual and rather prolonged boiling is important, of course, in the case of shellfish in view of the possibility of contamination with sewage polluted water.

The report does not state whether the meat had been taken out or was still in the shells when placed in the ice box after cooking. This is an important point to cover in considering the question as to when contamination took place. The statement that the remaining four lobsters were examined seems to indicate that the meat was allowed to remain in the shell in the case of those four at least, but one would like to know how long the meat that was used for the salad was kept after removing from the shells before the salad was served; also evidence as to sanitary conditions and the health of those who handled the food. Much useful information is obtainable in cases of food poisoning even when laboratory facilities and experimental animals are not available.

The symptoms in the four cases under consideration are consistent with those that might arise from the ingestion of small amounts of toxin formed by some member of the B. enteritidis-paratyphoid group of bacilli. The incubation periods and duration of symptoms are also consistent.

As remarked in a previous discussion of this subject, there is often opportunity for shellfish to become contaminated with microorganisms of this group. At the same time spoilage is prone to occur quickly and suddenly in warm weather even in a refrigerator in which a temperature below 50 to 60° F. can not ordinarily be maintained. The tendency among those engaged in studying food poisoning in recent years is to believe that decomposition products formed in fish and shellfish are not any more toxic than those formed in meats of land animals, and there is quite general agreement that putrefactive changes in the latter are not a matter of toxicological importance. However, the failure to demonstrate toxin formation experimentally is not conclusive evidence that fish and shellfish may not at times become poisonous through spoilage. There has not been opportunity to investigate fish poisoning under conditions and circumstances favorable to study, as not infrequently is the case in an outbreak of meat poisoning. To the minds of many, on the basis of negative findings, sufficient evidence has not been synthetized to establish a probability that the toxin, when sea foods are toxic, must necessarily have been produced by some member of the comparatively small paratyphoid-enteritidis group of bacilli. Inedible species and idiosyncrasies or sensitization on the part of the individual eating the fish, of course, are not under consideration here.

It may well be that toxin production is limited to this group of organisms, and since one or another of these bacilli is likely to be the offending microorganisms and its detection is possible by practical laboratory methods, a characteristic bacillus should be looked for in food poisoning cases when facilities permit. Apart from these considerations, the average individual will not unreasonably be suspicious of sea food that shows any indication of spoilage or that has been kept over several days after it was cooked or taken from a can.

RESULTS OF INVESTIGATION OF THE DYSENTERY SITUATION, PROVINCE OF LEYTE, PHILIPPINE ISLANDS

The following summary of epidemiological investigations made in the Province of Leyte, was taken from the monthly bulletin of the Philippine Health Service for October, 1923. The paper, submitted from the division of communicable diseases, was written by Senior

Surgeon Regino G. Padua, Philippine Health Service, chairman, committee on dysentery investigation.

The findings are of interest in that they seem to show that little is required in the way of sanitary improvements beyond observance of the fundamental principles of safeguarding the water supply and insuring safe disposal of excreta, not only to prevent actual epidemics of bacillary dysentery but to reduce endemic prevalence so that the great majority of the inhabitants in a town or rural district are not exposed to danger.

"An investigation on the prevalence of dysentery in Leyte Province was conducted during the last half of September, 1923. The result showed that the death rates from it were, for the past five years, increasing although the mortality rates from all causes were decreasing. The morbidity figures were unreliable since the living cases were seldom, if ever, notified to the health authorities.

"A great proportion (82.50 per cent) of the deaths occurred among children below 15 years of age, and many of these were public school pupils.

"Very marked death rates from dysentery were noted, since the beginning of the year up to September 8, 1923, in Pastrana, Naval, Tolosa, Kawayan, Barugo, Carigara, and several others. No cases were reported in only 10 out of 46 towns. True epidemics developed especially in Carigara and Barugo.

"The disease was prevalent during the third quarter of the year. In fact, the summit of the curve fell in July and August.

"The diagnoses of the dysenteries were not very reliable, for approximately 55 per cent of them were made by municipal secretaries or assistant sanitary inspectors, or both. And even among those diagnosed by physicians, only 21.30 per cent were classified into amœbic and bacillary. In the charts of Leyte Hospital, the clinical and laboratory findings did not in quite many instances warrant the final diagnosis. There seemed to be tendency of diagnosing any amoebic dysentery unless the contrary was proved.

"The clinical picture of the actual cases was that of acute bacillary dysentery. The bacteriological and serological findings confirmed this diagnosis. There were, however, few cases in which entamœba histolytica was found in the stool but B. dysentery was also in association in some of them. Therapeutically, all the cases yielded, in from 1 to 10 days, to injections of antidysenteric serum.

"The source or origin of the infection was investigated in the municipality of Tacloban where most of the actual cases occurred. As a result, it was found that a large proportion of the houses were not provided with closets—the excreta was deposited anywhere in the yard on the surface of mother earth. In houses provided with Antipolo closets, no case of dysentery occurred; on the other hand, about

70 per cent of the cases were living in houses without sanitary sewage disposal system. Moreover, the general sanitation of the town was apparently lagged.

"The infection in Tacloban was propagated by polluted and contaminated water. The water analyses made on a large number of samples showed that they were nonpotable. The cases of dysentery occurred in houses supplied by water from open surface dug well, while no case occurred in those the water of which came from the two sanitary dug wells and proved biologically safe for human use. Some of the cases, however, were secondary to previous ones, while others acquired the infection perhaps through food or flies alighting on their food.

"There were drawbacks to general sanitation. The lack of cooperation on the part of the municipal presidents and councils was not destitute of harmful results. Eleven municipalities have not yet enacted ordinances for the construction of Antipolo system of closet. Of the 35 municipalities in which the ordinance was approved, all but 5 were not complying with it. As a result, about 90.53 per cent of the population of the Province was not using sanitary sewage disposal system.

"This lack of cooperation has similarly lead to the failure of establishing potable public water supply, for there were only 12 artesian wells in the whole Province, all situated in only two towns. There were altogether 910 surface dug wells, many of which were located on the banks of rivers and communicated directly with the river water. Since one well was used by about 135 persons, the chances of pollution and contamination were thus great.

"Many of the assistant sanitary inspectors in eight municipalities along the Oriental coast were found deficient, due perhaps to insufficient previous training. As a result, the cases of communicable diseases were not immediately notified to the health officer and in many occasions their reports were not reliable.

"Other obstacles to the progress of sanitation in the Province were: (*a*) Lack of transportation facilities, (*b*) lack of sanitary conscience and education, and (*c*) low salaries and appropriations.

"The remedial measures adopted were: (*a*) Hospitalization and treatment of the cases, (*b*) disinfection of the premises where the cases or deaths occurred, (*c*) obtention of the support and cooperation of the municipal presidents and councils in the campaign for an immediate installment of potable public water supply and sanitary system of sewage disposal, (*d*) the coordination of the work so as to utilize all possible agencies in the municipalities, and (*e*) the drawing of recommendations for the further curtailment of the dysentery in the province."

A CASE OF ASPHYXIA INCIDENTAL TO DIVING

The following account of an accident that recently happened in the case of a Navy diver was submitted in response to a request for additional information upon receipt of the Form F card in the case which recorded asphyxia; work (diving); equipment at fault; air-intake valve on helmet apparently closed sufficiently to permit building up of carbon dioxide gas before realized by diver.

The circumstances were that a qualified deep-sea diver descended in 80 feet of water to search for a lost anchor. Three hundred feet of diving hose and cable were led out to him. One hour and twenty-one minutes later he failed to respond to telephone signal; a suspicious moaning was heard over the phone, and failure to answer distress signal on the line led to hauling him to the surface and getting him on board (U. S. S. *Widgeon*, subsalvage vessel). The air control valve was only partly open, and it was thought that in handling his line the diver had shut the valve sufficiently to cut down his air supply and allow the carbon dioxide content to build up sufficiently to cause drowsiness and asphyxia before he realized his danger.

He was unconscious and rigid when cut out of the diving suit, 1 hour and 30 minutes from the beginning of submergence. He was placed in the recompression chamber immediately and decompressed as follows:

30 pounds pressure	minutes	8
20 pounds pressure	do	1
18 pounds pressure	do	1
15 pounds pressure	do	6
13 pounds pressure	do	10
10 pounds pressure	do	10
5 pounds pressure	do	20

At the end of this period the patient was found to have regained consciousness. During decompression he vomited and there was some bleeding from the nose. He was recompressed to 10 pounds pressure, which was held for 10 minutes and then reduced to 5 pounds for 20 minutes. He was then removed from the chamber, temperature normal; pulse, 108; respirations, 24. The following day he returned to duty and was pronounced physically fit for diving, after he had been examined by a medical officer.

Comment.—Asphyxia is the most common accident likely to happen to a diver. As recorded in the Diving Manual, United States Navy, asphyxia from *insufficient air supply is inexcusable* because deficient circulation of air through the helmet is manifested by decrease in the amount of air bubbles rising to the surface, and there is also a decrease in the noise caused by air escaping from the helmet as heard over the telephone. Accidental closure of the air-inlet valve by the hand of the diver in working on his lines is hardly conceivable. On the other hand, it is said to be a common practice among experienced divers to cut down the air supply intentionally and thus reduce the roar of air in the helmet when it becomes annoying. That practice is not without danger. Whether or not that was the cause of asphyxia in this case apparently was not determined. The report makes no mention of a statement from the diver after he recovered, but the inference is that the diver had no recollection of what happened to him. With a diminished air supply warning of increasing percentages of carbon dioxide is given by slight dysponoea and panting upon slight exertion. A fall resulting in a squeeze with underinflation of the suit might have resulted in sudden asphyxia but that is not likely in this case as the diver had been working on the bottom for more than an hour before he failed to answer signals. If he had dropped off a ledge or into a hole he would probably have remembered the fall.

TWO CASES OF GONOCOCCUS INFECTION OF CONJUNCTIVA TRACEABLE TO INDIRECT CONTACT WITH A CASE OF GONORRHEA

Two officers, a lieutenant commander and an ensign, both in the engineering department of one of the battleships, developed severe gonococcus infection of the eyes, March 24 and March 26, 1924, respectively. A yeoman in the engineer's office was under treatment for active gonorrhea at the time these officers became infected. They were infected, presumably, by handling papers or other material previously handled by the yeoman in question. There was no evidence that either officer had or had ever had a venereal disease.

The bureau seeks a report of the epidemiological factors possibly involved in such cases in order that they may be cited as reminders of the importance of treating gonorrheal urethritis as a communicable disease dangerous to the public health, in the treatment whereof precautions should be taken to safeguard persons who may come in contact with the infected individual.

A few months ago two cases of gonorrheal ophthalmia occurred on board ship in the persons of enlisted men and resulted in such great permanent damage to the eyes that it became necessary to discharge both men from the service. Infection in those cases was attributed to the use of a wash bucket in common with a man who had active gonorrheal urethritis. In the cases reported above, fortunately, both patients recovered promptly and were discharged to duty with only eight sick days.

ABSTRACT FROM THE ANNUAL SANITARY REPORT OF THE U. S. S. "FLORIDA" FOR THE YEAR 1923—PROPHYLAXIS OF VENEREAL DISEASE

A comparison of the annual rates for venereal diseases covering three successive years follows:

	Gonorrhoea	Chancroid	Syphilis	Total
1921	87.3	42.7	5.4	135.4
1922	74.3	35.7	9.2	119.2
1923	101.9	27.3	10.4	139.6

The annual rate for 1923 shows an increase over 1922 of 20.4.

The annual rates (all venereal disease) for each month of 1923 were as follows:

January	148.6	July	168.5
February	183.2	August	327.8
March	101.9	September	57.0
April	127.4	October	98.0
May	121.9	November	75.8
June	78.0	December	75.1

The highest annual rate, 327.8, occurred in August. This would not be unexpected, as the ship gave liberty at Lisbon and Gibraltar at the end of July and in early August, where opportunities for intoxication and cheap venery abounded. It may be of interest to note that but one case of venereal disease was reported from the midshipmen throughout the cruise. The relatively high rates from January to May inclusive were incident to an overhaul period at the Boston Navy Yard.

Venereal disease prophylaxis.—Every effort has been made to increase the efficiency of prophylaxis. Instruction of the various divisions in small groups has been continued and special stress laid on the proper technique of the tube for self-administered prophylaxis. The imperative need of immediate treatment has been emphasized. All men should now fully appreciate the necessity of prophylactic measures within 3 hours at least. The number of prophylactic tubes issued during the year was 2,123. The tubes are not always properly used and men sometimes neglect the use of them altogether even when at hand, particularly if intoxicated. It has been the practice on this ship to question all men with venereal infections very closely in this regard. It is found for instance that men may use the tube and omit preliminary washing with soap and water. The men have been strongly advised to utilize the prophylactic facilities aboard ship on return from liberty even though the tube has been employed, thus securing a double safeguard. It is felt that the recent order of the bureau to the effect that all men be directed to take prophylaxis aboard, regardless of prior tube prophylaxis, will materially cut down the percentage of infections.

The following table presents the prophylactic data for the year:

Time after exposure	Number of treatments	Number followed by—			Total
		Gonorrhoea	Chancroid	Syphilis	
1 hour	1,300	49	17	1	67
2 hours	56	4	1		5
3 hours	51	11	3		14
4 hours	33	1	2	1	4
5 hours	33				
6 hours	6				
6 to 12 hours	2				
More than 12 hours	1				
Total	1,482	65	23	2	90

Number of men infected who failed to take prophylactic treatment

Gonococcus infection	37
Chancroidal infection	8
Syphilis	3
Total	48

These figures do not include cases received by transfer with venereal infections or other cases with indefinite prophylactic history.

It is realized that these data are of little value as the number of self-administered treatments by tube can not be accurately obtained. In the above table the number of prophylactic treatment represents the record as given aboard plus such self-administered treatments as were alleged by men developing infections. The great bulk of the treatments were therefore administered aboard. The percentage of gonococcus infections within the one-hour limit was 3.7 per cent; for chancroid, 1.3 per cent; for syphilis, 0.8 per cent. The corresponding figures for the second and third hours show the usual rise in percentage of failures; the fourth hour on the other hand shows an obviously fallacious drop. The efficiency in general does not appear high, but if the number of self-administered treatments were actually known the data would in all probability indicate much more favorable results.

Inspections of the crew have been continued quarterly. Advantage of this opportunity was taken to check up the number or the absence of vaccination scars and the standards of cleanliness among the men. Inspection of all food handlers—i. e., stewards, officers' cooks, mess attendants, ship's cooks, bakers, and mess cooks—has been carried out weekly; particular attention being given to cleanliness of hands and fingernails, skin infections, and body lice. All venereal-disease patients with open lesions or active symptoms are messed together in a separate mess, mess cooks being selected from their own number and mess gear sterilized separately.

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NOTE FROM THE ANNUAL SANITARY REPORT, UNITED STATES NAVAL STATION, OLONGAPO, P. I., FOR 1923—EPIDEMIOLOGICAL CONSIDERATIONS

There have been more admissions for the venereal diseases this year, originating either in Subic or Manila. It is a question whether the monthly inspections for the detection of these conditions have had any influence in this direction, although it is quite possible that fear of consequences following the concealment of gonorrheal urethritis has had a tendency toward making the men report as soon as symptoms appear.

There has been one case of dysentery, bacillary, admitted during the year from the service personnel, the source of infection could not be determined, but inasmuch as there was no other admission it is thought this case originated in one of the neighboring barrios. Among the natives several such infections occurred with a low mortality rate under the salt treatment, occasionally assisted by the serum.

There were no cases of smallpox or cholera found in the reservation.

There were two cases of typhoid fever treated at the Camilla Simpson Hospital, one of which was moribund at the time of admission. The other case is still a patient in the fourth week of the disease. These two cases originated outside of the reservation and were brought here for treatment.

Malaria among the natives, though prevalent, does not exist in large numbers, but the same does not hold with dengue which at times assumes epidemic rates. This last disease is the principal source of sick days in the service personnel of the station. Dengue can not be stamped out owing to the topography of the locality and the enormous expense which would be involved. Neither can sanitary measures for the prevention of malaria be instituted because of the above reasons.

The mortality among native infants and children continues very high, due to lack of personal hygiene and improper feeding, resulting from decreased activities in the yard and damage done to crops during the typhoon season. While the younger generation increasingly sees the benefits and necessity of modern medicine, it is still impossible to alienate the majority from the uses of herbs, earths, and home concoctions, which aggravate rather than ameliorate infections. Septic conditions are not brought to the hospital until they are well advanced, and then any home treatment prescribed or recommended are not carried out because of superstition, prejudice, and lack of sufficient intelligence. Casts are removed from fractures, and sterile dressings are replaced by pieces of old dirty linen.

Smallpox and typhoid inoculations are not in the least popular. Over 90 per cent of the children are infected with ascaris and a goodly percentage with hookworm, while over 50 per cent of breast-fed infants suffer with infantile beriberi, mostly of the dry type, and these usually end fatally in frank convulsions beginning one or two days prior to death. Contrary to most literature, these convulsions are typical and do not consist in "stiffening" of the muscles.

THE COMMON WASH BUCKET—NOTE FROM THE ANNUAL SANITARY REPORT OF THE U. S. S. "FLORIDA" FOR THE YEAR 1923

In the last annual report attention was directed to the dangers in the use of one bucket by several men in common for bathing themselves and washing their clothing; and sometimes for brushing their teeth. This is a bad practice and may lead to serious epidemiological consequences. An investigation of the number of buckets aboard in relation to the number of personnel was made recently. Three hundred and fifty buckets were in use by the deck force made up of approximately 752 men, or about 1 bucket for every 2 men. In the engineer's force were found 160 buckets to a force of 308 men, likewise about 1 bucket for every 2 men.

The data obtained with reference to officers' stewards, cooks, and mess attendants was of especial interest. Total number of buckets totaled 13; the number of servants, 50—less than 1 bucket to 4 persons. This situation should be remedied by providing definite stowage space and insuring that each individual is assigned his own individual receptacle. The necessity of this arrangement for food handlers is obvious. It is unfortunate that there is not sufficient stowage space for each man aboard to have this arrangement. It must always remain a serious sanitary defect, and therefore a factor in the propagation of communicable disease.

SANITARY MEASURES AT THE NAVY YARD, NORFOLK, VA.

The following circular, printed in large type, has been published by the commandant for distribution among householders and employees of the yard:

SANITARY POINTS FOR THE SUMMER OF 1924

Kill and burn the early flies—and the later ones. Do not carry crushed flies on the soles of your shoes all over the house. *Prevent flies from existing at all. How? Do not let them breed.* Fly eggs are laid in horse manure, filth, ground soaked with kitchen slops, decaying fruit and vegetables, etc. *Put manure, garbage, food, etc., where flies can not reach* this organic matter. (The more you prevent flies from breeding, the less you will have to "swat.") In Portsmouth and Norfolk about 14 generations of flies come and go every summer. Check their coming, and hasten their going. From fly egg to grub and from grub to young fly takes about 10 days of hot weather and longer in cooler weather. *About 40,000 babies are killed every year* by intestinal diseases caused by infected milk and other infected food. How infected?

By flies, with unwashed feet and faces, coming *from filth directly to food*. Extermination of all house flies would save all these babies and about as many more older children and grown-ups. *Do not let flies crawl over baby's milk bottle or nipple* (if you love your baby). Keep the rubber nipples in boric acid solution when not in use. *Screen outer doorways and windows. Screen food from flies. Screen the chimney or fireplace.*

Mosquitoes carry malaria and other diseases. A few flies and mosquitoes sleep through the winter and come out of their hiding places in the spring, or later. Both multiply very rapidly, millions of descendants within a few weeks. Some meet with an untimely (?) death. In hot weather a mosquito egg in water hatches into a "wriggler" and this changes finally into a young mosquito in about 10 days, longer in cooler weather. How like the fly! *Kill the early mosquitoes, and the later ones. Do not let water stand in old cans, vases, puddles, eaves of houses, or in any other hollow place. If you can not drain off the stagnant water (where mosquitoes breed) put a little kerosene oil over it.* (Thit precents the larvæ ("wrigglers") from getting air, and they die).

Cockroaches will leave the house in a huff if no food is within their reach. This means absolutely no food—no crumbs, no grease, and no dirt mixed with food. *Have kitchen, pantry, cupboards, tables, utensils, etc., strictly clean.* Do not depend upon roach killer alone; use both methods, or you may drive the pests into your neighbor's house. Roaches carry disease. *Use liquid "Pest Exterminator," "Flyosan,"* to kill roaches, ants, flies, mosquitoes, bugs, etc.

Ants in the house, two kinds, wood eaters and food eaters. "White ants" are black when they are in the full insect form, with wings. In the larval or grub stage they are white, and devour woodwork. *When you find spongy woodwork, report it so that the ant-eaten wood can be removed and burned (including the grub). When white ants swarm, spray them with pest exterminator* if the hand sprayer is at hand and filled for use. *Whether you spray them or not, sweep them into a broad pan of water*; where they become entangled and helpless. *Strain through a coarse cloth and burn them.* Do not let any ants escape to raise families to destroy more wood. An electric light (portable) placed over a broad pan of water attracts many of the winged, swarming ants and they fall into the water. To keep sugar, sirup, sweets, etc., from the food-eating ants, place the legs of the table or cupboard (holding the food) in cans holding water. Let no crumbs fall. Clean up as you go. Borax is the safest powder. The use of sodium fluoride requires more care. See (*n*) of summary.

Bedbugs carry one kind of fever (relapsing) from such patients to healthy persons. Clean clothing, clean bodies, clean bedding, and beds are preventives. Have plain, metal beds with no hiding places. Take a day off and go on a still hunt for the whole family if you see or feel one bug. Flaming will not injure a metal bedstead; not so with wooden ones. If bugs persist, report to yard dispensary (if in the yard) or to the civilian medical authorities. If cleanliness, flaming, strong vinegar or pest exterminator do not end the trouble, report to your doctor and he will supervise heroic treatment.

Rats.—The flea of the rat carries bubonic plague. The United States Public Health Service is continuously on the alert to prevent the introduction into the United States of the first infected rat or the first infected human patient affected with plague. Humans and rats can not spread the disease unless they are affected. We can do our part by lessening the number of rats. If plague should be brought to our city, humans would be more apt to listen to reason than rats. Persons with plague would be rigidly quarantined, while rats would do their worst. Every year in the United States rats eat or destroy millions of dollars worth of food and property. The rat is about the only animal that has no redeeming qualities; he does harm, and no good.

Trap and kill rats. Do not feed them by carelessly throwing garbage in the back lot or on the dumping grounds, or by failing to keep good food beyond their reach. *Throw your garbage into proper metal cans that have properly fitting covers* (not into open pails, baskets, paper boxes, etc.), so that cans and contents can be taken away from the house and the cans cleaned before being returned for use at the house.

SUMMARY OF THINGS TO DO

(*a*) Screen all outer windows and doors of your house, and keep them insect proof.

(*b*) See that there is no space between the screens and the window sashes.

(*c*) Screen all chimneys or fireplaces for the summer.

(*d*) Have no stagnant water in old tin cans, flower vases, buckets, or hollow places either in doors or out, in which mosquitoes will breed.

(*e*) If it be necessary or desirable to have standing water where mosquitoes will reach it, either screen it or empty the receptacles and refill with water, or pour a little oil over it.

(*f*) If a toilet should not be in use daily, flush the bowl and the tank at least once a week, as mosquitoes will breed there if present and if the water there should remain stagnant for 10 days.

(*g*) Close carefully all screened doors after you go in and out, and keep flies and mosquitoes out of the house.

(*h*) *Kill all early flies and mosquitoes indoors—and the later ones.*

(*i*) Scrub and clean all shelves, cupboards, tables, floors, utensils, etc. Do not use rags instead of scrubbing brushes and cleansers.

(*j*) Use fly paper and formaldehyde solution in saucers with a little sugar at edges.

(*k*) Use liquid "pest exterminator" or "flyosan" to kill roaches, ants, flies, and mosquitoes.

(*l*) Keep all food which you are to eat where flies, roaches, ants, mice, and rats can not find it.

(*m*) Place all refuse scraps of food in tightly covered garbage cans which should be marked, "*for garbage only.*"

(*n*) Scrape up all crumbs of food, grease and greasy dirt and throw into the garbage can, or burn in the range or stove, or wash this refuse down the sewer. Clean up as you go.

(*o*) Before disposing of emptied food cans, wash them clean and pierce holes in them. (Then there will be no food for rats and flies, no breeding place for flies in the cans, and no rain water collecting in the cans where mosquitoes will breed when the cans are thrown into hollow places for filling-in purposes.)

(*p*) Do not throw emptied cans into the garbage can with the garbage.

(*q*) Use saniflush once a week for cleaning toilets, after being thoroughly cleaned with it.

(*r*) Note all ant-eaten woodwork and report it so that it can be removed and burned.

A. R. ALFRED,
Captain (M. C.), U. S. Navy.

Approved:
H. J. ZIEGEMEIER,
Rear Admiral, U. S. Navy,
Commandant.

TYPHOID FEVER REPORT

The following case of typhoid fever has recently been reported to the bureau:

Seaman, 2c, United States Navy, Admitted to the sick list April 8, 1924, on board the U. S. S. *Beaver*, and transferred to the U. S. S. *Relief* with undetermined diagnosis. Diagnosis changed to typhoid fever April 14, 1924. Diagnosis confirmed by finding a gram negative motile bacillus in blood culture and by agglutination tests of the blood. Typhoid fever was epidemic in Trinidad while the patient was there on liberty.

The patient's statements and his health record indicate that he received inoculations of antityphoid vaccine October 19, October 26, and November 2, 1922.

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO APRIL, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and April 30, 1924, notified injuries and poisonings as follows:

	Within command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work of prescribed duty		
Injuries	1, 020	501	258	**1, 779**
Poisonings	4	20	10	**34**
Total admissions	1, 024	521	268	**1, 813**

Of these admissions 85.22 per cent were for injuries or poisonings occurring within the command, and 14.78 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 66.28 per cent were connected with the actual performance of prescribed work or duty, and 33.72 per cent were not so connected. Of the total admissions for injuries and poisonings only 56.48 per cent were connected with the actual performance of work or prescribed duties; i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "drug addiction" or "alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases are worthy of notice from the standpoint of accident prevention:

Battleship.—Amputation wound of distal phalanx, right middle finger. Injury was caused by using the finger to push meat into a meat chopper. It was noted that a safety device was lacking and that a device could easily be furnished for each chopper which would lessen the danger of the accident. It is assumed that such a device has been adapted to the meat choppers on board that particular vessel.

Haiti.—Burn of face caused by explosion of a gasoline torch because of the lack of a safety device.

Haiti.—Burn of left hand and wrist and right wrist due to the faulty operation of a defective valve on a coffee urn.

Marine Barracks.—Sprain of knee; the result of a fall caused by a hole in the sidewalk. Holes and broken boards constitute a frequent cause of injury where sidewalks in use are allowed to remain defective. The failure to make the necessary repair in this instance caused the disablement of an officer for eight days.

Tender.—Foreign body in leg due to the explosion of a cartridge contained in trash which the victim was feeding into a furnace. It was not determined whether the cartridge became accidentally mixed with the trash or was maliciously placed therein.

Ship station.—Two cases of foreign body in the eye incurred while sharpening tools at emery wheels. It was not stated whether there was a safety shield in use or whether the injured men wore protective glasses.

Torpedo station.—Case of trinitrotoluene (T. N. T.) poisoning due to the handling of same without observing precautions against poisoning that are generally recognized to be necessary.

Cruiser.—Fracture of phalanx of great toe. Rolling of the ship caused a projectile to fall from its rack. Lack of safety device was reported.

Destroyer.—Burn of left arm, face, neck, and chest. Caused by flareback from oil burner; the result of patient's negligence. Fire went out and he forgot to turn off burner while reaching for torch.

Air station.—Incised wound of palmar surface of hand. Injured while using bread-cutting machine. Lack of safety device reported.

Battleship.—Crush; abdomen, pelvis and both thighs. Faulty design of shell hoist reported as cause. Shell hoist failed and shell fell striking another shell, which fell across patient's pelvis and thighs.

Battleship.—Lacerated wound of hand caused by buzz saw, resulting in 108 sick days. Personal negligence and ignorance of safety methods were reports as being responsible.

Air station.—Burn of face and hands. An unknown person threw gasoline over a pile of trash which patient was about to burn. When ignited, an explosion occurred.

Tender.—Burn of leg caused by accidental contact with an unprotected steam pipe.

Air station.—Lacerated wound of hand resulting from being struck by radio propeller blade. Lack of safety device reported.

Airplane carrier.—Lacerated wound of hand caused by radio propeller blade. Report recommended "guard for propeller similar to that used for electric fans."

Tender.—Fracture of radius and humerus. Improper lighting was reported as the cause. Patient stumbled over an air hose and fell against hatch combing.

Cruiser.—Contusion of knee caused by fall through open hatchway.

Battleship.—Contusion of shoulder caused by fall into bilges through an open floor plate.

NTS vessel.—Fracture of radius. While going below to call his relief, the victim stepped into and fell through a hatch upon which one of the cover boards had not been replaced.

NTS vessel.—Fracture of first and second lumbar vertebrae, inferior rami of both pubic bones and right radius. While walking on lumber on deck, patient slipped and fell through open hatch, and dropped 40 feet.

Supply ship.—Fracture of humerus caused by falling through an open hatch while coming off watch.

HEALTH OF THE NAVY

This report is for the month of June. The general admission rate, based on admissions for all causes, was somewhat lower than the expected rate. It was 489 per 1,000 per annum. The median rate for June, computed for the last five years, is 529.

There was a slight increase in the common diseases of the respiratory type for the month of June. The combined admission rate was 97 per 1,000 per annum. The median June rate for the five preceding years is 66.

Practically, summer health conditions now obtain. Mumps is the only communicable disease that has been especially prevalent in recent weeks, and admissions for that disease decreased about 17 per cent during June. Cases have been about equally distributed among the personnel ashore and forces afloat, and of the cases occurring ashore 68 were reported from the United States Naval Training Station, Hampton Roads, Va.

Only 13 cases of scarlet fever were reported during the month, a satisfactory figure in view of the rather wide prevalence of scarlet fever in the United States earlier in the spring.

A sharp increase in the admission rate for venereal diseases was commented upon in April. The increase was mainly accounted for by visits of vessels belonging to the Battle Fleet in New York and other ports on the Atlantic coast. The resulting peak in the incidence curve has been followed by somewhat lower rates in recent weeks. The admission rate for May was 136 per 1,000 per annum, and for June 121 per 1,000 per annum. The five-year median rate for June is 111.

The following table shows rates per 1,000 per annum for the principal communicable diseases, June, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive:

	June, 1919–1923	June, 1924
Cerebrospinal fever	0.07	0
Diphtheria	.89	.10
German measles	.46	1.63
Influenza	14.12	8.03
Malaria	14.31	5.59
Measles	2.03	.81
Mumps	14.12	17.08
Pneumonia	3.00	3.56
Scarlet fever	.53	1.32
Smallpox	.15	0
Tuberculosis	3.26	1.83
Typhoid fever	.10	0

VITAL STATISTICS

The Monthly Health Index, which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the Monthly Health Index.

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$, or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

Table No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of June, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	78, 981	39, 075	118, 056	20, 659
All causes:				
Number of admissions	2, 644	1, 928	4, 172	1, 056
Annual rate per 1,000	401. 71	592. 09	424. 08	531. 60
Disease only:				
Number of admissions	2, 244	1, 928	4, 172	933
Annual rate per 1,000	340. 93	592. 09	424. 08	469. 65
Communicable diseases, exclusive of venereal disease:				
Number of admissions	527	531	1, 058	229
Annual rate per 1,000	80. 06	163. 07	107. 54	115. 28
Venereal disease:				
Number of admissions	859	332	1, 191	206
Annual rate per 1,000	130. 51	101. 96	121. 07	103. 70
Injuries:				
Number of admissions	330	234	564	119
Annual rate per 1,000	50. 14	71. 86	56. 33	59. 91
Poisons:				
Number of admissions	70	5	75	4
Annual rate per 1,000	10. 64	1. 54	7. 62	2. 01

Table No. 2.—*Number of admissions reported by form F cards for certain diseases for the month of June, 1924*

	Forces afloat, Navy and Marines (strength, 78,981)		Forces ashore, Navy and Marines (strength, 39,075)		Total (strength, 118,056)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases	2, 244	340. 93	1, 928	592. 09	4, 172	424. 08
Injuries	330	50. 14	234	71. 86	564	57. 33
Poisons	70	10. 64	5	1. 54	75	7. 62
Total admissions	2, 644	401. 71	2, 167	665. 49	4, 811	489. 04
Class II:						
Varicocele	8	1. 22	2	. 61	18	1. 83
Class III:						
Appendicitis, acute	41	6. 23	44	13. 51	85	8. 64
Autointoxication, intestinal	5	. 76	15	4. 61	20	2. 03
Cholangitis, acute	17	2. 58	10	3. 07	27	2. 74
Cholecystitis, acute	3	. 46	1	. 31	4	. 41
Cholelithiasis	1	. 15	0	0	1	. 10
Colitis, acute	2	. 30	4	1. 23	6	. 61
Constipation	13	1. 98	13	3. 99	26	2. 64
Enteritis, acute	11	1. 67	22	6. 76	33	3. 35
Gastritis, acute catarrhal	7	1. 06	9	2. 76	16	1. 63
Gastroenteritis	21	3. 19	26	7. 98	47	4. 78
Hemorrhoids	10	1. 52	16	4. 91	26	2. 64
Ulcer, stomach	1	. 15	2	. 61	3	. 30
Total	132	20. 05	162	49. 75	294	29. 89
Class V:						
Laryngitis, acute	0	0	2	. 61	2	. 20
Pharyngitis, acute	17	2. 58	10	3. 07	27	2. 74
Rhinitis, acute	1	. 15	3	. 92	4	. 41
Total	18	2. 73	15	4. 61	33	3. 35
Class VIII (A):						
Angina, Vincent's	25	3. 80	24	7. 37	49	4. 98
Bronchitis, acute	87	13. 22	88	27. 02	175	17. 79
Catarrhal fever	28	4. 25	48	14. 74	76	7. 73
Tonsilitis, acute	192	29. 17	118	36. 24	310	31. 51
Total	332	50. 44	278	85. 37	610	62. 01
Class VIII (B):						
Chicken pox	4	. 61	5	1. 54	9	. 91
Diphtheria	0	0	1	. 31	1	. 10
German measles	2	. 30	14	4. 30	16	1. 63

TABLE No. 2.—*Number of admissions reported by form F cards, etc.*—Contd.

	Forces afloat, Navy and Marines (strength, 78,981)		Forces ashore, Navy and Marines (strength, 39,075)		Total (strength, 118,056)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class VIII (B)—Continued.						
Influenza	48	7. 29	31	9. 52	79	8. 03
Measles	3	. 46	5	1. 54	8	. 81
Mumps	76	1. 55	92	28. 25	168	17. 08
Pneumonia, broncho	6	. 91	10	3. 07	16	1. 63
Pneumonia, lobar	8	1. 22	11	3. 38	19	1. 93
Scarlet fever	5	. 76	8	2. 46	13	1. 32
Whooping cough	0	0	1	. 31	1	. 10
Total	152	23. 09	178	54. 66	330	33. 54
Class IX:						
Dysentery, bacillary	0	0	3	. 92	3	. 30
Dysentery, entamebic	2	. 30	0	0	2	. 20
Total	2	. 30	3	. 92	5	. 50
Class X:						
Dengue	9	1. 37	31	9. 52	40	4. 07
Malaria	19	2. 89	36	11. 06	55	5. 59
Total	28	4. 25	67	20. 58	95	9. 66
Class XI:						
Tuberculosis (all forms)	13	1. 98	5	1. 54	18	1. 83
Class XII:						
Chancroid	285	43. 30	78	23. 95	363	36. 90
Gonococcus infection	497	75. 51	197	60. 50	694	70. 55
Syphilis	77	11. 70	57	17. 50	134	13. 62
Total	859	130. 51	332	101. 96	1, 191	121. 07
Class XVIII:						
Pleurisy, acute fibrinous	3	. 46	6	1. 84	9	. 91
Class XX:						
Herniæ	18	2. 73	28	8. 60	46	4. 68

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for May, 1924, and from various shore stations for the five-week period, June 1, 1924, to July 5, 1924*

	Annual rate per 1,000, May, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	162. 93	1, 100. 92	0	186. 94	960. 00
Battleship divisions:						
Battle fleet	38. 17	117. 86	229. 43	61. 70	131. 22	296. 05
Scouting fleet	51. 72	154. 43	338. 17	89. 96	169. 41	225. 17
Asiatic Fleet [1]	94. 49	318. 03	888. 89	120. 00	373. 14	543. 40
Light cruiser divisions:						
Scouting fleet	28. 10	183. 06	375. 78	115. 38	202. 83	529. 00
Destroyer squadrons:						
Battle fleet	0	145. 57	588. 23	0	162. 95	293. 28
Scouting fleet	0	128. 98	530. 97	0	193. 64	430. 11
Asiatic Fleet [1]	0	480. 78	1, 100. 92	164. 76	365. 74	960. 00
Miscellaneous: [2]						
Battle fleet	0	120. 82	642. 86	43. 71	192. 59	324. 32
Scouting fleet	0	137. 73	352. 94	0	199. 17	461. 84
Asiatic Fleet [1]	0	366. 22	525. 00	36. 04	338. 67	399. 75
Naval forces, Europe	112. 15	198. 22	660. 55	135. 08	240. 78	602. 32
Special service squadrons (based on Panama)	0	270. 42	427. 05	135. 48	231. 56	322. 69
Naval transportation service	0	158. 48	530. 97	53. 17	174. 93	292. 17
Special duty	0	104. 74	240. 06	0	168. 92	224. 18
Miscellaneous and district vessels	0	69. 87	800. 00	24. 24	136. 45	574. 85

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for May, 1924, etc.*—Continued.

	Annual rate per 1,000, June 1, 1924, to July 5, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	48.23	171.90	0	57.18	196.08
First naval district	0	20.03	45.81	26.77	37.75	87.17
Third naval district	0	64.00	94.69	15.65	47.08	71.28
Fourth naval district	16.10	29.25	36.75	21.77	42.90	60.87
Fifth naval district	0	62.18	138.30	0	70.42	116.23
Sixth naval district	39.15	44.46	97.20	49.28	63.04	196.08
Seventh naval district	0	0	0	0	0	0
Eighth naval district	77.42	89.75	171.90	49.59	59.33	60.77
Ninth naval district	32.99	32.99	32.99	101.87	101.87	101.87
Eleventh naval district	33.72	49.69	117.51	37.82	61.03	79.67
Twelfth naval district	0	18.58	24.38	34.77	50.81	93.96
Thirteenth naval district	0	53.44	117.74	45.96	89.02	188.92

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASES

	Per cent, May, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	59.14	9.19	60.93	8.00
Battleship divisions:				
Battle Fleet	66.00	10.67	70.33	11.33
Scouting Fleet	75.79	9.33	73.17	4.67
Asiatic Fleet[1]	39.28	17.86	45.57	15.93
Light cruiser squadrons:				
Scouting Fleet	49.98	0	46.67	3.81
Destroyer squadrons:				
Battle Fleet	63.77	15.94	61.88	7.57
Scouting Fleet	75.00	5.36	60.81	3.51
Asiatic Fleet[1]	44.44	8.08	57.05	8.20
Miscellaneous:[2]				
Battle Fleet	71.19	11.86	58.24	7.47
Scouting Fleet	45.71	14.28	55.53	6.00
Asiatic Fleet[1]	25.58	2.32	35.67	7.03
Naval forces, Europe	61.54	7.69	50.66	7.93
Special service squadrons (based on Panama)	60.00	5.00	67.37	5.67
Naval transportation service	64.91	5.26	60.71	7.94
Special duty	80.00	10.00	68.47	8.81
Miscellaneous and district vessels	25.00	0	45.71	2.86

	Per cent June 1 to July 5, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All naval districts in the United States	69.77	13.18	65.63	10.34
First naval district	100.00	0	89.55	2.99
Third naval district	81.25	12.50	81.96	14.75
Fourth naval district	60.00	20.00	80.00	20.00
Fifth naval district	63.16	10.53	66.46	12.31
Sixth naval district	60.00	30.00	74.69	7.46
Seventh naval district	0	0	0	0
Eighth naval district	75.00	12.50	71.43	14.29
Ninth naval district	75.00	25.00	77.08	18.75
Eleventh naval district	71.42	14.28	73.86	9.09
Twelfth naval district	100.00	0	80.49	7.32
Thirteenth naval district	60.00	0	75.00	15.91

[1] Month of April. [2] Vessels of train, base, air squadrons, etc.

TABLE No. 4.—*Number of admissions reported by form F cards and annual rates per 1,000, entire Navy, for the five-week period, June 1 to July 5, 1924, inclusive*

	Navy (strength, 97,397)		Marine Corps (strength, 20,659)		Total (strength, 118, 056)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of blood	5	0. 53	2	1. 01	7	0. 62
Diseases of circulatory system	59	6. 30	15	7. 55	74	6. 52
Diseases of digestive system	315	33. 63	104	52. 35	419	36. 91
Diseases of ductless glands and spleen	7	. 75	0	0	7	. 62
Diseases of ear	314	33. 53	70	35. 24	384	33. 83
Diseases of eye and adnexa	68	7. 26	18	9. 06	86	7. 58
Diseases of genito-urinary system (non-venereal)	115	12. 28	27	13. 59	142	12. 51
Communicable diseases transmissible by—						
Oral and nasal discharges (A)	308	32. 89	54	27. 18	362	31. 89
Oral and nasal discharges (B)	554	59. 15	116	58. 40	670	59. 02
Intestinal discharges	3	. 32	5	2. 52	8	. 70
Insects and other arthropods	57	6. 09	54	27. 18	111	9. 78
Tuberculosis (all forms)	20	2. 14	0	0	20	1. 76
Venereal diseases	1, 152	123. 00	206	103. 70	1, 358	119. 63
Other diseases of infective type	222	23. 70	80	40. 27	302	26. 60
Diseases of lymphatic system	52	5. 55	13	6. 54	65	5. 73
Diseases of mind	45	4. 80	14	7. 05	59	5. 20
Diseases of motor system	105	11. 21	41	20. 64	146	12. 86
Diseases of nervous system	26	2. 78	8	4. 03	34	3. 00
Diseases of respiratory system	41	4. 38	15	7. 55	56	4. 93
Diseases of skin, hair, and nails	61	6. 51	29	14. 60	90	7. 93
Herniæ	46	4. 91	8	4. 03	54	4. 76
Miscellaneous diseases and conditions	75	8. 01	35	17. 62	110	9. 69
Parasites (fungi and certain animal parasites)	68	7. 26	13	6. 54	81	7. 14
Tumors	11	1. 17	5	2. 52	16	1. 41
Injuries	511	54. 56	119	59. 91	630	55. 50
Poisoning	71	7. 58	4	2. 01	75	6. 61
Dental diseases and conditions	16	1. 71	1	. 50	17	1. 50
Total	4, 327	462. 00	1, 056	531. 60	5, 383	474. 19

TABLE No. 5.—*Deaths reported, entire Navy, for the five-week period, June 1 to July 5, 1924, inclusive*

Causes	Navy (strength, 97,397)	Marine Corps (strength, 20,659)	Total (strength, 118,056)
Pneumonia, lobar	1	0	1
Tuberculosis, chronic pulmonary	2	1	3
Tuberculosis, other forms	1	0	1
Syphilis	0	1	1
Other diseases	8	0	8
Drowning	6	4	10
Other accidents and injuries [1]	55	1	56
Poisoning	1	0	1
Total	74	7	81
Annual death rate per 1,000, all causes	7. 90	3. 52	7. 15
Annual death rate per 1,000, disease only	1. 28	1. 01	1. 23

[1] Forty-eight of the accidents and injuries were caused by the explosion of gunpowder on the U. S. S. Mississippi, June 12, 1924.

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CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY
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EDITED BY
LIEUTENANT COMMANDER W. M. KERR, MEDICAL CORPS, U. S. NAVY

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NAVY DEPARTMENT,
Washington, March 20, 1907.

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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

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Volume XI, No. 1, January, 1917.
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PREFACE

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

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

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

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

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

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

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

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

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

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U. S. NAVAL MEDICAL BULLETIN

VOL. XXI | SEPTEMBER, 1924 | No. 3

SPECIAL ARTICLES

HEMATURIA

ITS ETIOLOGY AND CLINICAL SIGNIFICANCE[1]

By W. S. PUGH, B. S., M. D., Commander, Medical Corps, United States Navy (retired), Assistant Urologist, New York and St. Mark's Hospitals

INTRODUCTORY

We have to present to-day three cases that you will find of much interest both from the standpoint of diagnosis and that of treatment. These patients present as their outstanding symptom one which you will frequently encounter in practice and which often requires considerable thought in order that its source may be quickly recognized and prompt treatment instituted. We refer to that group of urological patients who show as their cardinal symptom that of hematuria. In days of yore we were wont to speak of hematuria as if it were a distinct entity. Even to-day one only too frequently hears the expression essential hematuria. Essential hematuria! Let us banish the thought, for there can be no such thing, and we will do well to relegate this title to the archives of urological history, along with its close relatives, idiopathic and cryptogenic. Kanavel (1) says if you wish to make use of the expression essential hematuria do it in the quietness of your study or among very intimate medical friends, but never in the presence of an intelligent patient. In this materialistic age we know there is a cause for everything, and it is up to us to find it. Blum (2) says it is not required of the patient to prove he is suffering from a grave condition, causing hematuria, but it is the duty of the physician to find out what is the source of bleeding and institute treatment as soon as possible. Morten (3) refers to hematuria as a warning calling for prompt investigation as to its cause, and this distinguished surgeon, quite aptly, places his remarks in italics. In the days of the so-called essential hematuria, this symp-

[1] A clinical lecture delivered May 2, 1924, in the urological department (James Buchanan Brady Foundation) of the New York Hospital.

tom was often treated by the application of ice caps to the suprapubic, perineal, or renal regions. Hemostatic drugs were rather liberally used internally, or at times injected into the bladder. If the lesion was of any moment, the hemorrhage when checked usually returned, the cause invariably being determined in the sanctum sanctorum of the pathological department.

Hematuria often registers the presence of a grave pathological condition which endangers the life of the patient. It, however, may be of such a transitory nature as to lull the physician into a false sense of security, so that he fails to arrive at a diagnosis until the possibility of saving the life of the patient has disappeared.

ETIOLOGY

What are the causes of hematuria? We believe that the etiological factors may first be grouped into medical and surgical causes, as represented in the tables we prepare as follows:

MEDICAL CAUSES

Diseases, acute febrile: Malaria, scarletina, typhoid, typhus.

Acute diseases: Acute nephritis, post diphtheritic nephritis, oxaluria.

Diseases of the blood: Anemias, hemophilia, leukemias, malaria, scurvy.

Poisoning and occupational diseases: Arsenic, cantharides, phosphorus, turpentine.

Continued use of drugs: Rhubarb, senna, sulphonal, trional, urotropin.

Parasites: *Schistosomum hematobium, Filaria immitis, Amoeba urogenitalis.*

SURGICAL CAUSES

1. Trauma (general) of any part of urinary system.
2. Traumas of childbirth.

   Tumors: Carcinoma, hypernephroma, papilloma of pelvis, sarcoma.
3. Diseases of the kidney: Pyelitis, stones, tuberculosis, varicosities.
4. Disease of the ureter: Stones, strictures, tumor.
5. Diseases of the bladder: Infection, stones, tumors, ulcers, varicosities.
6. Disease of the urethra: Male—infection, polypus, or papilloma. Female—caruncle, urethral prolapse.

You will now naturally say you have given us most of the possible causes of blood in the urine, but we are interested in the common causes; what are they? The most common lesions of hematuria are those we have tabulated under surgical diseases, and among these, certainly stone, tumor, and tuberculosis are of paramount importance, in the order noted.

ELIMINATION OF ETIOLOGICAL FACTORS

How shall we proceed to eliminate the possible causes of hematuria? A carefully taken history is most essential and gives us a mine of information. The family history may throw much light on a family hemophilia, the so-called bleeder's disease. Other facts of importance may be elicited in regard to tuberculosis, tumors, or even purpuric conditions. In regard to purpura it is important to remember that we may not only have purpuric oozing, but that some students, particularly Blum, believe that many bladder ulcers are primarily purpuric spots.

The previous personal history may recall a scarlet fever, a typhoid, typhus, malaria, a gonorrheal infection, or may suggest a post diphtheritic nephritis. In this part of the history we may also inquire into any illness that may have led to the prolonged use of drugs, as in nervous lesions, where hematuria is by no means rare. Neither can we overlook the popular use of cantharides as a sexual stimulant.

As to the age of the patient, we know that when he is passed 50 years there is always a prostatic hypertrophy to be thought of, or a possible carcinoma of that gland.

As regards sex, we may think of, in the female, urethral caruncle, urethral prolapse, or possible accouchment injury. It is also of great import to rule out genital bleeding.

Occupation: Here we are faced by the question of occupational disease and the callings alluded to as dangerous trades. Workers in arsenic, phosphorus, turpentine (and some even accuse the alcohols) suffer not infrequently from attacks of hematuria. This is a common occurrence among painters, particularly when working in an illy ventilated compartment.

In taking the present history we will carefully inquire into the possibility of any injury, recent or remote. If we do not do this, we may overlook an important factor, as in making our external examination it is easily missed. We have seen severe injuries of the internal organs without any visible external signs. Some four years ago we were called to see a man who had fallen from his bicycle while looping the loop. This man had marked hematuria, with a ruptured kidney necessitating nephrectomy, while externally there were no visible signs of injury in the renal area.

CHARACTER OF THE BLEEDING

What is the character of the bleeding; is it always present or is it intermittent? Does the bleeding precede the urination—that is, an initial hematuria—or does it appear at the end of urination, a terminal hematuria? Is it intimately mixed with the urine? We must not overlook the fact that we may have to deal with a hemoglobinuria, and the color of the urine does not help us much. This is the condition which is common after the use over prolonged periods of sulphonal and trional, or at times in malaria, the form known as black-water fever. A microscopical examination of the urine and that of the blood come to our assistance here and aid us in eliminating the malarias and anemias as well. If blood clots are found, it is important to know if they are fresh, of a dark-red color, or do they look lighter and older. In some cases the hemorrhage is typical, and we can recognize the source at once. We can be very sure the bleeding which precedes the urine comes from the anterior urethra. This may occur in a severe urethritis, the so-called Russiche tripper, or the urethritis hemorrhagica gonorrhoica, as described by Glinger (4). This bleeding may come from the deeper urethra, but that must indeed be very rare, as it would necessarily be large in quantity, and associated symptoms would quickly call your attention to the bladder.

Terminal bleeding causes one to think, first, in younger men of an acute posterior urethritis, which is surely its most common cause. This you will remember occurs at about the third week of the Neisserian infection. In an advanced age we think of prostatic hypertrophy. Lesions of the vesicle neck, as polyps, or a small stone may cause the bleeding, or even the seminal vesicles, but this latter type is rare indeed.

Is the blood we note in the urine a continuous bleeding, or is it intermittent? We know that in such serious conditions as bladder hemorrhage the bleeding is often continuous, or may at times be checked by a large clot. In many of the serious conditions the bleeding may be either intermittent or continuous, as in tumor, tuberculosis, and stones of the kidney. In renal tumor the bleeding is most often intermittent, but of marked intensity. Small tumors may produce as much bleeding as those of a large size. It is in the intermittent type of urinary bleeding that we are liable to procrastinate. The physician usually gives a little medicine and waits to see what will happen. Thus the unilateral renal tuberculosis becomes a bilateral condition, or the benign tumor is converted into a malignant process, etc.

INSPECTION AS AN AID IN DIAGNOSIS

After we have collected and digested the preliminary data, we proceed to a general physical examination of the patient. We may be able to detect a swelling in the perineum; this with a history of an injury suggests urethral injury, possibly a ruptured urethra. In the absence of trauma we naturally think of stricture, with extravasation of urine, or a pus perineum. Let me impress on you at this time a very important point; that is, regard all tumors of the perineum in the male with suspicion. They are frequently pus perineums following a stricture and require immediate external urethrotomy. Tumors may be visible in the supra pubic region or in the vicinity of the kidney. Rectal palpation will give us information and perhaps locate pathological conditions of the prostate and vesicles.

Vaginal examination in the female may not only lead us to urethral and bladder disease, but at times that of the ureter. After some experience, palpation of the ureters per vaginum, by the method of A. M. Judd (5) elicits much valuable information.

INSTRUMENTAL EXAMINATION

The urethroscope, particularly of the Goldschmidt type, gives us a good view of the deep urethra. Tumors or other lesions are quickly seen, easily recognized and treated. When we pass into the bladder with our cystoscope, we must be prepared to irrigate. This is the point where the American-made cystoscope shows its superiority, as in the European instruments, with their wonderful lenses, one can not observe and irrigate at the same time. Should we find blood in the bladder and we are able to remove it in a reasonable time by irrigation, we can be quite sure the bleeding is in the urinary tract above the bladder. If removed with difficulty the hemorrhage is most likely in the bladder.

What shall we look for in the bladder as a most likely cause of bleeding? Principally ulcers, tuberculosis, stones, foreign bodies, tumors, and more rarely varicose veins. If we find purpura of the skin it will suggest ulcer, or a purpuric bladder lesion. Most ulcers, however, are tubercular, or should be considered so until proven otherwise. At this point let me call your attention to the fact that tubercles are present in the bladder in not over 20 per cent of patients with tuberculosis of that organ. It was long held that tubercular ulcers near a urethral orifice meant tuberculosis of the corresponding kidney. Rovsing (6) demonstrated that this was not only incorrect, but the reverse was often true; that is, tuberculosis in the opposite kidney.

Should we find bleeding from one or both urethral orifices, we are justified in passing a catheter up to the pelvis of the kindney, and examining the collected urine; at the same time carrying out our functional tests. Röntgen technique will also aid us greatly in our examination, as when combined with the urethral catheter it quickly rules out urethric disease. Hunner (7) believes that stricture of the ureter plays a very important part in the bleeding from the urinary tract, in the so-called essential hematurias.

The principal diseases left to consider are those of the kidney and its pelvis. Tumors, stones, and tuberculosis are the lesions causing most bleeding. Eisendrath (8) says that hematuria occurs as an initial symptom of tumor of the kidney in 30 to 60 per cent of the cases, according to statistics. It occurs as an associated symptom—that is, with pain, tumor, etc.—on an average of 78 to 80 per cent of the cases. There is a great variation in the duration and the extent of the hematuria, and the same is true of its tendency to recurrence. The urine in a renal tumor contains more blood than in any other condition, except papilloma of the bladder. The demonstration of a tumor, the pain over it, and the hematuria make the diagnosis certain.

Kretchmar (9) states that hematuria is more common in tumors of the bladder than in tumors of the kidney. In a series of 238 cases he found 60 per cent due to bladder tumors, about equally divided between benign and malignant; 14 per cent due to tumors of the kidney. Cabot (10), in 344 cases, found 24 per cent due to bladder tumor and 12 per cent to renal neoplasm.

In tuberculosis of the kidney, the bleeding from the ureter, the demonstration of the tubercle bacillus, and the pain over the renal area are as a rule quite conclusive of renal tuberculosis. At times the bacilli are scarce and may be detected by the methods of E. Granville Crabtree (11). If these fail, guinea pig inoculations can be used. We have read quite a little about hurrying the development of the tubercle in the guinea pig by the exposure of the animal to the X ray or by injuring the inguinal glands by the method of Bloch (12). My friends of long experience do not seem to regard these methods with much favor. In the closed type of tuberculosis we find no bacilli in the urine. We must therefore depend on local symptoms and the use of the X ray. Tuberculosis of the kidney usually presents itself as quite a typical picture on the film.

In renal calculus, we usually have the history of the typical crises, which are very severe and can only be appreciated by those of us who have gone through one. The pain may start in the lumbar region and may extend as far as the tip of the penis. The X ray is our real friend in cases of stone in the kidney. We can be sure of the stone casting a shadow in at least 90 per cent of the cases. Uric acid stones will sometimes be overlooked, but after several attempts are usually found. In connection with Röntgen-ray technique, let me impress upon you that it is just as important to take renal pictures from several angles as it is in bone injuries.

In order to bring out dimly appearing stones in a renal pelvis, Kümmel (13), of Hamburg, injected a rather thick solution of collargol into the kidney pelvis and left it overnight. I have read this article, but the technique is not quite clear. Kümmel states that the stone treated in this way showed quite clearly on the plate. Stones that produce bleeding are practically always in the renal pelvis and

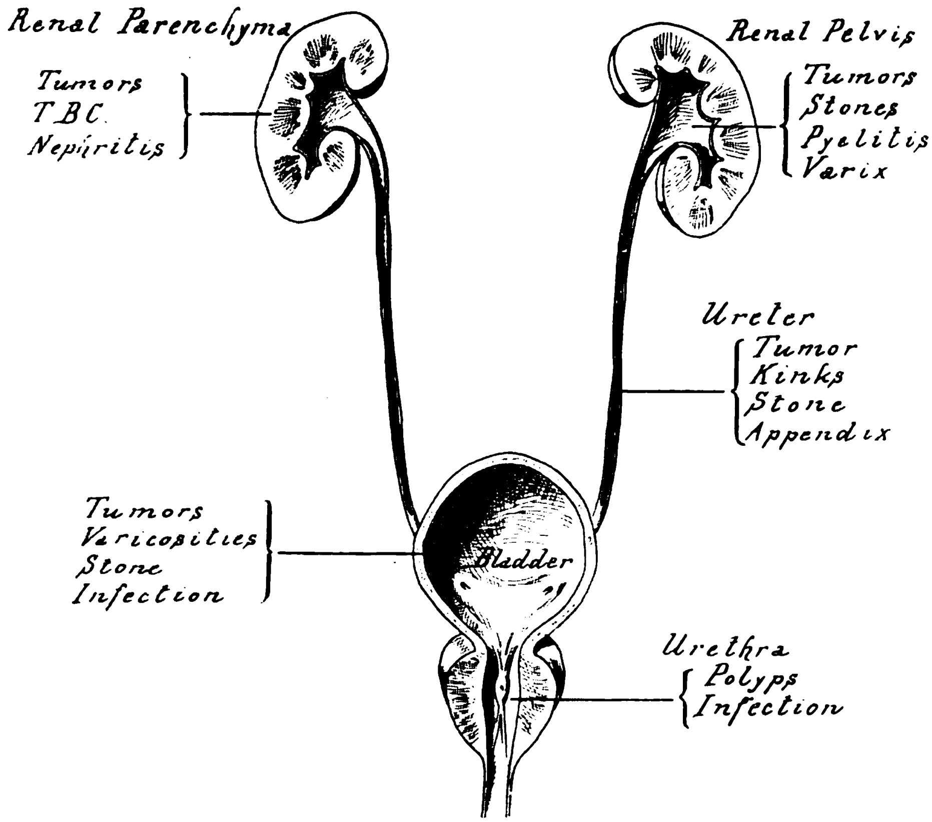

FIG. 1.—SOURCES OF HEMATURIA

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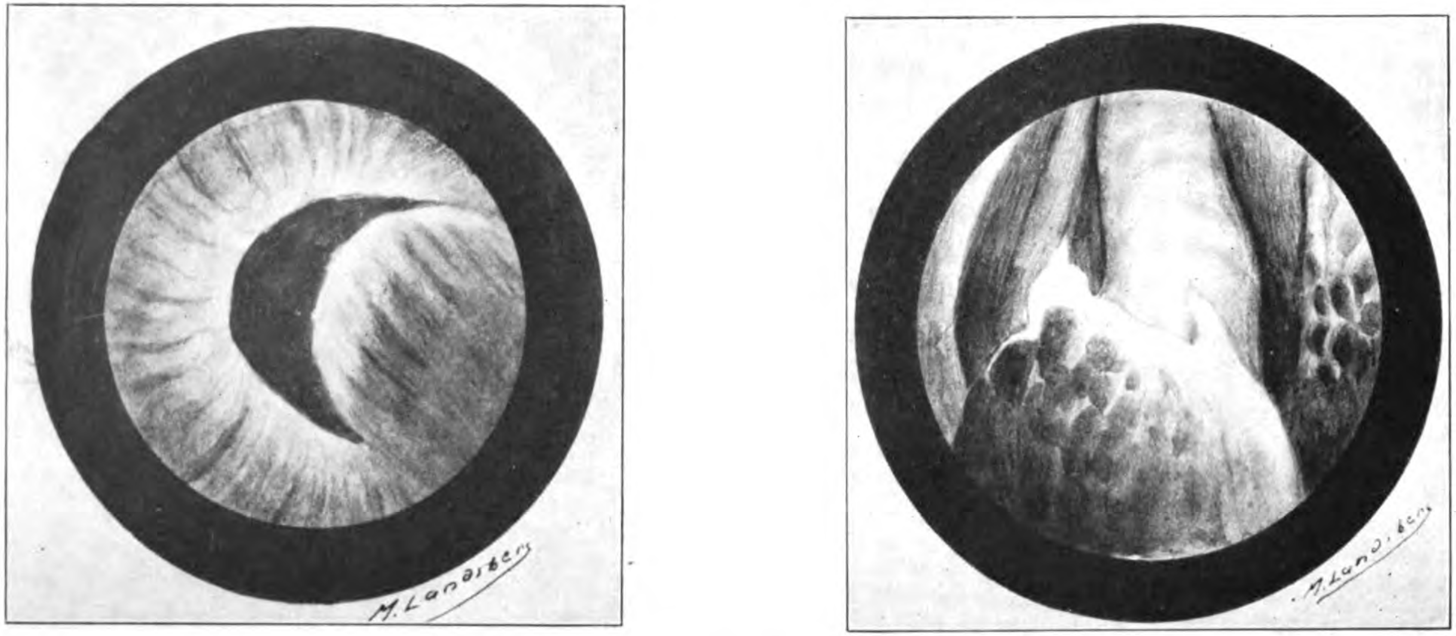

FIG. 2.—URETHROSCOPIC PICTURE OF CASE 1. THE FIGURE AT THE RIGHT SHOWS THE COLLICULUS UNDER SLIGHT DILATATION. THAT TO THE LEFT WITH FULL DILATATION ALLOWS A CLEAR DEMONSTRATION OF THE POLYPOID PROJECTIONS AND GRANULATION TISSUE IN THE VICINITY

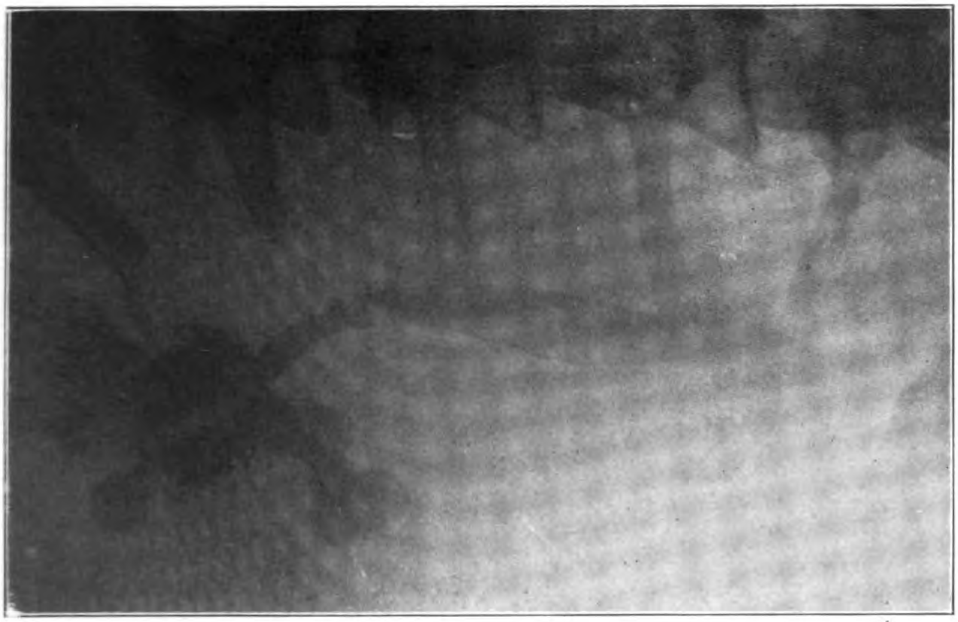

FIG. 3.—PYELOGRAM OF CASE 3, SHOWING UNMISTAKABLE EVIDENCE OF A TUBERCULOUS PROCESS IN BOTH THE SUPERIOR AND INFERIOR GROUP OF CALYCES

FIG. 4.—POSTOPERATIVE PYELOGRAM OF CASE 3. POSTOPERATIVE PYELOGRAMS ARE OF GREAT VALUE IN CHECKING UP TREATMENT AND URETERAL TECHNIQUE

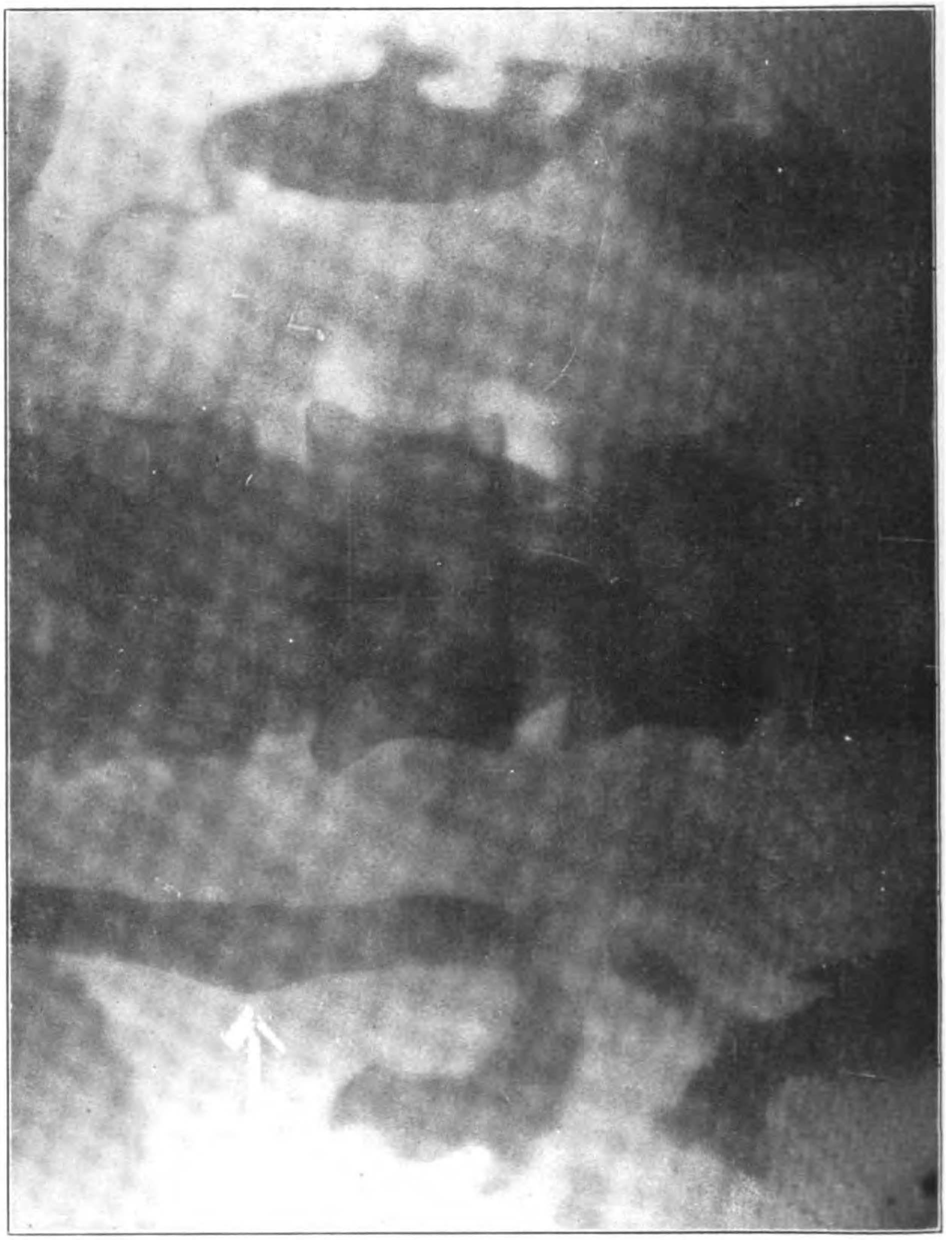

FIG. 5.—ILLUSTRATING A VERY INTERESTING FINDING IN A CASE OF HEMATURIA. THE PATIENT PRESENTS A BILATERAL DOUBLE KIDNEY. THE KIDNEY PELVES ARE SEPARATED ON THE LEFT SIDE, BUT ARE CONNECTED ON THE RIGHT. AT THE POINT INDICATED BY THE ARROW ON THE LEFT URETER, A SMALL CALCULUS WAS PRESENT, CAUSING HEMATURIA

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produce as a rule varying degrees of functional interference. This we can demonstrate by the use of phenolphthalein, which you all know. Not all kidney stones produce pain, but the majority do. The silent calculus is not at all unusual.

In connection with bleeding from the urinary tract, Corbus (14) tells us that while a great amount of speculation has been brought forward in regard to the etiological factors in so-called essential hematuria, few have considered here the possibilities of secondary ulcer or gummatous formation, and it might be a good idea to eliminate syphilitic infection before ascribing some doubtful etiology.

The foregoing remarks, while by no means covering the whole subject, I think will aid us materially with our cases.

CASE HISTORIES

Case I: The following is the history of M. J. M.: White; age 35; married; Italian laborer. Chief complaint: (1) Hematuria, (2) frequency, (3) dysuria.

The family history and previous personal history have no bearing on the case. No previous urological or venereal history.

Present illness began about nine months ago, when he noticed a feeling of heaviness in the perineum and would pass a few drops of blood at the end of urination.

After a period of about four weeks, under local treatment by a physician, blood (or we had better say visible blood) disappeared from the urine. In a short time, however, it returned at intervals, but for the last two months has been quite constant. During the time here mentioned the amount of bleeding has been gradually increasing in amount, and there is now actual bleeding at the end of urination, which patient states at times is as much as 2 teaspoonfuls. There is also increased frequency at times every hour during the day, but not at night. Urination seems to be getting a little more painful. The marked outstanding symptom in this case you will note is hematuria. The patient thinks he is weak from loss of blood, but he is more nervous than weak.

A very thorough physical examination in this case shows no evidence of disease. His blood and blood chemistry are normal. His urine is acid; specific gravity, 1.023; moderate amount of albumin; no sugar. Microscopic examination shows no bacteria. Numerous red cells. Vesicle epithelium, no casts. If we divide his urine—that is, void first in one glass and then in another—we have several times found the first glass clear of albumin and blood cells. The hematuria is definitely terminal. In view of these findings we shall proceed to a cysto-urethroscopy, using the McCarthy instrument. There is no blood in the bladder and that organ looks quite normal. When we enter the fossula prostatica we see a few uneven spots, but when we near the colliculus we meet much blood, which is removed with difficulty. On the lateral aspects of the colliculus summit we notice a very distinct polypoid condition, with, as noted, much bleeding. This is undoubtedly responsible for the patient's condition. These tumors readily respond to treatment with the D. Arsoval fulguration tip. We shall carry out that treatment in this case.

Case II: T. H.; age 35; married; storekeeper; native of the United States. Chief complaint: (1) Hematuria, (2) frequency, (3) colicky pain.

Family history and previous personal history are of no significance.

Present illness began about one month ago when he noticed that his urine was quite dark orange in color; this then gradually assumed more of a red color, finally becoming actually bloody. He has also noticed an increased frequency, at times as often as every 30 minutes. In the last week he has passed a large amount of blood and at times clotted blood in his urine. Three days ago the patient tells us that blood continued to drop from his penis for about 10 minutes after stream had ceased. Patient feels extremely weak, and is now bothered by frequent colicky pains in the suprapubic region.

A very thorough physical examination has been made and nothing except a fullness and a slight dullness noted in the suprapubic region. His urine is very bloody; specific gravity, 1.026. Shows, of course, considerable albumin. In the centrifuged specimen we note abundant red blood cells and epithelium. No casts noted. Patient's blood chemistry shows urea about 18 milligrams per 100.

Cystoscopy: Nothing in this case suggests an involvement of the urethra, so we proceed at once to cystoscope the patient. We shall first inject a little 4 per cent novocaine. On entering the bladder we note at once that our vision is shut off by large clots of blood, which must be removed before we can proceed. We remove the cystoscope and in its place insert a Chismore evacuator and introduce through it peroxide of hydrogen. The peroxide dissolves the clots rather quickly and they are then drawn out through the evacuator. Now our cystoscope is reintroduced and continuous irrigation started. At the first glimpse through the clear fluid we see that the vault of the bladder is covered with varicose veins and that one of them is bleeding considerably.

What, then, is the treatment in a case of this kind. Styptics are of no value. High-frequency sparking has been recommended as used in the treatment of ulcer by Cecil (15) and others. This we shall have to try in this case, as the patient at present refuses operation, at least, as he says, until we have tried something else first. I am sure that there is only one treatment for this case and that is suprapubic cystotomy, find the bleeder and tie it off. We hope the patient will be convinced of the necessity for operation before it is too late.

NOTE.—This patient was later operated upon. A suprapubic cystotomy was performed under novocaine 1 per cent, the bladder opened, and the bleeding vessel ligated.

Case III. J. G.; age 27; male; married; clerk; native of Russia. Chief complaint: (1) Hematuria, (2) frequency, (3) dysuria.

Family and previous personal history are so nebulous that they are without value.

Present illness: About three months ago patient states that on urinating, after sexual intercourse, he noticed blood appear at meatus, on termination of urinary flow. Since the above incident he has passed a few drops of blood at most every urination. He has tried various treatments without success and comes to us because the bleeding is alarming him. Patient's chief worry is the terminal hematuria, which is usually a few drops. In addition to the bleeding he now has to void about every hour during the day and about twice at night. Urination is at times slightly painful. Appetite is good; bowels are regular. Has lost no weight he believes.

Physical examination is negative except for the fact that first percussion elicits pain in the vicinity of right twelfth costovertebral junction. Urine examinations have been made on five different occasions and all show the same characteristics, viz, acid; yellow color mixed with blood; small amount of albumin. Microscopically few pus cells; bladder and renal epithelium, no bacteria. Numerous methods were tried by one of the staff to demonstrate tubercle bacilli in the urine, without success. Guinea pigs have yielded no results.

Blood chemistry in this case shows 26 milligrams per 100 of urea. Cystoscopy reveals an edema of the trigone. Right ureteral orifice seems surrounded by a zone of edema and is very difficult to catheterize. Left side is normal. Phenolsulphonphthalein tests were made and no dye appeared at all on the right side. From left ureter the phthalein appeared in four minutes. Eliminated 30 per cent phenolsulphonphthalein in first hour; 25 per cent phenolsulphonphthalein in second hour.

I forgot to tell you that the bladder urine in this case was quite bloody indeed, but it was quickly gotten rid of by irrigation. The blood then appeared to come from the right ureter.

The pyelogram, which you see, shows unmistakable evidence of tuberculosis of the kidney, and when the patient is ready we shall attempt the removal of the tuberculous organ.

NOTE.—One week later nephrectomy was performed and a tuberculous kidney removed. The specimen was quite large, showed numerous nodules in the upper half of external surface, surrounded by confluent hemorrhagic zones. On section they are seen to extend through cortex and medulla to the upper pole. In two of the pyramids there are white caseous nodules each 1 centimeter in diameter. The pelvis and adjacent ureter show thickening of the wall and a few small white tubercles. In the lower pole of the kidney the parenchyma appears relatively intact, but the pelvis is thickened as in the upper half.

Immediately after its removal, the postoperative pyelogram was made by injecting the ureter with 10 cubic centimeters of sodium iodide. It will be seen at once that these plates also show marked evidence of a tuberculous process in both the superior and inferior calices. It is our practice to make postoperative pyelograms of all kidneys removed by operation, as they often bring out diagnostic points of very great import.

CONCLUSIONS

Hematuria is a symptom of the greatest importance. Its point of origin and treatment will often give the most experienced surgeon cause for much thought. Urinary bleeding is a symptom which, if possible, should be traced and treated promptly, as procrastination is only too often fatal. In the average case the location of the bleeding is not difficult and its treatment correspondingly simple. It can not, however, be treated by medical means. A thorough knowledge of cystoscopy, ureteral catheterization, and modern methods of urological diagnosis are absolutely essential in cases presenting hematuria, or a symptom.

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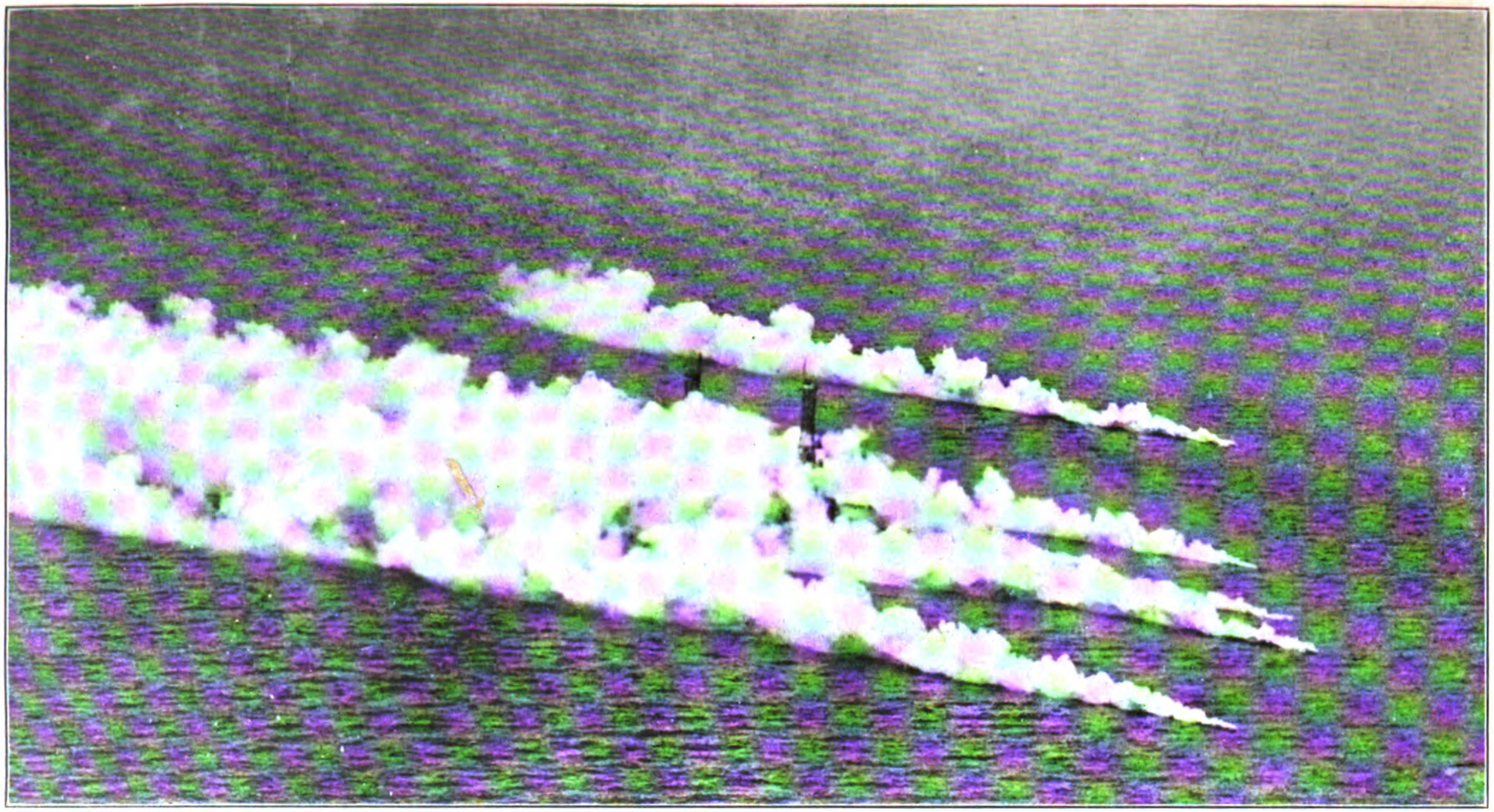

FIG. 1.—FLOATING SMOKE BOMBS DROPPED TO WINDWARD OF A BATTLESHIP BY AIRPLANE. AN ENORMOUS CONCENTRATION OF TOXIC SMOKE COULD BE SET UP IN THIS MANNER

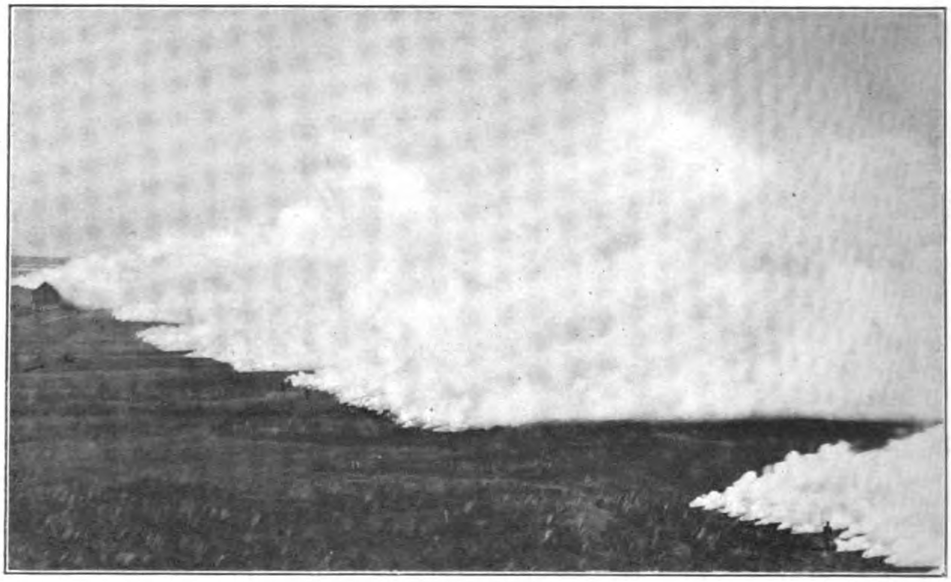

FIG. 2.—A CLOUD OF THIS EXTENT WOULD PRODUCE IRRITANT EFFECTS AND COMPEL MASKING OVER AN AREA OF MANY SQUARE MILES

FIG. 3. THIS CLOUD, SET UP BY TOXIC CANDLES BURNING 650 POUNDS OF D. M., PRODUCED UNBEARABLE IRRITANT EFFECTS AND VOMITING IN OBSERVERS 3 MILES AWAY

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TOXIC SMOKES

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On April 22, 1915, the Germans made the first gas attack of modern warfare on a sector in the neighborhood of Langemarck. The gas used was chlorine. The Allies soon developed masks which gave adequate protection against this simple lung irritant. Then began the struggle by scientists on both sides to develop newer and deadlier gases, gases which would either penetrate the enemy's gas masks or gases the slightest whiff of which would incapacitate the soldier before he had time to adjust his mask. Hundreds of gases were tested, both in the laboratory and field, with varying results, but, as a rule, the lethal or disabling effects of most of the compounds were not remarkable. But in July, 1917, the Germans began the use of two new gas shells which were destined to profoundly affect tactics. One type of these shells, the yellow cross, contained mustard gas, the effects of which have been widely described by many writers. The second type, the blue cross shells, contained compounds which have since become variously known as "sensory irritant gases," "sternutators," or "sneeze gases." A great amount of work on the exact nature and action of these gases has been done. The information obtained has always been considered confidential, but the recent publication of the British Medical History of the War and Flury's article on arsenic compounds producing local irritation, in the "Zeitschrift für die gesamte Experimentelle Medizin," March, 1921, has released this information. Both these articles give accurate concentrations and exact descriptions of the clinical picture resulting from the inhalation of the various arsine derivatives which constitute the base of practically all of the sensory irritant gases.

The Germans overestimated the value of their blue cross shells and produced them in enormous numbers. But as the blue cross shell was merely a high-explosive shell containing a small glass bottle filled with the irritant, they could be used either as high-explosive or as gas shell, both effects being obtained simultaneously. The high estimate they placed on the blue cross shell can be seen from the following figures:

	Per cent.
Captured German divisional shell dump, Moreuil sector, July, 1918:	
High-explosive shell	50
Blue cross shell	19
Green cross (lung irritants)	24
Yellow cross	7
Captured German shell dumps opposite British Third Army, September, 1918:	
High-explosive shrapnel	60
Blue cross	30
Other gas shells	10

The following instructions issued from the German general headquarters under Ludendorff's signature on July 9, 1918, express the German view of blue cross shell: "The substance in blue cross shell acts with extraordinary rapidity, in fact almost instantaneously, but it generally puts troops out of action for only a short time. In sufficient concentrations it penetrates the French mask effectively and the English mask to a lesser degree, in which case it forces the enemy to tear off their masks. For this reason a mixture of blue and green cross is recommended. In the case of an insufficient concentration, blue cross at least forces the enemy to wear their masks, thereby interfering with their fighting efficiency. The effect of the gas passes away and rapidly disappears after the gas or detonation cloud. In consequence it can be employed when our infantry are relatively close to it."

Blue cross shell were used in increasing numbers throughout 1918, but in spite of the valuable effects attributed to them in Ludendorff's instructions, they were, taking them all around, ineffective in the field. The irritant effects produced by them were but transitory, for it was unusual for a man to get more than a slight dose before he had adjusted the improved respirator which gave complete protection, and very often the affected man recovered so soon that it was unnecessary for him to be evacuated from his unit as a casualty.

In some cases, undoubtedly, the effects were more severe, and the pain, discomfort, mental depression, and feeling of weakness were enough to put the affected man definitely out of action for perhaps as long as a month or two. These cases were, however, in the minority, and many of them could be returned to duty again from medical units in the army area owing to their speedy recovery, so that the proportion evacuated to the base was not large. There was a general agreement in the reports received from the corps chemical advisers that blue cross shell were not much more effective than ordinary high explosive shell, and that the chlorarsines had little casualty-producing power, though at times men, especially working parties and troops during an advance, suffered considerable temporary inconvenience and distress from the fumes, while the necessity of wearing the box respirator hampered them in their work and increased their fatigue. The chemical adviser to the Fifth Corps summarized the effects of blue cross in the following words: "It is a negligible menace so far as causing serious and prolonged casualties; but it is a very real factor in a battle, particularly in a retreat, where both its moral and physical effects may greatly influence the issue during a limited number of hours." He further expressed the opinion that anything beyond a very mild dose led to a general decrease in the stamnia and power of resistance, and thus contributed to the number of prisoners taken by the enemy.

The poor results noted in the above excerpt were due to the faulty method of release of the irritant substances. Practically all these substances are solids and so form a particulate cloud as opposed to the ordinary gas clouds which are composed of the war gases in gaseous forms. Being solids, and present in the air as solid particles, they were not absorbed by the ordinary canister fillings of charcoal and soda lime, and mechanical filters consisting either of cotton, paper, or felt had to be introduced into the gas mask to provide protection. These filters provided excellent protection against the relatively coarse particles of toxic smoke given off by the explosion of a blue cross shell, but would give poor protection against the very fine smoke particles which can be released either in land or sea warfare by suitable smoke-producing apparatus. Such particles, having a diameter between 10^{-4} centimeters and 10^{-5} centimeters, settle out at a rate which is practically negligible and will pierce any except the very finest filter.

These particles can be produced by any of the following means: Proper detonation of a shell or bomb containing the irritant compound in solution in some suitable solvent, the use of toxic smoke candles in which the irritant is distilled off in fine particles by burning smokeless powder, and by the production of large clouds either on land or sea by the use of furnaces.

Defense against these smokes is very difficult. It is obtained in all gas masks by the introduction of filters of paper or felt which mechanically filter out all particles of dust or toxic smoke. This defense is not as yet perfect against the finer particles, and closed buildings, dugouts, and compartments which have become contaminated with these substances remain a menace unless thoroughly cleaned out. This cleaning is a process which is very difficult when dealing with compounds which are highly irritant, even when present in a concentration of only 1 to 700,000,000.

The materials commonly used as toxic smokes or as sensory irritants are all derivatives of arsine, AsH_3, made by the formation of aliphatic or aromatic derivatives and substituting various halogens, usually chlorine for the hydrogen of the arsine. In toxicological work arsenic is considered as being more toxic in the trivalent than in the pentavalent form, and its toxicological action depends on the dose administered and the manner and length of administration. For example, arsenic administered as arsine causes destruction of the red blood cells, marked jaundice, painful liver and kidneys, marked hemoglobinuria, and convulsions and death in acute cases. On the other hand, arsenious oxide when swallowed produces marked inflammation of the stomach and intestines, with vomiting and diarrhea. In chronic poisonings by arsenic, other conditions develop, such as local edemas due to the action of the arsenic on the capillary walls, polyneuritis, acne, blindness, and chronic gastrointestinal ulcers. While such symptoms might be expected theoretically from the inhalation of the toxic gases used in war, on the contrary, a totally different set of symptoms are found. The only cases noted in which the classical symptoms of vomiting, diarrhea, neuritis, and red cell destruction appeared were among men who had drunk water from shell holes contaminated by blue cross shell. The symptoms produced in men who had inhaled the smokes consisted entirely of local sensory irritant effects and various muscular incoordinations and paralyses of a totally different character from those due to the ingestion of As_2O_3.

The two principal compounds used by the Germans and producing these effects are diphenylchlorasine $(C_6H_5)_2AsCl$, and disphenylcyanarsine $(C_6H_5)_2AsCN$, commonly referred to as D.A. and D.C., respectively. They are both crystalline solids, D.A. melting at 43° C. and boiling at 333°C., D.C. melting at 31° C. and boiling at a temperature over 300° C. Other irritants which have been used are N-ethyl-carbazol, $(C_6H_4)_2NC_2H_5$; ethyldichlorarsine, $C_2H_5AsCl_2$; methyldichlorarsine, CH_3AsCl_2; phenyldichlorarsine, $C_6H_5AsCl_2$, and a host of others which have been tested in laboratory experiments in an effort to find more toxic compounds. None of the above compounds are "new" war gases. Their chemical properties and even their irritant properties were investigated by LaCoste and Michaelis in 1880, while LaCoste, in 1881, stated of ethyldichlorarsine: "It has a very powerful irritant action on the mucous membranes of the eyes and nose, causes painful blistering of the skin, and is very dangerous for those working with it, since its vapor causes respiratory embarrassment, faintness, and long lasting paralysis and anæsthesias of the extremities."

In later years many observations upon the toxicity of organic arsenicals were made during the course of investigations upon the therapeutically valuable arsenicals, especially by Ehrlich and his coworkers. With the rapid development of gas warfare the Germans soon settled upon a policy of using toxic arsenicals and developed this policy to the point where they were producing 600 tons of toxic arsenicals a month and loading over a million shells a month with them.

The effects of these various sensory irritants can be considered as a whole. While there are certain minor differences in their action, it is rather one of degree than of kind; i. e., a difference in toxicity, such as the fact that methyldichlorarsine is more lethal than diphenylchlorarsine for dogs by inhalation, while less irritant to man than diphenylchlorarsine by inhalation in small experimental doses.

If animals are exposed for various periods of time to lethal concentrations of these arsenicals the following symptoms are noted: The animals may show some slight excitement. There is slight lachrymation, some drooling of saliva, and toward the end of exposure respiration may be increased in frequency and depth. There is complete absence of the symptoms which are present in men when exposed to much smaller concentrations and no evidence of marked pain, suffocating feeling, tremendous retching and vomiting, or loss of sense of balance. Subsequent to exposure there may be retching and vomiting, increased nasal secretion, tracheal rattle, swelling of the eyelids, and conjunctivitis. In no cases were motor or sensory disturbances noted, with the exception of cats, which sometimes showed paralyses with cacodyl cyanide. Depending on the concentration and length of exposure the animals die either as early as 12 hours or as late as 20 days after gassing. At autopsy the principal pathology is found in the lungs and consists of the formation of an easily detachable fibrino-purulent exudate in the trachea and large and small bronchi. Under this the epithelium is denuded, leaving a rough surface. There is marked congestion of the alveolar area, with scattered hemorrhages and areas of edema, areas of emphysema, atelectasis, and in the delayed deaths patches of bronchopneumonia and occasionally secondary abscess formation. Injury to the alveolar area is less marked than in the case of the lung irritant gases, the principal damage being to the bronchial system. Congestion of the abdominal viscera is often noted and occasionally hemorrhagic changes are seen in the kidneys and more rarely in the liver. None of the animals showed any demonstrable changes in the nervous system. This was to be expected in view of the absence of any symptom pointing to poisoning of the central nervous system.

The following analyses of organs show, however, that the arsenic is actually absorbed and distributed throughout the body.

Dog E.A.M.R.D. 1326; field test; exposed to D.M. smoke; concentration 0.184 milligram to the liter for 4 minutes. Killed with magnesium sulphate on eleventh day. Organs extracted by Kjehldahl method and then the arsenic estimated as As_2O_3 by the Gutzeit method.

	Milligram to gram of organ
Brain	0.001
Heart	.002
Kidney	.008
Liver	.007
Pancreas	.005
Spinal cord	.001
Spleen	.0015

Dogs exposed in gassing chamber, 30 minutes, to various concentrations of D. A.:

Dog E. A. M. R. D. 1304; concentration 0.262 milligran to the liter; death in 13 days

	Milligram to gram of organ
Liver	0.013
Kidney	.004
Spleen	.002

Dog E. A. M. R. D. 1321; concentration 0.49 milligram to the liter; death in 12 hours

	Milligram to gram of organ
Brain:	
Sample 1	0.015
Sample 2	.014
Spinal cord	.005

Dog E. A. M. R. D. 1325; concentration 0.49 milligram to the liter; death in 12 hours

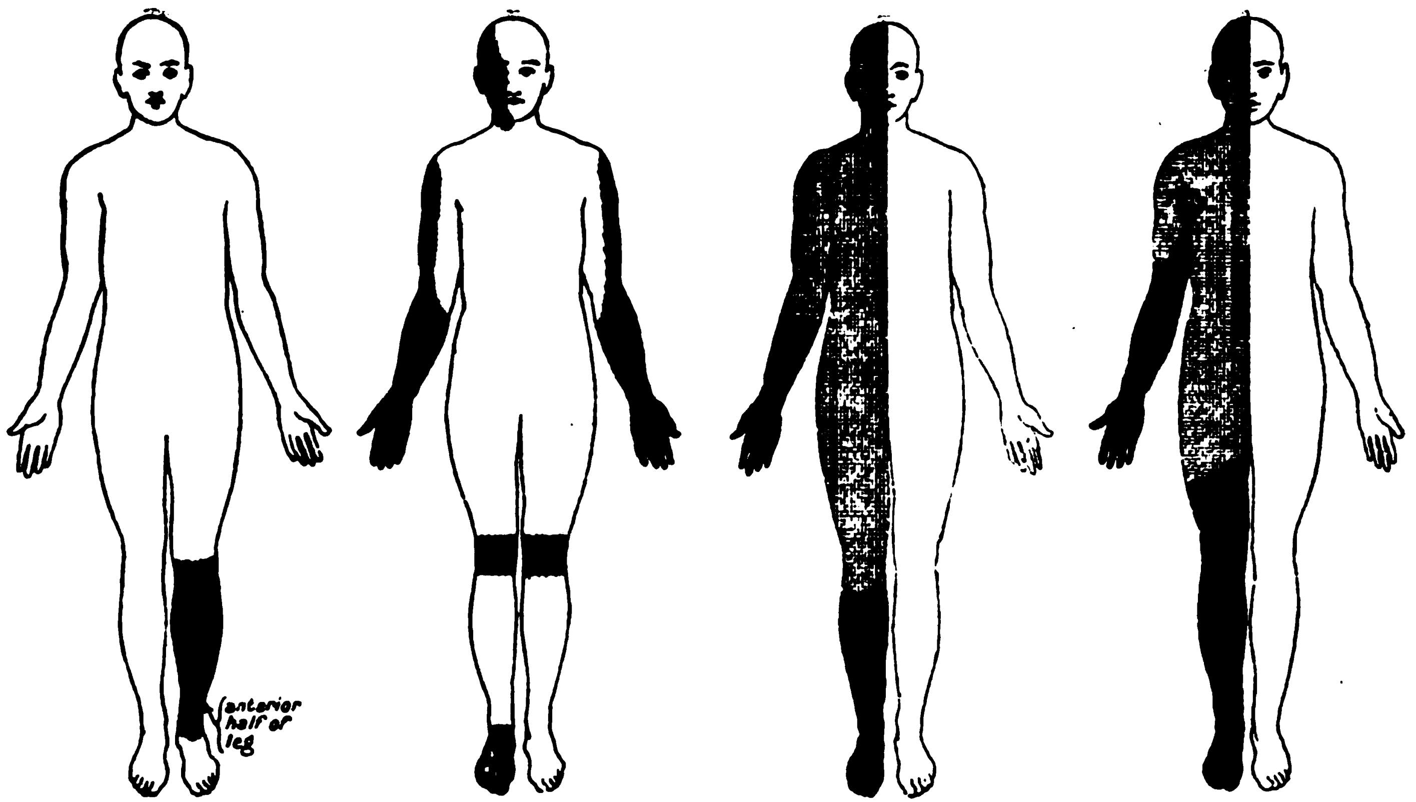
	Milligram to gram of organ
Brain	0.0016
Heart	.003
Kidney	.020
Liver	.014
Pancreas	.011
Spinal cord	.001
Spleen	.002

No fatal cases have as yet been described in men. There is available, however, a vast number of observations on cases gassed in the field, in laboratories, and in factories. The following description from the British Medical War History describes the main features:

"When a man was seriously affected by the fumes arising from a blue cross or green cross 3 shell the effects began to show themselves within a few moments of exposure and developed in rapid sequence: Intense pain of an aching or burning character in the nose, mouth, and throat, pain in the gums and jaws, tingling and smarting of the face, especially the cheeks and lips, aching pain in the eyes and frontal headache, watering of the eyes and painful conjunctivitis, copious watery discharge from the nose, tightness and burning sensation in the chest, salivation, pain in the stomach, nausea, retching and sometimes vomiting which might be followed by tenesmus, though diarrhea was practically never met with. The pain in the nose and throat was not infrequently described as passing upward into the eyes and head, a fact suggestive of the involvement of the frontal and accessory nasal sinuses. It is by no means easy to describe this pain. If slight, it resembled in some degree the pain which is sometimes experienced when fresh water gets into the nasal sinuses whilst bathing, but in the more severe cases it was of distressing intensity and sometimes agonizing. The pain in the chest was always described as of a burning character in the early stages. The degree to which the different symptoms developed differed even in the severe cases. Thus in some cases little complaint was made of distressing pain in the nose or head, and the throat felt unpleasantly dry rather than painful, though an intense burning sensation was felt in the chest. Possibly these differences were dependent on differences in the mode of breathing, for the serious involvement of the nasal passages would be less likely to occur in the case of mouth breathers. The pain in the eyes was somewhat different from the smarting caused by the simple lachrymators, the impression being gained that small gritty particles had been driven into the eyes. At an early stage, when the distress was at its height, the skin of the cheeks, especially close to the eyes and nose, might feel tense to the patient and have a slightly swollen look. Sneezing appeared to characterize the mild rather than the severe cases.

"A very early condition sometimes complained of was that of giddiness, and a certain number of cases quickly lost consciousness, a comatose condition persisting for several hours. Others in whom consciousness was never lost passed into a lethargic condition for a period of 12 to 24 hours. A remarkable feature in these severe cases was the intense mental distress which accompanied the symptoms already described. Even the slighter cases felt and looked miserable and wretched until the irritation had passed off, and the picture of utter dejection and hopeless misery furnished by the severe cases had no counterpart in any other type of gas poisoning. Occasionally the psychical depression resulted in the temporary loss of mental control, and men were in a few instances reported as having acted as if they were driven mad by their pain and misery. In at least one instance a man in this condition had to be forcibly restrained from shooting himself, and in another case a man tried to get under the floor of a hut under the delusion that he was being pursued.

"In addition to these changes in the mental condition, alterations in motor power were not infrequent. They might supervene within an hour, or be more delayed in appearance. Though the commonest complaint was of formication mainly referred to the finger tips—and this has also been observed in laboratory workers who would not be likely to exhibit functional phenomena—yet temporary paralysis involving one or more limbs was seen in a fair number of cases. In one instance complete paralysis of the left arm developed within three-quarters of an hour after exposure, so that by the time the man reached the advanced dressing station his arm was hanging flail like and useless. By the time, however, that he had arrived at the casualty clearing station, an interval of about 4 hours, this paralysis had almost entirely disappeared, and within 24 hours there was no sign left of it. Such instances as these were proportionally infrequent, though they were a strong argument in favor of a central toxic action of the gas which affected the cortical or spinal centers leading to a temporary abolition of function. Again, other instances occurred in which a more generalized motor weakness appeared, and one well-authenticated example of the combination of this motor weakness with mental depression may be quoted. A party of men had been affected by blue cross gas, and in addition to the irritative phenomena already described they developed a considerable weakness of the legs so that progression was difficult and uncertain. After taking a few steps the men would fall down. They would very shortly rise and struggle forward again. There seemed very little reasoning power in their progression, and they presented a picture of a loss of mental control which would not permit them to lie still when they fell but forced them to struggle on despite the motor weakness from which they were suffering. The experience of the Germans seems to have been similar, as is shown by the following quotation from Flury: 'In addition to the phenomena of sensory irritation, inhalation of diphenyl-chlorarsine may lead to serious disturbances of the nervous system from absorption of the poison. These show themselves as motor disturbances, uncertain gait, swaying when standing, and sometimes complete inability to walk. As a rule they are accompanied by severe pain in the joints and limbs. Inhalation of very high concentrations is also often followed by giddiness, attacks of faintness, and loss of consciousness, which may last for many hours. When considerable quantities of diphenylchlorarsine or related organic arsenical compounds are taken through the skin, nervous disturbances of various types may arise, and these are to be ascribed not to a local action of the poison but to its general



(a) Case 1. (b) Case 2 (c) Case 3 (d) Case 4

Fig. 4.—Distribution of skin anesthesia found in four cases of probable chlorarsine gas poisoning. Areas of marked anesthesia are heavily shaded, areas of less marked anesthesia are indicated by cross hatching.

absorption. Hyperæsthesia, anæsthesia, and paræsthesia of definite areas of the skin, especially of the lower extremities, could frequently be observed. Twitching of the muscles and convulsions may occur in very severe cases of poisoning by similar substances.'

"These motor changes in the early stages must be clearly differentiated from the sensory changes occurring later in the course of the illness. The former may with some degree of certainty be ascribed to toxæmia, transitory but definite, of the central nervous system. It is far more difficult to come to a certain conclusion about the latter. The sensory changes were mainly a disturbance of epicritic sensation leading to anæsthesia more or less complete, a condition which commonly supervened about the fourth day. The extent of the anæthesia varied from a mere numbness of the finger tips to a complete loss of sensation over a considerable part of one or more limbs. Commonly, however, the affection was bilateral and conformed to the glove or stocking distribution. Reflexes were in these cases unaffected, and the sensory condition was not accompanied by any motor change or any sign of trophic disturbance. Pressure on the nerve tracts was not painful, nor was any corroborative evidence of peripheral neuritis obtainable. Naturally, the first suggestion in considering these cases was that an arsenical peripheral neuritis was present, but prolonged and careful observations tended to disprove this view. Progress in all these cases was undoubtedly toward recovery, and in no instance did any indication of involvement of motor nerves develop. Numerically, cases showing this manifestation were very uncommon, and hence the opportunity to decide finally was not forthcoming. The conclusion arrived at, however, was that in all probability these sensory changes were functional in character. An arsenical poisoning should not have the selective power to attack only the sensory cells of the cord, leaving the motor cells intact. Further, the distribution of the anæsthesia was never of a segmental character, but was almost always of that glove or stocking distribution which is so significant of functional disorders. Also, recovery was so rapid and so uniform that this formed part of the argument against an organic basis for the lesion.

"In illustration of this the following four cases reported on by Capt. C. D. Christie, M. R. C., United States Army, at one of the hospitals at the Rouen base may be quoted. Exposure to the gas shelling was followed within 10 minutes by the typical symptoms of conjunctival and nasal irritation, constriction of the chest, nausea, dizziness, and partial disorientation. On the following day the casualties had recovered except for a certain weakness. Three days later at the base they exhibited the following phenomena:

"*Case 1* (fig. 4, *a*).—Special senses normal. No ataxia. Reflexes normal. Weakness of flexors and extensors of arms and legs. Anæsthetic to all types of sensation, including heat, cold, vibration, touch, and pain over the anterior surface of the left leg.

"*Case 2* (fig. 4, *b*).—Reflexes normal. Muscular weakness of arms and legs. Diminution of all types of sensation on the outer surfaces of arms and fore-arms, and slightly over the right side of the face. Lumbar puncture showed fluid under increased pressure.

"*Case 3* (fig. 4, *c*).—Special senses and reflexes normal. Loss of power in right limbs. General anæsthesia of the whole of the right side of the body. No nerve tenderness.

"*Case 4* (fig. 4, *d*).—Special senses and reflexes normal. Diminution of muscular power of right limbs. Hemianæsthesia of entire right side of body. Acrotaxia of right big toe. Cerebrospinal fluid under pressure but normal in composition.

"In all cases improvement was rapid and recovery complete.

"Whilst a final conclusion as to the true nature of these nervous phenomena is difficult to arrive at, since the dividing line between functional and organic changes is one which it is impossible to demarcate with firmness and accuracy, it is certainly true that no lasting organic lesion was produced. Perhaps a transitory poisoning of the central nervous system was responsible for the temporary loss of function on the motor or sensory side or the lethargy that was occasionally noticed. It may be taken as axiomatic that exposure to hostile gas of whatever nature is in itself likely to set up a functional condition, more particularly in drafts exposed for the first time to such an experience. The very nature of such an attack, unseen and of unknown quality, experienced after instruction as to the danger of hostile gas, is liable to start a functional change. Lieut. Col. Gordon Holmes, consulting neurologist in France, made the following remarks in a report in which he reviewed the evidence bearing on the late nervous disorders that might ensue in casualties affected by the arsenical warfare gases: 'After a general intoxication which affects cerebral functions, as ethyldichlorarsine generally does, men tend to be abnormally suggestible, and are consequently liable to retain and incorporate in the system of ideas associated with their condition suggestions such as that sensation is lost in certain areas of their bodies, or that their limbs are weak and can not be moved. This is now recognized to be the most common origin of hysterical or pithiatic symptoms.' The late sensory changes seen in France are therefore to be regarded as in all probability of functional origin.

"In some instances areas of cutaneous hyperæsthesia could be mapped out over the chest or abdomen. Such a condition was not confined to cases of poisoning by the arsenical compounds, but it was apparently more common in casualties of this type than in those caused by other warfare gases. Capt. J. Ramsay found that these areas corresponded fairly accurately with a segmental distribution from a corresponding area of hyperæsthesia down the spine, and suggested that reflex irritable areas developed in the spinal cord from the affection of some viscus, either lung, stomach, or intestine, and were reflected in a true segmental distribution over the corresponding skin areas. Cutaneous hyperæsthesia of this type might persist for four or five days after gassing."

In addition to the above effects, cutaneous affections have been described by German writers. These consist of local brawny and painful swellings after direct applications of the various arsenicals. An idiosyncrasy is often developed of such a degree that the application of the minutest portion of the irritants produces marked local reactions and often a general acneiform eruption. On the other hand, some operatives in the German factories developed a marked tolerance for the compounds, being able to work with ease in an atmosphere which was intolerable to visitors.

Several cases of poisoning occurred in the British Army owing to the men drinking shell-hole water contaminated by the blue cross material. In one instance this water when analyzed was found to contain arsenic in organic combination equivalent to 3.75 milligrams of As_2O_3 per liter. These men all had lachrymation, weakness and numbness of legs, burning of nose and throat, coughing, and vomiting. The symptoms from washing in such water were very similar, with swelling of the cheeks in addition.

The above descriptions apply to the more severe cases. In milder cases such as are seen in tolerance tests on men the symptoms are the same but less marked. Even here, however, the mental depression experienced is extreme and completely out of proportion to the physical anguish suffered and the amount of arsenic absorbed. This mental depression and feeling of hopelessness is so marked that I am inclined to believe that some of these arsenicals have a definite selective action on certain of the higher thought centers.

A point of great importance in judging the value of toxic smokes is the slowness of appearance of symptoms. With D.A. and D.C. the effects are not felt for 6 to 15 minutes in mild concentrations. During this time a man could absorb enough toxic material to render him a casualty for some hours. The American toxic smoke D.M. has an even more delayed action, and a man would be severely gassed before the first symptoms gave him warning of his peril. The longer persistence of symptoms from D.M. would maintain him a casualty for a longer period of time than the German D.A. or D.C.

From what has been said above it appears that very few if any of the cases will have more than a temporary disability. Most cases recover in a few hours, and the bulk of the remaining cases can be discharged to duty within a week. The usual after effects noted are headache, depression, dryness of throat, nausea, and coughing. The percentage of blue cross cases appearing among the total gassed cases will naturally vary directly with the percentage of blue cross material used to other gases used.

In the British Fifth Corps gas center, May 25 to October 9, 1918, out of a total of 3,510 cases admitted 9.6 per cent were blue cross casualties. In the same hospital during the period May 25 to June 30 the proportion mounted to 17.3 per cent corresponding to an increase in blue cross shelling.

Unofficial reports upon the fighting that occurred after the armistice between British troops and the Bolshevik forces state that many of the Russians who had inadequate protection against the smokes employed by the British were reduced to a semiparalyzed condition for 24 hours, later recovering completely.

From the late histories of cases so severely gassed that they became hospital cases, statistics show that 95 per cent of them will have been discharged to duty by the end of the sixth week. Therefore, from a medical point of view, the present toxic smokes are not greatly to be feared in comparison with the lung irritant and vesicant gases. From a naval warfare point of view they are more to be feared, as their immediate action leads to the possibility of a ship's company being quickly placed out of action during the height of an engagement, and the modern naval battle is seldom if ever a long drawn-out affair.

Unfortunately no therapeutic agents have been discovered which give immediate relief. The usual treatment prescribed is rest, fresh air, and removal of contaminated clothing. Inhalations of chloroform, or a mixture of alcohol, chloroform, and ether, or of ammonia vapor sometimes give relief.

The eyes, nose, and mouth may be treated with a 2 per cent solution of bicarbonate of soda.

In the very severe cases hypodermics of morphine or anæsthetics may be used to control the pain, and the use of such sedatives is not contraindicated as in poisoning from lung irritant gases.

ANTHELMINTIC WARFARE

By MAURICE C. HALL, Senior Zoologist, Bureau of Animal Industry, United States Department of Agriculture, Washington D. C.

In a previous lecture at the Naval Medical School the present status of anthelmintic medication was discussed. This lecture was published in the NAVAL MEDICAL BULLETIN [2] and is available to you. It is, therefore, unnecessary to cover that topic again except by way of bringing it up to date, and that is attempted here in connection

[2] Notes on the present status of anthelmintic medication. U. S. Naval M. Bull., 1923, v. 18, no. 6, pp. 678–679.

with a consideration of some general principles of anthelmintic medication.

Anthelmintic medication may be regarded as a form of warfare against worms, and the medical man, be he physician or veterinarian, may be likened to an officer in command. As such he must be versed in the tactics and strategy of this form of warfare. As naval officers, you may find an extension of this simile of interest in connection with this medical topic. The weapons of warfare in general are those causing traumatic injury, toxic injury, and such physiological conditions as starvation, asphyxiation, etc. Traumatic attack on worms is possible in certain cases. Surgical intervention, as in the removal of hydatids, cysticerci, oncocerca tumors, Guinea worms, etc., is feasible and is commonly practiced. Starvation and asphyxiation can not well be employed against worms. The common ascarid of man and swine can live as long as 26 days in Kronecker's solution, a slightly alkaline physiologic saline solution, and there is little hope of starving such a worm within its host. The conditions under which many worms live may be termed practically anerobic for animals, so there is little likelihood of our being able to asphyxiate these worms. The vast majority of our weapons of warfare against worms fall into the category of those producing toxic injury.

Under the conditions of warfare against worms the enemy (the worms) must be driven from a terrain which may be likened to the invaded territory of a friend and ally (the host), and we must at all times keep in mind that the destruction of this enemy must be accomplished with the minimum of damage to the occupied territory. In other words, our toxic weapon (the anthelmintic) must cause the maximum injury to the worms and the minimum amount of injury to the host. Our warfare must be carried out in the dark against an unseen enemy. We launch an attack and judge its results by the evidence in the form of enemy casualties (worms passed in the feces) or in the form of cessation of enemy activity (cessation of egg production by blood flukes) or in indications of diminished enemy activities seen in the invaded terrain (clinical improvement of patient). On the basis of an initial attack we may announce a complete victory or declare the attack a failure or only a partial success and launch a second or a third attack.

Fortunately, we may adopt training camp methods in studying anthelmintic warfare. We need not hurl a poison gas of unknown capacity for injury to friend or enemy into the occupied friendly terrain. By the method of animal experimentation we can obtain very definite and useful information in regard to the efficacy and safety of our weapon. We can launch an attack, collect the casualties, and by post-mortem examination we can uncover the scene of action and ascertain the survivors. In rare instances human subjects, criminals condemned to death, can be used in this way, and this has been done on several occasions in tests of carbon tetrachloride, but in general we must depend on the method of critical test on experimental animals for our information as to the exact efficacy of drugs. In veterinary medicine the findings with this method apply at once and with little modification to veterinary practice. In human medicine the findings on experimental animals, such as dogs, require some modification in transfer to the case of the human being, but this does not alter the fact that the training-camp method of animal experimentation is of great value in the warfare against worms in human beings. This training-camp method has done much in the last 10 years to make our armamentarium of anthelmintic weapons among the most dependable of all the weapons the physician possesses in the field of war against disease.

In anthelmintic warfare the commanding officer must have a sound knowledge of the many involved factors. He must know his weapons, the anthelmintics, and this involves a knowledge of their efficacy, safety, minimum effective dosage, minimum lethal dosage, solubility, concomitant effects, relation to purgation or constipation, and to specific purgatives, etc. He must know his enemies, the worms, and this involves a knowledge of their sites, habits, life histories, etc. Finally, he must know the field of action, the patient, and this involves a knowledge of the patient's physical condition, possible contraindications for treatment, such as profound weakness, massive infestations with ascarids in very weak patients, cirrhotic livers or pronounced pathological conditions of the kidney where drugs seriously affecting these organs are to be used, alcoholism, etc. The well-informed officer will know these things and will select his weapons and plan his campaign with these in mind, and will in consequence carry on successful campaigns, come victorious from his battlefields, and will have few casualties among his allies, the patients. The officer who neglects his study of anthelmintic tactics and strategy will select his weapons without judgment, enter his campaigns without plans, will fail to take his objectives, and will inflict disproportionate losses on his allies.

The modes of attack with anthelmintic poisons are quite varied. One may employ a frontal attack by oral medication, launching the attack by floods in solution as a drink or by stomach tube or in other ways, or by shells in the form of hard or soft gelatin capsules. This is the common mode of attack for worms in the stomach or small intestines. For worms in the small intestine one might use an anthelmintic explosive shell in the form of an enteric-coated capsule which would not open in the stomach, but so far it has been difficult to time these shells to open at the right point, and they are likely to pass the enemy unopened and explode in the rear, inflicting no damage on the enemy and at least slight damage on the allied terrain. Such a frontal attack may fail if the enemy has dug in by burrowing in the mucosa or under a catarrhal exudate. In this attack one must pay attention to the attack by purgation as well as to the preparation for the attack by fasting. The question as to whether the purgative should go over the top with a given anthelmintic or follow it as a mopping-up party is a very important one. The purgative has the dual function of assisting the anthelmintic attack and protecting the terrain against injury by the anthelmintic. At present the tendency in practice, supported by experimental evidence, favors a simultaneous attack by anthelmintic and purgative, or at least a prompt launching of the purgative attack, in the case of most anthelmintics. As regards fasting, it seems likely that allowing the patient a light meal in the evening and attacking the worms the next morning is ample preparation for the purposes of the attack and less weakening to the patient than more prolonged fasting.

A rear attack by the use of enemas is indicated in the cases of certain parasites in the lower part of the digestive tract. It is commonly employed in the removal of the gravid female pinworms in the colon.

A flank attack may be made in the form of subcutaneous, intramuscular, and intravenous injections of anthelmintics, or of anthelmintics given by mouth and attacking by way of the blood, bile, etc., and this form of attack has received much consideration of late years and has become extensively used in certain cases. Thus tartar emetic and emetine are commonly used by intravenous injection against blood flukes, tartar emetic and novarsenobenzol have been used successfully against the Guinea worm, sugar in large amounts by mouth is reported as effective in removing the Guinea worm, male fern is effective in removing the common liver fluke from the bile ducts of sheep and cattle, and Lambert has reported the removal of whipworms from man by means of intravenous injections of chenopodium and to a lesser extent by the use of intramuscular injections of chenopodium. This mode of attack is very interesting and will doubtless receive much more attention in the course of time.

A final consideration in this survey of the strategical aspects of anthelmintic medication is that of prophylaxis against worm infestation. Prophylaxis is a form of warfare by which the enemy is cut off from reenforcement, the allied terrain being surrounded by sanitary conditions favorable to the terrain and unfavorable to the enemy, which is prevented from obtaining additional forces. In pinworm infestations this is of great importance, as the great difficulty here appears to be the constant accretion of forces by renewed infestation. If the infestation can be held down and kept without renewals, even the slow gnawing or nibbling process, the wearing down of the enemy a little at a time, coupled with the enemy losses due to causes other than losses in battle, such as deaths from age, disease, and other factors, must ultimately clear the invaded terrain of the hostile forces.

Just as research on the subjects of explosives, poison gases, and fire-arms is a constant occupation of times of peace, so investigations of anthelmintic efficacy and safety is a laboratory task that must prepare for the campaigns of mass treatment in tropical and subtropical countries and for the minor engagements of private medical practice. The old armamentarium of anthelmintics established by clinical use, and often originating in ancient folk practice, must be studied by critical tests, checked by post-mortem examinations, and the true efficacy and safety rather definitely ascertained. Chemicals not in use as anthelmintics, but promising in this connection on theoretical grounds, must be similarly tested. Underlying our experimental findings there are certain fundamental principles which when once known and understood will enable us to improve our anthelmintic weapons with greater speed and certainty. Such tests as have been made have established certain of the older anthelmintics as effective and reasonably sure in suitable doses against certain worms. Thus chenopodium has been established as effective against ascarids and the Old World hookworm, *Ancylostoma duodenale*. New anthelmintics have been similarly established as effective for certain purposes. Thus carbon tetrachlorid has been established as effective against the New World hookworm, *Necator americanus*.

A study of enemy movements, in the form of a study of the life histories and habits of worms, has given definite information in regard to plans of battle against worms, both along the lines of anthelmintic warfare and of sanitation against worms. We know that many worms enter the skin of the host, or enter the wall of the digestive tract after being taken in by the mouth, and that these invaders may wander through the circulation, tissues, and air passages of the host for days or weeks before occupying the lumen of the digestive tract, their final objective. We know that during these maneuvers these enemies can not be successfully attacked. A campaign of extermination against these enemy forces should, therefore, include plans for host sanitation for a period before anthelmintic attack. Failing this, the attack may clear out the enemy forces present in the digestive tract, only to have the migratory forces occupy the scene of battle, perhaps in force, for days or weeks afterwards, necessitating a renewed attack with its concomitant injury to the host. In this connection we know that prenatal infection may occur with worms of migratory habits, and that if we are to protect the fetus and the infant from attack sanitary measures for the mother must be established early in the embryonic life of the offspring.

By way of supplementing the last year's summary on the status of anthelmintic medication, we may note the following points:

As regards ascarid infestation, which increased in prevalence in Europe during the war and is still common there in places, it has become increasingly evident in the past year that this may be an extremely serious matter and one that may present serious difficulties to the medical man in combating it. Recent papers have extended the series of injurious consequences following heavy or even light infestations, and cases showing symptoms of meningitis, cases of enterospasm, and other untoward symptoms bespeak the highly toxic nature of these worms and their products. Doctor Lambert writes me from the Fijis that he meets cases of children weighing 30 to 50 pounds infested with hundreds of these large worms. In such cases treatment is extremely dangerous and difficult. Anthelmintic attack must be weakened in proportion to the size and weakness of these patients, but amounts of anthelmintic inadequate for the size and numbers of these worms stir them to dangerous activity, the worms migrating to the stomach, causing vomiting, or clumping in masses difficult or impossible of passage by these tiny feeble hosts and resulting in intestinal obstruction. We have here an instance of an invaded ally, perishing from enemy attack, but so enfeebled as to be unable to render the usual aid when an attack is launched to relieve it and suffering from retaliatory actions of any enemy that resists attack.

In the campaigns against hookworms, carbon tetrachloride has sustained its early promise of efficacy against *Necator americanus* in large-scale tests in many countries. However, in the dose originally recommended, 3 cubic centimeters to adults, it appears to be less effective against *Ancylostoma duodenale* than is chenopodium in the customary doses. This is rather surprising in view of the fact that the efficacy of carbon tetrachloride was first established experimentally against a species of Ancylostoma in the dog.

In connection with hookworm treatments it may be noted that the findings of Macht and Finesilver, to the effect that magnesium sulphate administered simultaneously with other drugs inhibits the absorption of these drugs, have been applied successfully in carbon tetrachloride treatments for the greater protection of the patient. It is evident from their findings that where systemic effects of drugs are desired, salts should not be given simultaneously or for some time before or after treatment. But where systemic effects are undesirable, as in the administration of anthelmintics, this use of salts is indicated provided no serious loss of efficacy follows. A recent paper by Hall and Shillinger reports experiments on dogs showing that no loss of efficacy occurs with carbon tetrachloride, and Lambert has reported the same result in 7,000 human cases in Fiji. Lambert also finds evidence of greater safety to patients in that reports of headache, dizziness, and other unpleasant symptoms are much less common when salts are simultaneously administered.

Pinworm infestations increased greatly in Europe during the war and are still very prevalent. Consequently much attention has been paid to this condition and its treatment. At present it appears that combating these worms should include anthelmintic medication by mouth to remove the males and immature females from the small intestine, rectal enemata to remove gravid females from the rectum and lower colon, the use of suitable anal ointments to destroy the eggs in the perineal region or at least prevent their return to the mouth, and such sanitary measures as proper night clothing, care of the night clothing and bedding, etc., as will diminish the chance of reinfestation. Salts of aluminum are in great favor in Europe as anthelmintic for pinworms.

Treatments for whipworms have involved more varied strategy than those for any other worms. The worm is situated in the cecum and appendix, sites very difficult of access by anthelmintic attack. Apparently most anthelmintics are absorbed to such a great extent and diluted so greatly in their passage through the stomach and small intestine that they do not reach the ileo-cecal valve in sufficient amounts to be effective in many cases. Moreover, not everything that passes the ileo-cecal valve enters the cecum, and it is only by chance that the worms are removed by a single treatment by mouth. This very fact, however, makes the whipworms very susceptible to anthelmintics, since they have little occasion to develop resistance to what is ingested by the host, and they are sometimes removed by even comparatively feeble anthelmintics if these drugs actually come in contact with the worms. As solutions for this strategical problem of insuring contact with the worms the following modes of attack, aside from single-dose treatments with ordinary anthelmintics have been tried: (1) Repeated attacks by small daily doses, or doses several times a day, of some nonirritant drug such as santonin to insure the entry of the drug into the cecum; (2) mass attacks with bulky anthelmintics of relatively low toxicity, such as the latex of the fig, *Ficus laurifolia*, to insure the entry of the drug into the cecum; (3) a rear attack by rectal injections; (4) flank attacks by subcutaneous, intramuscular, and intravenous injections; (5) traumatic attacks by surgical removal of the cecum or appendix. For present-day practice, repeated doses of santonin or the use of the fig latex, leche de higueron, appears most satisfactory. Lambert's results from intravenous injections of oil of chenopodium warrant further investigation in search of a less dangerous drug of equal or greater efficacy for intravenous injection.

As regards worms not in the digestive tract, the following recent developments in the line of treatment deserve mention:

Duff reports that African natives objected to intravenous injections for Guinea worm and he therefore tried administering tartar emetic in solution by mouth, with good results. Le Dentu found tartar emetic intravenously effective in removing Guinea worms from 14 of 40 patients; in 10 cases there was clinical improvement without the expulsion of the worms, and in 6 cases no benefit and no expulsion of the worm.

Shattuck reports the cure of clonorchiasis in one case from tartar emetic intravenously, and in one case from tartar emetic followed by arsphenamine. A third case showed no benefit from treatment.

Cawston states that emetine destroys the lung fluke, Paragonimus, but the protocols in this work have not yet been seen by me.

Phease reports that tartar emetic is very satisfactory in schistosomiasis, but that in 20 per cent of cases the cure is not permanent. In cases kept under observation some relapsed a third time. He thinks patients should be kept under observation at least two years. In this connection Christopherson notes that some failures are reported where the amount of drug used was too small. He sets the curative dose for adults at 30 grains administered over a period of 28 to 30 days, and says few failures occur when this dosage is employed. He has seen one such case require a second treatment, but such cases are rare.

In previous papers it has been assumed that the efficacy of male fern by mouth against the common liver fluke of sheep was due to a blood-sucking habit on the part of this worm, this explanation being invoked to account for the fact that the drug destroys these flukes but does not destroy the lancet flukes in the same site in the same hosts. Mueller has recently stated that the common liver fluke does not feed on blood. If he is correct in this, our theory explaining this anthelmintic action falls and leaves us nothing but the theory of selective action of anthelmintics on each worm species as an explanation. As we do not know how any anthelmintic attacks any worm, this explanation amounts to little more than the statement of a problem.

GOITER: A REVIEW OF RECENT ADVANCES IN ITS DIAGNOSIS AND TREATMENT

By R. HAYDEN, Lieutenant Commander, Medical Corps, United States Navy

During a recent tour of instruction at the Mayo clinic, the writer was impressed with the advances made in the diagnosis and treatment of goiter during recent years, and it is with the idea that these might be of interest to other medical officers that this recapitulation is written.

FUNCTION OF THE THYROID GLAND—THYROXIN

A very extensive investigation of the function of the thyroid gland has been made at the Mayo clinic during the past 10 years and this gland has been shown to be of great importance in connection with body metabolism.

In 1914, Kendall separated a pure chemical compound, which he called thyroxin, from the thyroid gland and showed this to be its active agent. Since that time, he has been working to produce this compound synthetically and has largely succeeded. He has shown that the real function of the normal thyroid gland is the production of thyroxin and the maintenance in the body of an approximately constant level of this compound, thus regulating the body basal metabolism. Plummer and Boothby have shown that thyroxin is active, directly or indirectly, in the cells throughout the body. It stimulates body basal metabolism, regulating heat production, and may be said to determine the amount of oxygen which may be taken up by the individual cell. Plummer has shown the action of thyroxin to be essentially calorgenic and, further, that there is a definite quantitative relationship between the amount of thyroxin supplied the body tissues and the basal metabolic rate. The exact method of action of thyroxin has not been determined. Kendall has shown, however, that apparently its action is essentially catalytic and that it is used over and over again without destruction. He has also shown that probably the production of hypoiodus acid in the body, from thyroxin, is the essential intermediate step in the action of thyroxin. The amount of thyroxin normally present in the body tissues, exclusive of the thyroid gland, is estimated to be 14 milligrams and the average daily exhaustion of thyroxin to be between 0.75 and 1 milligram.

Thyroxin acts slowly, reaching its maximum effect in 9 or 10 days and lasting from 5 to 7 weeks, thus differing from epinephrin, which produces a rapid calorigenic action of but short duration. The amount of thyroxin in the tissues does not immediately affect the basal metabolic rate, but the metabolic rate slowly comes into accord with the amount of thyroxin functioning.

Pathological changes in the thyroid gland causing a constant change in thyroxin production, as seen in myxedema, hyperthyroidism, and exophthalmic goiter, result in definite changes in the body basal metabolism which, in turn, cause a definite chain of clinical symptoms. The colloid secretion of the thyroid gland appears to be used as a storehouse for the iodin necessary for the elaboration of thyroxin. No definite evidence of any other function for the thyroid gland has been discovered.

As regards the clinical effects of thyroxin, Plummer has shown that its proper administration to a thyroidless individual will bring his basal metabolism and his physiologic status to normal in from 10 to 12 days. A daily oral dose of 1.6 milligrams of thyroxin will keep it normal. Fifteen milligrams of thyroxin given intravenously to patients having large colloid goiters with greatly enlarged blood vessels, thrills, and bruits will frequently cause a rapid disappearance of the symptoms and a shrinkage of the gland to normal. Basal metabolic rate determinations have shown that patients having adenomatous goiters with hyperthyroidism or the more severe forms of exophthalmic goiter are only about one-half as efficient as normal persons, requiring about twice as many calories to do a given piece of work.

The symptoms of hyperthyroidism in toxic adenomatous goiters have been shown by Plummer and Kendall to be due to an excessive supply of thyroxin in the body tissues. In such cases the thyroxin is apparently produced in excessive amount by the adenomatous tissue. Only 1 to 1.5 milligrams in excess each day will produce marked symptoms. These symptoms can also be produced by the administration of thyroxin orally. In these cases the thyroxin molecule appears to be unchanged and there is no deficiency of iodin. The symptoms of exophthalmic goiter, however, appear to be caused by a disturbance in the thyroxin molecule itself and not by an excessive production of thyroxin. This disturbance apparently consists of a diminished amount of iodin in the molecule. Just what causes this chemical change in the thyroxin molecule is unknown. The symptoms of exophthalmic goiter have not been produced by the administration of thyroxin in excess. On the other hand, the symptoms of exophthalmic goiter are greatly improved by the administration of iodin, usually given in Lugol's solution, while cases of adenomata with hyperthyroidism are made worse by such treatment.

THE BASAL METABOLIC RATE AND ITS INFLUENCE IN THE DIAGNOSIS OF GOITER

The study of basal metabolism has received a great impetus, and its importance in connection with the diagnosis and treatment of goiter is becoming more generally recognized. The determination of the body basal metabolic rate is a determination of the heat production of the body under standard conditions. Boothby has shown that the basal metabolic rate differentiates diseases into those having increased, normal, or decreased basal metabolism quite as sharply and constantly as does temperature into febrile and afebrile groups.

The methods of determining the basal metabolic rate at the larger clinics or laboratories, while very accurate, require too much apparatus and are too complicated for everyday use. For the average physician or hospital the writer recommends that an apparatus such as the metabolimeter, manufactured by the Middle West Laboratories Co., Chicago, Ill., or Sanborn's handy metabolism apparatus be used. Either apparatus is comparatively simple to operate, may be used at the bedside, in an office or laboratory and, if reasonable care is used in obtaining necessary standard basal conditions, will give sufficiently accurate readings for all practical purposes.

Technical errors are a less frequent cause of faulty metabolic rate determinations than failure to obtain the rate under standard basal conditions. Cooperation by the patient is necessary. Nervous or worried patients will give a high rate, and it may be necessary to make several tests before the true basal metabolic rate of the individual concerned can be determined. The subject can not depress his metabolic rate, but many things, such as headache, pain, discomfort, excitement, nervousness, poor sleep the night before, surreptitious taking of food, fear, movements, etc., may cause an increased rate. Such changes in rate are rapid, however, and should not be confused with changes resulting from a disturbed thyroxin production, the latter not reaching its maximum for some 5 to 10 days.

The " normal " line of the basal metabolic rate is somewhat arbitrary and varies with age. There is considerable difference between the normal for an infant or child and an adult. The adult normal is the one usually used and varies so slightly as to be entirely acceptable clinically. The usually accepted normal rates in healthy individuals vary from 10 below to 10 above this " normal " line. Most symptoms of hyperthyroidism and of exophthalmic goiter are due to secondary effects on the body tissues of long continued and marked increase in the basal metabolism.

The following tables, prepared by Boothby and Sandiford from the study of 8,614 subjects, are quoted to show the basal metabolic rates in normal persons, in those having diseased conditions not due to thyroid disorders, and in those having goiter.

TABLE I.—*Comparison of the basal metabolic rate in 6,917 patients with thyroid disorders*

Diagnosis	Cases	Percentage range								
		Above +20	+20 to +16	+20 to +11	+15 to +11	Normal +10 to −10	−11 to −15	−11 to −20	−16 to −20	Below −20
Exophthalmic goiter	2, 569	93	----	5	----	[1] 2	----	----	----	----
Recurrent exophthalmic goiter [2]	320	90	6	----	2	2	----	----	----	----
Adenoma with hyperthyroidism [3]	1, 425	68	----	32	----	----	----	----	----	----
Recurrent adenoma with hyperthyroidism [2]	46	57	17	----	26	----	----	----	----	----
Adenoma without hyperthyroidism	1, 111	----	----	----	----	100	----	----	----	----
Recurrent adenoma without hyperthyroidism [2]	62	----	----	----	----	90	8	----	2	----
Colloid goiter [4]	328	----	3	----	10	79	6	----	1	1
Myxedema	102	----	----	----	----	----	----	20	----	80
Postoperative myxedema	41	----	----	----	----	----	----	46	----	54
Questionable hyperthyroidism	86	----	----	----	----	9	----	61	----	30
Cretinism [5]	28	----	----	----	----	21	----	32	----	47
Thyroiditis	34	32	----	12	----	35	----	12	----	9
Malignant thyroid	45	22	----	9	----	67	----	----	----	2
Total number of cases	6, 197	----	----	----	----	----	----	----	----	----

[1] With a few exceptions the patients with exophthalmic goiter having basal metabolic rates below +20 per cent came under observation during a period of remission.

[2] The patients listed under recurrent exophthalmic goiter and recurrent adenoma, with and without hyperthyroidism, include those who had had a previous partial thyroidectomy before any metabolism studies had been made in our laboratory and in whom the question of the necessity for further operative treatment was under consideration.

[3] A basal metabolic rate of +10 per cent has been taken arbitrarily as dividing patients with adenomatous goiter into the groups with and without hyperthyroidism. While all cases with basal metabolic rates below +10 per cent are unquestionably not hyperthyroid, it can not be assumed that all those with basal metabolic rates slightly above +10 per cent are necessarily hyperthyroid; unfortunately this group when tabulated was not subdivided at +15 per cent as was done in some of the other groups.

[4] The cases grouped in the table under colloid goiter include a considerable and unknown proportion of cases of colloid adenoma, because in the earlier cases of the series less attention was directed to making a correct differential diagnosis than is at present exercised.

[5] Only rarely does a cretin come under our observation who has not had thyroid medication; therefore the results presented in the table can not be considered as the average of a group of untreated cases. Furthermore, the normal standards for children are not yet as accurately established as are those for adults.

TABLE II.—*The basal metabolic rate in conditions not due to thyroid disorders*

Diagnosis	Cases	Percentage range							
		Below −20	−20 to −16	−15 to −11	−10 to +10	+11 to +15	+16 to +20	Above +20	−15 to +15
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Normals	127	-----	-----	3.2	92.1	4.0	0.7	-----	99.3
Migraine	31	-----	-----	6.4	93.6	-----	-----	-----	100.0
Chronic nervous exhaustion	267	-----	1.2	2.3	87.3	8.6	.7	-----	98.2
Neurasthenia	384	-----	0.3	3.6	84.3	9.4	1.4	1.0	97.3
Obesity	94	1.1	3.2	6.4	80.7	7.5	1.1	-----	94.6
Asthenia	36	-----	2.7	11.2	77.8	8.3	-----	-----	97.3
Essential hypertension	170	-----	-----	.6	73.0	15.8	7.2	3.4	89.4
Cardiac neurosis	99	-----	1.0	2.0	83.9	10.1	1.0	2.0	96.0
Heart block	10	-----	-----	-----	80.0	10.0	-----	10.0	90.0
Endocarditis	56	-----	-----	1.8	80.4	5.4	1.8	10.6	87.6
Myocarditis	55	1.8	-----	3.6	81.9	10.9	-----	1.8	96.4
Pericarditis	4	-----	-----	-----	100.0	-----	-----	-----	100.0
Congenital heart	5	-----	-----	-----	80.0	20.0	-----	-----	100.0
Renal	127	4.4	1.6	3.2	72.4	12.6	4.0	2.4	88.2
Hodgkin's disease	1	-----	-----	-----	-----	-----	-----	100.0	-----
Mental	34	3.0	3.0	8.9	61.7	17.6	2.9	2.9	88.2
Epilepsy	22	9.1	4.6	9.1	77.3	-----	-----	-----	86.4
Gastrointestinal	98	1.0	1.0	3.1	85.7	4.1	5.1	-----	92.9
Gynecological	96	1.0	2.1	6.3	81.3	4.1	5.2	-----	91.7
Malignancy	200	-----	5.0	-----	55.0	10.0	10.0	20.0	65.0
Dermatological	43	2.3	-----	14.0	79.1	4.6	-----	-----	97.7
Pregnancy	30	-----	-----	-----	70.0	10.0	10.0	10.0	80.0
Encephalitis	10	-----	-----	10.0	70.0	-----	-----	20.0	80.0
Dysphagia	65	16.9	6.2	10.7	63.1	3.1	-----	-----	76.9
Acromegaly	30	3.3	-----	3.3	43.4	13.3	10.0	26.7	60.0
Hypopituitarism	58	12.1	25.9	15.5	34.5	5.2	3.4	3.4	55.2
Paget's disease	6	-----	-----	-----	66.7	16.7	-----	16.6	83.4
Addison's disease	13	15.4	-----	7.7	69.2	-----	-----	7.7	76.9
Polycythemia	2	-----	-----	-----	50.0	-----	-----	50.0	50.0
Secondary anemia	30	-----	3.3	-----	80.0	13.4	-----	3.3	93.4
Anemia, splenic and pernicious	19	-----	-----	15.9	63.0	10.5	-----	10.6	89.4
Leukemia, lymphatic, and myelogenous	16	-----	-----	-----	6.3	6.3	-----	87.5	12.6
Questionable ductless glands	24	8.3	8.3	16.6	58.4	-----	-----	8.4	75.0
Sclerosis of central nervous system; tabes	20	-----	-----	-----	90.0	10.0	-----	-----	100.0
Diabetes	68	17.7	10.3	7.3	52.9	-----	5.9	5.9	60.2
Arthritis	69	2.8	2.8	5.7	75.3	11.6	1.4	-----	92.6
Miscellaneous, not thyroid	178	-----	2.7	5.6	77.1	8.4	4.0	2.2	91.1
Total number of cases	2,417	2.1	2.2	4.6	77.1	8.3	2.6	3.1	90.0

VARIETIES OF GOITER

Plummer classifies goiter in three general classes—colloid, adenomatous, and exophthalmic—claiming that all other varieties found clinically are either variations or combinations of these. This makes the clinical classification much more simple.

In colloid goiter, sometimes called adolescent goiter, the acini are dilated and filled with colloid material. The epithelium lining the acini is low and flat. Both lobes and the isthmus are symmetrically enlarged. Most of the endemic goiters are colloid in type. The exact reason for the deficiency of iodin in the tissues which causes these goiters is unknown, but Plummer states that the introduction of bacteria into the intestinal tract is fairly well established as the possible cause. These are supposed to act by interfering with the absorption of the small amount of iodin in the food. This remains to be proven, but might explain the geographical distribution of endemic goiter. Colloid goiter occurs most frequently between the ages of 15 and 25 and may be recognized clinically by the symmetric enlargement of both lobes and the isthmus and the soft, granular feel. It frequently produces no symptoms except a uniform fullness of the neck and perhaps slight nervousness. At times, however, it produces symptoms of nervousness, tremor, and tachycardia, with enlarged vessels, thrills, and bruits, then resembling exophthalmic goiter. Clinically, colloid goiters with symptoms of hyperthyroidism may be distinguished from true hyperthyroidism and exophthalmic goiter by the fact that there is no loss of weight or strength and by the difference in the tremor from that of hyperthyroidism. A differential diagnosis of this condition, however, may always be made from the basal metabolic rate which, in colloid goiter, is always normal or slightly subnormal and never increased. Plummer states that in the majority of cases of colloid goiter with symptoms of hyperthyroidism the basal metabolic rate is from 8 to 15 per cent below the average normal. Occasionally adenoma develop in colloid goiters and the condition then becomes adenomatous, with corresponding change in symptoms.

Plummer explains symptoms of hyperthyroidism in colloid goiter and its reaction to thyroxin and iodin on the following hypothesis: Normal stimulation of the thyroid is caused by partial exhaustion of thyroxin in the body. Anything interfering with the production of thyroxin lowers the amount delivered. The one known factor causing this interference is an actual or relative shortage of iodin in the body tissues. He has shown, however, that a thyroid under such conditions, if sufficiently stimulated, can produce a normal or even an excessive amount of thyroxin. A thyroid handicapped by a deficiency in iodin, which is the case in colloid goiters, has a higher degree of stimulation than does the normal gland. This stimulation probably increases as the thyroxin content of the tissues falls. Under these conditions, an excess of colloid is deposited in the acini producing the diffuse colloid goiter. He states that the data on the subject agree much better with this hypothesis than with the theory that the increased deposit of colloid interferes with the production of thyroxin, thereby causing a shortage of thyroxin in the body. This hypothesis also explains the effect of thyroxin and iodin administration in cases of colloid goiter.

Adenomatous goiters are subdivided into the nontoxic, without hyperthyroidism, and the toxic, with hyperthyroidism. Adenomatous goiters are the most common type and, while apparently developing in middle age, usually show some beginning thyroid enlargement between the ages of 15 and 20. They are produced by the growth of adenomatous tissue within the thyroid gland and may increase in size either slowly or rapidly. At times, they cause an enormous thyroid enlargement. They show an irregular type of growth, the gland being symmetrically enlarged with one or more rounded tumors of varying consistency on palpation.

Wilson has shown that there is a distinct pathological difference between adenomatous goiters without hyperthyroidism (nontoxic) and those with hyperthyroidism (toxic). He states that about 95 per cent of nontoxic adenomatous thyroids show no evidence of cell hypertrophy or hyperplasia, while about 90 per cent of toxic adenomata show distinct parenchymatous cell activity—cell hypertrophy and hyperplasia. Many areas are packed with dense colloid, and other areas have little or no colloid. In the toxic adenomata, the colloid present has a much lighter staining reaction than in the nontoxic type.

Plummer and Kendall are of the opinion that hyperthyroidism in adenomatous goiters is due to hyperfunction of the adenomatous tissue. Wilson appears to have confirmed this pathologically. These glands contain an excess of colloid. It is known that the colloid contains thyroxin, and histologic examination shows that the colloid is apparently being transferred to the circulation with resulting increased absorption of thyroxin.

Adenomatous goiters develop slowly and do not usually produce any symptoms in their early stages unless they happen to cause pressure on the trachea or neck. Symptoms of hyperthyroidism in this type of goiter frequently do not develop for 19 or 20 years after the beginning of the goiter. In nontoxic adenomata, however (without hyperthyroidism), degenerative changes frequently occur within the capsule of the adenoma late in the disease, causing various clinical varieties—hemorrhagic, cystic, calcareous. Occasionally, these degenerative changes cause a decreased activity in the thyroid with a resulting mild hypothyroidism and lowered basal metabolic rate.

Plummer states that 23 per cent of cases of adenomatous goiters coming to the Mayo clinic show symptoms of hyperthyroidism.

It is his experience that such symptoms do not develop, however, until the goiter has existed for an average of about 17 years.

Toxic adenomatous goiters (with hyperthyroidism) and the other type of toxic goiter, the exophthalmic, are frequently confused, but both Plummer and Boothby have shown that they are distinct clinical entities, while Wilson has demonstrated their difference pathologically. In addition to their much slower growth, longer history, and different feel on palpation, the toxic adenomata do not have either the ocular symptoms, crises, or the nervous syndrome peculiar to the exophthalmic type. The basal metabolic rate of the exophthalmic goiter patient is usually higher than in one having a toxic adenoma, but even in cases having the same rate, the exophthalmic patient shows a much more evident toxemia than does the patient with toxic adenoma. The usual symptoms of toxic goiter, such as tremor, flushed moist skin, loss of weight and strength, tachycardia, palpitation, arrhythemia, myocarditis, and, later, dyspnea and edema, may be found in both types of goiter, but in the toxic adenoma the cardiovascular system is most affected, while in exophthalmic goiter it is the nervous system. The patient with exophthalmic goiter is much more nervous than one having a toxic adenoma. Exophthalmic goiter cases have a characteristic weakness and sinking in of the quadriceps muscles of the thighs and, though confident of their ability to do so, can not step up on a low stool or chair because of this weakness, while the toxic adenomatous patient has no such difficulty. The thrill and bruit almost constantly present over the superior thyroid vessels, and often also over the inferior thyroid, in exophthalmic cases, is absent in patients with toxic adenomata. The basal metabolic rate in patients with toxic adenomata is decidedly increased but not usually as high as in cases of exophthalmic goiter.

Exophthalmic goiters are usually symmetrically enlarged, though the size of the gland apparently bears but little relationship to the intensity of the symptoms, small glands frequently producing markedly toxic symptoms and vice versa. Pathologically, exophthalmic goiters are characterized by a diffuse parenchymatous cell hypertrophy. The more advanced stages show varying amounts of stored colloid. Plummer and Kendall are of the opinion that the symptoms of exophthalmic goiter are due to an incomplete thyroxin molecule, probably a deficiency of iodin. Clinical support to this theory is given by the effect of iodin (Lugol's solution) in this disease and the fact that symptoms of true exophthalmic goiter can not be reproduced by the administration of thyroxin in excess to a normal individual. Pemberton states that it is possible that the real cause of exophthalmic goiter is unknown, but that it may be something which acts upon the thyroid gland, producing changes in the gland and its secretion, thyroxin, which latter changes cause the symptoms of the disease.

Exophthalmic goiter may occur at any age, but usually between 30 and 50 years. They may develop slowly or rapidly and may be remittent or chronic. The remittent form usually develops gradually, and the patient may be unaware that he has a goiter until an exacerbation of symptoms occurs. These symptoms then usually persist and gradually increase in severity, with or without the appearance of a goiter or exophthalmos, until a crisis occurs with pronounced accentuation of all symptoms. The chronic form develops gradually and usually runs a rather even and milder course without exacerbations or crises. Either form may shift to the other. The growth of exophthalmic goiter, however, is always much more rapid than that of the toxic adenomatous type.

Usually, the well-known exophthalmic toxic symptoms develop immediately after the onset of hyperthyroidism, but they may develop before there is any evidence of thyroid enlargement. Exophthalmic goiter is usually toxic from the beginning. There is rapid loss of weight and strength, usually characterized by weakness of the quadriceps, a flushed, moist skin, tremor, and rather characteristic, marked nervous symptoms. This is followed by the development of exophthalmos, symptoms of myocardial changes, tachycardia, palpitation, arrhythemia, and a pronounced bruit and thrill over the thyroid vessels. Later, dyspnea and edema occur. The course of the disease, especially in the remittent type, is frequently characterized by crises which occur at varying intervals and during which the patient is acutely sick with high fever, extreme weakness and nervousness, nausea, vomiting, diarrhea, and symptoms of acute cardiac distress. Occasionally the disease starts clinically with a crisis, previous symptoms having been unnoticed. During these crises, acute damage is caused the heart and other vital organs, liver, kidneys, and muscles. Patients who do not die in one of these attacks, upon recovery from the acute symptoms show an apparent improvement and partial remission of symptoms, which may last for months or several years, but the crises always recur at varying intervals and the patient becomes a chronic invalid unless the condition is promptly relieved by proper treatment. The longer the disease is permitted to continue the more marked will be the visceral degeneration.

The basal metabolic rate is always markedly increased in exophthalmic goiter.

TREATMENT OF GOITER

The treatment of goiter is both medical and surgical, each having its proper place. The fact that the proper differential diagnosis of the essential varieties of goiter is not generally understood is responsible for the variety of treatments recommended. In this fact also rests considerable danger to the individual patient because, while many goiters can be cured medically and should properly be so treated many others, and these the most dangerous, can only be cured surgically, though associated medical treatment also has its share in their cure. The determination of the basal metabolic rate is one of the most important points in the proper differential diagnosis and treatment of goiter. The true colloid or adolescent goiter, usually occurring about the time of puberty, should not usually be operated on. The administration of thyroxin, desiccated thyroid, or of iodin will usually cure these cases and reduce the gland to a normal size. There are approximately 10 milligrams of thyroxin in 150 grains of desiccated thyroid. The more or less continuous administration of iodin may be necessary, however, to keep the gland within normal limits. This is the only type of goiter which disappears under the administration of thyroxin or iodin. When a supposedly colloid goiter does not disappear under this treatment, it shows that the goiter in question is really one of the mixed type, often seen, in which small adenomatous growths occur in a colloid goiter. In such cases, the treatment causes a disappearance of the excess colloid but the adenomatous tissue remains. In case colloid goiters are removed surgically, they may recur unless thyroxin or iodin is given as postoperative treatment. It is not considered advisable to give iodin to patients over 23 to 25 years of age who supposedly have colloid goiter. Such patients may be made worse and symptoms of hyperthyroidism induced, probably because the goiter is really of the mixed type and contains adenomatous tissue. In cases of apparently colloid goiter at this age, therefore, it is considered better to recommend thyroidectomy and the postoperative administration of thyroxin or iodin to prevent recurrence.

Adenomatous goiters probably form the most common type. Most of the large goiters are of this variety. They are eventually best treated surgically. Because of the facts, however, that these cases are nontoxic in younger persons, that the thyroid gland is very essential at that age, that they are of slow growth, and that small adenomata within the gland often can not be palpated even after the gland is exposed, it is customary at the Mayo clinic to recommend that adenomatous goiters not be treated surgically until the patient becomes 25 or 30 years of age unless the goiter increases so rapidly in size before that time as to cause pressure symptoms or considerable deformity, or unless symptoms of hyperthyroidism develop earlier. A thyroidectomy is advised at this age because of the extremely small risk and the inadvisability of allowing the goiter to remain and possibly subject the patient to later dangerous toxic effects.

A careful preoperative study and medical treatment is as important in cases of adenomatous goiter as in exophthalmic, but is extensive only in those cases showing marked hyperthyroidism. Medical treatment for such cases consists of rest in bed, high caloric diet, plenty of fluids, and symptomatic medical treatment, digitalis being used to control the heart if necessary. Neither thyroxin nor iodin should be given these patients because, as previously stated, their condition is due to an excess of thyroxin in the body. Frequently, patients with advanced toxic adenomatous goiter are poorer operative risks than cases of exophthalmic goiter because of the extensive visceral degenerations which have occurred. The hyperthyroidism in these cases can not be reduced medically, and the object of preoperative medical treatment is to get them in as good general shape as possible for operation.

True exophthalmic goiter can only be really cured surgically, though temporary relief and even apparent cures may be obtained medically. Pemberton states that very rarely a spontaneous cure does occur in exophthalmic goiter. The operative mortality of operations for exophthalmic goiter, as well as for toxic adenomata, is not so much due to the ordinary risks attendant upon any major surgical procedure, but to the acute reaction of hyperthyroidism which often follows the operation. A careful preoperative study and medical treatment of these cases, then, is necessary to put them in the best shape to stand the operation and a possible acute postoperative reaction. This is especially true of exophthalmic goiters as preoperative acute toxic symptoms can be markedly improved. But little can be done to check the postoperative reaction when it occurs, this usually lasting for three or four days in spite of treatment. Five years' experience at the Mayo clinic has shown that routine determination of the basal metabolic rate is of very great value in planning the proper management of these cases. In addition to its aid in diagnosis, basal metabolic rate determinations give the surgeon a very much more accurate idea of the progress of the disease. Unfortunately, there is no definite rate at which it may be said it is best or safe to operate. It is only a relative index of operability, and a patient's other symptoms must be considered in connection with it. Some patients with a comparatively high basal metabolic rate are safer operative risks than others having a lower rate. This is especially true of cases who have had a preliminary ligation performed and gone home for two or three months' rest before thyroidectomy.

Cases of exophthalmic goiter with severe toxic symptoms are very poor operative risks, and they should never be operated in case of impending crisis, during, or immediately after a crisis. Impending crises are indicated by a steadily increasing basal metabolic rate and loss of weight. Such patients should first be treated by rest in bed, a high caloric diet with plenty of fluid, symptomatic treatment, removal of intercurrent infections, such as bad teeth, etc., and the administration of Lugol's solution in 10 to 15 minim doses daily. Digitalis may be used if necessary for cardiac decompensation or fibrillation. This treatment brings about a rapid diminution of symptoms and soon renders the patient a reasonably safe operative risk for either a ligation preliminary to thyroidectomy or an immediate thyroidectomy. The patient should be weighed and his basal metabolic rate determined about twice a week during this treatment. The dose of Lugol's solution is increased by about one-half on the day of operation.

In this connection, it might be stated that cases of colloid or non-toxic adenomatous goiters in nervous or neurotic patients are often operated upon in the belief that they have a toxic goiter, usually supposed to be exophthalmic. This class of patients frequently do not obtain the relief expected from thyroidectomy for the simple reason that the real cause of their trouble is not removed. They are improved, however, often considerably, because their worry over having a "goiter" is removed. Such cases may easily be properly diagnosed by a basal metabolic rate determination.

Pemberton classifies all cases of exophthalmic goiter into three groups: (1) Patients on whom a primary thyroidectomy can be performed with reasonable safety; (2) patients concerning whom the wisdom of advising thyroidectomy is doubtful; and (3) patients in whom indications for extended observation or preliminary measures are clearly defined. He says that one of the most important things in surgery of the thyroid is to select an operation suitable to the case in question.

In the first group he includes patients not having acute toxic symptoms and in whom the severity of the disease is apparently not increasing, whose loss of strength and weight is moderate, and whose basal metabolic rate is not unduly high. The second group includes patients having somewhat more severe symptoms than those in the first group, such as recent rapid loss of weight, marked weakness, a high degree of nervousness or apprehension, and whose basal metabolic rates are somewhat higher than those in the first group. The third group includes those patients obviously severely ill, in whom the disease is evidently progressing, or who are actually having a crisis, who have had recent marked loss of weight and strength, who have evidence of chronic visceral changes, chronic infection, or cardiac dilatation, and who have a high metabolic rate.

In the first group, primary thyroidectomy may be advised. In the second group, if the toxic symptoms subside satisfactorily under medical treatment, primary thyroidectomy may be advised. If the

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patient does not show satisfactory improvement, injections of hot water into the gland or ligation of the superior thyroid vessels is advised as a tolerance test. If no reaction or only a mild reaction follows, thyroidectomy may be done in from 7 to 10 days. If a severe reaction follows, the patient is transferred to the third group.

Patients in the third group require rather extensive preoperative study and medical treatment to determine the exact status of the disease, to reduce the toxicity of their symptoms, perhaps to carry them over an actual crisis, and to place them in the best possible condition for operation. These measures have been previously outlined. If they respond satisfactorily, they may be transferred to the first or second group and a primary thyroidectomy done. Many patients in this group, however, do not respond promptly to medical treatment. In these, ligation of the superior thyroid vessels is advised, followed by ligation of the inferior vessels if necessary. The ligations are followed by a three or four month rest at home. Upon their return, these patients usually show marked improvement, though the basal metabolic rate may continue high, and prompt thyroidectomy may be done. Some of these patients are so much improved that they do not want operation. This should be insisted upon, however, as their toxic symptoms are practically sure to return.

A few cases will show only slight improvement after ligation and rest. These results are usually found in patients who overexert themselves, have continued mental strain, an intercurrent infection, or who have had marked visceral degenerative changes. This class of patients can not be so improved as to be good operative risks and will always be semiinvalids. Thyroidectomy is indicated, however, for it will at least check further progress of the disease and frequently lengthen life for many years.

Because of the fact that cases of exophthalmic goiter come or are sent to hospital sooner than formerly and because of better preoperative treatment, "ligation" as part of the prethyroidectomy treatment has decreased about one-half at the clinic in the last two or three years. The majority of cases are now in either the first or second group.

While the technic of operations for goiter is well standardized, a review of the methods used at the Mayo clinic will be given. Great emphasis is laid on the necessity for care, skill, and thoroughness of operative technic, these often being the deciding factors in the recovery or nonrecovery of the patient. Pemberton prefers local anesthesia, with as little general anesthesia as possible. The other surgeons at the clinic use general anesthesia more frequently. In the opinion of the writer, local anesthesia is best if properly carried out and the patient cooperates. Otherwise general anesthesia will probably cause less shock.

For ligation of the superior thyroid vessels, a transverse incision about 2 inches long is made at the level of the thyroid cartilage. The cervical fascia is divided longitudinally just to the inner border of the sternomastoid. Retraction of the omohyoid mesially and the sternomastoid laterally brings into view the superior pole of the gland and the superior thyroid vessels. The artery should be exposed and ligated separately unless surrounded by such a heavy plexus of veins as to make this impractical. In such case, the vessels should be clamped, cut, and ligated.

For thyroidectomy, the so-called collar incision is made, a transverse incision across the front of the neck, about 3 centimeters above the clavicle, curving slightly upward, and with its center in the mid line of the neck. The skin, superficial fascia, and platyma are divided in the first incision and the upper flap dissected upward in its entirety for 3 or 4 centimeters. In substernal goiters, it may also be necessary to dissect the lower flap downward. The deep fascia is divided vertically in or about the mid line. The deep fascia and sternohyoid muscles are divided on each side transversely between muscle clamps and the cut portions retracted upward and outward and downward and outward, respectively. The sternomastoid and sternothyroid muscles are retracted laterally. This gives an excellent exposure of the gland. Because of the frequency of recurrences, which followed the old method of removal of one lobe, the greater portion of both lobes, and the entire isthmus are now removed. The gland may be removed in its entirety or each half removed separately. The gland capsule is not split, but is cut on either side in the course of the resection, the capsule covering the resected portion of the lobe being removed with the lobe. The lobes may be removed by working from the mid line toward the periphery or vice versa. A portion of the postero-internal part of each lobe amounting to from one-sixth to one-third of the normal sized lobe, is left, the larger amount usually being left in younger persons. The portion of each lobe left lies along the side of the trachea and protects the recurrent laryngeal nerve and the parathyroid gland. Leaving a slightly greater amount of the inferior pole will tend to better protect the nerve.

The resection of the gland is done by successive small cuts with either scalpel or scissors, and practically each piece of gland tissue is clamped before being cut, the exact amount of course varying with the vascularity of the gland. It is better to place two clamps on the proximal end of the superior and inferior thyroid vessels because, if only one clamp is used and it should slip, the vessel retracts and the nerve is endangered by attempts to stop the hemorrhage. The clamps used on one lobe are preferably all tied off and removed before the other lobe is attacked. If this is not done, some of the forceps may be accidentally removed while resecting the other lobe. The resultant hemorrhage may be severe, and attempts to check it may injure the recurrent laryngeal nerve or the parathyroid. The thyroid veins should be tied when cut to avoid possible air embolism. In performing this resection, care should be taken to always work in front of a plane parallel to the anterior surface of the trachea. This may be accomplished either by pulling the lobe forward when working from the periphery inward, or by outlining with a series of clamps the border of that portion of the lobe to be left and working from the mid line toward these clamps. If this precaution is observed, injury to the nerve or the parathyroid is almost impossible. This is especially important because of the fact that enlargement of the thyroid gland causes a displacement of the nerve outward from its normal position between the trachea and esophagus and renders it more liable to injury during operation. No special attempt is made to leave a portion of the isthmus across the front of the trachea. Leaving a portion of the isthmus in front of the trachea is not regarded as necessary for the protection of the trachea and unnecessary trauma may be caused the trachea in attempting to stop bleeding from this remaining portion of isthmus. Rarely, because of extreme friability or vascularity of the gland, or the condition of the patient, it may be necessary to stop after removing one lobe, the other lobe being resected at a later date. If a portion of the goiter is infrasternal or retrotracheal, it is best removed by working downward from above, clamping and cutting as before, and gradually pulling the gland up as progress is made. This method brings it out much more easily and safely than attempting to lift it out with the finger as was formerly done.

After the resection is completed, the remaining portion of each lobe and the corresponding portion of the capsule are sutured with a two-row continuous catgut suture. The first stitch is tied and the end left long. The first row of the suture starts at the upper pole and runs as a continuous mattress suture to the lower border, where it turns and is brought back as an ordinary continuous suture, the stitches of the second row being superficial to and interlocking those of the first row. The last stitch of the second row is tied to the long end left from the first stitch.

Complete hemostasis is very important after thyroidectomy, both to prevent immediate loss of blood to the patient, to prevent secondary hemorrhage, and to prevent possible air embolism. After all apparent bleeding has been stopped, therefore, the patient is caused to cough or strain for several minutes. If any vessels remain unligatured, this procedure will cause them to bleed. The wound is closed in layers and a small rubber drainage tube left in the middle of the incision. In patients whose condition is poor and in those from whom considerable oozing of blood may be expected, Crile's method of packing the wound with gauze to promote drainage and prevent absorption is followed, a long strip of sterile gauze, 1 inch wide, being used on each side of the trachea.

Aside from postoperative hyperthyroidism, the principal complications following goiter operations are hemorrhage, pulmonary or wound infection, pulmonary or air embolism, obstructive dyspnea, myxedema, and tetany. These complications are all largely avoidable.

Pulmonary infection is found in from 20 to 30 per cent of deaths following thyroidectomy. Avoidance of prolonged general anesthesia or surgical trauma, and especially injury to the recurrent laryngeal nerve, will tend to avoid this complication. Deaths from pulmonary or air embolism are uncommon, but the latter danger is always present and, to avoid it, the thyroid veins should be tied when cut and complete hemostasis secured as above described.

Obstructive dyspnea is an occasional complication and is always serious. It is most commonly caused by injury to the recurrent laryngeal nerve. It may also be caused by partial tracheal obstruction from pressure or surgical rotation of the trachea. This condition may be treated by steam inhalations and ice locally, but if prompt and decided improvement is not obtained, tracheotomy should be performed. In case of doubt, perform tracheotomy. The great danger of this complication is not a total occlusion with shutting off of air, but a constant diminished volume of air to the lungs for possibly several days. The danger from this is very frequently not recognized, and tracheotomy postponed until too late. Dr. Charles H. Mayo emphasizes the necessity for early tracheotomy in these cases if any doubt exists as to their prompt improvement.

Very rarely, parathyroid tetany may follow thyroidectomy. This condition is caused by injury to the blood or nerve supply of the parathyroid gland during the operation. This commences as a sensation of stiffness in the fingers and the patient has difficulty in holding things in his hand or raising the hand to his mouth. The condition may pass away spontaneously in a few hours or a day, or may become worse and involve the hand or arm. Even general convulsions may ensue. This condition is readily controlled by the administration of calcium lactate, preferably intravenously, 10 cubic centimeters of a 5 per cent solution in 100 cubic centimeters of saline solution.

Aside from the treatment of complications, the postoperative treatment is not nearly as important as the preoperative. A hyperthyroid reaction can not be prevented by postoperative treatment. The patient's body is elevated and fluids and food started as soon as possible. Normal saline or 5 per cent glucose solution is given by bowel and subcutaneously also if necessary. Gastrointestinal irritation is avoided so far as possible. Morphine is used only if really necessary. Digitalis may be needed for cardiac fibrillation. Excessive tracheal mucus is relieved by steam inhalations. When discharged, patients should be advised to do no strenuous work for a year or longer.

The mortality following operations for goiter is generally lower than in former years. This is largely due to improved management and technic, but Pemberton is of the opinion that in exophthalmic cases, at least, it is also largely due to the fact that patients come to hospital earlier in the disease than formerly and are therefore in better shape to stand the operation. In support of this theory he states that while the mortality in cases of exophthalmic goiter was generally decreased, little or no change has been noted in the mortality of cases of adenomatous goiter with hyperthyroidism. The symptoms of the latter disease are slow in making their appearance, and the majority of such patients do not come to hospital until they have a rather advanced visceral degeneration. Preoperative treatment can only tone up these patients temporarily and their visceral degeneration can not be improved. Furthermore, this class of patients will average about 15 years older than exophthalmic patients.

The mortality for operations for exophthalmic goiter at the Mayo clinic for the past year was 0.85 per cent, a reduction of 0.93 per cent in two years. The mortality for toxic adenomatous goiter was 3.24 per cent, but in connection with this disease it must be remembered that the preoperative treatment improves the patient but slightly and operative mortality is very largely dependent upon the number of poor risks accepted for operation.

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ULCER OF THE STOMACH

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Etiology.—The digestive action of an excessively acid gastric juice is conceded to be the most common cause of gastric ulcer. Embolism and thrombosis affecting the blood supply to any area of the stomach will lower the vitality of that section and predispose to ulcer. Posture, bending through occupational habit, is said to be a cause. The rôle of muscular action is questionable in this connection. Traumatism, mental anxiety, alcoholism (32 per cent of cases in the Mayo clinic) are common causes. Of specific causes tuberculosis and syphilis are prominent. Ingestion of very hot food is cited by the Mayos as a cause; also by Heiser. J. W. Dowden cites several cases occurring in one family as an indication of the rôle played by heredity in the production of a gastric ulcer.

The action of corrosive acids is a factor to be considered. Bacteria, in septic conditions originating in the throat, tonsils, gall bladder, and appendix, will either directly or indirectly induce an increase in the normal hydrochloric acid, later causing ulcer formation. Septic absorption from large areas of skin burns will produce duodenal ulcers in some cases. In Smithie's analysis of 140 cases in the Mayo clinic in 1912, 126 were due to enteric fever, 6 to pneumonia, 56 to syphilis, 8 to malaria, 27 to general infection; 12 had a previous history of appendicitis, 2 of gall stones.

Anemia plays a rôle in predisposing to a very acid gastric juice by the frequent occurrence of ulcer of the stomach in chlorosis. According to W. J. Mayo, anemia, hyperchlorhydria, and traumatism represent the most important factors. Constipation exists in at least 90 per cent of cases. In the Mayo clinic 70 per cent of gastric ulcers occured in males. Acute gastric ulcer is more common in young women than in women of middle age; in men it is more common after the age of 40. Chronic ulcer is most common in women between 30 and 40; in men at 40 and over. The majority of ulcers in both sexes fall between the ages of 30 and 40. Ulcer is rare under the age of 20.

The most common site of gastric ulcer is on the posterior wall and lesser curvature near the pyloric end of the stomach, 80 per cent being in this locality. Only one-half of 1 per cent of ulcers on the posterior wall perforate, as adhesions to adjacent structures form and prevent open rupture. An ulcer on the anterior wall of the stomach may have a mate on the posterior wall, the so-called "kissing ulcer."

Classification.—The Mayos classify ulcers as indurated and nonindurated. The nonindurated involve only the mucous coats; they may be mere erosions or fissures, microscopical in size, showing little if any evidence of their presence by any recognizable thickening on the external surface of the stomach wall, thus escaping the observation of the surgeon.

Ulcers are classified as:

Acute—with rapid progress.
Chronic—chronic from onset.

An ulcer may terminate in healing, cancer formation, or perforation. One to two per cent perforate. Adhesions may form, causing deformity and notching of the stomach wall; but this is more usual with duodenal ulcer.

In the stomach the ulcer erodes in crater-like areas tending to involve all the coats to the peritoneum; in the duodenum the tissue loss in ulcer is more superficial and widespread. Ulcer of the first portion of the duodenum may be associated with gastric ulcer.

In 2,830 autopsies in the Philadelphia Hospital there were gastric ulcers in 40 per cent of the cases; in 3,763 autopsies from four Philadelphia hospitals, 51 per cent showed gastric ulcers.

McClure and Reynolds classify gastric and duodenal ulcers as typical and atypical. In their series of 80 cases, 46 were in males; 34 in females. Occupation and habit had no apparent rôle in their etiology. The duration of the symptoms in 69 of the cases ranged from 10 days to 40 years; in 42 of the cases, 1 to 12 years; in 19 cases, 15 to 40 years.

Of the 80 cases, 54 were classified as typical and 26 atypical. In the typical group 28 cases had ulcer in the first part of the duodenum; 20 in the stomach, 5 of which were on the lesser curature some distance from the pyloris.

In the atypical group several types were distinguished:

1. Gall-bladder type, characterized by pain such as gall stones produce, occurring at irregular intervals and with exacerbations.
2. Type resembling malignancy.
3. Type with constant epigastric pain.
4. Type with marked vomiting.

The typical forms are readily diagnosed by the X ray. In the atypical forms many cases can not be diagnosed without aid of X-ray findings.

According to these authors the most important things to note in the laboratory findings are: Gross amount of blood in the vomitus or gastric contents; frequent vomiting of old food residues; and tarry stools.

Of less value are persistent occult blood in stools, food residues, and gastric contents; and the presence of free HCl in the gastric contents.

Ivy, in the Archives of Internal Medicine, 1920, brings out interesting facts as to the physiology of the stomach in studies of gastric ulcers in dogs. He states that chronic ulcer of the stomach or duodenum is rarely found in dogs. Healing of experimental ulcers near the pylorus produced by injections of silver nitrate occurred in 12 to 18 days. Ligation of the gastroepiploic vessels did not produce ulcers; injection of charcoal into the arteries also failed. Lead chromate (toxic) injected produced ulcers at times. Induced partial pyloric stenosis delayed healing of experimental ulcers, as also did feeding large quantities of virulent bacteria in case of healthy dogs. Abrasions were made in the stomachs of dogs ill with distemper; then bacterial feeding was instituted. Chronic ulcers resulted. The same result was produced by ligating the pancreatic duct.

Ivy concludes that the production of ulcer requires some injury to the mucosa, infection by the blood stream or mouth, a general lowered resistance, and temporary hypoacidity. Disturbances in motility and emptying time seen in chronic ulcers can be duplicated experimentally in acute ulcers. Ulcers of the pylorus and duodenum caused hypomotility and delayed emptying time, while ulcers of the fundus did not show this effect. With elimination of nerve control by section of the vagi and the splanchnic and cœliac plexus, increased motility still existed, but not as great as before section.

Symptoms.—The usual symptoms in order of importance are pain, local tenderness on pressure, a varying degree of muscular rigidity, vomiting, hemorrhage, and hypochlorhydria.

According to Moynihan, pain that is altered by food is the most valuable of all clinical data for diagnostic purposes. Next is frequency in vomiting, which is infrequent when due to ulcer and rarely occurs after taking food. The meal causes relief at first. Later vomiting occurs. Hematemesis is less frequent than supposed, melena is present in about 25 per cent of cases. Loss of blood in these cases is slight. Acute gastric hemorrhage is, according to this author, more frequently due to other causes. He thinks that the chemical examination of the gastric contents is of little value, since hyperacidity may exist in many other conditions. He states that the roentgenograph is the one positive method of diagnosis, and that no diagnosis of gastric ulcer should be accepted unless its presence is confirmed by the X ray. Moynihan cites the tendency of ulcer to recur and that the scars of healed ulcers may degenerate. He is of the opinion that gastroenterostomy should be performed where there is existing threatened obstruction. This operation, or gastrectomy (partial) and prolonged feeding through a jejunostomy opening, he considers the safest and surest surgical cure.

To go into the question of pain more closely. Hardt, in the Archives of Internal Medicine, May, 1922, furnished additional evidence that supports the theory recently advanced by Carlson and Guisburg that in peptic ulcer its production is not due to hyperacidity but to hyperperistalsis which irritates the lesion. A rubber balloon with a tube attached was swallowed by the patient and inflated. The tube was attached to a kymograph and tracings registering the contractions of the stomach during peristalsis taken. Pain coincided with the exaggerated movements of hunger contraction. Gastric contents should be removed by the Rehfuss tube during these experiments. Twenty-five patients were so examined. The pain occurred even in patients exhibiting complete achylia. The author suggests that the logical treatment for ulcer should be one that aims to regulate the exaggerated peristalsis.

Pain is usually paroxysmal in ulcer. It may be constant and violent, located in the epigastric region high near the tip of the ensiform, or it may, in case of ulcer of the lesser curvature of the stomach, be referred to the left costal margin. If the ulcer is in the posterior aspect of the stomach, the pain is usually referred to the back at a point on the right side of the spine between the eighth and ninth dorsal vertebrae. Occasionally it radiates to the esophagus, or to the chest and upper portion of the ensiform. If the ulcer is in the duodenum the pain is to the right of the midline above the level of the umbilicus. Food relieves pain; so does lavage, vomiting, administration of alkalies, and sometimes pressure over the site of the pain. A history of dyspepsia is usually obtainable, but not always of the acid type. Hyperchlorhydria is present in about 80 per cent of the cases. When the stomach is empty there is hunger pain and often actual pain. This is allayed by food when the ulcer is near the pyloric end of the stomach. If located near the cardiac end, or, as in case of luetic ulcers, to the left of the mid line on the greater curvature, there is but transitory relief afforded by food.

Vomiting, if occurring within two hours after the ingestion of a meal, points to gastric ulcer; if delayed for three hours or later, to a duodenal lesion. Careful examination of the vomitus is to be made for blood. Unchanged blood is seen in less than half the cases. Deaths from acute hemorrhage occur in about 3 to 8 per cent of the cases. The Rehfuss tube may bring up blood from a congested stomach mucosa if undue suction is made by a syringe in aspirating the contents. Such blood is not necessarily from a bleeding ulcer. If the blood appears without force used in suction the supposition is that it comes from some bleeding in the stomach, the duodenum, or ruptured vein about the cardia.

Hematemesis is a marked symptom in some cases; in others, while there may be as much hemorrhage, there is very little vomiting or none at all, and the blood passes out by way of the intestine, as is evidenced by tarry stools and persistent occult blood. The blood from a bleeding gastric ulcer is more apt to be vomited than passed through the bowels.

Occult blood of itself is not diagnostic of ulcer. It may originate at any site from the mouth to the anus. Any test for occult blood to bear significance must be made after two days of abstinence from rare meats, fish, sausage, and so forth.

The amount of hemorrhage depends on the size of the bleeding vessel. The erosion of small vessels in the cicatrix of an old ulcer occasions continuous loss of blood in some cases; a general seepage through a congested mucosa explains the persistent occult blood test in others. A severe hemorrhage may be but one of a series, or it may be followed by a few minor hemorrhages. Hematemesis, a single attack without previous gastric symptoms, is probably not due to ulcer.

Anemia resulting from a severe hemorrhage, or the gradual loss of blood through small hemorrhage, will eventually, if the red blood cells fall below 2,000,000 per cubic centimeter and the hemoglobin 40 per cent, require transfusion. The patient usually becomes very cachectic before reaching this stage, losing 15 to 20 pounds in weight.

Tenderness and muscular rigidity are usually present over the ulcer site. Occasionally the indurated area over the ulcer may be felt through a thin belly wall.

The presence of blood in the stools, or in the vomitus, determined by either chemical or microscopic means, is a positive aid in diagnosis of ulcer. Einhorn's string test may serve to locate an ulcer in the stomach or duodenum. There are latent cases of ulcer in which there is neither bleeding nor vomiting.

Hyperchlorhydria is present in 80 per cent of cases. Fractional gastric analysis carrying the examination over 1½ hours at 10-minute intervals will give a fairly accurate idea of the degree of acidity.

There may be hypoacidity in cases of ulcer of long standing characterized by dilatation, large gastric residues, atony, and hypomotility. A history of long-continued indigestion, if accompanied by pain, vomiting, and rigidity, even though acid content is normal, should make one suspicious of ulcer. Trypsin and bile give a plus reaction in the stomach in 80 per cent of cases of duodenal ulcer.

Hypomotility of the stomach is more common in case of ulcer than hypermotility. Cases exhibiting gastric residue are easier diagnosed than those without it. Cases of chronic ulcer with marked pyloric thickening, anemia, and cachexia are apt to be diagnosed as carcinoma.

The value of Röntgen diagnosis can not be underestimated. Haudek states that the changes in the shadow of the stomach and duodenum afford a picture of the anatomical changes of the wall of the gastric ulcer. Those changes of contour are emphasized by a spastic contraction. The loss of substance in the crater of an ulcer is seen in the form of a niche. The large curvature is notched and the stomach is rolled in at the lesser curvature near the ulcer. In ectasis of pyloric ulcer there are bulb-shaped deformities in the duodenal ulcer. The ulcer causes changes in the serosa of the stomach and circumscribed peritonitis. In the first case a point of pressure is projected upon the stomach. In the latter case there is a formation of a zigzag contour and a dextrofixation. A bulbous and duodenal stenosis will remain stationary. The symptoms of irritation, usually of a spastic muscular type, are represented by a scalloping of the larger curvature and paradoxical retention. The Röntgen picture gives information as to the size, hardness, penetration, complication with stenosis, either organic or spastic with the cardia, the bulk of the stomach, the pylorus, the duodenum, adhesions to the neighboring organs, especially of the liver, gall bladder, pancreas, colon, the anterior abdominal wall. The pyloric, prepyloric, and duodenal ulcers are harder of diagnosis. The difference between ulcers and carcinoma may be hard to establish. In ulcer, the niche in the shadow of the stomach is more pronounced, in carcinoma less. The hourglass stomach is indicative of ulcer; the notch in carcinoma is irregular and broad. The antrum deformity hardly enters into consideration where there is a cause for differentiation between ulcer and carcinoma. In the duodenum the bulbar defect is a sure sign of ulcer, because it practically does not occur in malignant tumors. The differentiation between ulcer and scar is somewhat difficult for the röntgenologists. The administration of atropine and papaverin have not proved efficient for the differential diagnosis. A simple small ulcer is not shown up by spasms or niches or adhesions. More pronounced and protracted functional disturbances are more often seen in the chronic callous type of ulcer. Where there is a combination of gastric hemorrhage with a normal or slightly atypical functional Röntgen picture, erosions must be considered. In nemosis, the clinical disturbances are very much more marked and the röntgenogram may be negative. Prognosis may be aided if regular examinations by the same röntgenolgist are made of the case.

An ulcer may heal, perforate, or form a basis upon which a malignant tumor develops.

Cicatrization may produce, in case of ulcer of the fundus, varying degrees of deformity, the extreme of which is represented by the so-called hourglass contraction. An ulcer of the pylorus may by cicatrical contraction produce a stenosis that in turn leads to dilatation and atony of the stomach. In the duodenum a similar kind of healing will produce stenosis. It is to be remembered that a cicatrix may degenerate and the ulcer reform.

Acute perforation begins with violent epigastric pain, a rigid abdomen, vomiting, mounting fever, rapid pulse, and all the classical symptoms of shock. The vomiting forces the stomach contents into the general or lesser peritoneal sac according to the location of the ulcer. Vomiting occurs in about 50 per cent of the cases. Blood may be present in the vomitus. Pain may be general over the abdomen or localized. It does not necessarily manifest itself at the site of the rupture. In perforation into the lesser peritoneal sac by an ulcer on the lesser curvature of the stomach, the escaped gastric content plus gas may lift the anterior abdominal wall and obliterate the liver dullness. The omentum may serve to limit the infection from a perforation. Infective fluid and material may gravitate to the flanks and be evident on percussion.

Chronic perforation of an ulcer on the posterior aspect of the stomach may build up a mass of adhesions which wall off and prevent a general infection, although in some cases it may result in a perigastric abscess.

Peritonitis spreads slowly unless the infection is widespread and made immediately general by the propulsion of gastric contents into the general peritoneal cavity. The treatment of acute perforation is immediate operation. The various operative procedures in treatment of this condition do not come within the scope of this paper.

The Sippy diet aims to neutralize all free hydrochloric acid from early in the morning until late at night. Hourly feedings and half-hourly administration of alkalies bring about this result. The corrosive action of the acid stomach contents is thus prevented and the ulcer allowed to heal. Aspiration of the stomach residue by means of a Rehfuss, Jute, or Einhorn tube one-half hour after the last feeding is desirable to ascertain acidity. If acid, additional alkali is to be given. The patient is to remain in bed from three to four weeks. The graduated diet is to be carefully followed as below described.

The after-treatment of the patient when symptoms of ulcer have disappeared and the Sippy cure completed is extremely important, else a speedy recurrence of the trouble will be invited. At least five feedings per day and alkaline powders occasionally between meals should be taken. Gastric analysis (test meals) should be made at intervals of three months to ascertain the amount of free HCl present.

Duodenal alimentation as advised by Einhorn is of great value in gastric ulcer. He uses 200 to 240 cubic centimeters of milk and 17 to 30 grams of lactose every two hours, adding at times, to increase the caloric value, cream, eggs, broth, and oatmeal gruel.

Rectal alimentation is useful in case of hemorrhage and in the treatment of special cases when ordinary measures fail. It can not be continued, as a rule, longer than 10 days. The Murphy drip method—30 drops per minute or less—is the best method of administration. Soapsuds enemata should be used before each nutrient enema. Four to six nutrient enema of 6 drams per day of glucose sirup, 1 ounce of 50 per cent alcohol, and normal salt solution 6 ounces, can be given, representing a total of about 1,000 calories. If the patient is very anemic and cachetic, rectal feeding can not usually be pursued longer than three or four days before beginning, of necessity, mouth feeding.

Sippy diet cure modified by Friedenwald and Ruhrah

Hour	First to fifth day	Sixth day	Seventh to eighth days
7 a. m.	Milk and cream	Soft egg, milk and cream.	Milk and cream.
8 a. m.	do	Milk and cream	Milk and cream and soft egg.
9 a. m.	do	do	Milk and cream.
10 a. m.	do	do	Do.
11 a. m.	do	do	Do.
12 a. m.	Milk and cream aa $1\frac{1}{2}$ ounces.	do	Do.
1 p. m.	Milk and cream	do	Cereal, egg, milk, cream.
2 p. m.	do	do	Soft egg, milk, cream.
3 p. m.	do	do	Milk and cream.
4 p. m.	do	do	Milk, cream, cereal.
5 p. m.	do	Milk or cocoa, soft egg.	Milk and cream.
6 p. m.	do	Milk and cream	Do.
7 p. m.	do	do	Do.

Hour	Ninth to tenth days	Eleventh to fourteenth days	Fifteenth day
7 a. m.	Milk and cream, cereal.	Milk and cream, soft egg, cereal.	Milk and cream, egg, cereal.
8 a. m.	Milk and cream	Milk and cream	Milk and cream.
9 a. m.	do	do	Do.
10 a. m.	do	do	Do.
11 a. m.	do	do	Do.
12 a. m.	do	do	Do.
1 p. m.	Cereal, egg, cocoa	Egg, cocoa, custard	2 eggs, cocoa, milk toast.
2 p. m.	Milk and cream	Milk and cream	Milk and cream.
3 p. m.	do	do	Do.
4 p. m.	do	do	Do.
5 p. m.	Milk, toast, egg, and cocoa.	Milk toast, egg, and cocoa.	Milk, toast, egg, and cocoa.
6 p. m.	Milk and cream	Milk and cream	Milk and cream.
7 p. m.	do	do	Do.

Sippy diet cure modified by Friedenwald and Ruhrah—Continued

Hour	Sixteenth day	Seventeenth to eighteenth day	Nineteenth day
7 a. m.	Egg and cereal, milk and cream.	Soft egg, cereal, cocoa.	Milk and cream.
8 a. m.	Milk and cream	Milk and cream	Milk and cream, chicken broth.
9 a. m.	do	do	Milk and cream.
10 a. m.	do	do	Do.
11 a. m.	do	do	Do.
12 m.	do	do	Do.
1 p. m.	Cream, milk toast, egg, vanilla ice cream.	Minced chicken, milk, milk toast, vanilla ice cream.	Minced chicken, cocoa, dry toast, vanilla ice cream.
2 p. m.	Milk and cream	Milk and cream	Milk and cream.
3 p. m.	do	do	Do.
4 p. m.	do	do	Do.
5 p. m.	Milk toast, egg, cocoa.	Milk toast, egg, cocoa.	Milk toast, egg, cocoa.
6 p. m.	Milk and cream	Milk and cream	Milk and cream.
7 p. m.	do	do	Do.

Hour	Twentieth day	Twenty-first day	Twenty-second day
7 a. m.	2 eggs, cocoa, slice dry toast, butter.	2 eggs, 1 slice toast, butter.	Milk and cream.
8 a. m.	Milk and cream	Milk and cream	Do.
9 a. m.	Milk and cream, egg.	Milk and cream, egg.	Cereal, milk and cream, egg.
10 a. m.	Milk and cream	Milk and cream	Milk and cream.
11 a. m.	Broth	do	Do.
12 m.	Milk and cream	do	Do.
1 p. m.	Minced chicken, 1 slice dry toast, butter, cocoa, spinach.	1 boiled lamb or mutton chop, dry toast, cocoa, butter, asparagus, or baked potato.	Chop or minced chicken, dry toast, strained vegetable, baked potato, cocoa, butter.
2 p. m.	Milk and cream	Milk and cream	Milk and cream.
3 p. m.	Broth	Milk and cream, milk, orange, egg.	Do.
4 p. m.	Milk and cream	Milk and cream	Do.
5 p. m.	Toast, cocoa, 2 eggs, cereal and milk.	Toast, cocoa, 2 eggs, cereal and milk.	Stewed fruit or baked apple, 2 eggs, cereal, milk toast, cocoa.
6 p. m.	Milk and cream	Milk and cream	Milk and cream.
7 p. m.	do	do	Do.

Milk and cream, equal parts of each, 1½ ounces throughout table.

Modified Sippy diet followed in some cases of peptic ulcer

[Milk and cream, of each 1½ ounces, every hour from 7 a. m. to 7 p. m.]

NINTH TO TWELFTH DAY

Hours a. m.	Hours p. m.	Medicine and foods.	Quantity.
7. 30	1. 30	Heavy calcined magnesia	10 grams.
9. 00	3. 30–5. 30	Sodium bicarbonate	Do.
11. 30	7. 30–9. 30	Calcium carbonate	Do.
8. 30	12. 30–6. 30	Sodium bicarbonate	Do.

THIRD TO FOURTH DAY FOLLOWING.

7. 00	3. 00	Milk and cream	Of each, 1 ounce.
11. 00	7. 00	Milk, egg, or cocoa	
9. 00	1. 00–5. 00	Heavy calcined magnesia	10 grams.
7. 30	3. 30	Sodium bicarbonate	Do.
11. 30	7. 30	Calcium bicarbonate	Do.
9. 30	1. 30 5. 30–9. 30	Sodium bicarbonate	Do.

FOURTH TO FIFTH DAY FOLLOWING.

7. 00–11. 30	3. 00–7. 00	Milk and cream	Of each, 1½ ounces.
9. 00		Oatmeal, egg and cocoa	
7. 30	1. 00–5. 00 3. 00	Milk toast, egg, cocoa, heavy calcined magnesia.	10 grams.
11. 30	7. 30	Sodium bicarbonate	Do.
9. 30	1. 30	Calcium bicarbonate	Do.
	5. 30	Sodium bicarbonate	Do.

TO BE FOLLOWED FOR SOME WEEKS.

7. 00	3. 00–7. 00	Milk and cream	Of each, 1½ ounces.
11. 00		Milk or egg or cocoa	
9. 00	1. 00–5. 00	Soft diet without acids	
7. 30	3. 30	Heavy calcined magnesia	10 grams.
11. 30	7. 30	Sodium bicarbonate	Do.
9. 30	1. 30	Calcium carbonate	Do.
	5. 30–9. 30	Sodium bicarbonate	Do.

Give additional sodium bicarbonate as required.

Diet list for use following an ulcer treatment

In addition to the usual meals, intermediate feedings should be taken. The patient may take:

Soups:
- Clam.
- Mutton.
- Barley.
- Rice.
- Vermicelli.
- Cream.
- Potato.
- Pea.
- Celery.
- Asparagus.

Fish (boiled, baked, broiled):
- Bluefish.
- Bass.
- Haddock.
- Halibut.
- Trout.
- Mackerel.

Oysters:
- Raw.
- Steamed.
- Stewed.
- Broiled.

Clams:
- Broth.
- Raw.
- Steamed.

Fruits:
- Pears, stewed.
- Peaches, stewed.
- Prunes.
- Apples, stewed and baked.

Meats (boiled, broiled):
- Lamb.
- Lamb chops.
- Mutton.
- Mutton chops.
- Brains.
- Sweetbreads.

Eggs:
- Raw.
- Soft boiled.
- Poached.
- Omelet.
- Scrambled.
- Shirred.

Cereals:
- Rice.
- Cracked wheat.
- Corn meal.
- Barley.
- Oatmeal.
- Cream of Wheat.
- Farina.
- Hominy.
- Grits.
- Shredded wheat.

Beverages:
- Barley water.
- Oatmeal water.
- Rice water.
- Albumin water.
- Tea, weak.
- Coffee.
- Cocoa.

Poultry (boiled, broiled, roasted):
- Chicken.
- Turkey.
- Squab.

Milk:
- Whole.
- Skimmed.
- Whey.
- Curd.
- Junket.
- Matzoon.
- Kinnies
- Kefir.
- Cream.
- Pasteurized.
- Buttermilk.

Ice cream:
- Vanilla.

Farinaceous food:
- Cornstarch.
- Tapioca.
- Sago.
- Vermicilli.

Desserts (puddings):
- Rice.
- Blanc mange.
- Cornstarch.
- Bread.
- Tapicoa.
- Cup custard.

Bread:
- Stale.
- Toasted.
- Pulled.
- Wheat.
- Zweiback.
- Crackers.

Butter.

Vegetables:
- Asparagus.
- Spinach.
- Squash.
- Cauliflower.
- Watercress
- Potatoes (mashed, baked).
- Carrots.
- Artichoke.
- Lima beans.
- Lentils.
- Peas.
- String beans.

Mineral waters:
- Vichy.
- Hawthorne.
- Lithia.
- Appolinaris.
- White Rock.
- Poland.

Articles to be forbidden:

- Candies.
- Salads.
- Fried foods.
- Alcoholic stimulants.
- Sweet potatoes.
- Strong tea.
- Strong coffee.
- Cabbage.
- Salted fish.
- Smoked fish.
- Sardines.
- Salmon.

Preserved fish.	Potted meats.	Berries.
Beef.	Corned meats.	Bananas.
Pork.	Stews.	Melons.
Veal.	Hashes.	Oranges.
Crabs.	Sausage.	Grapefruit.
Rice soups.	Twice-cooked meats.	Lemons.
Liver.	Celery	Preserves.
Kidneys.	Beets.	Pastry.
Duck.	Radishes.	Pies.
Corn.	Hot cakes.	Nuts.
Goose.	Hot bread.	Tomatoes.

The Lenhartz Ulcer Cure.—Rest in bed for four weeks; a protein diet; an icebag to the abdomen more or less continuously for two weeks are the cardinal principles of this treatment. The diet on the first day, even in the presence of hematemesis, is 200 cubic centimeters iced milk in teaspoonful doses, together with two raw ice-cold beaten eggs. The eggs are beaten up with sugar and kept cold by placing the container in a bowl of cracked ice. The milk is increased 100 grams daily and one more egg added. On the second day 2 pints of milk are given and this amount is not thereafter increased. On the sixth day scraped raw beef is added and the quantity is doubled on the following day. Well-cooked rice and Zwieback are added on the seventh and eighth days. On the tenth day raw ham and butter are given.

This treatment avoids the long-continued period of liquid diet usually presented in other treatments. It avoids loss of weight and anemia to a greater extent, and is considered by many more desirable to follow in cases marked by hemorrhage.

Diet of Lenhartz

Day after hematemesis	Eggs, number	Sugar, grams	Milk, cubic centimeters	Beef, raw, scraped, grams	Milk cooked with rice, cubic centimeters	Zwieback, grams	Ham, raw, grams	Butter, grams	Calories
1	2		200						280
2	3		300						420
3	4	20	400						637
4	5	20	500						779
5	6	30	600						955
6	7	30	700	[1] 35					1,135
7	8	40	800	[1] 35	100				1,388
8	8	40	900	[1] 35	100	20			1,721
9	8	50	1,000	[1] 35	200	40			2,138
10	8	50	1,000	[1] 35	300	40	50	20	2,478
11	8	50	1,000	[1] 35	300	60	50	40	2,941
12	8	50	1,000	[1] 35	300	60	50	40	2,941
13	8	50	1,000	[1] 35	300	80	50	40	3,007
14	8	50	1,000	[1] 35	300	100	50	40	3,073

[1] Twice a day.

The Laube diet demands a period of 14 days in bed on a liquid diet, mainly of milk. The patient is allowed to be out of bed part of the time in a reclining position in the third week. The diet is increased by gradual addition of easily digestible vegetables in the fourth week. Later white meats may be given. Adjuncts to this treatment are Carlsbad salts, in the morning and afternoons for the first few weeks, also hot poultices to the abdomen.

Smithie's ulcer diet, based upon established clinical and physiological facts, is as follows:

Days 1 to 7 (time varies according to patient's condition)

By mouth.—One-half ounce warm water hourly when awake. Patient chews paraffin wax for 15 minutes at least once in two hours. Juice of sweet orange or grapefruit occasionally.

By rectum.—Nutrient enema consisting of 50 per cent alcohol, 1 ounce, glucose sirup 1 ounce, and normal salt solution 6 ounces every 4 hours. The enemata are preceded by a cleansing irrigation of the colon with normal salt solution. They are given at body temperature by the drop method at the rate of 30 to 60 drops per minute. Calories daily approximate 1,000. During the first two days, tincture of opium, 10 minus is added to each enema.

Days 3 to 14 (case of average severity)

By mouth.—From 4 to 6 ounces of water gruel at temperature of 100° F. (37.8° C.). The gruel is taken slowly through a glass tube. Gruels are made from rice, Cream of Wheat, oatmeal, sago, corn meal, milk, macaroni, and vermicelli, rusks, potato, asparagus, cauliflower, beans, peas, and boiled onion. They are strained before feeding. Flavoring with coffee, chocolate, vanilla, caramel, etc., renders the cereal gruels palatable and their administration easier. To the vegetable gruels small quantities of arrowroot or cornstarch are added to secure a thin emulsion. Before each feeding paraffin wax is chewed for five minutes. Warm water or sweet orange or grapefruit juice is allowed as desired, but never in greater quantities than 1 ounce at a time.

By rectum.—During the first two days of mouth feeding two alcohol-glucose-saline nutrient enemata are given. During the second two days one such nutrient enema is given. After the fourth day of mouth feeding no rectal feedings are given in the average case. Calories approximate 800.

Days 14 to 21

6.30 a. m.: 1 glass hot water and 1 teaspoonful of noneffervescent sodium phosphate.

7.30 a. m.: I ounce sweet orange or grapefruit juice, 2 ounces thin Cream of Wheat, or Farina, or well-cooked rice, or corn meal, 2 ounces of skimmed parboiled milk may be taken with cereal, and if desired a small quantity of sugar used. One Zwieback with a thin layer of butter, 4 ounces of parboiled skimmed milk containing half volume of limewater, served warm, and flavored with coffee, cocoa, caramel, or vanilla.

9.30 a. m.: 6 ounces thin water gruel from cereals or fresh vegetables, strained and served hot, 1 rusk or Zwieback, or dry toast.

11.30 a. m. 4 ounces malted milk, whipped egg with parboiled milk, cornstarch pudding, simple custard lightly cooked.

12.30 p. m.: 6 ounces potato, pea, bean, or asparagus purée, strained, or vegetable broth; 4 ounces of Salisbury steak (moderately well cooked) to chew; 2 ounces (cooked weight) of thin rice, sago, tapioca, or cornstarch pudding made with parboiled milk and egg yolk; 2 ounces of parboiled milk and small quantity of pulverized sugar may be eaten with the pudding; 1 rusk or Zwieback, 6 ounces of parboiled milk, and quarter volume of limewater flavored to taste.

4 p. m.: 4 ounces of water gruel from cereals, 1 very soft poached egg, 1 rusk or Zwieback, 4 ounces of hot Vichy water.

6 p. m.: 4 ounces of whipped egg, 2 rusks or Zwieback, 6 ounces of malted milk (thin), flavored to taste, or cereal water gruel, or parboiled milk, and quarter volume of limewater gruel.

9 p. m.: 6 ounces of water cereal gruel or 4 ounces of malted marrow, 2 Graham crackers. Calories approximately 1,500.

Days 21 to 42

6 a. m.: 2 teaspoonsful of phosphate of soda in a glass of hot water.

8 a. m.: Juice of 1 sweet orange or half sweet grapefruit, or boiled prunes passed through a fine colander; 2 ounces (cooked weight) of thin cereals (Cream of Wheat, Farina, oatmeal, corn meal), 2 ounces skimmed milk and small amount powdered sugar, 1 soft poached egg, 2 Zwieback, 2 rusks or 2 thin slices of well-toasted Graham bread, 1 pint of hot skimmed milk, a quarter volume of limewater flavored to taste (cocoa, vanilla, etc.).

10 a. m.: 1 pint of hot parboiled whole milk and fifth volume of limewater, 2 rusks or Graham crackers.

12.30 p. m.: 4 ounces creamed soup from vegetables strained, 6 ounces rare meat to chew, 4 ounces well-mashed potato (mealy inside) or carrot, peas, beans, cauliflower, Brussels sprouts, or asparagus (all vegetables passed through a strainer and served with 15 grams of butter); 4 ounces (cooked weight) of pudding from rice, cornstarch, sago, tapioca, Cream of Wheat, or Farina, or 4 ounces of custard, pulp of sweet orange, grapefruit, or prune whip, or chew 6 ounces of watermelon or cantaloupe, half pint of hot skimmed milk.

3.30 p. m.: 150 cubic centimeters hot whole milk and one-quarter volume limewater, or 150 cubic centimeters malted milk or weak cocoa.

6.30 p. m.: 2 rusks or Zwieback, or 2 slices or well-toasted Graham bread, 2 very soft poached eggs, 100 grams sweet apple sauce or 1 baked apple (omit skins), or juice of sweet orange or half of grapefruit, or chew 6 ounces of melon, or 1 pint of skimmed hot milk.

9 p. m.: 250 cubic centimeters whole parboiled milk and one-fourth volume limewater, or 250 cubic centimeters malted milk hot. Calories for 24 hours, approximately 2,000.

Smithies' General Diet After Three Months.—(If distress, patient should go back to seventh to twenty-first day diet):

7 a. m.: 1 pint of skimmed milk and half gill of cream.

9 a. m.: 2 pieces of toast without butter, juice of 1 sweet orange or grapefruit, or ripe melon, or apple sauce or baked apple (do not eat skin), or marmalade, 1 dish of well-cooked cereal (oatmeal, Farina, or Cream of Wheat), 2 very soft poached eggs, 2 cups of not sweetened water. The water may be made more palatable by flavoring with cocoa, tea, coffee, or cream.

11 a. m.: 1 cup bouillon (2 cubes), 2 Graham crackers.

1 p. m.: This should be the heavy meal of the day. It may consist of meat (rare beef or rare Hamburg steak, lamb, or white meat of fowl), fish (never fried), oysters, well-cooked squash, spinach, cauliflower, carrots, peas (hulled), string beans, Brussels sprouts, baked or mashed potatoes (in moderation), rice with gravy, simple puddings made from cereals, cornstarch, gelatin, well-cooked fruit sauces, simple cakes, no white bread (all bread should be made from dark flour and should be at least 1 day old), 1 pint of skimmed milk taken hot.

4 p. m.: 1 glass of hot peppermint water (20 drops of "essence" of peppermint to the glass, sweeten to taste and drink slowly), 2 Graham crackers.

7 p. m.: A light lunch consisting of vegetable soup, simple salad, toast, soft eggs, and plain puddings or cake, with or without ripe cooked fruit sauces, 1 pint of hot skimmed milk.

Bedtime: 1 glass of malt marrow, malted milk, or hot skimmed milk. Calories, approximately 3,500 for 24 hours.

In all dietetic treatment of gastric or duodenal ulcer the procedures should be made to fit the case rather than *vice versa.* Some cases will do better on a combination of two treatments without violating the basic principle of either. The Leube treatment is occasionally made a preliminary to the Lenhartz treatment. Certain phases of the Smithie diet fit in well with the Sippy diet, especially as a preliminary treatment in case of hematemesis. The Smithie ulcer diet is especially valuable in that it gives the patient a definite program in diet to follow after he is away from the immediate observation of his physician. If recurrence is to be minimized, observation and dietetic care must never be relaxed.

Surgical treatment.—The indications for surgical treatment given by the Oxford Medicine, vol. 3, page 150, are as follows:

(1) When there is reason to suspect carcinoma.

(2) Perforation into the free peritoneal cavity.

(3) Organic pyloric obstruction of such degree as to materially effect the emptying of the stomach.

(4) Hourglass stomach due to organic constriction.

(5) Hemorrhages recurring in spite of proper medical treatment.

(6) Perigastric abscess.

According to Moynihan the surgical procedures that have been adopted in the treatment of gastric ulcer are the following:

(1) Gastroenterostomy.

(2) Excision of the ulcer.

(3) Gastroenterostomy combined with excision.

(4) Gastroenterostomy combined with the destruction of the ulcer by cautery (D. C. Balfour's operation).

(5) Median resection of the stomach, "sleeve resection."

(6) Gastroenterostomy combined with jejunostomy (Moynihan's operation).

(7) Partial gastrectomy.

Prognosis.—Depends on the location of the ulcer; the length of time it has existed; the degree of care exercised in prolonged medical treatment; and the age of the patient. Baar states that out of 1,000 cases treated by the Sippy method he found it necessary to refer only 6 to the surgeon.

The case report appended has the following unusual features:

1. It is a case of ulcer of the duodenum in which a gastroenterostomy was performed several years ago. The patient later developed ulcer of the stomach with a difficult differential diagnosis between jejunal ulcer, gastric ulcer, and duodenal ulcer.

2. Recovery recurred after a severe intestinal hemorrhage, with a resulting profound anemia.

3. Illustrates the efficacy of blood transfusion.

4. It presents a contrasting barium series, showing niche of the gastric ulcer, and lastly, because of resolution changes, a complete obstruction of the duodenum.

5. It offers a definite example of the application of all phases of dietetic treatment of ulcer, with follow-up treatment for a year

D. McK.; male; age 48; admitted June 23, 1922. Diagnosis undetermined; origin in the line of duty. History as follows: In 1915 at the United States Naval Hospital, Newport, R. I., he was a patient for three months, entering with symptoms of acute abdominal pain and hemorrhage from what was thought to be duodenal ulcer. He had a blood transfusion at this time. After being discharged he had no further trouble until 1916, in May, when he was operated at the Flower Hospital, Newport, R. I., for appendicitis, and one month later for duodenal ulcer, a gastroenterostomy being performed. After the later operation he was free from abdominal symptoms. On May 27, 1917, he was retired because of the above history. After the gastroenterostomy he had pain for nearly two months, usually beginning about 4.25 p. m. and lasting to about 9 p. m. This gradually disappeared, and he was able to eat anything without distress. In 1919 he was a patient in the United States Naval Hospital, Brooklyn, N. Y., at which time he complained of pain in his left side, low down. A bismuth meal X-ray series was made at this time. Under a starvation treatment he recovered in about a month. Present trouble: About eight months ago he began to have pains, particularly at night, at intervals about once a month; gradually becoming more frequent until they were present day and night. Eating seemed to give relief, but pain would return later.

June 22, 1922: He vomited a clear watery fluid and pain was very severe at the time.

June 23, 1922: Patient came to this hospital direct from his office in the city. He said he had pain in the left side, low down. He was put to bed and hot-water bag applied to his abdomen. He complained of severe pains in his abdomen in a spot just to the left of median line at level of the left anterior superior spine of the ilium. The pain was described as of burning character. One-eighth grain morphine sulphate was given. Abdomen examined and found soft; no rigidity. A soapsuds enema was given with good results; the patient was quiet afterwards.

June 24, 1922: During the night the patient vomited three times, a brown fluid. A Rehfuss tube in his stomach withdrew 600 to 700 cubic centimeters of coffee-colored fluid which tested positive for blood. Patient was kept in bed; absolute rest. Patient had a small lumpy dark stool which also tested positive for blood. Ice bag to the adbomen. Two ounces of water per mouth every two hours. Blood examination: Red blood cells 3,700,000; hemoglobin, 75 per cent, blood type 3, Jansky method.

June 25, 1922: One and one-half ounces water by mouth every hour, and nutrient enema every four hours; alcohol 50 per cent, 1 ounce; normal salt solution, 6 ounces. The enemas were not retained. The salt solution used in the preliminary washing of the colon was returned containing blood clots and mucous shreds stained brown.

June 26, 1922: Considerable pain on same side in same site. Morphine one-eighth by hypo ordered and given at 9.30 a. m. Sippy diet began at 3 p. m. Morphine sulphate one-fourth grain at 10.50 p. m. because of pain; site as before, lower left quadrant adbomen. Red blood cells, 3,900,000.

June 27, 1922: Passed a very quiet night.

June 28, 1922: Treatment continued.

June 29, 1922: Blood in stool. Red blood cells 3,050,000. Had considerable pain during the night. Opiates necessary. Icebag on abdomen two hours in the evening. Calcium lactate, 20 grains every two hours, given.

June 30, 1922: Catheterized at 11 a. m. Some tension in the bladder felt in the early morning. Patient resting comfortably this morning. Sippy diet continued to 9 p. m. Extra powder given at 10.30 p. m. Calcium lactate, 20 grains every two hours. Unable to urinate. Catheterized every five hours. Red blood cells, 3,220,000; hemoglobin, 80 per cent.

July 1, 1922: Did not sleep last night. Less pain than previous night. Enema this a. m., glycerine and soapsuds. Result a dark brown stool containing blood. Red blood cells, 3,250,000; hemoglobin, 70 per cent. Sippy diet increased by one egg twice a day.

July 2, 1922: Red blood cells, 3,330,000; hemoglobin, 70 per cent. Urine examined, negative for albumin and sugar. Specific gravity 1.013. Still unable to urinate voluntarily. Catheterized every eight hours. Patient passing feces involuntarily. Dark colored, pasty in consistency.

July 3, 1922: Sippy diet continued. Calcium lactate, 20 grains every two hours. Continue catheterization every eight hours.

July 4, 1922: Codeine and veronal necessary to produce sleep at night. Condition same. Urine examination negative for faint trace of albumin. Feces positive for occult blood.

July 5, 1922: Bladder irrigated with one-half of 1 per cent mercurochrome once a day. Some impaction of feces present in sigmoid. Olive-oil enema given. Urine examination. Negative except for many leucocytes (pus). Has had some slight infection in bladder. Red blood cells, 3,300,000; leucocytes, 13,500; hemoglobin, 70 per cent. Feces positive for blood.

July 6, 1922: Urine examination. Specific gravity 1.013; albumin negative; sugar negative. Few pus cells present. Microscopic blood in stomach contents. Olive-oil enema and high glycerine and soapsuds enema cleaned bowel of lumpy fecal matter and flatus. Feels more comfortable. Sippy diet continued and slightly increased.

July 7, 1922: Red blood cells, 3,400,000; leucocytes, 8,600; hemoglobin, 80 per cent; neutrophiles, 69; lymphocytes, 28. large m. 2, transit, 1. Thrombo-plastin, 20 cubic centimeters in 100 cubic centimeters one-tenth normal. NaCl instilled in stomach after withdrawal of contents at 9 p. m. Macroscopic blood seen in contents of stomach. Enema given in evening with good results. Patient had a comfortable night after veronal and allonal administration. Slept well.

July 8, 1922 (9 p. m.): Thrombo-plastin, 1 ampule 20 cubic centimeters in 100 cubic centimeters one-tenth normal NaCl put in stomach after aspirating contents that showed microscopic blood. Coagulin seen in salt solution withdrawn. Patient had a fairly comfortable day. Red blood cells, 3,350,000; hemoglobin, 70 per cent. Sippy diet continued.

July 9, 1922: Same treatment continued. Thrombo-plastin solution left in stomach in p. m. Enema given 10 a. m. with good results. Evidence of hemmorrhage, weak pulse, thirst. Phenol, 1 drop in water, given twice during the day. Had sleepless night. Morphine given.

July 10, 1922: Ulcer of stomach. Origin in line of duty. History as above. All evidence points to bleeding from stomach. Red blood cells, 2,170,000; hemoglobin, 65 per cent. All diet by mouth stopped. Water given every two hours, 6 ounces. Morphine one-eighth grain at 11 a. m. and 3 p. m. Ice bag to abdomen. Catheterized every six hours. Unable to urinate voluntarily. Nutrient enema given in the evening and retained.

July 11, 1922: Pulse weak, rapid, and compressible. Hemorrhage from the stomach has continued. Red blood cells, 1,580,000; hemoglobin, 35 per cent this morning. Blood in stools. Nutrient enema, 1 ounce dextrose in 6 ounces one-tenth normal NaCl solution, every four hours. Calcium lactate 10 grains every hour. Blood transfusion from type 3 donor, 350 cubic centimeters, given intravenously.

Date	Red blood cells	Percentage of hemoglobin	Blood in stools	Diet	Urinary findings
July 12	1, 660, 000	35	Positive	Sippy	Trace albumin.
13	1, 910, 000	40	do	do	Do.
14	1, 980, 000	45	do	do	Negative.
15	1, 950, 000	45	do	do	Do.
16	1, 980, 000	50	Not examined	do	Do.
17	2, 040, 000	55	Positive	do	Do.
18	2, 290, 000	60	do	do	Do.
19	2, 130, 000	60	do	do	Do.
20	1, 910, 000	55	do	do	Do.
21	2, 590, 000	60	do	do	Do.
22	2, 330, 000	60	do	do	Do.
23	(1)	(1)	Not examined	do	Not examined.
24	2, 200, 000	55	do	do	Negative.
25	2, 250, 000	60	do	do	Do.
26	2, 030, 000	55	Positive	do	Do.
27	2, 170, 000	60	Not examined	do	Do.
28	2, 120, 000	60	Negative	do	Do.
29	2, 140, 000	60	do	do	Do.
30	2, 180, 000	60	do	do	Do.
31	2, 280, 000	60	Not examined	do	Do.

[1] Not examined.

July 31, 1922: Barium meal X-ray series; part examined, gastro-intestinal tract. Report: Stomach, slightly dilated; barium passes through pyloris and gastroenteric anastomosis, but only intermittently through the latter; whole outline of stomach is ragged, especially near anatomosis and at pyloris along the lesser curvature. Indicative of pathology. Cap is deformed, also indicative of pathology. Six hours: Moderate gastric residue. The fundus of stomach under diaphragm is ragged and contains large amount of gas. Ileal delay. Small amount of barium in transverse colon. Contraction at ileocaecal valve.

Patient has had daily attacks of paroxysmal pain since he came into the hospital, but of lessening severity.

Date	Red blood cells	Percentage of hemoglobin	Blood in stools	Diet	Labratory and clinical findings
Aug. 1	2, 660, 000	60	Positive	Sippy	
2	2, 810, 000	65	Not examined	do	
3	2, 440, 000	65	Negative	do	
4			do	do	No pain.
5	2, 900, 000	65	Not examined	do	Do.
6	2, 600, 000	65	do	do	Do.
7	2, 330, 000	65	do	do	Do.
8			Negative	do	Do.
9	2, 970, 000	70	Positive	do	Do.
10				do	Do.
11	2, 780, 000	65	Negative	do	Do.
12			do	do	Do.
13			do	do	Do.
14	2, 670, 000	65	do	do	Do.
15			do	do	Do.
16			Positive	do	Do.
17			Negative	do	Do.
18	3, 070, 000	65	do	do	No pain; leucocytes, 6,300.
19			do	do	No pain.
20			do	do	Do.
21	3, 100, 000	65	do	do	No pain, leucocytes, 6,150.
22			do	d	No pain.
23	3, 250, 000	70	Positive	do	Do.
24			do	do	No parasites in stool.
25	3, 220, 000	70	do	do	Do.
26				do	No pain.
27				do	Do.
28	3, 100, 000	70	Positive	do	Leucocytes, 6,450; negative.
29			Negative	do	
31	3, 240, 000	70	do	do	Leucocytes, 6,800; negative.
Sept. 2	3, 400, 000	75	do	do	Leucocytes, 6,700; negative.
8	3, 460, 000	75	do	do	Moderate degree of secondary anemia with evidence of regeneration present.
23	3, 450, 000	80	do	do	

September 21, 1922: Patient's teeth X rayed; 11 teeth abscessed in upper jaw; 2 in lower jaw. All remaining teeth (upper) extracted. X-ray and clinical examination showed all infected. Local and conductive anesthesia used. General condition of patient good. Now weighs 129 pounds. He has been out of bed since teeth were extracted.

October 4, 1922: All dental work completed. Red blood cells, 3,830,000; hemoglobin, 80 per cent. No blood in stools. Sippy diet. Urinary findings negative. Doing well.

October 9, 1922: Weight now 129 pounds.

November 4, 1922: Weight now 133½ pounds. Red blood cells, 5,460,000; hemoglobin, 90 per cent.

November 6, 1922: Discharged from treatment, well. Advice given to patient as to continued dietetic treatment and consultation.

The patient returned to the United States Naval Hospital, New York, on February 3, 1923, the record during his stay being as follows:

Was a patient in this hospital from June 23, 1922, to November 6, 1922, with ulcer of stomach and duodenum. Several hemorrhages. At discharge felt well, although had gastroenterostomy in 1916. Had recurrence of pain in abdomen about 1st of January. He was careful of diet and used alkalis dispensed here. Had pain in abdomen, left side, level of umbilicus, coming on sometimes before lunch or dinner, relieved by eating, and coming on again three or four hours after meals.

Examination: Eyes normal; mouth, teeth seem in good repair (4 crowns). Chest, lungs, negative. Heart, negative. Abdomen, flaccid, tympanitic. Scar of appendix incision and gastroenterostomy incision present. Stomach percussion to level umbilicus and right median line. Tender spot 1 inch to left of umbilicus. Glands, negative; reflexes, negative. Blood count (January 15, 1923), red blood cells, 4,900,000; white blood cells, 8,500; hemoglobin, 100 per cent; polys, 75; lymphs, 12; large monos, 18 per cent.

February 5, 1923: Urine clear, acid; specific gravity, 1.010; no albumin, no sugar, occasional thread mucus. Leucocytes, 2 per field; red blood cells, 4,370,000; hemoglobin, 100 per cent; white blood cells, 6,150; neutrophiles, 65 per cent; lymphocytes, 2 per cent; mononuclears, 5 per cent; eosinophiles, 1; transitionals, 2 per cent.

February 6, 1923: Feces, slight trace occult blood. Ewald test breakfast. Gastric amount, 55 cubic centimeters. Free HCl, 23; combined HCl, 5; lactic, negative. Blood, negative. Mucus, some; test meal.

Interval	Amount	Free HCl	Combined acid
	Cubic centimeters	*Per cent*	*Per cent*
20 minutes	21	14	7
40 minutes	21	19	4
60 minutes	21	25	9
80 minutes	21	27	11
100 minutes	18	22	5
120 minutes	17	25	7
Average	18	22	6

Contents still in stomach at 2½ hours. Patient is on Sippy diet.

February 8, 1923: All pain in abdomen has disappeared; feels much better.

February 26, 1923: Sippy diet discontinued. Given soft diet. Patient complains of occasional discomfort several hours after eating.

March 5, 1923: Bismuth series started this date. Patient still complains of periods of intestinal discomfort several hours after eating, but not regularly after each meal. X-ray gastrointestinal series: Stomach, size, normal; position, normal; peristalsis, normal. Outline: Barium passes through anastomosis; none through duodenum; very ragged outline; cap not visualized; 6 hours, trace of gastric residue; pudding in cecum and ileostasis, 24 hours, negative; 48 hours, delay in emptying; redundant and looped descending colon: 72 hours, fecal masses in lower large intestine. A large amount of small dense bodies level second lumbar vertebra. Urine, negative.

March 14, 1923: Feces, occult blood present. Patient's general condition fair; patient remaining about the same as on entrance. Urine negative. Stools negative for occult blood (March 29, 1923).

May 2, 1923: After careful observation of this patient over a period of several months and the consultation of other medical officers in the hospital, it is believed he is as well as could be expected under the circumstances, and that he is becoming too dependent on the hospital. With careful regulation of his diet, as he has been instructed, it is believed he will be better out of a hospital, with some occupation. Discharged this date.

This patient returned to the United States Naval Hospital, New York, June 25, 1923, exhibiting gastric symptoms, the history of which is as follows:

June 25, 1923: Complains of severe pain in the lower abdomen, bladder region. Patient was in this hospital several times with gastric ulcer, the last time from February 3, 1923, to April 2, 1923. Had gastroenterostomy in 1916 and several severe gastric hemorrhages in 1922. At the time of discharge in April he felt very well, although family and financial worries were not conducive to proper convalescence. He states that about six weeks ago he began to have abdominal pain, which at first came on at 11 p. m., then at 2 p. m., and sometimes 11 a. m. This pain was very severe and would last one and one-half hours. He took large quantities of alkalies with some temporary relief. No pain on urination; no radiation to kidney or genital region. Venereal: Gives history of gonorrhea 23 years ago, also herpes progenitalis (so called by the doctor 20 years ago). Denies other symptoms of syphilis. Married in 1918. No children. Wife had pelvic operation 1 year before marriage. She had been sick for 18 months past, in sanitarium; some adhesions intestines and nervous prostration. The patient is rather emaciated; eyes, negative; teeth, good; heart and lungs, negative. Abdomen flaccid, no tenderness; no tumors. Complains of pain in lower part of pelvis. Extremities: Reflexes, normal. Genitals: No scars. Glands: Cervical epitrochlear palpable; also inguinal, although small.

June 26, 1923: Urine clear, acid, 1.008. No albumin, sugar, or casts. Occasional leucocytes. Red blood cells, 4,610,000; hemoglobin, 90 per cent; white blood cells, 6,500; polys, 62; lympho, 34; eos, 2; trans, 2.

June 28, 1923: Had attacks of pain lower abdomen, coming on at 9 p. m. and 11 a. m. He appears to be in agony and yet there is no tenderness in lower abdomen (only pain), no rigidity, no skin moisture. Pulse rate during attacks has been counted as 72. Sterile water hypos also seem efficacious.

Gastric analysis: Fasting contents 28 cubic centimeters; Hcl, 22 per cent; combined acids, 47; no lactic acid; no blood.

Interval	Amount	Free Hcl	Combined acid
	Cubic centimeters	*Per cent*	*Per cent*
20 minutes	10	38	23
40 minutes	20	75	12
60 minutes	15	35	13
80 minutes	13	39	15
100 minutes	13	70	5
120 minutes	14	49	10

Patient was given a mixture of magnesium oxide, calcium carbonate, sodium bicarbonate.

July 2, 1923: Occult blood positive in feces. No pain for three days. Improved.

July 5, 1923: On K I tid gr. XX. Increase food.

July 7, 1923: Out of bed, increased diet. No pain for over a week.

July 13, 1923: Patient feels well and will be discharged Monday.

July 16, 1923: Discharged from hospital this date. Condition satisfactory.

Conclusion.—This case illustrates the rôle of dietetic treatment. At the time the patient came under treatment his condition was such as to make surgery inadvisable.

While the location of pain in this case would make one suspect the presence of a jejunal ulcer, X-ray investigation showed definite pathology in the duodenum and lesser curvature of the stomach, a distinct niche showing in the latter organ. Of course, the presence of a jejunal ulcer could not be ruled out clinically. After gastroenterostomy they are not uncommon. The gastroenterostomy opening was shown to be functioning. The pylorus was functioning intermittently; later examinations showed it nonfunctioning. This would seem to warrant the assumption that the lesions were both gastric and duodenal. The fact that macroscopic blood was obtained from the stomach washings would point to the trouble as chiefly gastric.

The difficulty in the after treatment of these cases is shown clearly by this history. There is a tendency for the patient to avoid a rigid dietetic régime.

Attention is invited to the rôle played in this case by focal infection—abscessed teeth. In all cases every effort should be made to discover and eliminate focal infection.

THE GENERAL SIGNIFICANCE OF KETONURIA

By R. A. Cutting, Lieutenant (junior grade), Medical Corps United States Navy

Some degree of confusion seems to exist in the average medical mind as to the general significance of the condition commonly known as "ketonuria"; i. e., the condition in which the ketone bodies, beta-hydroxy-butyric acid, aceto-acetic acid, and acetone appear in the urine. This confusion appears to arise mainly from the fact that the condition is encountered most frequently and in its severest form in connection with diabetes mellitus, and it thus tends to become mentally associated with a particular disease rather than with the problem of general body metabolism, to which it properly belongs.

The ketone bodies appear in urine in considerable amounts in a variety of conditions in no way connected with diabetes; e. g., in ordinary starvation, whether voluntarily induced or brought about by such conditions as carcinoma of the stomach or intestines or stricture of the esophagus, after ether and chloroform anesthesia, in connection with parturition, and as an accompainment of various febrile conditions, especially in the exanthemata and particularly in children; indeed, by means of very delicate methods, it is possible to detect traces of these substances in normal urines.

Although the occurrence of ketonuria in connection with all the aforementioned conditions has been recognized for a number of years and many methods have been elaborated for the detection of the ketone bodies, it is only quite recently that the real significance of the appearance of the latter in abnormal amounts has been brought to light.

Formerly, it was taught that the ketone or "acetone" bodies were derived in some unknown manner from the body proteins, since, during starvation, which induces ketonuria, the body becomes eventually dependent for its sugar upon its own protein, and during the process of conversion of the former into the latter acetone increases in the urine. Latterly, it has been demonstrated, however, that the chief precursors of the acetone bodies are the fats, although it is not denied that certain of the amino-acids derived from protein may also be capable of performing the same function, the argument being that in severe ketonuria more acetone may be excreted in the urine than can be accounted for by the breakdown of proteid as measured by urinary nitrogenous excretion; further, the ingestion, under these conditions, of fats may cause an increase in acetone excretion.

Fats occur in the body in the natural fat reservoirs—the subcutaneous, retro-peritoneal, hepatic—in the neutral form; i. e., as esters of fatty acids with glycerol, 3 molecules of fatty acid being combined with 1 molecule of glycerol to form 1 molecule of neutral fat. The first change that occurs in the oxidation of such fat *in vitro*, and probably also *in vivo*, consists in a dissociation of the fatty acids from the glycerol; and from this point on the oxidation is essentially an oxidation of fatty acids, so that the metabolism of fats is essentially the metabolism of fatty acids.

The fatty acids are combinations of carbon, oxygen, and hydrogen, the carbon atoms being arranged in the form of long straight chains—in the case of the saturated series, thus:

$$\begin{array}{ccccccccccc} & & H & & H & & H & & H & & \\ & & | & & | & & | & & | & & \\ H & — & C & — & C & — & C & — & C & \ldots\ldots\ldots\ldots & COOH \\ & & | & & | & & | & & | & & \\ & & H & & H & & H & & H & & \end{array}$$

Those characteristically entering into the metabolism of the human body are three in number—*stearic*, *palmitic*, and *oleic*—and all contain an even number of carbon atoms, either 16 (palmitic) or 18 (stearic and oleic). Beyond the obvious fact that the end products of the oxidation of such compounds must of necessity be CO_2 and H_2O, only a surprisingly small amount of information is at hand to indicate the nature of the intermediate products; this is most likely due to the transitory character of the latter, the concentration of any one at any given time being insufficient, normally, to permit of its isolation and identification. There is considerable evidence to substantiate the view that during the process of metabolism oxidation always occurs at the so-called beta-carbon atom, two terminal carbon atoms being thus removed at each successive step in the decomposition. At all events, in the only condition that we know in which the oxidation process is arrested, viz, ketonuria, the arrest occurs at the four-carbon-atom stage, in which, obviously, there is an even number of carbon atoms, and the appearance of the ketone bodies in the urine is due to an excess accumulation of four-carbon-atom oxidation products in the blood stream, from which they "spill over" into the urine. The four-carbon-atom fatty acid is *butyric acid*, CH_3—CH_2—CH_2—COOH. This apparently undergoes oxidation at the beta-carbon atom, with the production of *beta-oxybutyric acid*, CH_3—CHOH—CH_2—COOH, which on further oxidation yields *aceto-acetic acid*, CH_3—CO CH_2—COOH, and *acetone*, CH_3—CO—CH_3.

These substances, with the exception of acetone, are not regarded as abnormal products of fat metabolism; on the contrary, they form a part of the normally unbroken sequence of oxidation products of which the last are carbon dioxide and water; their presence simply indicates the arrest of a normally complete combustion, or metabolism process. Van Slyke and Fitz find that the total acetone bodies in normal blood amount to 1.3 to 2.6 milligrams per 100 cubic centimeters (calculated as acetone), while in the blood of patients exhibiting ketonuria 10 to 40 milligrams (even as high as 350 milligrams) are frequently found. Inasmuch as acetone is a very diffusable substance, it is very rapidly eliminated by the kidney, and, accordingly, the concentration of acetone in the urine is much greater than that in the blood. Beta-hydroxybutyric acid, the forerunner of both aceto-acetic acid and acetone, is found to occur in greater quantities in both blood and urine than the aceto-acetic-acid-acetone fraction, as might be expected.

Clinically, it has been for a long time noted that the appearance of ketone bodies in the urine is characteristically associated with disturbances of carbohydrate metabolism; i. e., ketonuria is prone to occur when abnormally small amounts of carbohydrates are being utilized. This observation, as soon as the origin of the ketone bodies came to be understood, led to the hypothesis that carbohydrates must somehow unite with the acetone bodies before the latter could be further oxidized. As first expressed by Geelmuyden, an intermediate product of carbohydrate metabolism, glycuronic acid, must unite with the acetone bodies, themselves a product of lipoid metabolism, before the latter could be further oxidized.

That glycuronic acid is the substance concerned, however, is highly unlikely, and, furthermore, it has been demonstrated that the general situation is not nearly so simple as was first believed. While fats contribute by far the largest amount of ketone bodies in ketonuria, certain of the amino acids—derived from proteins—the alpha-amino acids, leucine, tyrosine, and phenylalanine, undoubtedly are capable of forming a small quotum, since these acids, when fed to diabetics or when added to blood in perfusion experiments are found to be convertible to acetone bodies; moreover, certain substances not apparently derived from carbohydrates, such as glycerol, are capable of performing the function of combination with the ketone bodies to permit of normal oxidation. Accordingly, for the sake of convenience, those compounds which give rise to the formation of aceto-acetic acid during the process of metabolism have come to be called "ketogenic," whereas those substances which give rise to glucose or those products of glucose metabolism which can combine with aceto-acetic acid to give an oxidizable compound are known as "anti-ketogenic."

Using the accepted terminology, it is now assumed that one molecule of antiketogenic substance must be present for every molecule of ketogenic substance metabolized in order that equilibrium may exist and no acetone bodies appear in the urine.

The theory of ketonuria, or "ketosis" (the underlying condition of which the ketonuria is but one aspect) as thus developed is an interesting one and should be capable of experimental assay; were the only source of antiketogenic bodies carbohydrate and the only source of ketogenic bodies lipoid this assay would be easy, but, actually, the problem of ketosis is inextricably bound up with the still larger problem, itself still far from solution, of the extent to which and the manner in which carbohydrates, proteins, and fats may give rise the one to the other in the extremely complicated re-arrangement and breakdown of molecules known as metabolism.

Very satisfactory evidence of the main source of the ketone bodies is furnished by the prompt disappearance of ketonuria which takes place when so-called "odd-carbon" fats are substituted for the "even-carbon" fats (olein, palmitin, and stearin) in ketosis; fats with an odd number of carbon atoms are apparently incapable of yielding butyric acid, which is the starting point, so to say, for a ketonuria.

To Shaffer and his pupils belong the credit of the pioneer investigations aimed at an experimental demonstration of the theory of ketosis as above outlined. Shaffer has succeeded so far in showing an *in vitro* analogy to the reaction between a ketogenic and an anti-ketogenic substance and has also pointed out and partially worked out two avenues of approach to the heart of the problem, viz, the carbohydrate-protein-fat balance in ketosis. He has demonstrated "that the oxidation of glucose in alkaline solution by hydrogen peroxide accomplishes the disappearance of aceto-acetic acid if the latter be present in the solution." He shows that "aceto-acetic acid in the absence of glucose or other 'ketolytic' substance is oxidized very slowly by hydrogen peroxide, but its disappearance is rapid even at room temperature if glucose is simultaneously oxidized." In two succeeding papers he attacks the problem by a different route by showing that (1) by feeding various subjects mixed diets containing known quantities of carbohydrates, protein, and fat, an attempt can be made to establish the molecular proportions of mixtures which give rise to traces of urinary acetone bodies—i. e., mixtures which just upset the ketogenic-antiketogenic balance—and (2) by data derived by utilizing the nonprotein respiratory quotient to calculate the relative amounts of fat, carbohydrates, and protein being catabolized, and from this the molecular proportions of the three substances which, when catabolized, just cause acetone bodies to appear in the urine.

Hubbard and Wright, following out suggestions of Shaffer, have developed a mathematical formula for expressing the ketogenic balance of any diet mathematically: 1.9 (weight carbohydrate plus 25 per cent weight of protein) equals fat; and this very closely corresponds to a formula independently derived by Woodyatt: $2X$ carbohydrate plus protein equals fat.

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CLINICAL NOTES

NOTES ON CASES OF SURGICAL INTEREST

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

PERNICIOUS ANEMIA, APLASTIC TYPE

Male; white; age, 27; single. Date admitted, March 12, 1923.

Past history: The past history of the patient has no bearing upon his illness, unless two years of tropical service shall be so considered.

Present complaint: He complains chiefly of shortness of breath and bleeding from his gums.

Present illness: Two years prior to admission to the sick list he has worked among paints and has noticed a shortness of breath and pounding of his heart after climbing ladders or other exertion. He has felt weak in the knees and his head has ached and his gums have bled. He has noticed that he has been pale, that his vision did not seem to be quite so good, and that it was difficult to stop bleeding in small cuts.

Physical examination: This patient appears poorly nourished and has marked palor. There are no signs of neuritis or paralysis. His gums bleed easily but no blue lines are present. His tonsils are small and embedded. His teeth are fair. His heart sounds are clear but distant. His lungs are apparently negative. The abdomen shows an appendectomy scar. Pupils react equally to light and accommodations, and the reflexes are normal. Genitalia and extremities negative. The urine is negative. His red blood count is 980,000, with coagulation time of three minutes. Leucocytes, 2,350; hemoglobin, 20 per cent; neutrophiles, 43; lymphocytes, 49; large mononuclears, 1; transitionals, 2; eosinophiles, 5. There is no basophilic stippling but the red cells show marked poikilocytosis.

March 17, 1923: Transfusion of 450 cubic centimeters by the citrate method.

March 18, 1923: Red blood count, 810,000; clotting time, 2 minutes and 30 seconds.

March 19, 1923: Red blood count, 800,000; hemoglobin, 35 per cent.

March 24, 1923: Red blood count, 670,000; hemoglobin, 40 per cent. Again given transfusion of 750 cubic centimeters by the citrate method.

March 25, 1923: Red blood count, 920,000; hemoglobin, 30 per cent.

March 29, 1923: Red blood count, 740,000; hemoglobin, 30 per cent.

March 30, 1923: Red blood count, 680,000.

March 31, 1923: Red blood count, 610,000. Again transfused with 750 cubic centimeters by the citrate method. Following this, red blood count rose to 1,090,000, hemoglobin, 49 per cent.

April 9, 1923: Red blood count, 1,004,000; hemoglobin, 49 per cent.

A daily blood count at this time seemed to show that the patient was finally beginning to produce some blood himself, for his count remained above a million until April 17, 1923, when it again fell to 900,000; hemoglobin, 30 per cent.

April 18, 1923: Red blood count, 870,000.

April 19, 1923: Red blood count, 600,000. He was this time transfused at 1,250 cubic centimeters by the citrate method, and his count rose to 1,630,000; hemoglobin, 40 per cent. It was now decided to build him up by transfusions and attempt splenectomy, working on the chance that there was a possibility that his spleen was destroying the red cells as fast as we could furnish them through transfusion.

April 23, 1923: Another transfusion of 700 cubic centimeters. On this date through a left pararectus incision, with local anesthesia the peritoneum was exposed, then under ether the abdomen was opened, the spleen shelled out and the pedicle ligated en masse. The patient reacted well from the operation, the red blood count the following day being 2,620,000; hemoglobin, 69 per cent.

April 26, 1923: In excellent condition as far as his operation is concerned. Red blood count, 2,331,000; hemoglobin, 65 per cent.

April 27, 1923: In excellent condition. Red blood count, 2,330,000; hemoglobin, 65 per cent.

Death occurred on April 28, 1923.

Autopsy: The abdominal wound was in excellent condition, the belly dry, and the spleen stump healing. His bone marrow was about the consistency of semisolid butter. The heart had a large amount of fat over the surface and the muscle was somewhat yellow in color; the valves showed no evidence of disease.

Conclusion: This case is reported because of the fact that the patient appeared to have a true aplastic anemia in which he himself produced no red blood corpuscles and in fact fairly rapidly destroyed those which were placed in his circulation by transfusion. It is impossible to say what splenectomy at an earlier date might have done, but it is certain that splenectomy at the time when it was performed, although attended by almost no shock, failed to influence the course of his disease.

OSTEOMA OF SCAPULA

Male; white; age, 26; date admitted, January 2, 1924.

Past history: Left shoulder dislocated nine years ago. Since that time the shoulder has bothered him. About a year ago felt a grating under scapula on moving his arm.

Physical examination: The edge of a hard tumor can be palpated adherent to the under surface of left scapula. X ray shows the presence of a thickened area in body of left scapula. (See fig. 1.)

Operation: Fibers of infraspinatus muscle separated. Periosteum exposed and incised, and pushed back together with muscle. A section of the infraspinous fossa of the scapula about 2 inches in diameter was removed, the tumor being attached to the under surface of the removed section. (See fig. 2.)

The periosteum was then sutured over the opening and muscles allowed to drop back into place.

On section the tumor was found to be an osteoma.

The opening of the scapula is gradually filling in with new bone and function is normal. Patient has returned to duty.

Remarks: Osteoma of the scapula is not a rare condition, but is usually found on the dorsal surface. In reviewing the available literature we were unable to find one subscapular; therefore the method of approach and removal are interesting.

FRACTURE SIMPLE, RIGHT SCAPULA

Male; white; single; age, 26; date of admission, May 22, 1923.

Past history: The past history of this patient has no bearing on the case.

Present complaint: Admitted complaining of inability to lift properly with his right hand, particularly above the level of the shoulder, this condition having existed about a month following an accident in which he was caught beneath an overturned automobile.

Physical examination: A well-developed and well-nourished young man. Two lower molars are missing, several crowns, and several fillings in teeth. Tonsils normal. The right scapula appears smaller that the left, and the lower angle appears to be missing. The arm is raised to the level of the shoulder, but when efforts are made to raise it to a higher level, the scapula wings outward and he is unable to farther raise the arm. Urine is negative. Wassermann is negative. X-ray examination shows a triangular piece (the lower angle of the scapula) which is broken off and displaced upward.

Operation: On June 5, 1923, under ether, the under surface of the right scapula was cleaned off and roughened and the detached fragment was united with kangaroo tendon to the denuded surface. The arm was then immobilized. The wound healed by first intention, and one month later passive motions and massages were begun. X ray at this time shows the fractured tip of the scapula to be in the position fastened during the operation. The patient was encouraged to begin active motions a month later, and was, before discharge from this hospital, able to raise his arm above his head. The only residual was a certain amount of weakness complained of by the patient in the muscles of the shoulder girdle.

Conclusion: This case is reported because of the unusual nature of the injury and because of the interest attached to the mechanics involved. So far as we are able to determine, when the fracture of the tip of the scapula occurred, sufficient of the rhomboideus major muscle was detached so that when the patient endeavored to raise his arm the scapula winged outward instead of being anchored as it should be. This conclusion would seem to be borne out by the end result.

THYROGLOSSAL CYST

Male; white; age, 18; single; date admitted, November 15, 1922.

Past history: His past history is negative except for the fact that his neck was operated upon September 15, 1922, for a similar swelling.

Present complaint: About 10 days ago he noticed a swelling about the size of his thumb below the thyroid cartilage, just below the old operation scar. He says it came up overnight, that it causes sharp pains at times, and that these are not connected with swallowing.

Physical examination: The physical examination is negative except for the scar and the tumor mass. On January 16, 1923, under ether, the tumor mass was exposed through a collar incision and was injected with methylene blue. Tonsillectomy was then performed to determine any opening into the throat. No definite opening could be found, but a very small amount of methylene blue was found in the throat secretions. The cystic mass was then dissected out and was ligated close above the greater cornu of the hyoid bone. The wound healed without trouble and he was discharged to duty on February 14, 1923, apparently cured.

Conclusion: This case is reported because of the fact that thyroglossal cysts are fairly common and are often not correctly recognized and at times are subjected to frequent operations.

The patient was seen six months after his discharge from the hospital and there were no signs of recurrence.

OSTEITIS DEFORMANS

Male; negro; age, 49; married.

Past history: Patient was never sick until 1910 when he received a heavy fall. Since that time he has had pains in the iliosacral region.

Present complaint: Pains in lumbar region, left hip, and left leg.

Physical examination: Patient appears well developed and well nourished. Examination reveals nothing of interest and is practically negative.

Laboratory findings: All laboratory tests have been negative.

Roentgenological examination: The bones involved show areas of increased and decreased density. This is due to a proliferative and rarefying osteitis. This condition is present in the skull, pelvis, first and fifth lumbar vertebræ. Left tibia (fig. 3) shows an absence of definition of the cortex and cancellous tissues. There are no areas of rarefaction in the left tibia and there is no bowing. (See fig. 4, in which the skull shows a spongy appearance of the compact layer with areas of increased and decreased density.) Arteriosclerosis is marked in roentgenograms of feet.

Diagnosis: Osteitis deformans, or Paget's disease.

Conclusion: Very few cases of Paget's disease have been reported in the literature. The Röntgen diagnosis in these cases is conclusive when syphilis has been ruled out. Some authorities believe this condition may be a form of syphilis.

PYONEPHROSIS

Male; white; date admitted, August 21, 1923.

Family history: Has no bearing on the case.

Past history: About July 26, 1923, coming from Panama, had chills and fever for three days. Fever remained high for about a week, but he had no further chills. At this time he saw a doctor, who prescribed quinine. His temperature fell and he felt good until quinine was stopped. Temperature rose to 102°. About five days after onset he noticed pain in left side. On arrival at San Pedro he was seen by a medical officer, who found a tender mass in left side of abdomen.

Present complaint: At present he complains of a tenderness in left abdomen. Appetite is poor; bowels constipated; no nausea or vomiting; no cough; no frequency of urination, hematuria, or passage of stones. He has lost 25 pounds weight in past three weeks.

Physical examination: General appearance, pale and undernourished; head and neck negative; chest negative; abdominal mass can be palpated to left of median line. This mass has a sharp convex edge; is firm and immovable. There is no intestinal tympany over this tumor. Genitalia normal, no discharge; prostate, normal size and consistency; urine sediment shows many pus cells. Cystoscopic examination: No strictures; bladder normal; ureters—right function normal; left function slow; right ureter catherized; left catheter stopped by obstruction one-half centimeter within orifice. Specimen from right ureter, few pus cells and few finely granular casts. Stained smear and culture showed gram positive bacilli. Function: R. 15 minutes less 5 per cent; 30 minutes less 5 per cent; L. (transvesical) 30 minutes less 5 per cent. X-ray left diaphragm higher than right. There is a shadow extending from beneath left costal margin to a point about 2 inches above crest of ilium. Lower border is definitely rounded.

Laboratory: Red blood cells, 5,100,000; white blood cells, 14,800; polynuclears, 66; lymphocytes, 30; hemoglobin, 80 per cent. Malarial parasites, none. Wassermann negative.

Operation: Local and gas anesthesia. Incision to expose left kidney. Tissues edematous. A large cystic mass occupies the kidney area, filled with about a liter of purulent urine. Following nephrotomy a tube was sewed into sac. Upper pole of sac pulled down and packed off with iodoform gauze. Lower pole pulled up and packed off. We now have the sac compressed into a mass by the iodoform packs. Patient reacted well. Ten days later nephrectomy performed. At present patient is in excellent health, with normal kidney function. He is above his normal weight.

Remarks: Following nephrotomy, abdominal mass had disappeared. The interest in this case lies in the lack of urinary symptoms and the presence of a sharp-edged abdominal tumor mass. The discrepancy between the size of the pyonephrotic sac and the palpable tumor leads us to the belief that the palpable tumor was displaced spleen. A refinement in technic is shown in packing off the sac following drainage, which greatly facilitates subsequent nephrectomy.

RUPTURED DUODENAL ULCER

White; male, age, 31; date admitted, July 22, 1923.

Past history: Stomach trouble for some time. Dull ache in epigastrium at all times except when he took soda; no nausea or vomiting.

Present complaint: Eight hours ago had sudden severe cramps in epigastrium which doubled him up. Vomited several times. States he had been drinking night before.

Physical examination: Fairly well nourished. Temperature. 100.4°; pulse, 120; respiration, 34; white blood cells, 2,400; polynuclears, 85 per cent. Urine negative. Chest, lungs negative.

Heart, tachycardia; no murmurs. Abdomen, marked rigidity of abdomen, tenderness most marked over gall bladder.

Operation (12 hours after onset): Ether anesthesia. High right rectus incision. Small amount clear fluid in abdominal cavity. Small perforation in ascending portion of duodenum. Considerable plastic exudate attaching duodenum and gall bladder. Perforation sutured, incision closed with drainage. Uneventful recovery.

In spite of medical treatment over period of four months, patient continues to have sour stomach with eructation and dull aching pain in epigastrium.

Operation: Ether. Thick scar of previous perforated ulcer located and area widely excised.

At present (three months postoperative), he is in excellent health and has had no return of stomach symptoms. Gastrointestinal series shows no constriction at site of resected area.

Remarks: Case in which symptoms continued although ulcer found to be healed. Disappearance of symptoms followed resection of ulcer area.

FRACTURE OF TIBIAL TUBERCULE

Male; white; age, 18; single.

Past history: About six weeks ago, while playing basket ball, patient fell and bruised left knee; otherwise negative.

Present complaint: Painful left knee.

Examination: Swelling and tenderness on pressure over tubercule of left tibia. Pain in region of tubercule of left tibia when thigh is flexed. Wassermann negative. X ray shows a partial separation of the tubercule of the left tibia. The upper portion of the tibia usually develops from one center of ossification, the upper articular surface having an anterior projection which extends downward over the diaphysis. In this case there is a separate center of ossification for this projection, and ossification is not complete. (See fig. 5.)

Treatment: Strapped with adhesive. Rest. Surgery not indicated in this case.

Conclusion: This condition is also known as Osgood-Schlatter's disease. It should be classified as an injury rather than as a disease, since this condition is the result of trauma. The roentgenogram is decisive in making a differential diagnosis from tuberculosis of the knee, loose cartilage, fracture of the patella, bursitis, and periostitis.

FRACTURED TRANSVERSE PROCESS, FIRST LUMBAR VERTEBRA

Male; white; age, 23; single.

Past history: A few months ago developed a sharp pain in back while lifting heavy bags aboard ship.

Present complaint: Pains in lumbar region upon motion.

Physical examination: Negative except for limited flexion of spine. Laboratory findings negative. X ray shows a fracture of the transverse process of the first lumbar vertebra. The fragment on the right side is displaced upward. The fragments on the left side are in good position.

Treatment: Fragments on right side removed surgically. Patient sent to duty. Well.

Conclusion: These fractures are often overlooked and probably occur with greater frequency than the literature would lead us to believe, as they frequently result from muscular action and wrongly diagnosed as strains. This condition must be differentiated from rudimentary ribs.

CHRONIC CHOLECYSTITIS

Male; white; age, 21; single; date of admission, September 10, 1923. Past history: From 3 to 10 years, three attacks of inflammatory rheumatism. Measles at 5; mumps at 8. Occasional sore throat. No serious injuries or venereal diseases. Operated upon for hemorrhoids at this hospital two years ago.

Present complaint: Feeling of fullness in upper abdomen. This is accentuated by exercise and by eating hearty meals. He describes a sensation as if there were not room enough for his lungs and various other organs within his body.

Physical examination: A well-developed young adult. Skin is negative. Conjunctiva are slightly bile stained. Tonsils enlarged and cryptic. Teeth in good order. The upper part of the abdomen bulges, shelving off abruptly about three fingers' breadth above the umbilicus. A small, soft, freely movable tumor marks the termination of this on the right side. The normal contour of the lower lateral thoracic wall is not disturbed. Reflexes are normal. No glandular enlargements, except the left submaxillary. There is diffuse, wavy pulsation over the entire precordium, extending into the carotids on the left side. Lungs are negative. There is a slightly prolonged and forcible pulmonic second sound and a soft blowing systolic murmur down the left border of the sternum, heard only for about 40 heart beats after exercise. There is a hard mass occupying the upper abdomen, beginning at the left border of the left rectus, about four fingers' breadth below the sternum. It rounds downward to two fingers' breadth above the umbilicus and blends into the lower region of the liver in the right flank. X ray of the heart shows enlargement in the transverse diameter, and the radiologist suggests the possibility of a mitral heart. Both diaphragms are higher than normal, but the costo-phrenic angles are clear. The Wassermann is repeatedly negative. The urine is negative. Routine blood examination is negative. No enlargement of the spleen is noted. The stools are negative.

FIG. 1.--TUMOR OF SCAPULA

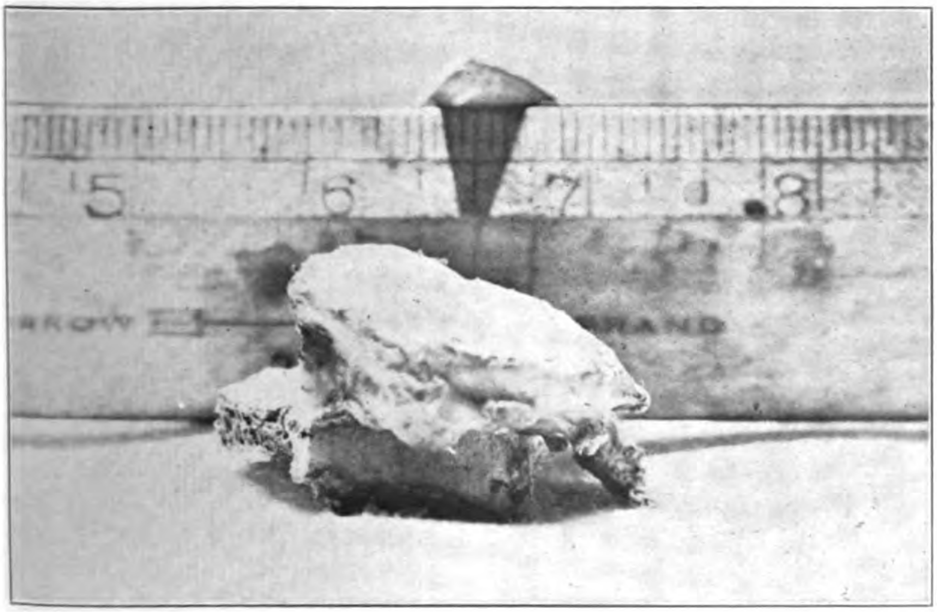

FIG. 2.—TUMOR OF SCAPULA, EXCISED

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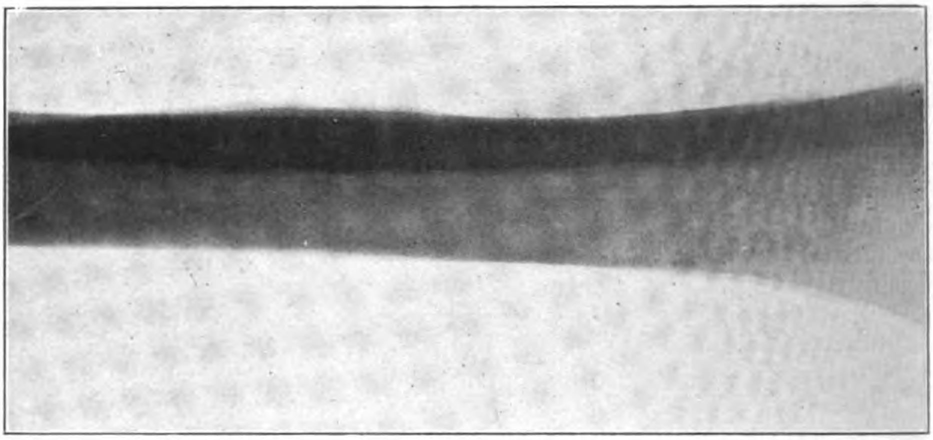

FIG. 3.—LEFT TIBIA SHOWING AN ABSENCE OF DEFINITION OF CORTEX AND CANCELLOUS TISSUE IN A CASE OF OSTEITIS DEFORMANS

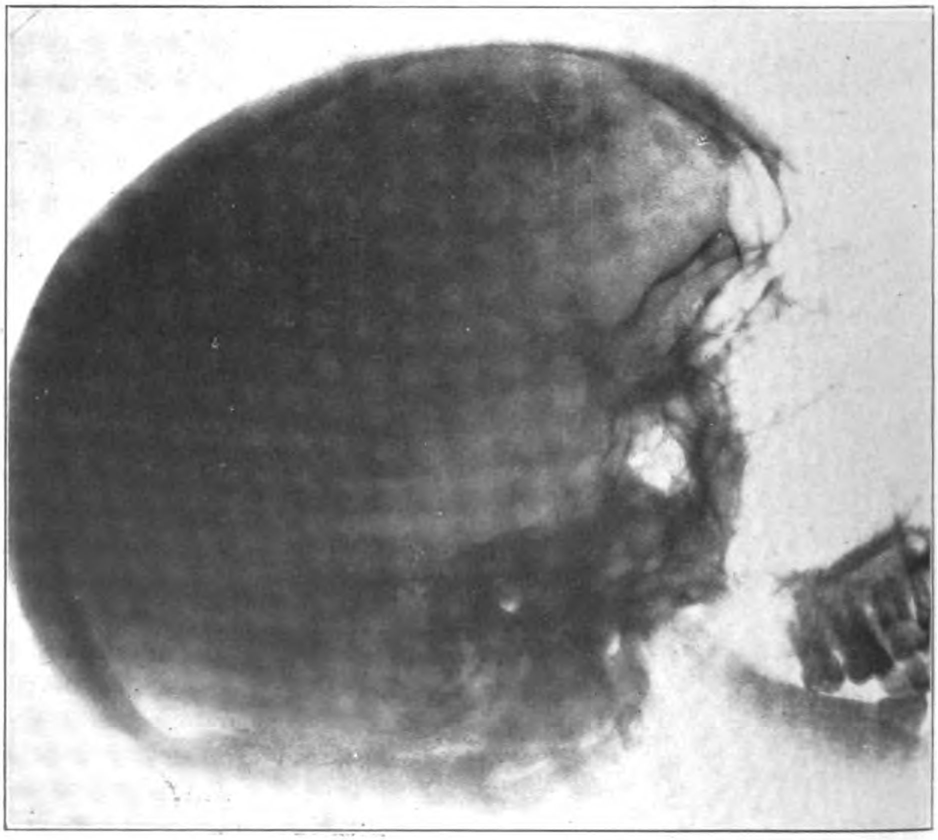

FIG. 4.—SHOWING A SPONGY APPEARANCE OF THE COMPACT LAYER OF THE SKULL WITH AREAS OF INCREASED AND DECREASED DENSITY, A CASE OF OSTEITIS DEFORMANS

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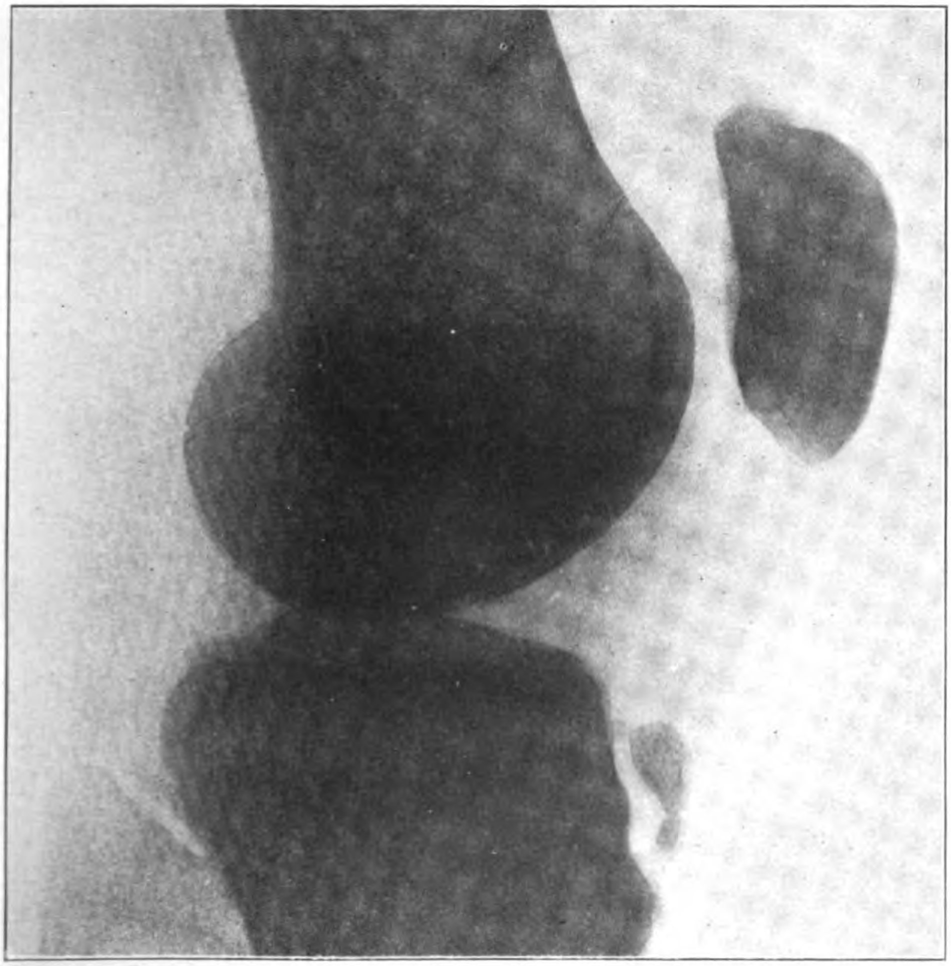

FIG. 5.—FRACTURE OF TIBIAL TUBERCLE

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FIG. 6.—SPONDYLOLISTHESIS (CASE 1), SHOWING MARKED DEPRESSION JUST ABOVE THE SACRUM

FIG. 7—SPONDYLOLISTHESIS (CASE 1), SHOWING DISLOCATED FIFTH LUMBAR VERTEBRA

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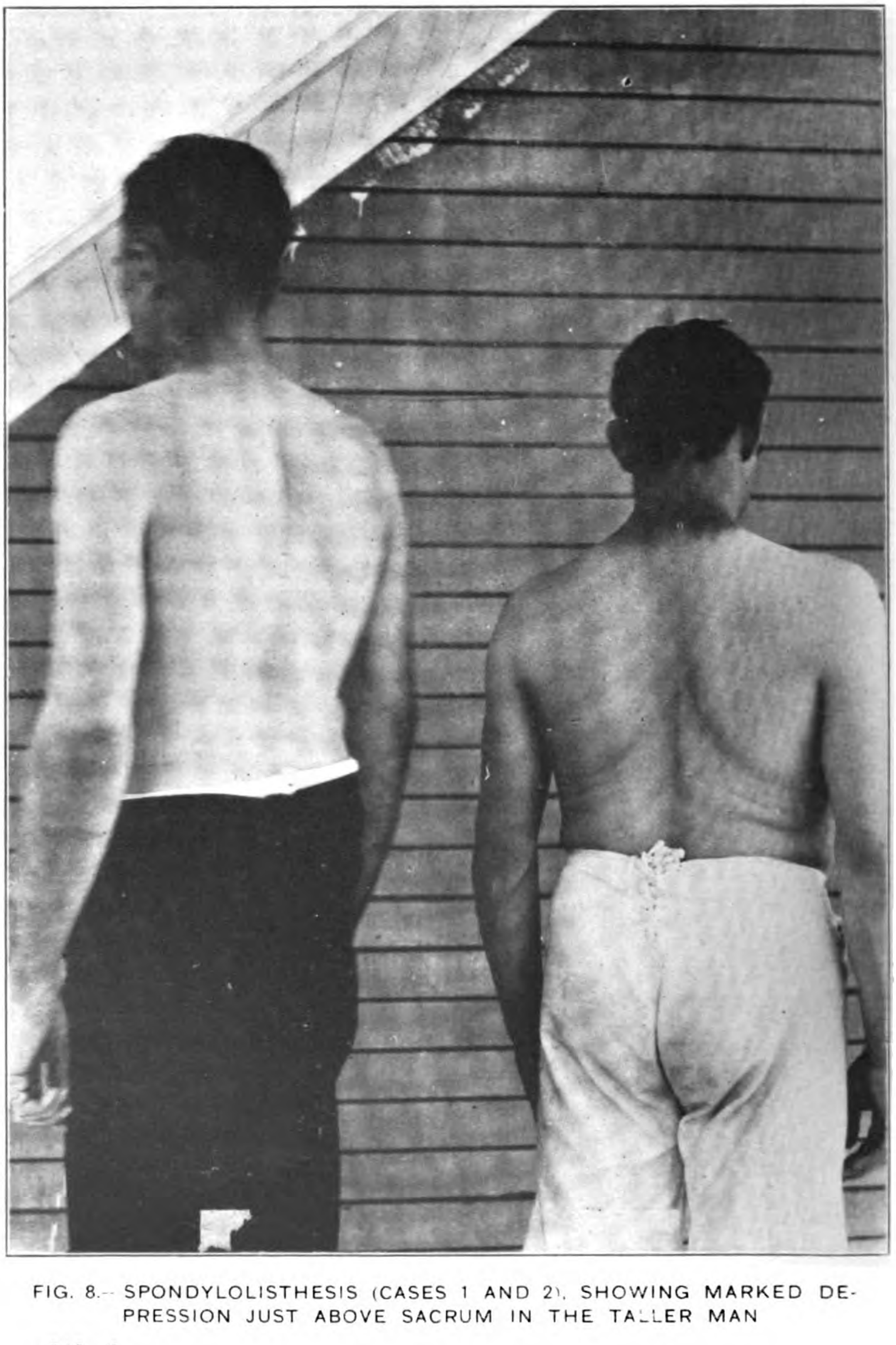

FIG. 8.—SPONDYLOLISTHESIS (CASES 1 AND 2), SHOWING MARKED DEPRESSION JUST ABOVE SACRUM IN THE TALLER MAN

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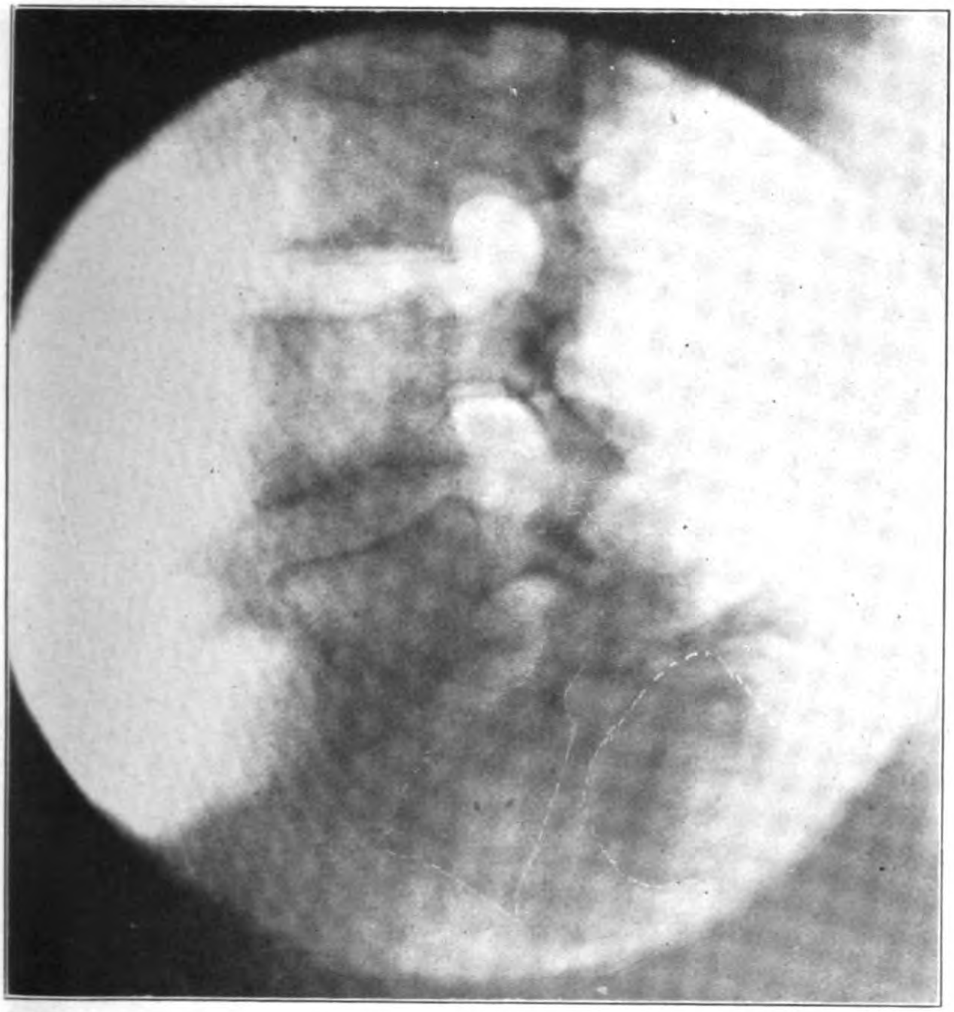

FIG. 9.—SPONDYLOLISTHESIS (CASE 2), SHOWING ANTERIOR DISPLACEMENT OF THE FIFTH LUMBAR VERTEBRA

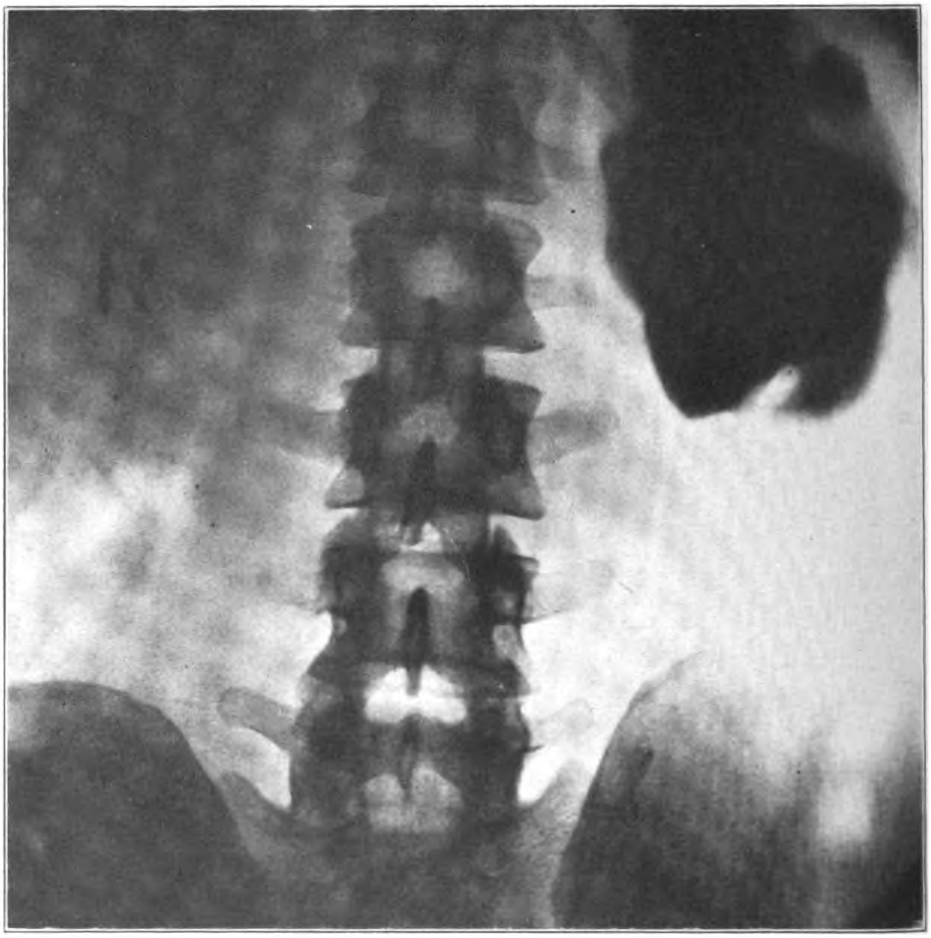

FIG. 10.—HYDRONEPHROSIS, SHOWING LEFT PELVIS, INJECTED WITH SODIUM IODIDE SOLUTION, APPEARING AS A LARGE SAC WITH DILATED CALYCES

The tentative diagnosis of a cirrhosis of the liver of unknown origin, with probable gall-bladder disease, is made.

Operation: On October 16, 1923, under ether anesthesia, through a diagonal right rectus incision, the abdomen was opened for exploration. The liver was found to be enormously enlarged, and in the fissure of the liver the gall bladder was found to be enlarged to a capacity of about 1 pint, with the wall of the gall bladder showing large bluish-brown cystic areas. The appearance of the liver was so unusual that only a tentative diagnosis of a prolonged septic hepatitis as a result of the gall-bladder disease could be guessed at. Cholecystectomy was performed, but it was impossible to close over the under surface of the liver from which the gall bladder had been removed. A Penrose drain was therefore placed and left in position until drainage ceased.

Postoperative: There was considerable drainage of bile from the raw surface of the liver for a period of about three days, at the end of which time the drain was removed. In view of his cirrhosis, he was placed on increasing doses of potassium iodide and has made an uneventful recovery. At the date of writing (more than three months after operation), his liver is reduced to normal size and his general health is excellent. Repeated Wassermann since operation has remained negative.

Conclusion: This case is reported because of the enormous size of the liver due to cirrhosis, the etiology of which is not fully determined, unless it be due to a low-grade, long-continued sepsis. Laboratory reports of the gall bladder itself were negative for culture, and section has not revealed anything which would clear up the etiology.

SPONDYLOLISTHESIS

The term spondylolisthesis implies a forward subluxation of one of the lower lumbar vertebræ upon the vertebræ below it, or upon the sacrum. It is commonly used in reference to a partial displacement forward of the body of the last lumbar vertebræ upon the sacrum. The condition may be slight or well marked. It may or may not be followed by secondary changes.

The causes of this condition are congenital malformation, injury, or disease of the lumbo-sacral articulation. Displacement at this point is favored by a relative weakness of the ligamentous support and the inclination of the upper surface of the sacrum. Most authorities assume that the existence of a deficient union between the vertebral laminæ is essential to this condition. Trauma is the most frequent cause; but, taking the above facts into consideration, it can readily be seen that it need not necessarily be very severe.

Two cases are presented:

Case 1: Male; white; age, 26.

Past history: Usual diseases of childhood. In 1916, during a runaway, he fell from a wagon, striking his back against a curbstone. He was confined to his bed for six months. He wore a steel jacket for five years following the accident.

Present complaint: Says that he has a "weak spot" in the lower lumbar region and tires easily. He complains that his ribs impinge on his iliac crests in lateral movements of the trunk.

Physical examination: Well nourished. Stands in an awkward constrained position, with right shoulder higher than left. Spine is curved to the right to a noticeable degree. There is a marked depression just above the sacrum. (See fig. 6.) The lower ribs are but a slight distance above the iliac crests. The abdomen is protruding forward and the trunk is inclined backward. Lateral and forward movements of the trunk are impaired. Examination is otherwise negative.

Roentgenological examination: Rudimentary ribs on twelfth dorsal vertebra. Congenital anomaly of the transverse process, right side, of the first lumbar vertebra. The fifth lumbar vertebra is dislocated anteriorly with bony proliferation about it. (See fig. 7.)

Diagnosis: Old anterior dislocation of fifth lumbar vertebra.

Case 2: Male; white; age, 26.

Past history: While pulling in a boat's crew, about five months ago, he wrenched his back when an oar broke. Since then he has had a pain in both hips and center of back. History otherwise negative.

Present complaint: Pain in back and tires easily. Also complains that ribs impinge on iliac crests in lateral movement of trunk.

Physical examination: Exceptionally well developed and nourished. Pelvis tilted to left, with atrophy of gluteal muscles on right side. There is a marked depression just above the sacrum. (See fig. 8). The abdomen is protruding forward and the trunk is inclined backward. Lateral and forward movements of the trunk are impaired. The lower ribs are but a slight distance above the iliac crests. Examination is otherwise negative.

Roentgenological examination: The fifth lumbar vertebra is dislocated anteriorly, with bony proliferation about it. (See fig. 9.)

Diagnosis: Old anterior dislocation of fifth lumbar vertebra.

Conclusions: 1. The two cases reported show that the above condition can be produced by direct or indirect violence. The trauma is not necessarily severe. Most authorities assume the existence of a deficient union or weakness between the vertebral laminæ in both of these cases. No doubt the inclination of the upper surface of the sacrum, a relative weakness of the ligamentous support, and the mobility of the articulation favor this displacement.

2. There is less evidence of damage to the cord in dislocations of the lumbar vertebræ than in those of the thoracic or cervical

region. This is due to the ability of the cauda to accommodate itself to the contracted space.

3. This condition is not as infrequent as the literature would lead one to believe. It occurs most often at puberty or in young adults.

4. Effort was made under ether anesthesia to replace the vertebra in the second case, but failed. Further surgery not indicated.

ARTHRITIS CHRONIC, LEFT HIP

White; male; single; age, 21; date admitted, March 8, 1923.

Past history: This patient gives a history of a sudden pain in his left hip on rising from a sitting position on the deck of the U. S. S. *Alden* in December, 1921. He was eventually discharged from the service by medical survey on June 7, 1922, with the diagnosis of arthritis chronic and the following statement in his record: "There seems to be a strong neurotic element in this condition, as no objective symptoms can be elicited." This statement is probably based upon the fact that repeated X-ray examinations failed to reveal any pathology.

Chief complaint: Inability to walk because of pain in hip.

Physical examination: A small man, fairly well developed and nourished. Chest asymmetrical; the right shoulder appears higher than the left. Rough respiratory sounds posteriorly on both sides high up. No heart pathology. Left-hip movements limited, and when effort is made to move hip further a marked tremor is noticed which subsides on relaxing. Wassermann negative. Urine negative. X-ray examination of the left hip joint and the sacro-iliac synchondroses negative for pathology. He walks with a decided limp. In view of his complaints the patient was examined while walking by placing the hands over the hip joints. It was noticed that at about every third step the head of the left femur slipped part way out of the acetabulum and that it was at these particular times that he complained of pain.

Operation: On April 30, 1923, under ether anesthesia, the capsule of the left hip was exposed from behind and two plications were made in it. The leg was then dressed in extension and eversion in a plaster cast. Three weeks later the plaster cast was removed and passive motions were begun. Four weeks later he was encouraged to walk on this leg, bearing only part of his weight.

Having been admitted as a Veterans' Bureau patient he was, on August 21, 1923, discharged to civil life at his own request, apparently cured. This patient has called upon the writer within the past month and says that his hip now gives no trouble.

Conclusion: This case is reported because of the fact that he was originally erroneously discharged from the Navy with a diagnosis which amounted to neurasthenia when real pathology existed. The report is further prompted because approach to the hip from behind is not easy and is not always attended by satisfactory results.

CHRONIC LYMPHADENITIS (BUBO INGUINAL)

Male; white; age, 22; single; date of readmission, October 18, 1922.

Past history: The past history of the patient has no bearing on his condition.

Present complaint: He was originally admitted to the sick list while serving on the Asiatic station on the U. S. S. *Rainbow*, on April 20, 1922, under the diagnosis of chancroid, designated "not in the line of duty, and due to his own misconduct." The Wassermann at that time was negative. About three months later a bubo was opened and drained, and he was eventually surveyed to this hospital and readmitted on the date shown. At that time he had a large indolent ulcerated area occupying the entire left groin and extending down almost to the anus. All the methods of local treatment, including continuous Dakin drip, were tried but without avail. His Wassermann here remained persistently negative, and inasmuch as we believed his condition to be a tropical ulcer, his diagnosis was changed to that shown above, with the authority of the bureau. In accordance with the approved practice, he was given a course of tartar emetic intravenously in doses beginning at one-half grain and increasing to 2½ grains, but so far as we were able to see several of such courses did not particularly influence his condition. On October 5, 1923, the ulcer area was thoroughly cleaned, cauterized, and excised, and plastic repair was attempted. This repair, however, failed due to insufficient vitality in the grafts, and an intercurrent colon infection. However, this procedure stirred up healthy granulations in the wound, and on October 30, 1923, skin grafts from his own thigh were applied. At this date, three months after operation, he has been healed for about three weeks, and his scar is in good condition.

Conclusion: This case is reported because it is believed that in a good many instances patients are under misconduct diagnoses where such are not warranted. It is also reported to show the beneficent result which may arise through an intercurrent infection.

HYDRONEPHROSIS

Case No. 1: White; male; age, 22; date admitted, January 4, 1924.

Past history: For past five years has had attacks of pain in left loin. At these times urination is less frequent, but following each attack he urinated an increased amount. Pain is always of a dull aching character and does not radiate. No history of hematuria or passage of calculi. No loss of weight.

Present complaint: Two days ago attack commenced with chill, followed by pain in left loin. No frequency, dysuria, nycturia, or hematuria. No nausea or vomiting, although he has no desire for food.

Physical examination: Well developed, well nourished. Head and neck negative. Chest negative. Abdomen, no tumor or rigidity. Tender to pressure over left kidney area. Tumor mass which was previously palpated in this area has disappeared. Genitalia normal; no discharge. Prostate, normal size, but both lobes boggy in small areas. Urine shows a few pus cells.

Cystoscopic examination: Brown Buerger, anterior, capacity 250 cubic centimeters. Bladder normal, both ureters functioning. No. 6 catheters passed readily. Right flow intermittent. Left flow continuous. Specimens collected. Bladder urine shows granular casts, pus cells. Right ureter shows a few granular casts and few pus cells. Left, few pus cells. Bladder urine contains many cocci. Smears, right negative, left many cocci. Culture, bladder staphylococci, right no growth, left staphylococci. Function (phthalein) 15 minutes, left none; right 12 per cent 30 minutes, left none; right 16 per cent. Capacity of pelvis, right 5 cubic centimeters; left 75 cubic centimeters. Pyelogram (see fig. 10), left pelvis injected with sodium iodide solution, appears as a large sac with markedly dilated major calyces. Ureter not dilated.

Operation: Local anesthesia (procaine), gas and oxygen for a few minutes during separation of upper pole, which was densely adherent. Nephrectomy. Penrose drain for 48 hours. Incision healed by first intention. At present, 21 days postoperative, patient is up and about in excellent health. Casts have disappeared from his urine.

Remarks: This case was interesting from a diagnostic standpoint in that he had an abdominal tumor which was present on two examinations and then disappeared. The adoption of local anesthesia to major surgery is also shown, as almost the entire operation was done with one-half of 1 per cent procaine solution.

Case No. 2: White; male; age, 26; date admitted, September 28, 1923.

Past history: Six months ago patient was operated on and nephrectomy performed for hydronephrosis. The incision has not entirely healed. No details of operative technic available.

Present complaint: Draining wound in loin. No pain. No urinary symptoms. No loss of weight.

Physical examination: Chest negative. Abdomen, no mass; no rigidity or tenderness. There is an operative scar extending from lower border of twelfth rib posteriorly to crest of ilium anteriorly. In the upper half of the scar are two small sinuses which communicate. The upper one seems to extend inward about 5 centimeters. Genitalia, normal. Prostate, normal size and consistency. Secretion, normal. Cystoscopic, no pathology in posterior urethra or bladder. Right ureteral orifice closed. Urine, clear, no organisms, smear or culture.

There was no improvement under treatment over a period of four months. Operation was decided upon and performed under ether anesthesia. Sinus injected with methylene blue. Dissection revealed lower sinus communicating with upper subcutaneously. The upper sinus ends in a cavity about 10 centimeters in diameter between the dome of the liver and diaphragm. It was necessary to cut the attachments of the twelfth rib and retract it to expose cavity, which was filled with thick pus. A tube drain was sewed in and cavity irrigated daily with Dakin's solution.

At present (two months post operative) he is entirely healed.

Remarks: It is very unusual for a sinus to persist following nephrectomy of nontuberculous kidney. Amœbic abscess in this location was thought of and was ruled out. The most likely explanation is a subdiaphragmatic abscess developing secondarily from infection when he was originally nephrectomized. Particular interest attaches to the method of approach, in which it was not necessary to dissect out the twelfth rib, as is recommended in abscesses in this location.

AINHUM

By R. S. G. Welch, Lieutenant, Medical Corps, United States Navy

The condition known as ainhum, or dactylolysis spontanea, in which spontaneous amputation of a toe, usually the little toe, occurs, is a disease of comparative rarity, except perhaps in parts of Africa, Brazil, and India, from which places the majority of cases have been reported.

As the disease is essentially a chronic condition with gradual onset and a protracted course extending over several years, unaccompanied by pain or inflammation as a rule, it is rarely seen until late in its course when the bony attachment no longer exists and the enlarged, bulbous toe, aptly described by Stitt as having the appearance of a small potato, hangs by a fibrous cord and causes the individual to seek medical aid in an effort to rid himself of an

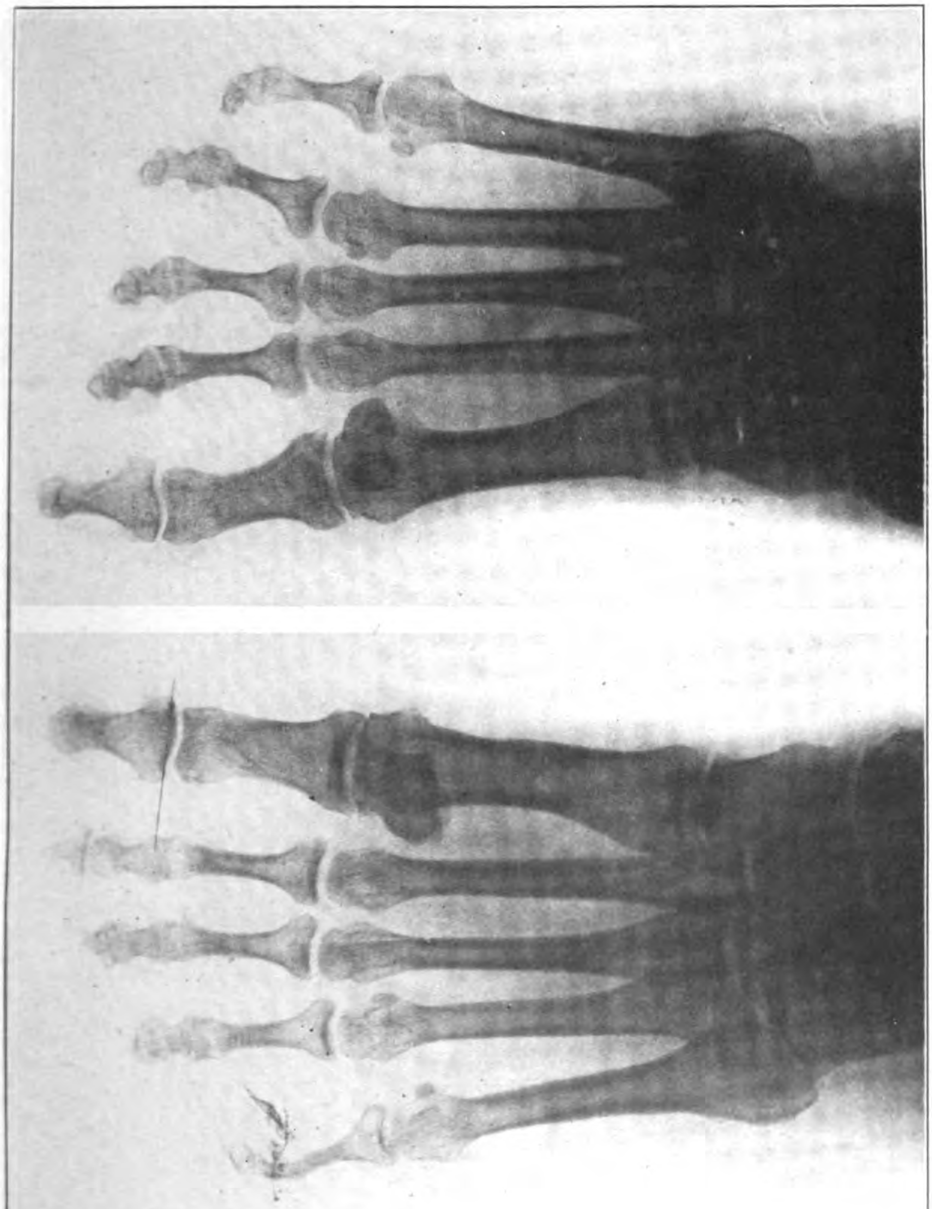

FIG. 1.—RADIOGRAPH OF A CASE OF AINHUM

awkward, unnecessary, and unpleasant appendage which is constantly in his way and by its mechanical presence causes discomfort.

The etiology of this condition is still a matter of conjecture. Many theories have been advanced as to the cause of ainhum, notably, (*a*) that it is a tropho-neurosis, (*b*) that it is related to leprosy, (*c*) that it results from wearing constricting bands or rings on the toe, (*d*) that it is due to frequent injuries to the under surface of the toe.

All observers seem to agree as to the occurrence of the disease almost exclusively in negroes and in the tropical or semitropical regions. The age at which it is most likely to occur is variously given by different observers as from early childhood to adults between the ages of 20 and 30.

The pathology, according to Unna, as stated in Stitt's Diagnostics and Treatment of Tropical Diseases, consists of "a ring-form sclerodermia with thickening of the epidermis, causing an endarteritis with the production of a rarefying osteitis." X-ray examination of a case observed by the writer shows atrophic changes in the shaft of the bone with deformity. The distal end of the proximal phalanx shows rarefaction and thining of the cortex. There were no facilities for microscopical study of cut sections on the island of St. Croix, but at operation the excessive thickness of the epidermis was noted. The toe was practically bloodless when removed, no bleeding occurred during operation, which was a disarticulation at the metatarso-phalangeal joint under local anesthesia, procaine one-half of 1 per cent being used with the addition of 6 drops of adrenalin chloride to the ounce.

The treatment may be palliative early in the course of the disease or throughout its entire course in those cases in which pain is negligible. In the cases manifesting moderate or severe pain the treatment should be surgical. Division of the constriction has been recommended, but when the patient complains of pain on the proximal side of the constriction and the X ray shows bony involvement above the constricted area amputation or disarticulation at the metatarso-phalangeal joint seems advisable.

Medical records of St. Croix prior to the American occupation in 1917 are unavailable, but since the island has been under American control two cases of ainhum appear in the records. In both of these cases pain was a prominent symptom. The first case was observed in Frederiksted Municipal Hospital in January, 1923. This was an advanced case, the toe hanging by a fibrous pedicle. It occurred in a male negro, aged 43, a field laborer. He complained of pain in the toe and side of his foot and frequent injuries to the pendulous toe which interfered with his work in the cane fields. He came into the hospital and requested that the toe be removed. Examination showed the right little toe and outer side of the right foot to be somewhat swollen and tender on pressure. The physical examination was otherwise negative. The patient was placed in bed and the swelling of the foot soon subsided. The toe was removed by severing the fibrous cordlike attachment and the patient was discharged relieved.

The second case was observed by the writer in the Christiansted Municipal Hospital. This was a comparatively early case and afforded an opportunity for clinical observation and study. The case is here reported.

M. C.; aged 46; female; negro; occupation, field laborer; born in Antigua, British West Indies, but has lived in St. Croix for the past 15 years. On December 27, 1923, she applied for treatment at the dispensary of the Christiansted Municipal Hospital, complaining of pain in the left little toe. She was admitted to the hospital for observation and study. About a year ago she began to have pain in the little toe of the left foot. At that time she noticed a slight constriction near the base of the toe which she described as "like a string was tied around it." She has never noticed the constriction prior to the onset of the pain. The pain was intermittent for several months and not very severe. It has gradually increased in severity and is now constant, but worse at night. States she has often been prevented from sleeping on account of the severity of the pain. She describes the toe as being "blind" and states that it is frequently bruised. Careful quizzing revealed the fact that she had tied a thread around the toe, in the furrow, as she stated, to ease the pain. This she stated was done only a short time ago. She denies that she ever tied anything around her toe before. So far as patient knows there has been no family history of tuberculosis, malignancy, nervous disease, leprosy. or a condition similar to the patient's present complaint.

The little toe of the left foot showed a deep furrow or constriction at its base completely encircling the toe. The toe distal to the constriction was slightly swollen and enlarged. The foot appeared normal otherwise. Tactile sense was slightly impaired in the toe, chiefly distal to the constriction. Right lower extremity was negative. Reflexes were normal. No anesthetic areas were found. No areas of decreased pigmentation. Observation showed the patient to have a somewhat neurotic temperament. Laboratory reports as follows: Urinalysis showed a faint trace of albumin and an occasional hyaline cast and a few leucocytes. Feces were negative for ova or parasites. Blood smear negative for filaria embryos. Nasal smear negative for *Bacillus leprae*. Wassermann negative. X-ray examination of left foot: Atrophy of shaft of proximal phalanx of left little toe, with thinning of cortex. No other bone pathology. X ray of right foot: No bone pathology.

A disarticulation at the metatarso-phalangeal articulation was decided upon and performed under local anesthesia. The wound healed by first intention and the patient was discharged relieved of her pain.

This case is interesting as it came under observation comparatively early in the course of the disease and afforded an unusual opportunity for study of the clinical aspect of the condition. The various theories of etiology were carefully considered and the most plausible in this case seems to be that it is a tropho-neurosis with possibly a traumatic element combined.

IDIOPATHIC ANEMIA

By H. L. PUGH, Lieutenant (junior grade), Medical Corps, United States Navy

Great difficulty is encountered in satisfactorily classifying the anemias owing to the fact that the etiology of many forms is but poorly or not at all understood.

A common clinical classification has been the division into (1) primary or idiopathic anemias, and (2) secondary anemias. By primary anemia was meant a genuine disease of the blood itself; by a secondary anemia an alteration in the blood consequent upon a disease of some organ or due to some known etiological factor. According to this classification the Addison-Biermer type, or so-called pernicious anemia, and chlorosis were placed among the primary anemias. Most other anemias were regarded as secondary, but in the last analysis it may be said there is no such thing as a primary anemia. Every anemia must be secondary to some deleterious influence, for the blood is not an organ but a product of many organs, predominantly of the bone marrow and lymphadenoid tissues as far as its cells are concerned.

Ehrlich classified anemias on the basis of regenerative forms that appear in the blood. The red corpuscles of postembryonic life are derived from the normoblasts of bone marrow, while those of early embryonic life are derived from larger cells, the so-called megaloblasts. Ehrlich's studies showed that in some anemias the regenerative form is predominantly normoblastic; in others predominantly megaloblastic. In posthemorrhagic anemias no megaloblasts were believed to occur, but if erythroblasts appeared in the blood they were supposed to be of the type of normoblasts. On the other hand, in pernicious anemia the predominant erythroblast in the blood was supposed to be the megaloblast. Accordingly Ehrlich subdivided anemias into (1) anemias of postembryonal blood formation type and (2) anemias with embryonal blood formation type.

More recent studies, however, indicate that a certain number of megaloblasts may occur in almost any kind of anemia, even in the posthemorrhagic anemias. In any event, up to the present, Ehrlich is agreed with to the extent that a predominance of megaloblasts in the blood as compared with normoblasts is accepted as one of the cardinal differential diagnostic criteria between the so-called pernicious anemia and secondary anemia.

It is not my purpose here to discuss the various classifications of the anemias nor to suggest any new classification. For our intents and purposes it seems that the classification adopted by Osler is practical enough for general uses. His classification is as follows:

1. Primary:
    a. Chlorosis.
    b. Idiopathic or pernicious.
        (*a*) Aplastic type.
2. Secondary:
    a. Acute.
    b. Chronic.

Primary anemia, or that type of anemia variously designated as progressive, pernicious anemia, Addison's anemia, Biermer's anemia, the Addison-Biermer type of anemia, idiopathic or essential anemia, is defined by Osler as "a recurring and usually fatal anemia of unknown origin, characterized by hemolysis and imperfect action of the blood-making organs."

Age.—Usually in middle ages. Excessively rare in childhood and old age.

Sex.—United States and England, males; in Germany, females.

History.—The world owes to Addison, of England, its first knowledge of this remarkable and mysterious disease. Addison's first report appeared in the London Medical Gazette, March, 1849. Biermer, of Germany, wrote of the same ailment in 1868.

Etiology.—The actual causes of primary anemia are unknown, but its dominant and invariable characteristic is an excessive intractable and ultimately fatal hemolysis due doubtless to an unknown toxin.

Symptoms.—Weakness, fatigability, headache, dyspepsia dizziness, ringing in the ears, palpitation, usually marked anorexia. Patients are usually apathetic.

Physical signs.—Pallor and lemon yellow tint to skin are most striking features.

As a rule patients are well nourished.

Anemic murmurs may be audible over the heart and a *bruit de diable* is sometimes audible over the bulb of the jugular vein.

The spleen is as a rule not palpable but may be somewhat enlarged.

Remission.—One of the most remarkable features of the disease is the tendency to remissions.

Blood findings.—1. Reduction in number of red blood corpuscles. The number may be very low, usually below 2,000,000—may fall as low as 143,000 (Quincke) or 138,000 (Naegeli).

2. In the fresh blood slide the most outstanding features are:

(1) The outspoken anisocytosis.

(2) The high-grade poikilocytosis.

(3) Polychromatophilia.

(4) Megaloblasts and nucleated reds.

(5) Color index—greater than 1.

(6) White blood corpuscles—usually diminished.

(7) The blood platelets—usually diminished.

(8) Other blood findings. The total amount of blood is usually diminished. Coagulation time is usually lengthened. The viscosity is low. The specific gravity is low.

Differential diagnosis.—Primary pernicious anemia should be differentiated (1) from other chronic forms of hemolytic anemia (discoverable etiology, anamnesis); (2) from acute hemolytic anemia (blood findings including leukocytosis, course); (3) from anemia pseudo-leukemia infantum (youth, splenomegaly); (4) from carcinosis of the bone marrow (physical examination myelocytosis); (5) from posthemorrhagic anemias and chlorosis (history, low color index, normoblasts, leukocytosis); (6) from aplastic anemia (absence of nucleated reds, of polychromatic corpuscles, and of basophilic granulation of red cells from the blood on repeated examinations); (7) from subacute infective endocarditis (blood culture, blood findings); (8) from hepatopathies (blood findings, history); (9) from carcinosis ventriculi (motility tests, X rays, blood findings).

Treatment.—Rest in bed, together with light nutritious food given at short regular intervals. Osler speaks of five essentials: First, a diagnosis; secondly, rest in bed for weeks or even months, if possible; thirdly, in the open air; fourthly, all the good food the patient can take; fifthly, arsenic, Fowlers' solution in increasing doses beginning with minims iii or iv, t. i. d., and increasing 1 minim each week until the patient takes minims xv, t. i. d. Other forms of arsenic such as sodium cacodylate or atoxyl hypodermically may be given, or arsenous acid in pill form one-thirtieth or one-twentieth grain. Transfusion, especially if the hemoglobin falls below 20 per cent. It offers the possibility not only of averting death, but for a time, at least, of initiating one of the periods of quiescence so characteristic of the disease. Injections of blood serum, i. e., 10 to 20 cubic centimeters of rabbit serum preferably direct into vein, or defibrinated human blood in amounts up to 500 cubic centimeters may be given. This is better than direct transfusion, according to Osler. However, the most recent work in this field tends to favor direct transfusion or in any event the use of whole blood.

Splenectomy.—Eppinger believed that the spleen was capable of causing external hemolysis in pernicious anemia. Pearce and his collaborators have shown that splenectomy causes increased resistance of the red cells to salt solution. In any event, splenectomy, at least, may afford a longer period of remission of the disease than any other method of treatment. This is the opinion of the Mayos.

REPORT OF CASE OF IDIOPATHIC ANEMIA

The following is the history and report of a case of anemia now under treatment at the United States Naval Hospital, Chelsea, Mass. This case is being carried and treated as one of pernicious anemia; however, there are certain features connected with the case which make a satisfactory diagnosis as yet a mooted question.

The patient is a white, married man, 33 years of age.

Complaint.—The patient walked (with assistance) into the hospital February 1, 1924, presenting the following subjective symptom complex: General weakness, unable to climb grades, tendency to avoid inclines, constant headaches, attacks of pain in left side, frequent feverish spells, and inability to sleep. Patient states that for past six months he has had no desire to eat; he has, however, neither gained nor lost appreciably in weight.

Family history.—Father died, at age of 67, after six weeks' illness; cause unknown. Mother died at age of 64, after three months' illness; cause unknown. Five brothers alive and well. One sister alive and well. One sister died in early childhood of unknown cause. The patient is fifth in a family of eight.

No history of tuberculosis, malignancy, cardiac, or renal disease. No history of blood disorders, thyroid disease, obesity, arthritis, nervous and mental disorders, or alcohlism in patient's family or among immediate relatives.

Marital history.—He has been married six and one-half years. His wife and two children, ages 4 and 2 years, are living and well. No children dead. Wife has had no miscarriages.

Past history.—Patient had the usual diseases of childhood, including measles, whooping cough, mumps, and chicken pox. His convalescence was uneventful and recovery complete in each case. No history of any serious illness, accident, nor operation in his life. He never had scarlet fever, diphtheria, pneumonia, smallpox, pleurisy, malaria, typhoid, or influenza.

No history of headache prior to onset of present illness. No history of vertigo, injury to head, nor vomiting. No history suggestive of sinusitis.

Patient had never suffered any discomfort with eyes prior to present illness. Vision clear. No indication for glasses. No history of flashes of light, muscae volitantes nor diplopia. No inflammation nor pain.

No history of deafness nor tinnitus. Neither has he had pain or discharge from ears at any time. No mastoid trouble.

No history of head colds, discharge, or epistaxis. No disturbance of olfaction or breathing.

Teeth have always been good. Lips and gums have always been free of ulcers and gum boils. He has never experienced excessive salivation.

No history of sore throat, quinsy, laryngitis, dysphonia, aphonia, or dysphagia.

Prior to the onset of the present illness the patient had never experienced any palpitation of heart, dyspnea, precordial pain, cyanosis, orthopnea, or sleep starts. At no time has he experienced swelling of feet and ankles. There is no history of chronic cough, matinal cough, seasonal colds, bronchitis, hemoptosis, noctidrosis, chills, or fever. No undue lassitude prior to early winter of 1919, when he was overtaken by the disability which has brought him to the hospital. Undue lassitude has constituted one of cardinal symptoms of patient's present illness.

His appetite and digestion have been good up to six months ago when he lost his appetite entirely. He has always eaten regularly of good food. No particular articles of diet have ever tended to disagree with him. No history of excessive gaseous eructations, nausea, vomiting, hematemesis, nor gastric distress or discomfort. Bowels have been generally regular. No melena. There has been no frank jaundice; however, there have been times during the past four or five years when his skin bore a yellowish cast. The patient is ignorant of the existence of any hemorrhoids. He gives a history, however, of having passed fresh-looking blood by bowel about seven years ago. Moreover, his brother states that there has been blood in his stools on not infrequent occasions, and after passing this bloody stool the patient would sometimes be markedly weak. No intestinal parasites have ever been noticed in stool.

The patient's sexual qualities have always been normal. No history of kidney or bladder disturbance of any kind. No renal or ureteral colic. No passage of calculi. No polyuria nor polydypsia, no pollakiuria, ischuria, oliguria, anuria, dysuria, hematuria, pyuria, nocturia, enuresis, incontinence or retention up to 10 days ago when patient, for the first time since the onset of his illness, experienced an inexplicable retention, being unable to start stream. This is believed to have been a nervous phenomenon, since patient eventually voided in a normal fashion.

The patient denies any venereal infection. There never has been any abrasion or ulceration on his penis; neither has there been any urethral discharge.

The patient's nervous make-up has always been normal. He has never experienced any nervous spells, convulsions, shocks (save for that occasioned by an explosion which will be described later), worries, mental depressions, or elations. Prior to the onset of his present illness he had always slept well. There has been no abnormalities connected with his nervous system belonging to the category of neuralgia, neuritides, sciaticas, palsies, paralyses, trophic disturbances, muscular rheumatism, myalgias, atrophies, or dystrophies.

The patient has always been a man of strictly temperate habits. Up to past month or six weeks he has been able to sleep well. He has always been an observer of regular hours. He has never used alcohol, tobacco, or opiates in any form. He very seldom drinks coffee.

For a number of years the patient has been employed by the National Board of Underwriters as a fire prevention inspector. His employment affords him the opportunity to be out in the open most of the time. He was unusually vigorous and active as a youth and on up to the onset of his present illness. It is interesting to note that he was not so long ago a marathon runner. He ran 26 miles on three occasions; i. e., April, 1916; June, 1916; and April, 1917.

He enlisted in Fifth Massachusetts Infantry May 17, 1917, called into Federal service July 25, 1917. Went overseas with Thirtieth Engineers August 27, 1917. He sustained no injuries while across—incapacitated only a few days with a cold. Returned to United States January 26, 1919, landing at Norfolk, Va. Upon day of landing patient dropped a box of ammunition which exploded, causing an injury to his right hand. He was sent to Spartanburg, S. C., where the hand was operated upon. He was given a S. C. D. from Second Headquarters, Casual Detachment, Spartanburg, S. C., last part of April, 1919. After arriving home his hand was operated on at Waltham Hospital February, 1919 (osteomyelitis, third metacarpal bone). Another operation was done on this hand at Parker Hill the latter part of 1922. A dermatitis developed on the back of the hand immediately after the operation. This condition was treated by X ray at the Collis B. Huntington Hospital for a month or six weeks, the latter part of 1922. He has worn a heavy leather brace on this hand ever since the last operation.

Weight.—Normal, 150 pounds; present, 145 pounds; highest, 163 pounds; lowest, 140 pounds.

Present illness.—The patient dates the onset of his present illness to the early part of 1919. While he was in the hospital in Spartanburg, S. C., receiving treatment for his wounded hand, it was noticed that he was anemic and perhaps had a yellowish tinge to his skin. In any event it was at this time that the doctors began to examine his blood. It was in the early spring of 1919, i. e., March or April, that the patient first noticed that he was unduly weak. His arms and legs felt heavy; he couldn't climb hills. He found himself avoiding inclines. The ordinary affairs which he had formerly executed without inconvenience became laborious. He could no longer bear the burden in the heat of the day. The malady "had crept upon him as a thief in the night." Thus the onset was insidious, and since it was while he was under treatment for his wounded hand when the condition was first noticed he naturally attributed his general weakness to the effects of the shock associated with the accident. Prior to the explosion which caused the injury to his hand the patient is quite sure that he was perfectly well. He never experienced any difficulty or inconvenience in discharging the everyday duties of a soldier. He suffered no pain in any region during the first year or two of his illness. It was not until November, 1921, when he was admitted to Parker Hill, that headache became a part of his symptoms complex. The disease has been characterized by remissions and exacerbations since the onset. The exacerbations have lasted for varying periods of from 1 to 6 months. The remissions have lasted from 2 to 10 or 11 months. He has been able to work for 10 or 11 months at one time with relatively little trouble. Just prior to the most recent exacerbation, which brought him to this hospital, he worked seven months. The patient states that his headaches and general symptoms seem to become progressively more marked with each exacerbation. During November, 1923, the patient states that he felt very well. The onset of the present attack was roughly about December, 1923. His most aggravating symptoms at present are persistent headaches and inability to sleep. It has only been during the past month or six weeks that he has slept so poorly. His appetite is poor. He has never had better than a fair appetite; never voracious. Nausea and vomiting have never constituted a significant feature of the case. He has, however, had occasional spells of vomiting which he could usually account for in terms of some indiscretion of diet. His bowels have been constipated since his admission here. Prior to his admission his bowels were fairly regular. There had been nothing unusual about the appearance of his stools since his admission here until a few days ago when he passed considerable blood following a constipated stool.

Physical examination.—The patient is a well-developed and well-nourished man with a tendency toward adiposity. His musculature is soft and flabby; his skin is of a peculiar pasty, pale or waxen cast but free of any significant scars or eruption. There is not the lemon yellow tint so characteristic of primary pernicious anemia. His mentality is good, he does not appear to be suffering acutely; however, it is markedly apparent that he is profoundly weak and becomes highly exhausted upon slight exertion. The effort of talking seems to weaken him quickly, and he holds his head with both hands complaining of a severe headache, but lying quietly in the bed he complains of no pain and appears comfortable. He does not appear apprehensive or perturbed about his condition, but is cheerful and answers all questions clearly and readily. The three most striking features to be observed are (1) the profound degree of anemia without the characteristic lemon yellow tint; (2) the extreme readiness with which he becomes exhausted; (3) the strikingly well-nourished condition of his body. His temperature was 100 at the time of this examination; he has run a persistently elevated temperature ever since his admission, ranging around 100 most of the time but reaching 103.5 upon one occasion. His pulse rate is 100 at present, regular and of good quality. The rate has remained around 100 since his admission. His respiratory rate has been consistently normal.

Eyes: There is no edema of the lids. The area around the eyes bears a suggestion of lemon yellow color. The eye movements are normal. No exopthalmos, nystagmus, or strabysmus. Sclerata not tinged but appear pearly white. No evidence of a chronic conjunctivitis. Pupils equal, regular, and react normally to light and accommodation. Fundi negative save for being markedly pale. Vision has been corrected by glasses. He complains of no diplopia, but dimness of vision; a blurring and photophobia constitute a part of his few complaints.

Ears: Hearing good. No discharge; no tophi.

Nose: No discharge. Mucous membranes appear waxy. Left nostril smaller than right; slight deviation of nasal septum to the right. No evidence of sinus trouble.

Mouth: Breath not foul. No ulceration, exudate, or pigmentation about mouth.

Lips: Extremely pale. No herpes, exudate, or fissures.

Gums: Pale. No bleeding; no evidence of pyorrhea or lead line.

Teeth: In good repair. Nonsuspicious for apical abscesses. No suggestion of Hutchinson's teeth.

Tongue: Very pale; light white coat. No tremor either fine or trombonelike. No mucous patches.

Tonsils: Not enlarged. No evidence of sepsis.

Neck: No enlargement of the thyroid; no cervical adenopathy. No pulsations, tracheal tug, or stiffness.

Chest: Well developed and symmetrical. Rate and depth of respiration normal. Expansion good.

Lungs: Respiratory excursions free and equal. No lagging of the apices. Percussion reveals no areas of impaired resonance; bases freely movable; no increase or diminution in tactile fremitus. Auscultation reveals no adventitious breath or voice sounds. No râles.

Heart: Apex beat in fifth interspace one-half inch inside midclavicular line. Heart regular in force and rhythm. Sounds of good quality. No murmurs. The pulse is regular, of good volume, and synchronous with the apex beat. Blood pressure, systolic, 120; diastolic, 65.

Abdomen: Well developed, full, and soft. No masses, areas of tenderness, or rigidity. No abnormal pulsations. No hernia nor shifting dullness. Abdominal reflexes normal.

Liver: Normal in size as made out by palpation and percussion. Edge not felt.

Gall bladder: No mass palpable. No tenderness in gall-bladder region.

Spleen: Edge may be felt well up under left costal margin.

Genito-urinary: Kidneys negative to palpation.

Genitals: No evidence of an active venereal infection. No significant scars. No hernia, hydrocele, or varicocele. Rectal examination reveals external evidence of small hemorrhoids.

Glands: No enlargement of superficial cervical, axillary, inguinal, or epitrochlear glands.

Reflexes: Pupillary, normal; patellar, normal; Babinski, negative; Kernig, negative; plantar, normal; corneal, normal; cremasteric, normal: triceps, normal: biceps, normal; Romberg's sign, negative.

Extremities: No objective evidence of arthritis. Joints freely movable. No ulcers, varicosities, or edema. No clubbing of fingers Patient wears a leather brace on his right hand. There is an irregular scar on the back of this hand and evidence of destruction of part of the carpal and metacarpal bones, said to have resulted from injury and operations following injury received when box of ammunition exploded, January, 1919. This hand has undergone marked disuse atrophy.

Bones: No bony evidence of rickets or lues. No kyphosis, scoliosis, lordosis, or exostoses.

Muscles: No atrophy other than that of right hand: no hypertrophy or paralysis.

Nervous system: Apparently well balanced. No external evidence of central nervous system pathology.

Special examination.—February 24, 1924: Proctoscopic examination rather unsatisfactory owing to inability to dilate anal sphincter due to intense pain; however, hemorrhoids of a fair size were found to exist above the anal margin. To just what extent these hemorrhoids might have ever bled could not be ascertained.

Laboratory data.—February 2, 1924. Upon admission the laboratory findings were as follows:

1. Urinalysis: Color, straw; specific gravity, 1.021; reaction, slightly acid; albumen, negative; sugar, negative; microscopic, occasional leucocytes.

2. Blood: Red corpuscles, 1,700,000; white corpuscles, 6,700; polynuclears, 59 per cent; lymphocytes, 41 per cent; hemoglobin, 30 per cent; color index, 0.88; coagulation time, five and one-half minutes.

Microscopic examination of fresh blood smear shows marked degree of anisocytosis and poikilocytosis. Few normoblasts. Not infrequent megaloblasts; considerable polychromatophilia. Occasional cell showing basophilic stippling.

Wassermann, negative.

February 2, 1924. The blood picture shows considerable improvement over that which existed when patient was first admitted to the hospital:

Red corpuscles, 2,400,000; white corpuscles, 7,000; polynuclears, 65 per cent; lymphocytes, 20 per cent; large monomuclears, 4 per cent; Eosinophiles, 7 per cent; basophiles, 1 per cent; transitionals, 3 per cent; hemoglobin, 35 per cent; color index, 0.69; coagulation time, 2 minutes, 40 seconds.

Microscopic examination of fresh blood slide shows only a moderate degree of aniso and poikilo cytosis. Only an occasional normoblast may be seen, and while megaloblasts are still found to be present their number has decreased markedly. The degrée of polychromatophilia is markedly lessened, and only one cell showing basophilic granules was seen.

Another striking feature of the blood picture is the existence of a definite, however slight, degree of eosinophilia. Seven per cent of the white blood corpuscles were found to be eosinophiles.

3. Feces examined repeatedly for macroscopic blood and intestinal parasite ova, with especial attention for the presence of *Bothriocephalus latus* eggs. Macroscopic blood has appeared not infrequently in amounts ranging from a trace to 1 ounce or more. No intestinal parasite ova noted.

The question arises is this patient suffering from primary anemia or secondary anemia?

The factors favoring a diagnosis of primary pernicious anemia are as follows:

1. Insidious onset.
2. Definite history of remissions.
3. Symptoms of weakness, fatigability, headache, dyspnea, dizziness, and anorexia.
4. Well-nourished condition of body.

5. Presence of megaloblasts in blood and other abnormal cells, anisocytosis, poikilocytosis, etc.

Factors favoring a diagnosis of secondary anemia are the following:

1. Duration of condition (over five years).
2. The absence of the characteristic lemon yellow tint to the skin.
3. The fact that the patient is known to have hemorrhoids which have bled upon repeated occasions.
4. The color index is less than 1.
5. The coagulation time is not prolonged.
6. The microscopic examination of the blood slide does not reveal a picture which is incompatible with secondary anemia.
7. The patient has been seen by some of the leading blood specialists of Boston who, it is understood, failed to make a diagnosis of primary anemia.

Treatment.—Since his admission patient has received general supportive treatment, including rest in bed, fresh air, and sunlight, nutritious diet, and eliminative aids, along with iron and arsenic in the form of Blaud's pills and Fowler's solution.

A transfusion by the direct method was undertaken on February 7, but owing to the short coagulation time of the donor's blood the tubes became clogged repeatedly and only about 150 cubic centimeters of blood were successfully given.

A hemorrhoidectomy is contemplated as soon as patient's condition will warrant such an operation. Another transfusion, in order to expedite this procedure, has been considered, but owing to the fact that he seems to be responding so favorably to medical treatment it is though that this measure need not be instituted.

Conclusion.—The writer's reaction to the case is to the effect that it is one of primary pernicious anemia; however, the probability of a secondary anemia due to bleeding hemorrhoids is not altogether ruled out of the picture. In any event it is to be borne in mind also that bleeding from the rectum and other mucous membranes is highly in keeping with the symptom complex of primary anemia. Whether or not the rectal bleeding in this case is a cause or an effect is as yet undetermined. The writer is inclined to the view, however, that it is an effect or a concurrent affair and that the primary disease is pernicious anemia.

GASTRIC NEUROSIS

By P. C. SUPAN, Lieutenant (junior grade), Medical Corps, United States Navy

Gastric neuroses are those functional disturbances of the stomach which occur without any discoverable pathological changes.

These cases are most frequently found in those individuals who have either inherited a nervous constitution or who have gradually through indiscretions brought about an unstable nervous equilibrium from which the nervous gastric disorder takes its origin. Very frequently the gastric symptoms stand so far in the foreground that the general neuropathic character of the patient escapes notice.

In all disturbances of the digestive tract we must not forget that the gastric manifestations may have a reflex origin dependent on an organic disturbance in other parts of the body, as the liver, gall bladder, and appendix. Therefore attention must be given to the whole digestive tract and not only to the part apparently involved.

Friedenwald, in his statistics of some 2,000 cases, states that the greater percentage of the gastric neurosis cases occur between the ages of 20 and 40 years. Rarely has he found it beginning in old age.

The neuroses appear to be most commonly met with in the healthy, ruddy-cheeked adults. Persons living amid luxurious surroundings suffer most. Almost invariably the neuroses form a part of the protein manifestation of a congenital diathesis or of an acquired neurasthenia.

Osler, in his classification of the gastric neuroses, divides them into three groups: Sensory, motor, and secretory. These three groups he again subdivides as follows:

1. Motor:
   a. Hypermotility.
   b. Peristaltic unrest.
   c. Eructations.
   d. Nervous vomiting
   e. Ruminations.
   f. Cardio spasm.
   g. Pylorospasm.
   h. Atony.
2. Secretory:
   a. Hyperacidity.
   b. Superacidity.
   c. Subacidity.
3. Sensory:
   a. Hyperaesthesia.
   b. Gastralgia.
   c. Bulemia.

This classification has by no means been found satisfactory, for rarely does the individual suffer from one of these separate disturbances of the above three groupings.

REPORT OF A CASE

History.—Mr. C., married, was admitted to the hospital on November 11, 1923. The patient states that during the past four or five years he has experienced epigastric fullness, distress, flatulence, sour eructations, frequent belching of large amounts of gas, borborygmi, epigastric pain, and a feeling of general malaise. The epigastric pain is griping in character and comes on one to three hours after eating. Has no pain during the night. No history of any vomiting.

Appetite and nourishment are good. He is afraid to eat much because of the anticipated pain which is to follow. Patient is very irritable and appears depressed over his condition. His gastric condition, he states, dates back to an acute attack of gastric enteritis which occurred while he was in France in the fall of 1918. Was not hospitalized, but treated at sick bay only. Has had gastric disturbances more or less since that time. Family history is not significant, except that his mother probably died of tuberculosis. Health previous to admission always good. Had gonorrhea about 10 years ago and was treated for about 1 year. Denies other venereal diseases.

Operated on for chronic appendicitis in June, 1922, at Parker Hill Hospital, Boston, Mass. Returned to his trade as a tailor, but had to give it up about six weeks prior to his admission to the hospital, because of the seriousness of his gastric condition.

Habits.—Bowels usually constipated. Does not sleep well. Is very restless at night time. No loss of weight during the past year. Drinks wine only occasionally because it aggravates his condition. Has given up the use of tobacco lately.

Examination.—Patient is well developed and nourished. Height, 5 feet 4 inches. Weight on admission, 134 pounds. Appears quite restless and disturbed. Skin slightly oily and shows many pigmented spots and moles. Palms of hands and axilla perspire very readily, but most of skin elsewhere appears dry. Right rectus incision scar present from old appendix operation. Slight abdominal tenderness in epigastric region on deep palpation. No muscle rigidity present. Reflexes quite active. Babinski negative. Pulse, radial equal on both sides; rate, 82; temperature, 98.6° C. Blood pressure, 132–80. Wassermann, negative with both cholesterin and acetone antigens.

Neurological examination: Dr. A. W. Stearns could determine no organic nerve disease. Psychic symptoms consist of excessive concern over minor ailments and probably do not warrant a diagnosis of psychoneurosis.

Barium series: Esophagus negative; no gastric residue. Duodenal cap is distinctly visualized and no defects are noted in the stomach or duodenal cap. X-ray plates show no evidence of pathology in stomach or duodenal cap.

Gastric analysis (one-hour test meal on fasting stomach; quantity sent to laboratory, 59 cubic centimeters; quantity withdrawn, 120 cubic centimeters): Odor, none; appearance, opalescent; sediment, 5 per cent; total acidity, 54 per cent; free HCl, 40 per cent; combined acids, 14 per cent; blood, negative; lactic acid, negative. Blood examination: Erythrocytes, 4,800,000; leukocytes, 7,850; polyneutrophiles, 68 per cent; lymphocytes, 31 per cent. Microscopic examination: Starch cells, eosinophiles, 1 per cent; hemoglobin, 85 per cent. Urine, negative. Examination of stools: Negative for occult blood, ovæ, and intestinal parasites.

Treatment.—The patient was placed on a Lenhartz diet and kept strictly in bed for the first 14 days of the diet. During the first 10 days of the diet the patient very frequently complained of gastric discomfort and pain. Large amounts of gas seemed to accumulate in his stomach, which he did not seem able to get rid of. From the twelfth to the twenty-first days of the diet the patient's condition appeared somewhat improved and his discomfort was not so great, although he did not become symptomless. On completion of the 21 days of dieting his weight showed a gain of 4 pounds. About 6 or 7 days after completion of the Lenhartz diet his symptom complex again returned with their former severity. Early in January the Sippy diet was instituted. The liquid content of this diet added greater discomfort and distress to his gastric condition, and the patient became markedly depressed over his condition. After 33 days on the Sippy diet the patient stated that his gastric disturbance was not the least bit improved and, in fact, had been aggravated to some extent while on the latter diet. But even so, his weight never at any time did fall below 133 pounds. His mental condition, nevertheless, did not improve during this time.

The medicinal treatment consisted of employment of alkalies in large amount, usually given about two hours after meals so as to strive to neutralize and relieve the sour eructations and gas accumulation. Bismuth subcarbonate was also given in equal parts with the alkalies.

Atropine, which is supposed to inhibit glandular secretion, was given a trial, with unsuccessful results, so its use was discontinued. Sedatives were administered to quiet his nervous condition and that the patient might rest better at night. His bowels were kept well regulated in order to overcome his constipation.

Discussion.—This case is of great interest in that no active organic pathology could be found which would account for the patient's symptom complex. The report of the analysis of the gastric content obtained by means of the one-hour test meal on the fasting stomach adds but little significance because of the slight hyperacidity present.

The appendectomy performed in 1922 removes the possibility of a reflex origin as a cause of the gastric condition due to a diseased appendix, and no doubt at the same time examination of both gall bladder and stomach were made while the abdomen was open.

The negative Wassermann, active reflexes, and absence of a general adenopathy eliminate the possibility of an organic nerve disorder. Dietary means as employed in organic disturbances of the stomach proved unsuccessful and unsatisfactory for they appeared to add greater discomfort to the patient's condition. The patient's general make-up, irritability, mental and physical unrest, and depression, and the chief positive findings point toward the possibility and probability of his disturbance being due to a gastric nervous disorder. After all, it is upon the existence of a neuropathic temperament to be discovered by careful and often prolonged observation of the patient and his peculiarities that the diagnosis of his nervous character depends.

His symptom complex points toward his condition being one of a secretory gastric neurosis, the prognosis of which is less favorable because of its not being of a very recent origin.

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NURSE CORPS

AMERICAN RED CROSS NURSING IN ALASKA

FLORA L. BRADFORD, American Red Cross

The land of the big snows and midnight sun knows well the symbol of the Red Cross. Alaska in its relation to the American Red Cross is a part of the Pacific division, which has its administration office at San Francisco. The problem which it presents is as interesting as it is difficult, and as colorful as it is complex.

Folks are folks in Alaska, however, as well as elsewhere, and many choice spirits are in the lead in the development of Red Cross chapter activities in that far-away peninsula.

There are at present 11 active chapters in Alaska, all of which are carrying a program of service for the men who wore the uniform during the World War. Three chapters have Red Cross public health nursing, home hygiene and care of the sick classes, and health center work. Eight chapters have a Junior Red Cross section; two, home service extension; two, first-aid instruction; five are carrying a production program which includes the making of garments, etc.; and two chapters maintain loan closets well supplied with sick-room equipment which is given out as occasion arises.

Perhaps no factor has been as instrumental in stimulating Red Cross chapter and general health programs in Alaska as has the Red Cross nursing service. Miss Ebba Djube, an American Red Cross nurse, is at the same time the general field representative for Alaska Territory, working upon all problems concerned with Red Cross chapter organization and administration.

Miss Stella Fuller is the Delano Red Cross nurse, serving in southwestern Alaska. Her headquarters are at Seward. Miss Marie Falldine is the Red Cross public health nurse serving with Juneau Chapter.

The peculiar problems of these nurses, particularly those of Miss Djube and Miss Fuller, are determined very largely by geographical conditions, a large Indian population, and various local peculiarities with which some of us who have not had the opportunity of sampling at first hand have come to know and appreciate through the works of the writers of the northland and the ever-popular motion-picture production. Nothing one can say will compare in interest with the descriptions and "skits" by the nurses themselves, and we quote largely from their letters and narrative reports.

All of these nurses write of appalling conditions among the Indians, showing they are a menace to themselves and others. Enormous distances and difficult traveling facilities constitute a problem of paramount proportion. Miss Fuller travels 1,200 miles from Seward to reach the most distant branch of her service. Imagine Mobile, Ala., a branch of New York County Chapter. Miss Djube has accomplished some very significant things in Alaska, while the health report compiled by her and Miss Fuller will prove of great value for several years to come.

The various phases of Red Cross public health nursing as generally undersood, home hygiene and care of the sick classes, and school nursing constitute the program of the Red Cross nursing service in Alaska, and it is not too much to say that all three of our nurses are sinking themselves in service, and combating difficulties which would break the fiber of less seasoned and less devoted workers.

This summer Miss Djube went to Nome and is returning down the Yukon, either to Seward or Cordova. She has written some very interesting accounts of life as she found it in that far-away part of Alaska, and the following are excerpts from her last report:

"People up here profess to be busy, but their hour for business is around noon. Of course the days are 24 hours long and there is no real incentive to go to bed. Mrs. Welch, of the Red Cross, had a canary sent her from the States and she said that for two days it refused to settle down for a night's rest, and insisted on singing all night long. * * * The people in certain sections seem all run down and have no real desire to do anything but live from day to day. * * * When we had an awful rainstorm the other night, some of the guests (of the hotel) were obliged to find their way downtown for washtubs to receive the water that came through to their rooms."

Speaking of one of the towns on her itinerary, Miss Djube says: "The hotel we stay in is supported with studdings to keep it from falling over. * * * the bedding is of the coarsest, excepting the sheets, which are clean. The mattresses have evidently seen the Sahara Desert and they copy the humps of the camel. Well, at any rate, this is really the very worst place I have yet found in Alaska."

Juneau has many serious problems to be solved, but Miss Falldine seems to be commanding splendid cooperation and enjoying life to the full, nevertheless. She says:

"People are very nice to me up here. I went to the governor's reception, met many of the teachers, and had a lovely time. Met some of the movie crowd; danced with the 'villain' and talked with the 'leading lady.'"

In one of her reports she says:

"The weather has been ideal, and Alaska is very beautiful. You will be interested to know that in one day, in the discharge of my duties, I traveled by rowboat, sailboat, steamboat, automobile, and airplane."

Anent the above, Mr. Odlin, editor of the American Red Cross Courier, avows there are no ostriches in Alaska or Miss Falldine would be riding one.

Miss Fuller of necessity spends much time on the boats which ply the southwestern coast of Alaska. Her powers of observation are very keen and her sense of humor is never failing. Her sidelights on that section of the world are among the most graphic and entertaining to be found anywhere, and we know all nurses will appreciate her description of "Boat Day" and gain from it a knowledge of her field which no amount of technical reporting can possibly impart:

"Boat Day is the big event in southwestern Alaska; when the smoke of the last ship can no longer be seen the folks in Seldovia, Kodiak, Kanatak, Unga, and Unalaska begin looking for the next.

"The men used to have 'boat pools,' and the one who guessed nearest the time the boat docked got all the bets, but the radio has changed all that now; almost the exact time of the boat's arrival is known in most of the coast settlements.

"For two or three days before the boat is due the women are often heard to say: 'Dear me; it will soon be Boat Day, and I have not got half my letters answered.' The business men rush to get their money orders ready, and the whole town seems to be trying to get a money order at the same time.

"In one of the towns some of the ladies press their coats and wash their hair, knowing they will be invited to dine on the ship; the men comb their long locks with their fingers and say, 'Gee, I'll be glad when the *Watson* gets in; got to have a hair cut.' They later wait their turn before the ship's barber and at the same time question him about the news in the States.

"As the time approaches there is more hurried letter writing; folks begin wrapping furs in burlap to mail to friends outside; there are glances at the sky; discussions regarding the weather and the chance that 'she may not get in on time.' 'Looks a little like weather, Happy.' 'Don't you worry, Chuck, the old Cap'll bring her in all right, weather or no weather. If it was Peterson he might throw the hook an' wait for a fair wind, but Jensen'll plough right through.' Remarks of this sort nearly always start lengthy comparisons of various captains, which often end in stories of shipwreck and reference to the time the *Old Dora* was lost for 90 days—but that's another story.

"The man who has charge of the radio station is besieged with questions: 'Hear anything more about the boat?' 'Has she left Seldovia yet?' 'How many passengers she got this time?' 'Know how much freight she's carrying?'

"Dories and gas boats begin to come in from the neighboring islands or fox ranches. There is talk about having a dance when the boat comes in. Cooks say, 'I'll be glad when the boat gets in so we can have some fresh fruit and vegetables, and won't a T-bone steak taste good!'

"Those who are planning to go outside have their bags packed and say their good-bys over and over again, promising to write by every boat. The village wag pulls the old joke which gets everybody. He throws up his hat and yells, 'S-t-e-a-m-b-o-a-t! S-t-e-a-m-b-o-a-t!' Folks run out of their houses and look down the bay while he laughs.

"Everyone gets up early on boat day. Stores and eating places prepare for a big time. At last a speck is seen far out to sea—only coast people could detect it—and everyone smiles. The children run up on the hills to be really sure. The speck grows larger and larger, and after what seems to be an age the whistle booms and the mountains echo the sound; there is a rush for the dock: everyone goes—men, women, and children and many, many dogs.

"As soon as the ship is in hailing distance merry calls are exchanged, ready hands reach from the dock to catch the lines, watchful eyes follow the movement of the seamen while the gangplank is being placed, and there is a sigh of relief when the first passenger steps ashore. The boat is in at last.

"The captain and his officers are greeted in the most friendly manner; old-timers question each other about mutual friends in Nome, Fairbanks, and other places; the wharfinger begins to plan for a number of longshoremen to handle the cargo; returning relatives are embraced; the incoming tourists, or those making the trip, begin their search for furs, old ivory, or Russian samovars; the post office is crowded with people waiting for their mail. About this time a dog fight begins. The malamutes, the chesapeakes, and the ladies' pets start a grand scrap—always a delight to the Alaskans. These are started by the ship's cook who throws food to the dogs. Bright-eyed native children are given oranges by the waiters: the captain and his officers invite the white women to dinner and the ladies invite the officers to tea or to the dance, and so hospitality continues to flourish.

"The ship remains in port about 12 hours usually, the exact time depending on the cargo. Just when everyone is happy, the inevitable quesion, 'How long before she leaves?' casts a gloom over the water front. The half-hour whistle blows; letters written at the last minute are put in the ship's mail bag; the 15-minute whistle sounds; more good-bys are said; the gangplank is withdrawn; the officer on the bridge calls, 'Let go your stern line!' Slowly she turns and points her nose out to sea, leaving the little group of waving people on the wharf to wait until the next boat comes in."

The scope of American Red Cross activity is an ever-widening one, and in those far-flung possessions of our country to which the nurses of the Navy find themselves assigned, there are American Red Cross chapters doing a great and vital work.

Many of the nurses of the Navy are American Red Cross nurses as well, and interested in all phases of human betterment as represented by the program of the latter organization. They are inalienably a part of it, and they are at the same time very highly prized members of the great Red Cross family.

As the nurses of the Navy and other governmental services come and go in their own high tasks, the American Red Cross keeps watch from afar, pledging to them in peace and war the loyalty and service which is their rightful due.

BOOK NOTICES

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

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

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

MODERN UROLOGY IN ORIGINAL CONTRIBUTIONS BY AMERICAN AUTHORS. Edited by *Hugh Cabot, M. D., M. G., F. A. C. S., dean and professor of surgery in the Medical School of the University of Michigan.* Volumes I and II, second edition. Lea & Febiger, Philadelphia, 1924.

The first edition of this work, which appeared in 1918, presented an interesting departure from precedent in the form of a brief historical sketch of American contributions to urology by Dr. F. S. Watson. The five years which have elapsed since the appearance of the first edition have brought many advances in urology. In fact so many changes were necessary in the revision in order to bring the two volumes up to date that we note with regret that the editor was forced to omit Doctor Watson's delightful historical sketch from the second edition in order to make room for new material. Death has claimed two of the original contributors and we find their work replaced by that of others. Thus Dr. Preston M. Hickey has contributed a chapter on the " Roentgen-ray examination of the urinary tract," and Dr. J. M. Gardner has prepared the chapter on " Prostatic obstructions," subjects handled in the first edition by Drs. Walter J. Dodd and Paul Pilcher. Dr. Arthur Stein's excellent description of syphilitic hypertrophy of the vulva has been substituted for the description of that disease appearing in the first edition. There is an excellent chapter on " Tumors of the testicle " by Dr. Frank Hinman, and chapters on " Sarcoma of the prostate and calculus disease of the prostate " by Dr. H. H. Young have been included.

Several of the original contributions have been rewritten to conform to our late knowledge of the subject. Of special importance in this respect are the papers on " Infection of the testicle," " Genital tuberculosis," " Etiology of stone," " Urethral stricture," " Technic of the application of fulguration in the treatment of tumors of the bladder of connective tissue origin," "Chronic cavernositis."

Among other new material we find descriptions of late modifications of the cystoscope, high-frequency treatment of tumors, dangers of pyelography, syphilis of the bladder, tabetic bladder, standard syphilis technic, Bucknall's operation for the cure of penoscrotal hypospadias, Young's modification of Cantwell's operation for epispadias, Robbin's and Seabury's treatment of chancroid, in which a 25 per cent solution of copper sulphate is driven into the tissues by a high-frequency current, granuloma inguinale, modern methods of cultivating the gonococcus, complement fixation test for gonorrhea, acriflavine treatment of gonorrhea, Key's suspensory for epididymitis, Pasteau's operation for chronic stricture of the urethra, results of operation for varicocele, cancer of the prostate, modern methods and the ultimate results of the use of radium in cancer of the prostate, special points in the management of malformations of the bladder and the ultimate results of treatment, the elusive ulcer of Hunner, the results of Coffey's operation for injury of the urethra, estimation of blood creatinin, treatment of bilharziosis by tartar emetic, the operative treatment of tuberculosis of the kidney, and Mayo's method of examining the kidney during operation with the fluoroscope after stones have apparently been removed.

This work is an excellent expression of American urology as it stands to-day, and as such it is recognized by the profession at large.

LOCAL ANESTHESIA. ITS SCIENTIFIC BASIS AND PRACTICAL USE, by *Professor Dr. Heinrich Braun, obermedizinalrat and director of the Kgl. Hospital Zwickau, Germany;* translated and edited by *Malcolm L. Harris, M. D., professor of surgery, Chicago Policlinic; chief surgeon, Alexian Brothers Hospital; surgeon to the Henrotin, Policlinic, and Passavant Hospitals, Chicago.* Second American from the sixth revised German edition. Lea & Febiger, Philadelphia, 1924.

Braun has been the standard work on this subject since its first appearance in 1905, and other books on local anesthesia pay tribute to his leadership by frequent quotations from his writings. This second translation contains much new matter covering the changes and advances that have been made in the 10 years since the first appeared.

The opening chapters tell of the history of local anasthesia up to the discovery of cocaine and discuss the sensation of pain, the pain-relieving action of nerve compression and anemia, the effect of osmotic tension of watery solutions, absorption and local poisoning, tests, general properties and methods for using local anesthetics.

Chapter 7 is devoted to a discussion of the local anesthetic agents. Twenty-five pages are given to details of the history, action, uses, and dangers of cocaine. The others considered are tropococaine, eucaine, holocaine, aneson, akoin, anesthetics of the orthoform group, stovaine, alypin, novocaine, and apothesine. The author gives the requirements of local anesthetics as follows: The substance must be less toxic than cocaine in proportion to its local anesthetic power. It must not cause the slightest irritation or tissue injury. It must be soluble in water and its solutions stable and possible of sterilization by boiling. It must be possible to combine the agent with suprarenin. He concludes that novocaine and alypin are the two substances which fulfill these requirements, and they have made the use of cocaine in surgery almost obsolete.

In chapter 8, the effect of suprarenin as an aid to local anesthesia is considered, and Braun states that the limits of usefulness of local anesthesia have been materially increased since the introduction of suprarenin. Its results are more certain, the technic has been simplified, and danger has been markedly reduced.

Statistics from various German hospitals show that for the last few years over 50 per cent of operations have been done under local anesthesia. There are reasons against the greater elimination of narcosis. In the endeavor to increase the field of usefulness of local anesthesia by the employment of larger doses, a limit has been reached.

It is interesting to compare this book, of German origin, with an excellent American book on the same subject which has recently appeared. In the German book, nearly half the pages are devoted to discussion of the history, chemical composition, and scientific experimentation relating to local anesthetics, while the rest are devoted to the practical application. The choice of patients and the mental control of the patient are hardly noticed. In the American book, one is referred repeatedly to Braun for the scientific aspects while the psychic attitude of the patient and its control require several chapters.

The later chapters of the book describe the practical application of local anesthetic methods to operations on the various parts of the body. They are very practical and valuable. Both the author and the translator are entitled to congratulations for their part in the production of such an excellent book. Every surgeon who employs local anesthesia should read it.

A TEXTBOOK OF PHARMACOLOGY AND THERAPEUTICS OR THE ACTION OF DRUGS IN HEALTH AND DISEASE, by *A. R. Cushny, M. A., M. D., LL. D., F. R. S., professor of materia medica and pharmacology in the University of Edinburgh; formerly professor of materia medica and therapeutics in the University of Michigan, and later in the University of London.* Eighth edition. Lea & Febiger, Philadelphia and New York, 1924.

In the preface of a former edition of this well-known work, the author made an appeal to teachers, and especially to the members of examining boards, to restrict further the drugs which the student has to study, for as long as he has to learn the supposed virtues of a host of obscure substances he will tend to use them in practice, generally with the results that are disappointing. The employment of such substances by many practitioners necessitates their inclusion in the pharmacopœias, which again gives them some standing and perpetuates them as subjects of teaching and examination. Numberless preparations of drugs of questionable value in use in the recent past have tended to discourage interest in thereapeutics. On these grounds the author, in earlier editions, began to omit mention of many preparations found in pharmacopœias and textbooks, which appeared to him of doubtful value. In the present edition he considers only those drugs which have been proved by scientific investigation to be of thereapeutic value.

Since the last edition appeared there has been great advance in cardiac therapeutics. This has resulted in the inclusion of the latest views on digitalis and the cinchona bases. In the hope of attracting more attention to substitutes for cocaine emphasis has been laid on this group of local anesthetics. The insulin treatment of diabetes and the vitamins have been allotted short chapters because of their importance in present-day therapeutics. Many other changes appear, especially in the discussions of quinine, thyroid, strychnine, and pituitary.

The general form of the previous editions has been retained. After an introduction in which, among others, the general theories of pharmacological action, conditions modifying the effects of drugs, methods of administration, the chemical character of drugs, and biological assay are commented upon, the author takes up in turn substances which are characterized chiefly by their local action, substances characterized chiefly by their action after absorption, the heavy metals. The volume closes with a useful classification of drugs according to their therapeutic use. Medical officers will find this volume a useful commentary on the action of drugs.

COSMETIC SURGERY. THE CORRECTION OF FEATURAL IMPERFECTIONS, by *Charles Conrad Miller, M. D.* F. A. Davis Co., Philadelphia, Pa., 1924.

To those who, like the reviewer, have followed the developments of plastic surgery for years, this unique book will come as a delightful surprise. Other works on facial surgery treat of the correction of deformities due to injury or new growth. This one is frankly devoted to beauty surgery and the removal of the evidences of age. Whether we, as surgeons, believe it desirable or not, there is undoubtedly a demand for work of this sort from women of the stage and society. To them wrinkles and double chins are as definitely disabling as is the hernia to the working man. It is better that there should be a few reputable surgeons with the necessary skill to do such work than to let the patients drift into the hands of the beauty-shop tyro.

After the opening chapters on antisepsis, local anesthesia, and hemorrhage, the author describes his methods of correcting bags and wrinkles about the eyes, facial wrinkles, double chins, and scars. He tells us how to form dimples, reduce the bulbous nasal tip, correct outstanding alæ nasi, and remove hump nose. There are operations for enlarging the mouth or making it smaller, improving flop ears, changing the shape of the ear, and a chapter on the modification of featural types. The conclusion covers briefly the history of cosmetic surgery, suggestions on the technic and handling of cases, the psychology of the sort of people who seek to have this work done, and the limitations of the field.

One regrets that the author did not see fit to include a chapter on the medico-legal aspects of his specialty. So much is said, among plastic surgeons, of the malpractice suits threatened and instituted by dissatisfied patients that a beauty surgeon of Doctor Miller's experience must have witnessed some episodes worth recording. Other men would be glad to know what precautions he has learned to take to protect himself.

The book is an excellent one and will be a necessity to those who work in this field.

APPLIED PATHOLOGY IN DISEASES OF THE NOSE, THROAT, AND EAR, *by Joseph C. Beck, M. D., F. A. S., associate professor of laryngology, rhinology, and otology, University of Illinois College of Medicine.* C. V. Mosby Co., St. Louis, Mo., 1923.

In this book the author presents the pathological conditions of the nose, throat, and ear encountered in his own practice and points out the bearing pathology has to treatment applied in these special regions. As he reminds the reader in the preface, he has endeavored "to make this work one on applied pathology in the belief that a greater benefit will be derived from applying the pathological entities to etiology, symptoms, diagnosis, and prognosis, thereby arriving at a rational basis for treatment, exclusive of the strictly surgical interventions."

With this point in mind the writer devotes the first seven chapters to the pathology of the acute diseases and the last five to the chronic affections.

The book is unique in that the subject matter is derived exclusively from the author's personal experience, differing in this respect from the average run of textbooks which contain details of rare conditions extracted from the writings of many authors. Fortunately the writer's experience has been extensive, and he has had an opportunity to observe all of the pathological conditions which the general practitioner or even the specialist may encounter. For this reason the book is of especial value to the medical profession.

Cancer of the Breast. With a Study of Two Hundred and Fifty Cases in Private Practice, by *L. Duncan Bulkley, A. M., M. D., senior physician to the New York Skin and Cancer Hospital; consulting physician to the New York Hospital; late member of the American Association for Cancer Research; member of the American Association for the Study and Cure of Cancer.* F. A. Davis Co., Philadelphia, 1924.

Bulkley's work at the New York Skin and Cancer Hospital has been a prolific source of controversy for years. Those who have studied his treatment and observed his patients have become strong advocates or bitter opponents of his methods. The reviewer does not presume to pass judgment upon them.

This book presents his argument, describes his treatment, and gives an analysis of 250 cases from his private practice. He challenges investigators of all kinds to a serious consideration of his conclusions and results. The opinion is expressed that cancer is a mutiny of body cells due to deranged nutrition and excited to erroneous action by some irritant, physical or neurotic. A proper diet is stated to be the basic element upon which the cure of cancer of the breast rests, since animal protein and its faulty partition are fertile causes of the derangement of metabolism which leads to the growth of cancer. With this he combines medical treatment to avoid constipation and maintain the urinary excretion, also local applications, which are fully described.

Handbook of Modern Treatment and Medical Formulary. A Condensed and Comprehensive Manual of Practical Formulas and General Remedial Measures, compiled by *W. B. Campbell, M. D., formerly resident physician at the Methodist Episcopal Hospital of Philadelphia.* Seventh edition. F. A. Davis Co., Philadelphia, 1924.

When the first edition of this book appeared, in 1908, the compiler stated that the subject matter had been gathered from the results obtained by medical men of wide and ripe experience and he hoped that it would serve as a ready reference book to the busy physician. A feature of the work, to which he particularly directed the attention of the profession, is the clinical hints and suggestions scattered through its pages.

In the preface of the present edition the reader is informed that "the book not only consists of many good and useful formulas, ready for use where the drugs thereof are indicated, but also will serve to show many combinations and offer ideas that might not readily occur without some kind of a reminder." The reader is again reminded that "the formulas are the result of practice by careful and discriminating practitioners, and have been used by them before their publication."

On examining the book one notes that the diseases considered have been arranged alphabetically, and "the prescriptions, which have proved most gratifying in results secured, are arranged under the diseases for which prescribed." In the table of contents, however, the diseases are arranged according to systems, and "in this way the use of the handbook is facilitated."

So far the book is promising. A careful reading, however, forces upon one the conclusion that the "practice by careful and discriminating practitioners" in many instances is the practice of former generations which was sufficient in accordance with the state of medical knowledge at the time, but which never produced the results demanded by modern medicine.

In one part the book is singularly up-to-date. Under diabetes the work of Banting is mentioned. Under syphilis, however, one looks in vain for any mention of treatment by arsphenamin, reliance being placed on mercury and the iodides. The treatment of burns has not got beyond the picric acid stage; there is no mention of the efficient treatment developed during the late war.

Among the "clinical hints and suggestions" one notes the following: Under adherent dressings it is stated that "Doctor von Mikulicz suggests an easy means for the painless removal of adherent dressings, viz, by wetting the dressings with oxygenized water. This provokes a copious evolution of bubbles of gas, the mechanical effect of which is to free the gauze and allow its removal without causing pain." In the treatment of appendicitis castor oil is recommended "to unload the bowels if operation is refused."

"The best remedy for bleeding at the nose is the vigorous motion of the jaws as if in the act of chewing. In the case of a child, a wad of paper should be inserted and chewed hard. It is the motion of the jaws that stops the flow of blood. The remedy is very simple, but has never been known to fail in a single instance, even in the severest cases.

"For epistaxis Hutchinson recommends that the patient soak his hands and feet in water as hot as can be borne, a method which he says never fails, even in obstinate cases."

Speaking of ringworm: "Nock says that the following method was shown him by a conscientious but rather ignorant woman who has had charge for many years of a home for waifs and strays. She said that she had never known more than two applications necessary. Take a piece of sodium carbonate (the household washing soda) about the size of a walnut and hold it against a red-hot iron (Nock uses the poker heated in the consulting-room fire); then rub the melted end freely over the ringworm, and particularly thoroughly if it is in the scalp, the hair around the lesion having been cut short. One application is sufficient on the body, but on the scalp it may be necessary to repeat it six or seven days later."

In the treatment of chancre "Erdos advises the following method: If the chancre is of recent date * * * excision followed by asceptic suture is to be recommended. If the sore is ulcerated and of long duration, two months, for instance, and if excision is impossible, a few drops of soluble salt of mercury, such as the benzoate. the biniodide, or the bichloride, may be injected around the chancre. Having washed the parts with a solution of sulphate of copper, or nitrate of silver of strength 1 in 50, an ointment should be applied, consisting of 15 grains of white precipitate, 8 grains of resorcin, 1 ounce of simple ointment, and 2½ grains of lanoline. The same ointment can be used for the normal chancre. The internal treatment should consist as much as possible in mercurial injections. If these are not permitted the ordinary inunction treatment should be followed."

INSTRUCTIONS TO MEDICAL OFFICERS

Circular letter. AWD MET 132694-0(24).
Serial No. 314-1924.

WASHINGTON, D. C., *February 23, 1924.*

To: All naval hospitals.
Subject: Total patient capacity.
Inclosure: Blank forms for report.

1. In order that this bureau may have at all times accurate information as to the number of beds for patients available at each hospital, it is directed that a report on the inclosed form be forwarded to this bureau as of the date of this communication. This report is to be based only upon buildings actually completed and upon those still suitable for the purpose. In case a space has been utilized for purposes other than that of billeting patients, if thereby its adaptability for use as ward space has not been destroyed, and provided that the supplanting activity is not of major importance for a maximum patient activity, the space will be included in the estimated bed capacity.

2. No change in the total number of beds available for patients as now carried, will be made in any official report prior to the receipt at the hospital of instructions relative thereto.

3. Information is desired as to the following:

Normal patient capacity of wards and rooms based on an 8-foot interval between center line of beds in (*a*) permanent structures (*b*) wooden structures.

Emergency patient capacity of wards, rooms, porches, solaria, and other spaces available based on a 6-foot interval.

4. Permanent buildings are to include all brick, stone, concrete, and tile structures; wooden construction to include those built with stucco on wood frame.

5. Information is also desired as to any possible extension of the bed capacity in case of an emergency by utilizing adjacent structures or tents, either on the hospital reservation or adjacent thereto.

E. R. STITT.

U. S. Naval Hospital, ____,

____, 19__

REPORT ON PATIENT CAPACITY

Designation of building, ward, or space	Permanent construction		Wooden construction		Remarks
	8-foot center	6-foot center	8-foot center	6-foot center	

Circular letter. AWD/JBC 125470(24).
Serial No. 315–1924.

WASHINGTON, D. C., *February 26, 1924.*

To: All naval hospitals.

Subject: Classified expenditures and per diem costs at naval hospitals (continental) during November and December, 1923; and review of expenditures for the six months' period from July 1 to December 31, 1923.

1. Due to the late receipt of accountability reports from some hospitals for the months of November and December, and as a review of the longer six months' period is of more practical value than one covering a single month, only a brief consideration will be given to the monthly reports.

2. Before discussing economies evidently effected, the bureau desires to express definitely its policy relative to this subject. It is desired that all hospitals be equipped, maintained, and managed in such a manner as will best conduce to the speedy recovery, comfort, and contentment of the patients. The accountability system and the remarks based thereon, issued from time to time, are for the purpose of enabling the several commanding officers and their staffs to determine how each individual hospital is financially administered from month to month, thereby creating a competitive spirit. These reports also enable the bureau, after a careful consideration of the various factors affecting expenditures and the professional reputation from the several hospitals, to judge of the efficiency of the administration of each. Economy is desirable, not only for patriotic motives but is necessary to meet the constantly contracting appropriation under the operation of the budget. All expenditures curtailed by preventing waste, loss by theft or carelessness means funds available to increase facilities for the care of the sick.

3. That a healthy spirit of rivalry has been aroused is evident when the successive monthly returns have been reviewed, as is shown by a general fall of costs. Furthermore, it is not apparent

that this economy has entailed sacrificing of any essential requirement of the hospital service.

4. Reports for November and December show a seasonal increase in patient activity, particularly at the principal east-coast hospitals. The admission rate to hospital has not reached the usual high point for the season, due to favorable climatic conditions and the absence of epidemic diseases. The discharge ratio has decreased, notable exceptions being Norfolk, San Diego, New York, and Annapolis, where it has risen.

5. It is of interest to note the total cost of food at hospitals running approximately the same monthly per diem ration. At Mare Island during November (with a daily average of 369) this cost was $14.190; San Diego (average 386), the cost of food was $11,405; New York (average 410), cost of food $12,306; while at League Island, with an average of 297 patients, it cost $12,169, or nearly as much as New York, which had over 100 more patients.

6. In respect to total patient per diem cost these two months are appreciably affected by heightened cost for heat and light from seasonable reasons. Despite this, Norfolk shows a drop from $2.45 to $2.10, in December as compared with November. New York shows a reduction of per diem cost of 90 cents in December, which, however, is coincident with an increase of 110 in the daily average of patients. Chelsea shows a 10-cent fall in cost of ration but a marked increase in the total per diem cost, amounting to $2.11. This increase is more than accounted for by urgent repairs to buildings, amounting to $2.16 per patient day. League Island, while adversely affected by a condition, since remedied, causing a high ration cost, taking into consideration the high cost of maintaining temporary buildings, compares favorably with Mare Island and Chelsea. Under Group II Puget Sound is still supplying a ration 12 cents under that of Newport, with the latter having a slightly higher per diem patient rate. It cost $1.10 more per diem per patient at the latter hospital. This cost is traceable to the following charges (some of which are subject to administrative control) in excess of those at Puget Sound: Ration, 12 cents; administration, 5 cents; operating room, 2 cents; dispensary, 1 cent; laundry, 5 cents; heat, light, and power, 40 cents; maintenance buildings and grounds, 7 cents; housekeeping, 7 cents; nurses' quarters, 1 cent; loss by survey, 30 cents. The remaining two hospitals in this group are difficult of comparison, due to the much greater daily average per diem of patients at Washington. Both Annapolis and Washington have a high ration cost, particularly Washington, but both have a rather unique clientele. Annapolis has a falling ration with a much reduced number of patients.

Washington shows a fairly constant average of patients, with a rising ration cost, which may possibly in a measure be due to high cost of commodities. It is believed by careful attention to the special diet kitchen and to the nurses' mess that there should be a reduction in the cost of rations at this hospital. It is of interest to note that at Annapolis, according to reliable information, the nurses' mess subsists satisfactorily on a per diem ration costing 40 cents. Total per diem costs at Washington are falling and compare favorably with Newport. Annapolis has a high per diem rate, partially due to a low patient personnel but also to an increase in the cost of maintenance buildings and grounds, due to extensive urgent repairs.

7. Under Group III Parris Island holds the record for low costs. It is also the most active of the hospitals of this group. The ration for December cost 50 cents and is the lowest of any of the continental hospitals. If this hospital ration is adequate, and there is no reason to presume the contrary, it demonstrates that it is not necessary to have a large daily average of patients to run a low-priced ration. This hospital also has the lowest per diem cost, which has been reached by uniform decreases during the last six months, and as it appears in practically all classes of expenditures shows a careful administration. With the exception of Portsmouth, where climatic conditions necessitate an expenditure per patient day of $5.15 for heat and light during December, this group shows a creditable progressive lowering of the total per diem costs.

8. Before proceeding to a review of the returns of the first six months of the year it is desired to express the appreciation of the bureau of the evident earnest cooperation of the administration of the various hospitals in accomplishing a reduction of expenditures, which, it is believed, has been secured without any sacrifice of efficiency. Foremost in these reductions is that of the cost of ration, which is now for all continental hospitals $0.717 as compared with $0.75 for the fiscal year 1923. This reduction represents a saving of approximately $45,000. This showing is especially good, as it has been effected despite a rise in the cost of food and without any increase in the total daily average of patients in all hospitals.

9. The average cost of ration in Group I was $0.697; Group II, $0.796; Group III, $0.75. Compared with similar costs of the previous year, it is seen that a saving has occurred in Groups I and III, Group II having increased from 78 cents to 79 cents. The following hospitals show a reduction below last year's cost: Group I, New York and Norfolk (marked), Great Lakes and Mare Island; Group II, Puget Sound and Newport; Group III, Key West and Portsmouth. Those showing an increased ration cost are, in Group I, Chelsea and San Diego; Group II, Washington (highest cost for last three

years): Group III, Charleston and Parris Island. It may be noted that Parris Island, while slightly exceeding the ration of the preceding year, has recently markedly reduced it and is now the lowest in the service, as noted above. The naval hospital, Annapolis, has a ration cost the same as last year, but inasmuch as it has had a much lower daily average of patients this in a measure is equivalent to a reduction.

10. During the six months' period under consideration the last three months include seasonal changes which cause a marked increase in the per diem cost at those hospitals subject to these climate conditions; this, taken with the varying patient activity, makes comparison of hospital with hospital in respect to the total per diem patient cost of little value, and the same is true of any comparison of these costs in any one hospital from month to month.

11. When the present system has been continued longer each month can be reasonably compared with the same period of a previous year in the case of each hospital.

12. It is evident, however, that there is a general downward tendency in total costs, which, while small when the individual item is considered, in the aggregate constitutes a considerable economy.

13. The average total patient per diem cost for all these hospitals is $3.14. For Group I, $2.91; for Group II, $2.46; and Group III, $5.69.

E. R. Stitt.

Circular letter. WRJ-Dy 125884(24).
Serial No. 316–1924.

Washington, D. C., *February 29, 1924.*

To: All medical officers, dental officers, pharmacists, and hospital corpsmen on independent duty.

Subject: Modification of present allotment system.

References: (*a*) Paragraph 3043(*d*), (*e*), (*f*), and (*g*), Manual of the Medical Department.
(*b*) Paragraph 3047(*d*) and (*e*), Manual of the Medical Department.
(*c*) Paragraph 3049, Manual of the Medical Department.

Inclosure: Outline of system.

1. References (*a*), (*b*), and (*c*) are hereby canceled.

2. The object of the system outlined on inclosure is to provide information necessary for the proper administration of current appropriations and to enable the bureau to compile the data required by the Bureau of the Budget and by Congress. It does not in any

manner modify or cancel the instructions relative to the internal accounting system for hospitals, ships and stations.

3. The major changes are:

(*a*) Preparation of a budget.

(*b*) Submission of reports of expenditures on allotments quarterly instead of monthly.

(*c*) Simplified classification.

(*d*) Consolidation of allotments.

(*e*) Making available obligated balances until expended.

4. Estimates will be prepared by each naval hospital, medical supply depot, and the Naval Medical School, for the coming fiscal year. In order that each activity may have sufficient time to prepare the estimates the time for submission will be extended from March 15 to April 1.

5. Beginning with the fiscal year 1925, report of expenditure cards will be submitted at the end of each quarter instead of monthly.

E. R. STITT.

INSTRUCTIONS COVERING REPORT OF EXPENDITURES AND OBLIGATIONS BY OBJECTS OF EXPENDITURE

[Effective beginning 1 July, 1924, at all Naval Medical Department activities]

CLASSIFICATION OF OBJECTS OF EXPENDITURE

1. The classification by objects of expenditure herein given will be used when reporting appropriational expenditures.

2. Expenditures from any appropriation under the cognizance of the Bureau of Medicine and Surgery fall within one of the following general objects of expenditure:

14. *Maintenance and operation of shore stations.*—Includes all expenditures for the general maintenance of and repairs to property at hospitals, medical supply depots, and Naval Medical School; for the repair of equipment (medical department only) at dispensaries, sick quarters, etc.; and all supplies and services consumed in the operation of such activities which are charges against appropriations under the cognizance of the Bureau of Medicine and Surgery.

15. *Maintenance and operation of fleet.*—Includes all expenditures for medical supplies, laundry services, special diets, etc., used on board ships, including hospital ships, by the medical department.

16. *Miscellaneous operating charges.*—Includes all expenditures made for the benefit of the naval service generally not assignable to any individual hospital, station, or ship. Special instruction, artificial limbs, tolls, ferriages, etc., are examples of proper charges to this classification.

22. *Burial expenses.*—Includes all expenditures incurred in connection with the preparation, transportation, and clothing of remains.

30. *Equipage of naval vessels.*—Includes all expenditures made for surgical instruments, appliances, or other equipment purchased for use by the medical department of a ship. (Articles furnished by other bureaus will not be included.)

32. *Additions and improvements to shore stations.*—Includes all expenditures made for buildings, major improvements to land and buildings, new equipment, etc.
34. *Reserve stores on hand.*—Includes the purchase of stores for issue by medical supply depots.
01. *Payment for professional services.*—Cost of services where naval medical officer is not available. Cost of services where naval dental officer is not available.

3. The above-named objects of expenditure are so comprehensive that they do not furnish sufficient detail for administrative purposes. It is, therefore, necessary to further classify the expenditures made under each general object of expenditure by specific items, or groups of items, making up the totals expended under the general objects of expenditure. For appropriational accounting reasons it has been necessary to make a number of arbitrary divisions of items that would otherwise fall within the same class. For example, item 40, "Repairs to machinery and equipment," would ordinarily include "repairs to motor vehicles," but as two appropriations are involved, a division is necessary. The classification by items, or groups of items, is as follows:

01. Salaries.
02. Wages.
04. Payment of civilian physicians.
05. Payment of civilian dentists.
06. Drugs and medicinal preparations.
07. Hospital and surgical supplies.
08. Laboratory, X ray, and special supplies.
10. Dental supplies.
11. Stationery and office supplies.
12. Cleaning and toilet supplies.
13. Provisions.
14. Special diets.
15. Forage and other supplies for animals.
16. Laundry supplies.
17. Laundry services.
18. Transportation service (supplies and services).
19. Transportation service, passenger carrying (supplies and services).
20. Fuel (except gas; and gasoline for transportation service).
21. Furnishing of gas.
22. Furnishing of steam.
23. Furnishing of electricity.
24. Furnishing of water.
26. Kitchen, dining-room, and household supplies.
27. Mechanics', engineers', and electricians' supplies.
28. Materials. (See classification of item 28.)
34. Miscellaneous supplies and services (not elsewhere classified).
35. Repairs to building and appurtenances.
36. Excavations, embankments, etc.
37. Repairs to reservoirs, wells, cisterns, and sewers.
38. Repairs to restraining walls, etc.
39. Repairs to bridges, piers, and wharves

40. Repairs to machinery and equipment.
41. Repairs to motor vehicles.
42. Trees, plants, care of grounds, seeds, etc.
43. Removal of rubbish, ashes, garbage, etc.
49. Special and miscellaneous repairs and minor improvements.
50. Burial expenses.
51. Transportation of remains.
52. Caskets and embalming supplies.
53. Care of cemeteries.
54. Care of sick in other than naval hospitals.
55. Care of insane.
56. Orthopedic, and prosthetic supplies, including artificial limbs.
57. Special instruction.
58. Tolls and ferriages.
60. Hospital equipment.
62. Kitchen, dining-room, and household utensils and equipment.
63. Furniture, furnishing, and fixtures.
64. Dental equipment.
65. Office machines and devices.
66. Heat, light, power, water, refrigerating, and electrical equipment.
67. Machinery and tools.
68. Transportation and carrying equipment.
69. Fire-preventing and fire-fighting equipment.
70. Cleaning, sanitation, renovating, and polishing equipment.
71. Clipping, trimming, rolling, and watering equipment for lawns and garden.
72. Library and reference books.
79. Sundry equipment.
80. Buildings and appurtenances.
81. Wells, cisterns, and sewers.
82. Retaining and restraining walls, etc.
83. Bridges, piers and wharves.
84. Excavations, embankments, etc.
85. Pavements.
86. Service utility lines.
87. Nonstructural improvements.
89. Special and miscellaneous structures and improvements.

4. For the purpose of clarifying the relationship between the appropriational classification given above and the internal accounting system for hospitals, ships, and stations, the items are divided into two groups; i. e., "Supplies and services" and "Acquisition of property." The former corresponds to expendable articles and the latter to nonexpendable property.

SUPPLIES AND SERVICES

Items in this classification are preceded by symbol numbers 01 to 59, inclusive. In this group are included a large variety of finished articles or things when applied to the use to which they are adapted are consumed; or if not consumed, are not to be held for return or specific account by the person to whom issued. It also includes all expenditures made in the nature of repairs and minor improvements or alterations to buildings, excavations, equipment, and like items, whether done by contract or by Government forces. It includes expenditures for materials which may be used for any of several purposes, the determination of which purpose they will be applied to not having been made at the time of purchase.

All expenditures of a current nature, in contradistinction to acquisition of property, will be a charge under this classification. In other words, this group corresponds to the "Stores" and "Operating expense" account in the hospital accounting system and to the "Expendable supplies" on the accounting system for ships and stations (excepting items preceded by symbol numbers 04, 05, and 50 to 59, inclusive, which are charged to "Navy as a whole" in the hospital accounting system).

ACQUISITION OF PROPERTY

Items in this classification are preceded by symbol numbers 60 to 99, inclusive. Under this heading are grouped those expenditures made in purchasing things or parts of things which are adapted to continued use. It includes expenditures made for the purchase of all equipment and for the construction of and major repairs and extensions to buildings and appurtenances, land, etc.

Items preceded by the symbol numbers 60 to 79, inclusive, correspond to the "Equipment" account in the hospital accounting system and to "Nonexpendable supplies" in the accounting system for ships and stations. Items preceded by symbol numbers 80 to 99, inclusive, correspond to the "Real estate, land and building" account in the hospital accounting system. No similar classification is carried in the accounting system for ships and stations, except for medical supply depots and the Naval Medical School.

NOTE.—These instructions supersede those given in the Manual of the Medical Department and the Bureau M. and S. Circular Letter No. 163–22 regarding the classification of accounts and the preparation and submission of the report of expenditure card. They do not in any way affect the procedure of submitting requisitions or the quarterly report of receipts and expenditures Form E). The instructions in the Manual of the Medical Department will be brought up to date as soon as practicable.

EXAMPLES FOR NUMBERING

1401. Maintenance and operation of shore stations (14), salaries (01).
1406. Maintenance and operation of shore stations (14), drugs and medicinal preparations (06).
1506. Maintenance and operation of fleet (15), drugs and medicinal preparations (06).
1654. Miscellaneous operating expenses (16) care of sick in other than naval hospitals (54).
1655. Miscellaneous operating expenses (16) care of insane (55).
2251. Burial expenses (22), transportation of remains (51).
3064. Equipage of naval vessels (30), dental equipment (64).
3060. Equipage of naval vessels (30), hospital equipment (60).

3260. Additions and improvements to shore stations (32), hospital equipment (60).
3272. Additions and improvements to shore stations (32), library and reference books (72).

The following material was purchased for (*a*) ships (including hospital ships), (*b*) shore stations:

1. Operating table.
2. Dental chair.
3. Typewriter.

(*a*) 1.—3060. Equipage of naval vessels (30), hospital equipment (60).
(*b*) 1.—3260. Additions and improvements to shore stations (32), hospital equipment (60).
(*a*) 2.—3064. Equipage of naval vessels (30), dental equipment (64).
(*b*) 2.—3264. Additions and improvements to shore stations (32), dental equipment (64).
(*a*) 3.—3065. Equipage of naval vessels (30), office machines and devices (65).

NOTE.—This would apply only to hospital ships, as typewriters furnished other ships are a charge against another bureau.

(*b*) 3.—3265. Additions and improvements to shore stations (32), office machines and devices (65).

The following were purchased for a hospital:

1. X-ray films.
2. Flour.
3. Laundry starch.
4. Gasoline.
5. Paint.
6. Grass seed.
7. Caskets.
8. Artificial limb.
9. Lawn mower.
10. Ambulance.

Reference to Chart No. 1 will show that the above purchases fall within the classifications given below:

1.—1408. Maintenance and operation of shore stations (14), laboratory, X-ray, and other special supplies (08).
2.—1413. Maintenance and operation of shore stations (14), provisions (13).
3.—1416. Maintenance and operation of shore stations (14), laundry supplies (16).
4.—1418. Maintenance and operation of shore stations (14), transportation service (18).
5.—1428. Maintenance and operation of shore stations (14), materials (28).

NOTE.—If the paint was for a specific purpose and the allocation could be made at time of purchase, the charge would be as follows:

1435. Maintenance and operation of shore stations (14), repairs to buildings and appurtenances (35).

6.—1442. Maintenance and operation of shore stations (14), trees, plants, care of grounds, seeds, etc. (42).
7.—2252. Burial expenses (22), caskets and embalming supplies (52).

8.—1656. Miscellaneous operating expenses (16), orthopedic and prosthetic supplies (56).

9.—3271. Additions and improvements to shore stations (32), clipping; trimming, rolling, and watering equipment for lawns and gardens (71).

10.—3268. Additions and improvements to shore stations (32), transportation and carrying equipment (68).

The "Report of expenditure and obligation card" will show the expenditures made under the several classifications by numbers only; e g.:

1408	$25
1413	50
1416	35
Etc.	

NOTE.—Reference to Chart No. I will show the proper object and item number to be used in every case.

NOTE.—Reference to Chart No. II will show the proper appropriation to be charged.

The plan outlined will permit the carrying forward of the amounts obligated and unexpended during each quarter.

WHAT CONSTITUTES AN ACTUAL OBLIGATION?

The following will be considered actual obligations:

1. Contracts covering supplies, services, repairs, construction work, or anything actually contracted for where the amount is definite. This would not include the amounts shown on a "more or less" annual contract, unless a definite order had been placed for the delivery of certain items.

2. Requisitions for which an actual order for delivery had been placed. Requisitions submitted to the bureau for approval or for which bids had not been received or orders placed will not be considered as an obligation against the amounts available during the quarter for which the actual order or contract is placed.

3. Job orders approved by the bureau and the work authorized will be considered actual obligations.

4. Orders placed under annual miscellaneous requisitions and the supplies received will be considered actual obligations, but orders placed and the supplies not yet received will *not* be considered actual obligations.

5. In unusual cases where the hospital requests a large amount of work and has planned expenditures so that they will be a charge against a certain quarter and, through no fault of the hospital, the work is not authorized before the expiration of the quarter, a special request may be made to the bureau for authority to charge such obligations to the quarter intended. No such obligations will be set up without approval of the bureau.

6. Stub requisitions which have been completed but for which a charge has not been received will be considered actual obligations.

INSTRUCTIONS FOR PREPARING REPORTS OF EXPENDITURES AND OBLIGATIONS

The reports will be submitted quarterly as of September 30, December 31, March 31, and June 30.

One report of expenditure and obligation card will be submitted to cover each allotment card issued.

On the sample report of expenditure and obligation card each line has been assigned a number for the purpose of reference; the numbers are used in the following explanation to explain the manner in which the report will be prepared.

1. Enter in this space the same number as appears on the allotment card.
2. Enter in this space the last day of the quarter for which the report is submitted; i. e., September 30, December 31, etc., and the year.
3. Enter in this space the name of the hospital, ship, station, or other activity submitting report.
4. Enter in this space the same title of appropriation as appears on the allotment card.
5. Enter in this space the same number and object as appears on the allotment card.
6. Enter in this space the same subhead as appears on the allotment card.
7. Enter in this space the total amount allotted for the year or other period covered by the allotment card.
8. Enter in this space the amount allotted to the quarter for which the report is submitted.
9. Enter in this space the amount of actual obligation outstanding and unpaid as shown in column 12 of the previous quarter's report.
10. Enter in this space the sum of columns 8 and 9.
11. Enter in this space actual expenditures on public bill, pay rolls, stub requisitions, job orders, etc.
12. Enter in this space all actual obligations outstanding and unpaid at the end of the quarter for which the report is submitted.
13. Enter in this space the difference between column 10 and the sum of columns 11 and 12. The amount shown in this space (column 13) represents the sum that will revert to the bureau for further allocation and will not be considered as available for expenditure by the activity.
14. Enter in blank space actual expenditures only (column 11) by classes. (See instructions for numbering.)

In order that the activity may be able to intelligently plan expenditures so as not to create deficiencies in any one quarter, also to allow for obligations incurred during a quarter but not satisfied at the end of the quarter, the activity is authorized to carry over amount of actual obligations from quarter to quarter, thereby increasing the amount available during the succeeding quarters. It is realized that it quite frequently happens a contract is let, say, for the construction of a road during one quarter but it is impossible to finish the work during the quarter or to have the bills paid. As it had been planned to pay for this work out of the amount available during the quarter, it is manifestly unfair to require a report of actual expenditures with a large unexpended balance for the quarter in question and require the amount to be paid out of the next quarter's allowance.

SAMPLE REPORTS OF EXPENDITURE AND OBLIGATION

1. Allotment No. *5815–25.*		
2. Report of expenditures and obligations for quarter ending *Sept. 30, 1924.*		
3. Activity. (*Name of hospital or activity.*)		
4. Subtitle of appropriation *5815–Naval hospital fund–1925.*		
5. Object *14–Maintenance and operation of shore stations.*		
6. Subhead *20; 21; 23; and 24.*		
7. Amount allotted, *$50,000.*		
8. Apportionment for quarter		*$10,000*
9. Plus: Obligations carried over from last quarter		-------
10. Amount available for expenditure and obligation		*10,000*
11. Expended during quarter	[1] *$6,000*	
12. Obligations outstanding	*3,000*	
		9,000
13. Unexpended and unobligated balance		*1,000*
14. Enter in space below expenditures under each item:		
1420		*3,000*
1421		*200*
1423		*1,000*
1424		*1,800*
		6,000

1. Allotment No. *5815–25.*		
2. Report of expenditures and obligations for quarter ending *Dec. 31, 1923.*		
3. Activity. (*Name of hospital or activity.*)		
4. Subtitle of appropriation *5815–Naval hospital fund–1925.*		
5. Object *14–Maintenance and operation of shore stations.*		
6. Subhead *20; 21; 23; and 24.*		
7. Amount allotted, *$50,000.*		
8. Apportionment for quarter		*$15,000*
9. Plus: Obligations carried over from last quarter		*3,000*
10. Amount available for expenditure and obligation		*18,000*
11. Expended during quarter	*$12,000*	
12. Obligations outstanding	*4,000*	
		16,000
13. Unexpended and unobligated balance		*2,000*
14. Enter in space below expenditures under each item:		
1420		*7,000*
1421		*600*
1423		*2,000*
1424		*2,400*
		12,000

NOTE.—The amount shown in column 12 for the previous quarter will be the amount shown in column 9 for the succeeding quarter. The amount shown as "unexpended and unobligated balance" will revert to the bureau for future apportionment as may be necessary.

[1] The amount shown as an actual expenditure during the quarter and the amount shown as a total for the several items should agree.

CLASSIFICATION BY ITEMS, OR GROUPS OF ITEMS, SHOWING IN MORE OR LESS DETAIL THE SPECIFIC ITEM OR CLASS OF ITEMS TO BE INCLUDED UNDER EACH CLASSIFICATION.

01. *Salaries (clerical).*
  - Bookkeeper.
  - Clerk.
  - File clerk.
  - Stenographer and typewriter.
  - Typewriter.
  - Telephone and switchboard operator.
  - Messenger.

02. *Wages.*
  - Includes the pay of all employees carried on the rolls except those listed under 01.

04. *Payment of civilian physicians.*
  - Include under this heading all expenditures made for the payment of civilian physicians for the care of the sick. When charge for professional services is included in the hospital bill, charge to 54.

05. *Payment of civilian dentists.*
  - Include under this heading all expenditures made for the payment of civilian dentists. When charge is for the manufacture of prosthetic appliances, professional work being performed by a naval dental officer, charge to 56.

06. *Drugs and medicinal preparations.*
  - Medicines.
  - Antiseptics and disinfectants.
  - Tablets.
  - Biologicals.

07. *Hospital and surgical supplies.*
  - Surgical instruments and appliances (expendable).
  - Surgical dressings.
  - Hospital and nursing appliances (expendable).
  - Bedding and linen (expendable).

08. *Laboratory, X-ray, and other special supplies.*
  - Dispensary and laboratory equipment (expendable).
  - X-ray apparatus and supplies (expendable).
  - Microscopes and accessories (expendable).
  - Chemical reagents and laboratory supplies.
  - Laboratory animals.
  - Physiotherapy apparatus and supplies (expendable).
  - Hydrotherapy apparatus and supplies (expendable).

10. *Dental supplies.*
  - Dental office furniture and accessories (expendable).
  - Dental instruments and appliances (expendable)
  - Dental fracture appliances and laboratory material (expendable).
  - Miscellaneous equipment (expendable).
  - Preparations and dressings.
  - Office linen (expendable).

11. *Stationery and office supplies.*
  - Plain paper in sheets and rolls (excluding toilet paper).
  - Printed forms and letterheads (when charge is made).

11. *Stationery and office supplies*—Continued.
   - Envelopes, mailing jackets, tubes, and filing folders.
   - Cards, guides, and tags.
   - Carbon and ink-coated papers.
   - Blotting paper.
   - Blank books.
   - Labels, seals, and paper binders.
   - Handwriting supplies, such as pencils, leads, penholders, pens, eradicators and erasers, desk pads, blotter holders, etc.
   - Supplies for office devices, such as typewriter ribbons and other office machine ribbons, brushes, pads and cloths for copying baths, inking pads for hand-stamping devices, metal seals, eyelets and staples, supplies for duplicating machines, etc.
   - Adhesive clips and fasteners, glue, paste, mucilage, pins, twine, tape, rubber bands and rings, sealing wax, metal tags, etc.
   - Inks and miscellaneous office supplies, such as sponges, pencil pointers, desk calendar pads, finger cots, etc.
12. *Cleaning and toilet supplies.*
   - Soaps, soap powders, and liquids (excluding laundry soap, etc.).
   - Chemical cleansers.
   - Disinfectants, fungicides, germicides, vermicides, insecticides, and other prepared animal poisons.
   - Toilet paper.
   - Sponges, fabrics, brooms and brushes, and other cleaning and toilet supplies.
13. *Provisions.*
   - Meat, fish, and fowl.
   - Dairy products and eggs.
   - Cereal food products.
   - Vegetables.
   - Fruits and nuts.
   - Saccharine products.
   - Beverages.
   - Condiments, flavors, and pickles.
   - Fats, oils, and miscellaneous provisions.
14. *Special diets.*
   - Special articles of diet purchased for the sick on board ships and stations. (Hospitals and hospital ships will charge to 13).
15. *Forage and other supplies for animals.*
   - Roughage (hay, clover, alfalfa, fodder).
   - Grain (corn, oats, barley, wheat, etc.).
   - Succulent feed, not by-products (vegetables, etc.).
   - Bedding.
   - Horseshoes, hoof pads, collar pads, packing, and dressing.
16. *Laundry supplies.*
   - Soap.
   - Soda.
   - Starch.
   - Blue.
   - Wax.
   - Canvas covers for rollers, tables, etc.
   - Miscellaneous laundry supplies.

17. *Laundry service.*
    All expenditures for laundry when performed by contract or by ship or station laundry.
18. *Transportation service.*
    Gasoline.
    Oils and grease.
    Automobile soap and cleaning supplies, such as sponges, chamois skins, polishing oils, etc.
    Spark plugs, and other small accessories.
19. *Transportation service, passenger-carrying.*
    Such items as are listed under 18 that are used for passenger-carrying vehicles will be charged under this heading. The only passenger-carrying vehicles authorized by law at the present time, under the Bureau of Medicine and Surgery, are located at the Naval Academy, Annapolis, Md., and Naval Dispensary, Washington, D. C. Passenger-carrying vehicles at naval hospitals authorized by the Secretary's office will not be charged under this heading, as the costs are not a charge to this bureau.
20. *Fuel.*
    Coal and other solids.
    Wood and kindling.
    Petroleum and oils.
    Special and miscellaneous fuel.[1]
21. *Furnishing of gas.*
    The cost of all gas furnished the activity that is a charge to the Bureau of Medicine and Surgery.[1]
22. *Furnishing of steam.*
    The cost of all steam furnished the activity that is a charge to the Bureau of Medicine and Surgery.[1]
23. *Furnishing of electricity.*
    The cost of all electricity furnished the activity that is a charge to the Bureau of Medicine and Surgery.[1]
24. *Furnishing of water.*
    The cost of all water furnished the activity that is a charge to the Bureau of Medicine and Surgery.[1]
26. *Kitchen, dining-room, and household supplies.*
    China, such as bowls, butter chips, cups, dishes, pitchers, plates, and saucers.
    Glass, such as vinegar bottles, butter-dish covers, butter dishes, catsup and sirup pitchers, mustard pots, salt and pepper shakers, tumblers.
    Miscellaneous—crew's mess gear, such as knives, forks, spoons, vegetable paring knives, and other small galley, mess-hall, and household supplies, except officers' silverware and other expensive items.
27. *Mechanics', engineers', and electricians' supplies.*
    Lubricants.
    Packing, calking, and gaskets.
    Polishing and abrading supplies.
    Waste and wipers.
    Electricians' and lighting supplies.
    Soldering and welding supplies.
    Refrigeration supplies.

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[1] Only at hospitals and medical supply depots is this a charge to the Bureau of Medicine and Surgery.

27. *Mechanics', engineers', and electricians' supplies*—Continued.
    Plumbers' supplies.
    Minor tools and supplies not carried as nonexpendable.
    Steam-fitters' supplies.
    Machine-shop supplies.
    Carpenters' supplies, such as nails, screws, minor tools, etc.
    Miscellaneous supplies.

28. *Material.*
    Includes expenditures for materials which may be used for any of several purposes, the determination of which purpose they will be applied to not having been made at the time of purchase.
    Materials purchased for constructing or repairing buildings or for the manufacture of equipment are to be charged directly to purpose for which expenditure is made, if known. For example, if at the time of purchase the materials are bought for constructing a building, it will be charged to 80; if purchased for repairing a building, it will be allocated to 35; and if purchased for manufacturing dining-room tables, it will be charged to 62; but if at the time of purchase it can not be allocated to a specific project, being purchased for stock, it will be charged to 28.
    Metals and metal products.
    Lumber and wood products.
    Fiber products.
    Paints and painters' materials, varnishes, shellacs, enamels, etc.
    Special and miscellaneous materials not specifically allocated for use as supplies, equipment, or structures at time of purchase.

34. *Miscellaneous supplies and services (not elsewhere classified).*
    Self-explanatory.

35. *Repairs to buildings.*
    The cost of material and supplies when purchased for the purpose of repairs to and minor alterations of buildings will be charged to this heading.
    Buildings include all permanent fixtures and equipment for furnishing light, heat, or power therefor; also all elevators, heating apparatus, plumbing, wiring, sewers, awnings, and other like appurtenances. For example, if at the time of purchase a wash bowl was bought for replacing a broken bowl it would be charged to this heading; if bought to be kept in stock it would be charged to 27; if bought for use in the construction of a building, to 80.
    Includes all expenditures made on job orders or under outside contract for the repair of buildings and appurtenances.

36. *Excavations, embankments, etc.*
    Repairs and minor improvements to tunnels, conduits, ditches, railway embankments, etc.
    Includes all expenditures for the purchase of supplies or materials allocated at time of purchase; also cost of work performed on job order or outside contract.

37. *Repairs to reservoirs, wells, cisterns, and sewers.*
    Repairs and minor improvements to water tanks, wells, cisterns, sewer system, etc.
    Includes all expenditures for the purchase of supplies or materials allocated at time of purchase; also cost of work performed on job order or outside contract.

38. *Repairs to restraining walls, etc.*

Repairs and minor improvements to sea walls, restraining walls, etc. Includes all expenditures for the purchase of supplies or materials allocated at time of purchase; also cost of work performed on job order or outside contract.

39. *Repairs to bridges, piers, and wharves.*

Repairs and minor improvements to bridges, boat houses, docks, piers, etc.

Includes all expenditures for the purchase of supplies and materials allocated at time of purchase; also cost of work performed on job order or outside contract.

40. *Repairs to machinery and equipment.*

Repairs and minor improvements to heat, light, water, refrigeration, and electrical equipment, such as—

- Steam-producing apparatus.
- Lighting equipment.
- Refrigerating equipment.
- Steam engines.
- Electrical generators and motors.
- Power, heat, and cold transmitting equipment.
- Pumping equipment.
- Smokestacks and chimneys.
- Fuel-oil tanks.

Repairs and minor improvements to telephone equipment.

Repairs and minor improvements to fire-fighting and fire-preventing equipment, such as chemical carts, hose and reels, fire extinguishers, and other miscellaneous equipment.

Repairs and minor improvements to cleaning, sanitation, renovating, and polishing equipment, such as laundry equipment, sweeping and scrubbing equipment, vacuum cleaners, electrical polishers, road-cleaning equipment, etc.

Repairs and minor improvements to ventilation and air-purifying equipment, such as equipment for disinfecting, fumigating, and sterilizing articles, etc.

Repairs and minor improvements to clipping, trimming, rolling, and watering equipment for lawn and garden, such as lawn mowers, lawn rollers, lawn and garden tools and implements, hose, and reels, etc.

Repairs to hospital furniture, ward and sick-room equipment, surgical instruments and appliances, hydrotherapy and physiotherapy equipment, X-ray and laboratory equipment.

Spare parts for and minor repairs to ranges, bakers, boilers, ice-cream freezers, mixing machines, bake ovens, coffee urns, steam kettles, bread-slicing machines, meat-slicing machines, vegetable machines, and other equipment used in galley, special diet kitchen, nurses' quarters, officers' quarters, etc.

Repairs and minor improvements to special and miscellaneous equipment not elsewhere specified.

Includes all expenditures under this heading for the purchase of supplies or materials for repairs when allocated at the time of purchase; also cost of work performed on job order or outside contract.

41. *Repairs to motor vehicles.*

Spare parts for and repairs to ambulances and trucks, including painting, repairing body, overhauling motor or electrical equipment, or special work required to maintain the vehicle in running condition.

To include all expenditures under this heading for the purchase of all supplies and materials for repairs when allocated at time of purchase; also cost of work performed on job order or outside contract.

42. *Trees, plants care of grounds, seeds, etc.*

Includes all expenditures for the purchase of plants, trees, seeds, fertilizer, bone meal, or other articles used for the beautification of the grounds; repairs and minor improvements to roads, sidewalks, etc.

Includes all expenditures for the care of trees, etc., whether work is performed on job order or on outside contract.

43. *Removal of rubbish, ashes, garbage, etc.*

Includes all expenditures for the removal of garbage, ashes, etc., whether work is performed on job order or outside contract.

49. *Special and miscellaneous repairs and improvements.*

Includes all expenditures for repairs and minor improvements not elsewhere classified.

50. *Burial expenses.*

Includes all expenses in connection with burial of the dead, such as embalming, casket, clothing, hearse and carriages, opening grave, permits, etc., when paid as one service (see 51 and 52), or paid for on two or more bills as part of one service.

51. *Transportation of remains.*

When remains are transported on bill of lading or paid for otherwise the charge will be placed to this account; if paid for as part of burial expenses charge to 50.

52. *Caskets and embalming supplies.*

Only such expenditures as are not paid for as part of the burial expenses will be charged to this account.

53. *Care of cemeteries.*

Includes all expenditures in connection with the care and preservation of cemeteries, including the placing of gravestones, etc.

54. *Care of sick in other than naval hospitals.*

Includes all expenditures in connection with the care of sick (except insane patients) in other than naval hospitals, such as professional service (when rendered as part of the hospital bill), laboratory and X-ray examinations, operating rooms, medicines, etc. Professional services when not included as part of hospital bill will be charged to 04.

55. *Care of insane.*

For the care, maintenance, and treatment of the insane of the Navy and Marine Corps on the Pacific coast, including supernumeraries held for transfer to the Government Hospital for the Insane.

56. *Orthopedic and prosthetic appliances.*

Includes all appliances for correcting or preventing deformity of the body or artificial parts fitted to the body, such as artificial limbs, artificial teeth, braces, etc.

57. *Special instruction.*

Includes all expenditures in connection with the instruction of medical officers, nurses, and hospital corpsmen, other than costs in Naval Medical School and Hospital Corps Schools.

58. *Tolls and ferriages.*

Includes only charges made to Bureau of Medicine and Surgery appropriations.

60. *Hospital equipment.*

Includes all expenditures for equipment that is peculiar to hospitals, such as hospital beds, mattresses, pillows, bedding and linen; nurses' desks; medicine and dressing cabinets; dressing carriages and tables; ward chairs and lockers; bedside screens; irrigating stands; operating tables; sterilizing apparatus; litters; bedpans and urinals; surgical instruments and appliances; X-ray equipment and apparatus; hydrotherapy and physiotherapy equipment; laboratory equipment; and other sundry and miscellaneous hospital equipment not otherwise classified.

62. *Kitchen, dining-room, and household utensils and equipment.*

Includes all expenditures for equipment that is peculiar to this department, such as ranges, cookers, steam kettles, mixing machines, bake ovens, butter-serving machines, vegetable machines, ice-cream freezers, scales, kitchen, meat-cutting and dining-room tables, cooking utensils, silverware, and other nonexpendable mess gear.

63. *Furniture, furnishings, and fixtures.*

Includes all expenditures for furniture used in hospital offices, reception rooms; officers', nurses', and other quarters, such as chairs, beds, and other supports of the body; tables, desks, and other supports and depositories for commodities (includes vaults and safes); floor coverings; portiers, wall, window, and furniture coverings, draperies, and window shades; desk equipment; receptacles, wastebaskets, and desk covers; storehouse fixtures (shelve bins, scales, etc.); equipment for convenience and comfort (porch shades, awnings, mirrors, etc.); and other miscellaneous furniture and furnishings.

64. *Dental equipment.*

Includes all expenditures for dental equipment, such as dental office furniture and accessories; dental instruments and appliances; dental fracture appliances and laboratory material; office linen, etc.

65. *Office machines and devices.*

Typewriters.
Adding and calculating machines.
Bookkeeping machines.
Addressographs.
Billing machines.
Blue-print machines.
Dictating machines.
Duplicating machines.
Mimeographs.
Paper-cutting machines.
Multigraphs.

66. *Heat, light, power, water, refrigeration and electrical equipment.*

Ash-handling apparatus.
Blowers.
Boilers, power plant (including fittings, foundations, settings, furnaces, etc.).

66. *Heat, light, power, water, refrigeration and electrical equipment*—Contd.
Coal-handling apparatus.
Engines, stationary.
Generators, power plant.
Motors.
Oil-burning apparatus, power plant.
Oil stoves, portable.
Pumps, power-house.
Switchboards.
Transformers.
Refrigerating equipment.
Miscellaneous heat, light, power, water, refrigeration, and electrical equipment.

67. *Machinery and tools.*
Drilling machines.
Emery grindstones and grinders.
Lathes, machine and woodworking.
Milling machines.
Oxy-acetylene and hydrogen cutting, outfit for.
Pipe cutting and screwing machines.
Saws, power driven.
Tools, machine.
Woodworking machines.
Power tools, portable.
Torches, hand.
Hand tools, such as chisels, dies, hacksaw frames, hammers, levels, mallets, oil cans, pipe wrenches, pliers, saws, squares, vises, wrenches (all kinds), and other miscellaneous hand tools.

68. *Transporting and conveying equipment.*
Ambulances.
Trucks.
Wagons.
Harness.
Bicycles.

69. *Fire-preventing and fire-fighting equipment.*
Chemical engines and trucks.
Hook-and-ladder trucks.
Hose carts.
Fire hooks, nozzles, and other fire-fighting implements.
Hose and reels.
Fire extinguishers.
Gas masks and other miscellaneous equipment.

70. *Cleaning, sanitation, renovating, and polishing equipment.*
Laundry equipment.
Brushes, sweeping and scrubbing equipment.
Vacuum cleaners.
Polishing machines and polishers.
Road, street, and sidewalk cleaning equipment.
Special and miscellaneous, such as ash, garbage, and refuse cans; vermin traps, mats, cuspidors, etc.

71. *Clipping, trimming, rolling, and watering equipment.*
Lawn mowers, power, hand, and horse-drawn.
Lawn rollers.
Lawn and garden tools and implements, hose, and reels.
Special and miscellaneous equipment.

72. *Library and reference books.*
    Charge the cost of all books purchased to this account.
79. *Sundry equipment.*
    Charge the cost of all equipment not elsewhere classified.
80. *Buildings and appurtenances.*
    Includes first cost or *major* repairs and alterations to all buildings and structures and their appurtenances; includes roofs, floors, walls, drains and sewers (inside), piping (inside), air, oil, gas, steam, water; radiators, wiring (inside).
    Charges for minor repairs, such as painting, or other minor repairs required to maintain the buildings or their appurtenances in good condition, will be to 35.
81. *Wells, cisterns, and sewers.*
    Includes first cost of or major repairs and alterations to all wells, cisterns, water tanks, and sewerage systems.
    Charges for minor repairs will be to 37.
82. *Retaining and restraining walls, etc.*
    Includes first cost or major repairs and alterations to all retaining, restraining, boundary and sea walls, and fences.
    Repairs and minor improvements will be a charge to 38.
83. *Bridges, piers, and wharves.*
    Includes first cost or major repairs and alterations to all bridges, piers, boathouses, and wharves.
    Repairs and minor improvements will be charged to 39.
84. *Excavations, embankments, etc.*
    Includes first cost or major repairs and alterations to tunnels, conduits, ditches, etc.
    Repairs and minor improvements will be charged to 36.
85. *Pavements.*
    Includes first cost or major repairs and alterations to roads, sidewalks, etc.
    Repairs and minor improvements will be charged to 42.
86. *Service utility lines.*
    Includes first cost or major repairs and improvements to water, electricity, gas, steam, and telephone lines. (Other than in buildings.)
    Repairs and minor improvements will be charged to 40.
87. *Nonstructural improvements.*
    Includes first cost of filling and terracing, grading; sodding and top soiling; horticultural and agricultural improvements; surface drains and curbing; razing structures and removing obstructions; and special miscellaneous improvements.
89. *Special and miscellaneous improvements.*
    Includes first cost of any improvements not elsewhere classified.

Chart No. 1

Hospitals	Shore stations	Ships and hospital ships	14 = Maintenance and operation of shore stations. 15 = Maintenance and operation of fleet. 16 = Miscellaneous operating expenses. 22 = Burial expenses. 30 = Equipage of naval vessels. 32 = Additions and improvements to shore stations. 01 = Payment for professional services.
14	14	------	01. Salaries.
14	14	------	02. Wages.
			03.
01	01	01	04. Payment of civilian physicians.
01	01	01	05. Payment of civilian dentists.
14	14	15	06. Drugs and medicinal preparations.
14	14	15	07. Hospital and surgical supplies.
14	14	15	08. Laboratory, X-ray, and special supplies.
			09.
14	14	15	10. Dental supplies.
14	14	15	11. Stationery and office supplies.
14	14	15	12. Cleaning and toilet supplies.
14	------	------	13. Provisions.
------	14	15	14. Special diets.
14	14	15	15. Forage and other supplies for animals.
14	14	15	16. Laundry supplies.
14	14	15	17. Laundry services.
14	14	------	18. Transportation service (supplies and service).
------	14	------	19. Transportation service, passenger-carrying (supplies and service).
14	14	------	20. Fuel (except gas and gasoline for transportation service).
14	14	------	21. Furnishing of gas.
14	14	------	22. Furnishing of steam.
14	14	------	23. Furnishing of electricity.
14	14	------	24. Furnishing of water.
			25.
14	14	15	26. Kitchen, dining-room, and household supplies.
14	14	------	27. Mechanics', engineers', and electricians' supplies.
14	14	15	28. Materials.
			29.
			30.
			31.
			32.
			33.
14	14	15	34. Miscellaneous supplies and services (not elsewhere classified).
14	14	------	35. Repairs to buildings and appurtenances.
14	14	------	36. Excavations, embankments, etc.
14	14	------	37. Repairs to reservoirs, wells, cisterns and sewers.
14	14	------	38. Repairs to restraining walls, etc.
14	14	------	39. Repairs to bridges, piers, and wharves.
14	14	15	40. Repairs to machinery and equipment.
14	14	------	41. Repairs to motor vehicles.
14	14	------	42. Trees, plants, care of grounds, seeds, etc.
14	14	------	43. Removal of rubbish, ashes, garbage, etc.
			44.
			45.
			46.
			47.
			48.
14	14	15	49. Special and miscellaneous repairs and minor improvements.
22	22	22	50. Burial expenses.
22	22	22	51. Transportation of remains.
22	22	22	52. Caskets and embalming supplies.
22	22	22	53. Care of cemeteries.

CHART No. 1—Continued

Hospitals	Shore stations	Ships and hospital ships	14 = Maintenance and operation of shore stations. 15 = Maintenance and operation of fleet. 16 = Miscellaneous operating expenses. 22 = Burial expenses. 30 = Equipage of naval vessels. 32 = Additions and improvements to shore stations. 01 = Payment for professional services.
16	16	16	54. Care of sick in other than naval hospitals.
16	16	16	55. Care of insane.
16	16	16	56. Orthopedic and prosthetic supplies, including artificial limbs.
16	16	16	57. Special instruction.
16	16	16	58. Tolls and ferriages.
			59.
32	32	30	60. Hospital equipment.
			61.
32	32	30	62. Kitchen, dining room, and household utensils and equipment.
32	32	30	63. Furniture, furnishings, and fixtures.
32	32	30	64. Dental equipment.
32	32	30	65. Office machines and devices.
32	32	------	66. Heat, light, power, water, refrigeration, and electrical equipment.
32	32	------	67. Machinery and tools.
32	32	------	68. Transportation and carrying equipment.
32	32	------	69. Fire preventing and fire fighting equipment.
32	32	------	70. Cleaning, sanitation, renovating, and polishing equipment.
32	32	------	71. Clipping, trimming, rolling, and watering equipment for lawns and gardens.
32	32	30	72. Library and reference books.
			73.
			74.
			75.
			76.
			77.
			78.
32	32	30	79. Sundry equipment.
32	32	------	80. Buildings and appurtenances.
32	32	------	81. Wells, cisterns, and sewers.
32	32	------	82. Retaining and restraining walls, etc.
32	32	------	83. Bridges, piers, and wharves.
32	32	------	84. Excavations, embankments, etc.
32	32	------	85. Pavements.
32	32	------	86. Service utility lines.
32	32	------	87. Nonstructural improvements.
			88.
32	32	------	89. Special and miscellaneous structures and improvements.

CHART No. 2

Hospitals (including hospital ships)	Shore activities (other than hospitals)	Ships (other than hospital ships)	M—Appropriation—Medical Department. C—Appropriation—contingent, Medicine and Surgery. D—Appropriation—Care of dead. F—Naval hospital fund. —No charges to be made under this class. X—Appropriation designated by bureau.
M	M	—	01. Salaries.
M	M	—	02. Wages.
			03.
C	C	C	04. Payment of civilian physicians.
C	C	C	05. Payment of civilian dentists.
F	M	M	06. Drugs and medicinal preparations.
F	M	M	07. Hospital and surgical supplies.
F	M	M	08. Laboratory, X-ray, and special supplies.
			09.
C	C	C	10. Dental supplies.
C	C	C	11. Stationery and office supplies.
F	C	—	12. Cleaning and toilet supplies.
F	—	—	13. Provisions.
—	M	M	14. Special diets.
C	C	C	15. Forage and other supplies for animals.
F	C	—	16. Laundry supplies.
F	C	C	17. Laundry service.
C	C	—	18. Transportation service (supplies and services).
—	[1] C	—	19. Transportation service, passenger-carrying (supplies and services).
F	[2] C	—	20. Fuel (except gas and gasoline for transportation service).
F	[2] C	—	21. Furnishing of gas.
F	[2] C	—	22. Furnishing of steam.
F	[2] C	—	23. Furnishing of electricity.
F	[2] C	—	24. Furnishing of water.
			25.
F	[2] C	—	26. Kitchen, dining-room and household supplies.
F	[2] C	—	27. Mechanics', engineers', and electricians' supplies.
F	[2] C	—	28. Materials.
			29.
			30.
			31.
			32.
			33.
F	C	C	34. Miscellaneous supplies and services (not elsewhere classified).
F	[2] C	—	35. Repairs to buildings and appurtenances.
F	[2] C	—	36. Excavations, embankments, etc.
F	[2] C	—	37. Repairs to reservoirs, wells, cisterns, and sewers.
F	[2] C	—	38. Repairs to restraining walls, etc.
F	[2] C	—	39. Repairs to bridges, piers, and wharves.
F	C	C	40. Repairs to machinery and equipment.
C	C	—	41. Repairs to motor vehicles.
C	[2] C	—	42. Trees, plants, care of grounds, seeds, etc.
F	[2] C	—	43. Removal of rubbish, ashes, garbage, etc.
			44.
			45.
			46.
			47.
			48.

[1] Applies only to Naval Dispensary, Washington, and Naval Academy, Annapolis.
[2] Applies only to medical supply depots and Naval Medical School, Washington, D. C.

CHART No. 2—Continued

Hospitals (including hospital ships)	Shore activities (other than hospitals)	Ships (other than hospital ships)	M=Appropriation—Medical Department. C=Appropriation—contingent, Medicine and Surgery. D=Appropriation—Care of dead. F=Naval hospital fund. —=No charges to be made under this class. X=Appropriation designated by bureau.
F	[2] C	—	49. Special and miscellaneous repairs and minor improvements.
D	D	D	50. Burial expenses.
D	D	D	51. Transportation of remains.
D	D	D	52. Caskets and embalming supplies.
D	D	D	53. Care of cemeteries.
F	F	F	54. Care of sick in other than naval hospitals.
[3] C	—	—	55. Care of insane.
C	C	C	56. Orthopedic and prosthetic supplies, including artificial limbs.
—	[4] C	—	57. Special instruction.
C	C	—	58. Tolls and ferriages.
			59.
F	M	M	60. Hospital equipment.
			61.
F	C	—	62. Kitchen, dining room, and household utensils and equipment.
F	C	—	63. Furniture, furnishings, and fixtures.
C	C	C	64. Dental equipment.
F	C	—	65. Office machines and devices.
F	[2] C	—	66. Heat, light, power, water, refrigeration, and electrical equipment.
F	[2] C	—	67. Machinery and tools.
C	C	—	68. Transportation and carrying equipment.
F	[2] C	—	69. Fire preventing and fire fighting equipment.
F	C	—	70. Cleaning, sanitation, renovating, and polishing equipment.
C	[2] C	—	71. Clipping, trimming, rolling, and watering equipment for lawns and gardens.
C	C	C	72. Library and reference books.
			73.
			74.
			75.
			76.
			77.
			78.
F	C	C	79. Sundry equipment.
X	X	—	80. Buildings and appurtenances.
X	X	—	81. Wells, cisterns, and sewers.
X	X	—	82. Retaining and restraining walls, etc.
X	X	—	83. Bridges, piers, and wharves.
X	X	—	84. Excavations, embankments, etc.
X	X	—	85. Pavements.
X	X	—	86. Service utility lines.
X	X	—	87. Nonstructural improvements.
			88.
X	X	—	89. Special and miscellaneous structures and improvements.

[2] Applies only to medical supply depots and Naval Medical School, Washington, D. C.
[3] Applies only to care of insane on Pacific coast (Mare Island Hospital).
[4] Applies only to Naval Medical School, Washington, D. C.

Circular letter. JRP-LMT SD- 132695-O(33).
Serial No. 317-1924.

WASHINGTON, D. C., *March 17, 1924.*

To: Commanding officers, all ships and stations.
Subject: Poster—Dangers of the common wash bucket.

1. In the interests of communicable disease prevention the Bureau of Medicine and Surgery feels that it is important to prevent the use of buckets in common by groups of men for washing themselves and their clothing. Hygiene demands that every man should have and use his own bucket. During the past year two deplorable cases have come to the attention of the bureau in which gonorrheal opthalmia traceable to infection acquired by using another man's wash bucket resulted in irreparable damage to the eyes and necessitated the discharge of both victims on account of permanent disability.

2. Where the common use of buckets is more or less general, concrete examples of infection that may be traced to that source represent but a small percentage of instances in which avoidable transfer of disease-producing microorganisms is taking place. The common wash bucket is regarded as a potent vector in the dissemination of the causative agents of communicable skin diseases and the common respiratory diseases, as well as dysentery, infectious diarrheas, and important communicable diseases such as diphtheria, scarlet fever, etc., when present in the organization.

3. It is requested that copies of the posters transmitted herewith be displayed repeatedly for a few days at a time in suitable locations, so that the crew may become widely informed of the dangers connected with this insanitary practice, and that division officers may be reminded that it is a practice that should not be permitted.

E. R. STITT.

Circular letter. WSD/FTD 126750-O.
Serial No. 318-1924.

WASHINGTON, D. C., *March 20, 1924.*

To: All naval hospitals.
Medical officer, all navy yards and naval stations.
Post surgeon, Marine Barracks, Quantico, Va.
Naval medical supply depot, Brooklyn, N. Y.
U. S. S. *Mercy.*
U. S. S. *Relief.*
Naval Medical School.
Naval Dispensary, Navy Department.
Subject: Medical periodicals.
References: M. and S. circular letter, Serial No. 253-1923, No. 126750-O(23), April 6, 1923.

1. In continuation of the plan adopted last year, and by direction of the Secretary of the Navy, all medical department periodicals for

the fiscal year 1925 will be subscribed for by and delivered to the bureau for distribution. Therefore, medical department activities will not submit requisitions for medical periodicals for the fiscal year 1925.

2. Standard and uniform lists of periodicals have been adopted for each medical department activity, and distribution will be continued from the bureau in accordance therewith, during the fiscal year 1925. weekly or monthly, as the case may be.

3. The standard distribution list adopted is as follows:

(*a*) Naval hospitals (Chelsea, Newport, New York, League Island, Washington, Annapolis, Norfolk, Pensacola, Great Lakes, Mare Island, San Diego, Canacao, U. S. S. *Mercy*, U. S. S. *Relief*):

American Journal of Medical Sciences.
American Journal of Nursing (2 copies).
American Journal of Pharmacy.
American Journal of Roentgenology.
Annals of Clinical Medicine.
Annals of Surgery.
Archives of Ophthalmology.
Archives of Surgery.
Journal of American Medical Association.
Journal of Dental Research.
Journal of Nervous and Mental Diseases.
Journal of Urology.
Military Surgeon.
Naval Medical Bulletin and Supplement.
Public Health Reports.
Surgery, Gynecology, and Obstetrics.
Tropical Diseases Bulletin (Canacao only).

(*b*) Naval hospitals (Portsmouth, Charleston, Parris Island, Key West, Puget Sound, Pearl Harbor, Guam, St. Thomas, naval station, Tutuila, Samoa; marine barracks, Quantico, Va.):

American Journal of Medical Sciences.
American Journal of Nursing (2 copies).
American Journal of Pharmacy.
Journal of Dental Research.
Journal of American Medical Association.
Military Surgeon.
Naval Medical Bulletin and Supplement.
Public Health Reports.
Surgery, Gynecology, and Obstetrics.
Tropical Diseases Bulletin (Guam, Samoa, and St. Thomas only).

(*c*) Navy yards and stations:

American Journal of Medical Sciences.
Dental Cosmos (where there is a dental officer).
Journal of American Medical Association.
Journal of Industrial Hygiene (industrial yards only).
Military Surgeon (larger yards only).
Public Health Reports.
Tropical Diseases Bulletin (for tropical stations).

(*d*) Naval medical supply depot, Brooklyn:

American Journal of Roentgenology.
Chemical Abstracts.
Dental Cosmos.
Dental Digest.
Dental Items of Interest.
Druggist's Circular.
Journal of American Medical Association.
Journal of Industrial and Engineering Chemistry.
Military Surgeon.
Modern Hospital.

(*e*) Other Medical Department activities, with two or more medical officers:

American Journal of Medical Sciences.
Dental Cosmos (where there is a dental officer).
Journal of American Medical Association.
Public Health Reports.

(*e*–1) One medical officer:

Dental Cosmos (where there is a dental officer).
Journal of American Medical Association.
Public Health Reports.

(*f*) Hospital Corps schools:

American Journal of Pharmacy.
Journal of American Medical Association.
Journal of American Pharmaceutical Association.
Military Surgeon.

(*g*) Training stations and Naval Academy:

American Journal of Medical Sciences.
Dental Cosmos.
Journal of American Dental Association.
Journal of American Medical Association.
Journal of Dental Research.
Military Surgeon.
Public Health Reports.

4. Endeavor will be made promptly to forward the journals in accordance with the foregoing. Only a sufficient number of each journal has been ordered to supply anticipated requirements, however, and some variation from the list may be required, from time to time, to provide for changes or new activities.

E. R. STITT.

Circular letter. (ERS):ESK 129733(33).
Serial No. 319–1924.

WASHINGTON, D. C., *March 24, 1924.*

To: All naval hospitals.
Subject: Instruction in occupational therapy at U. S. naval hospitals.

1. The Bureau of Medicine and Surgery invites the attention of the commanding officer to the fact that occupational therapy aids, instructors, or teachers employed by this bureau (not the American Red Cross personnel) are for the purpose of instructing United States Veterans' Bureau beneficiaries only, and under no conditions are these employees to give instruction to naval and Marine Corps personnel.

2. Occupational therapy personnel employed by the American Red Cross Society and assigned to duty at United States naval hospitals may instruct United States Veterans' Bureau beneficiaries as well as naval and Marine Corps personnel.

3. This bureau approves the arrangements under which occupational therapy instruction is now being conducted at naval hospitals with the exceptions made in paragraphs 1 and 2 of this letter.

4. These instructions apply to all United States naval hospitals to which beneficiaries of the Veterans' Bureau are assigned for treatment, and particularly to institutions at which naval and Marine Corps personnel are receiving instruction in subjects which were formerly classed as prevocational training, such as arithmetic, grammar, spelling, commercial law, typewriting, stenography, etc. Instruction in these subjects will not be given naval and Marine Corps personnel. There is, however, no objection to naval and Marine Corps personnel, attached to naval hospitals, receiving instruction from American Red Cross aids, teachers, or instructors in bead work, weaving, basketry, pottery, leather work, etc.

5. Acknowledgment of the receipt of this letter is requested.

E. R. STITT.

Circular letter. WSD:FTD 132645.
Serial No. 320–1924.

WASHINGTON, D. C., *April 4, 1924.*

To: All naval hospitals (continental limits).
Naval hospital, Pearl Harbor, Hawaii.
Post surgeon, Marine Barracks, Quantico, Va.
Naval medical supply depots, Brooklyn, N. Y., and Mare Island, Calif.
Naval Medical School, Washington, D. C.
Naval Dispensary, Navy Department, Washington, D. C.
Senior medical officer, naval training station, Hampton Roads, Va.

Subject: Civilian employees; service records in connection with retirement.

References: (*a*) Navy Department circular letter, March 4, 1922, "Application for refund."
(*b*) Navy Department circular letter, May 16, 1922, "Application for refund."
(*c*) Navy Department circular letter, October 20, 1922, "Abstract of official record of employees."
(*d*) Navy Department circular letter, November 28, 1923, "Application for refund."

1. Attention is called to the importance of compiling and keeping current service records of all civil-service employees eligible for retirement under the act of May 22, 1920, as amended. At the present time, while records are readily available, it should be comparatively easy to prepare a complete service record for each employee from date of original appointment, including record of the 2½ per cent deductions from pay from August 1, 1920, properly computed and posted by fiscal years. Space for these latter entries is provided on N. M. S. Hospital Form No. 62, " Time and pay-roll record and service card."

2. The form of application for annuity upon retirement requires a complete schedule of employment under the Government, with entries showing compensation for at least the last 10 years of actual service. Upon the transfer of an employee from one administrative unit to another an abstract of official record must be transmitted to the office to which transfer is made, showing complete record from date of appointment and a statement of deductions for retirement fund from August 1, 1920, by fiscal years. When an employee leaves the service and makes application for refund of deductions the certifi-

cate of the administrative officer calls for similar data. It will thus be appreciated that complete service records, in addition to being required by the retirement act, are essential to the proper preparation of these various forms.

3. The essential features in connection with these service records are stressed in the department circular letters listed as references.

F. L. PLEADWELL,
Acting.

Circular letter. ERS:CAS 132674(42).
Serial No. 321–1924.

WASHINGTON, D. C., *April 9, 1924.*

To: All medical officers.

Subject: Changes in Supply Table of the Medical Department, United States Navy, 1922.

1. Spiritus ætheris nitrosi, U. S. P., in 100 c. c. bottle, is hereby added to the Supply Table. Correct copies of Supply Table by deleting "Ætheris nitrosi, spiritus (2), concentrated solution for, in glass tube, ------ tubes" and allowances and explanatory note pertaining to this item. Substitute the following: "Ætheris nitrosi, spiritus, 100 c. c. in bottle, ------ bottles" and insert allowances in columns, as follows:

Destroyer to which no medical officer attached	A	B	C	D	E	F	G	H
-------------------	------	15	20	25	30	35	40	(1)

E. Epinephrinæ, bitartras, synthetic, 0.18 gram in ampule (the equivalent of 0.1 gram epinephrine), is hereby added to the Supply Table. Insert the following on page 12 of Supply Table, below "Digitalis, tinctura": "*Epinephrinæ bitartras, synthetic, 0.18 gram ampule, ------ ampules"; insert footnote on page 12, as follows: "* The contents of one ampule dissolved in 100 c. c. sterile, distilled water will yield the equivalent of a 1–1,000 solution of epinephrine (L-suprarenin)." Insert allowances in columns, as follows:

Destroyer to which no medical officer attached	A	B	C	D	E	F	G	H
1------------------	1	1	2	2	3	4	5	(1)

E. R. STITT.

Circular letter. (ERS):ESK 129733(32).
Serial No. 322–1924.

WASHINGTON, *D. C.*, *April 16*, *1924*.

To: All naval hospitals.

Subject: Reports by telegraph of admissions to and discharges from United States naval hospitals, and notices of deaths of ex-members of the Canadian, Imperial, or other British forces.

Reference: (*a*) U. S. V. B. Med. Div. Hospital Circular 135–B, dated March 10, 1924.

1. The Surgeon General of the Navy addressed a communication to the Director of the United States Veterans' Bureau, requesting that official to modify the United States Veterans' Bureau orders referred to in reference (*a*) in such a manner that commanding officers of naval hospitals could communicate directly with the United States Veterans' Bureau district offices regarding moves of patients, to and from their hospitals, who are ex-members of the Canadian, Imperial, or other British forces. This communication also stated that it was impracticable for the commanding officers of naval hospitals to send telegrams to the Canadian officials direct.

2. The following reply has been received from the Assistant Director of the United States Veterans' Bureau, under date of April 12:

"In reply to your letter dated April 2, 1924, your reference No. 129733(32) WJCA:FTD, it is pointed out that the object in requesting that the commanding officers of naval hospitals wire the Director of Medical Services, Department of Soldiers' Civil Reestablishment, Ottawa, Canada, direct in advising of the admission, discharge, and death of Canadian ex-service men who come under the jurisdiction of such hospitals, was to expedite the reports to the Canadian Government and to save unnecessary expenses.

"Under the prior arrangement the commanding officer of the hospital wired the subdistrict office, which in turn wired the district office, which in turn wired central office, which in turn wired Canada, a roundabout procedure which occasioned delays that at times proved embarrassing, not only to this bureau, but to the Canadian Government.

"There should be no occasion for confusion in the transmission of telegrams or radiograms to the Director of Medical Services, Department of Soldiers' Civil Reestablishment, Ottawa, Canada, by a commanding officer of a naval hospital. All that is necessary is to have the commanding officer indorse the telegram, 'Charge United States Veterans' Bureau.'"

3. Commanding officers of naval hospitals receiving the class of patients referred to in reference (*a*), are directed to comply with instructions contained in reference (*a*), and on all telegrams to

the Director of Medical Services, Department of Soldiers' Civil Reestablishment, Ottawa, Canada, to write "Charge United States Veterans' Bureau." Such telegrams will be sent directly through the local office of the telegraph company, and not through the Naval Communication Service. It is understood from the letter received from the Director of the Veterans' Bureau that the telegraph companies receiving the message will make charge for the same against the United States Veterans' Bureau.

E. R. Stitt.

Circular letter. JWR: GA 125949(34).
Serial No. 323–1924.

Washington, D. C., *April 19, 1924.*

To: All naval hospitals.

Subject: Admission to naval hospitals of officers and enlisted men not of the regular Navy.

References: (*a*) Paragraph 1909, Manual of the Medical Department, 1922.

(*b*) Paragraph 2 of footnotes on Ration Notices S and T.

1. Attention is invited to a discrepancy appearing in the instructions contained in above mentioned references. The instructions contained in footnotes on Ration Notices "S" and "T" are correct, and will be followed. Subparagraph (*a*) of paragraph 1909, Manual of the Medical Department, 1922, is in error, and will be corrected in the next publication of "Changes in the Manual of the Medical Department."

2. When a transferred member of the Fleet Naval Reserve, Navy and Marine Corps (ref. *b*) is admitted to a naval hospital, Ration notice Form "S" will be immediately issued and forwarded to the "Retainer Pay Section, Allotment Division, Bureau of Supplies and Accounts, Navy Department," and Ration notice Form "T" mailed to the same address upon discharge from treatment.

E. R. Stitt.

Circular letter. (ERS): ESK 129733(43).
Serial No. 324–1924.

Washington, D. C., *April 19, 1924.*

To: All naval hospitals.

Subject. Discharge of claimants from naval hospitals whose cases have been disallowed by the United States Veterans' Bureau.

Reference: (*a*) Director United States Veterans' Bureau letter to Surgeon General of the Navy, dated April 17, 1924.

1. Reference (*a*) is quoted herewith for your information and compliance:

" Information has been received that there is some misunderstanding in some of the hospitals of your service relative to the attitude of the Veterans' Bureau in discharging claimants from hospitals whose cases have been disallowed but the discharge of whom is impracticable, owing to the possibility of jeopardizing their lives and safety by such discharge.

"It is respectfully requested that your hospitals be advised with reference to this matter as follows:

"If the claimant's case is disallowed while he is under treatment and his condition is such that it would make his discharge from the hospital unsafe or impracticable by jeopardizing his life and safety, he must necessarily be kept under treatment until he can be safely discharged or until death intervenes, and during the time that such claimant remains in the hospital after disallowance of his claim, he is entitled to any treatment that may be necessary, including special care from outside sources (if proper treatment can not be obtained through the regular hospital facilities) or by transfer to another hospital where the treatment can be given. If the necessary treatment is of such character as to require transfer of a claimant in a case of this sort to a hospital in another district, a telegraphic request should be made to the central office stating briefly the circumstances indicating transfer and requesting authority to remove the claimant to another institution.

"This is covered also by Veterans' Bureau 'District manager letter, Director's Office No. 3,' under date of April 15, 1922, copy of which is inclosed for your information."

E. R. Stitt.

Circular letter. AWD/JBC 125470(52).
Serial No. 325–1924.

Washington, D. C., *May 12, 1924.*

To: All naval hospitals.

Subject: Classified expenditures and per diem costs at naval hospitals (continental) during January, February, and March, 1924; and review of expenditures for the three months' period from January 1 to March 31, 1924.

1. The total number of patients in continental naval hospitals during this quarter is less than during the corresponding period of the previous year, reflecting the low morbidity rate for the service during the past year. This means that the overhead expense has been met by a lower number of sick days, and hence the figures for the total average per-diem rate show comparatively less than has been actually accomplished economically.

2. The daily average of patients increased during this period in all of Group I with the exception of the west-coast institutions, where a reduction followed the departure of the fleet; Group II, all

decreased except Annapolis; Group III shows little variation in the number of patients. New York has had the greatest number of patients, closely followed by Norfolk, Chelsea, and San Diego. Mare Island and League Island are closely approximated in the number of patients. In Group II, the activities at Newport and Puget Sound are about the same. Washington has decreased in the number of patients, while Annapolis has increased.

Average discharge ratio.—This ratio is slightly higher than during the preceding period of this year, the increase being most marked in Group II. Group I, New York experienced the most rapid overturn of patients. The lowest ratio is at Mare Island, not taking into consideration the Great Lakes Hospital, where, due to the chronic type of its patients (neuro-psychiatric), the overturn is slower. Group II, Newport and Annapolis have a high discharge ratio, and Washington and Puget Sound show an increase.

Administrative charges.—These charges are quite uniform throughout the service, being somewhat higher in the hospitals having Veterans' Bureau patients. They usually run from 0.05 to 0.07 per patient day. Unless explainable by bookkeeping methods, this charge at Newport is very high.

Operating room.—This cost runs from 0.01 to 0.03. Norfolk shows a very economical service, while Annapolis is rather high, from 0.05 to 0.10. These expenditures are, of course, subject to unavoidable increases, due to the activity of the surgical section, the nature of the operative cases, and may in some instances be apparently large due to methods of bookkeeping, as, for instance, at some hospitals all surgical dressings are prepared and issued from a central sterilizing room, charged to the operating room, then issued to the wards, while at others the wards are charged directly.

X ray.—The average cost per patient for this service is from 0.01 to 0.03. The New York Hospital shows the highest charge, amounting from 0.04 to 0.07. League Island has a low charge considering the amount of work done there.

Physiotherapy.—The charge per patient for this service is so minimal as to hardly deserve notice, except to state that as the cost of electric current and water are not charged to this activity, the figures given do not represent the actual expense. Savings in this department would appear under heat, light, and power.

Dispensary.—This charge averages 0.03 to 0.05, which amount is notably exceeded by Washington and Annapolis, both of which have considerable out-patient activity. The general use of iletin has been effective in raising dispensary costs.

Dental and other laboratories.—These activities add but little to the per diem cost.

Laundry.—The charges for laundry work show great variation, from 0.04 to 0.40 per patient day. The high per diem contract laundry costs at Great Lakes were due to a lack of competition, and as a result the hospital laundry has been reopened. At the present time, the bureau has no accurate figures on which to base an opinion as to the desirability from a purely financial standpoint of operating hospital laundries. The only hospitals maintaining a laundry during this period are those at New York and Pensacola. The former was operated under disadvantageous circumstances and the latter in its per diem cost, due to the small number of patients at that hospital, had to bear a heavy overhead. The retention of the hospital laundry where civil hospitals can contract for this work will depend in a large measure upon the efficient manner in which the hospital laundry is administered. It is believed that any hospital averaging over 100 beds should be able to effect a cash saving by operating its own laundry. In order to permit hospital laundries to function economically where efficient and economic contracts can not be effected, the bureau will consider the installation of the most modern appliances.

Transportation.—The more active hospitals show a per diem patient charge of from 0.05 (League Island), Group II, charges 0.08 (Washington) to 0.20 (Newport). This charge naturally varies according to the distance from sources from which patients are received, but it is materially subject to control through careful supervision of motor efficiency, care of tires, and the greater use of the more economical small ambulances and trucks.

Heat, light, and power.—This charge is comparatively little affected by the number of patients and to a great degree by climate, season, number, and character of buildings, and by the extent of grounds, so the total cost only will be considered. Norfolk and Washington are the only hospitals where all heat, light, and power are supplied from the hospital power plant. New York, Chelsea, Mare Island, Annapolis, Newport, and Great Lakes have boiler plants supplying steam only. League Island was furnished steam from an auxiliary yard plant, and the charges represent the cost of fuel allowed, and therefore these figures are not comparable with any of the others. Allowing for climatic and other local conditions, the power plants at Norfolk and Washington appear economical. New York and Chelsea are close in total costs, with an apparent advantage as to low cost of operation for Chelsea. This is probably explainable by a less economic power plant at New York, which upon the recommendation of the commanding officer is to be extensively changed. Considering climatic conditions, the extent of reservation, number and structure of all buildings, the cost of the Mare

Island plant appears high as compared with Great Lakes and would seem to indicate an inefficient plant.

Maintenance, buildings and grounds.—Owing to the short period involved during which extensive repairs and renovation were effected at many hospitals, the charges do not give a fair showing. It is believed that next to the commissary charges it is in this item that executive ability has its greatest chance to effect economy. At all hospitals a liberal allotment is made for employees, and now that the bureau has allowed the larger jobs to be done by contract or temporary employees, it is to be expected that the routine maintenance of buildings and grounds shall be done by hospital force.

Commissary.—The cost of the ration enters so largely into this charge that it will be considered in connection with it. The ration value for the continental hospitals for the period under consideration was 0.659, as compared with 0.75 for the fiscal year 1923. This represents a saving for these hospitals of $53,094. All groups participated in this saving. As compared with November and December, 1923, Group I has dropped from 0.697 to 0.639; Group II from 0.796 to 0.729; Group III from 0.75 to 0.695. This is approximately a drop of 0.06 in each group. Practically all hospitals show a reduction in commissary cost, the exceptions being those on the Pacific coast, where a lower average patient complement is partly accountable for it. San Diego runs about as before. Mare Island and Puget Sound show a reduction in ration cost and an increase in the commissary rate. New York and Norfolk have made marked reduction in the commissary rate. The former especially so in March, when it reached the low figure of 1.03, accompanied by a ration value of 0.539, this being the lowest of any of the hospitals which are now being considered. Washington has made a marked reduction in the per diem commissary cost despite a reduction in the number of cases. Annapolis likewise has effected a notable lowering of the ration and commissary costs. League Island is approaching the average cost, and Puget Sound and Newport are nearing each other's figures. The reduction at all hospitals is a matter of great gratification to this bureau, particularly as it has not been accomplished by lowering of the quality or quantity of the ration but is known to have been accomplished by an improved menu, this being attributable to an increased interest and attention on the part of commanding officers, executive and commissary officers.

Housekeeping.—This charge runs from less than 0.01 per patient day at Norfolk to 0.12 in New York in Group I, the average being about 0.05. It seemed to be rather high in the case of the latter and somewhat too low in the former. In Group II, Newport stands high, 0.12, especially when compared with other hospitals of this group.

Occupational therapy.—This activity is present in only a few of the hospitals, where it costs from 0.02 to 0.12 per diem.

Net operating expense.—This item is so influenced by surveys at some hospitals and climatic changes and unusual expenditures for repairs that comparison for less periods than a year is hardly advisable.

E. R. STITT.

Circular letter.
Serial No. 326–1924.

WSD/FTD 124942–O.

WASHINGTON, D. C., *May 14, 1924.*

To: All naval hospitals.

Subject: Status of civilian employees taken on for temporary work.

References: (*a*) Par. 1837 (*a*), page 171, Manual for the Medical Department.

(*b*) Navy Department circular letter No. Sonyd–7–Wo, February 25, 1924, " Leave of absence with pay in cases of temporary employees."

(*c*) Navy Department letter No. Sonyd–7–Wo, May 7, 1924.

1. Following the promulgation of reference (*b*), question was raised as to the right to accumulated annual leave in cases of yard employees transferred to the roll of a naval hospital for work of temporary duration, such employees being additional to and not a part of the regular force of the hospital; it being stated that such temporary transfer had not broken the continuity of service necessary for accrual of leave under the act of August 29, 1916, which provides " That it shall be lawful to allow pro rata leave only to those serving twelve consecutive months or more."

2. In submitting the question to the Assistant Secretary of the Navy the bureau stated that it was the custom to carry these additional employees on the hospital pay rolls under a separate heading, " Temporary employees," but that this was not considered as in any way affecting their status. The reply of the Assistant Secretary (reference (*c*)) is quoted in full:

" 1. Temporary appointments, as such, may only be made in the absence of available eligibles in the particular rating in which it is desired to make appointment, and such appointments terminate within 30 days from the establishment of an eligible register, unless the temporary appointee is within reach for certification from the said register, in accordance with paragraphs 49, 50, and 51 of reference (*d*). (Civil service Form 2009.)

" 2. There is no authority to set up separate pay rolls containing names of so-called temporary employees, as was done at the naval hospital, Great Lakes, Ill. With the exception of employees holding temporary appointments, as indicated in paragraph 1 hereof, all other employees holding either probational, conditional probational, or absolute appointments shall be carried on the roll without distinction; shall be rated on the basis of demonstrated efficiency in their trade or occupation, and when reductions in the force become necessary shall be selected for discharge in accordance with paragraphs 68, 69, and 70 of reference (*d*).

"3. The question of granting leave to employees holding temporary appointments has been referred to the comptroller for further consideration.

"4. It is requested that the bureau issue instructions to discontinue the practice reported in references (*b*) and (*c*) (using the pay-roll heading 'Temporary employees') and direct conformity with the provisions of civil service Form 2009, 'Regulations governing the employment of civil personnel under the naval service.'"

3. All hospitals will immediately comply with the instructions contained in paragraph 4 of the above quoted letter; the provision relating to temporary employees appearing on page 171 of the Manual for the Medical Department (ref. (*a*)) will be stricken out.

4. Attention is called to the distinction between "temporary employees" appointed in the absence of available eligibles from the register of the Labor Board, and employees holding probational or absolute appointments who are taken on by the hospital for work of temporary duration. The exact status of employees taken on for temporary work always should be ascertained from the Labor Board in order that they may retain any rights accrued on account of leave or civil service retirement.

5. By Alnavsta of May 13, 1924, the department directs that the provisions of reference (*b*) shall be followed until further instructions are issued.

E. R. Stitt.

Circular letter. WRJ–Dy. 125884(52).
Serial No. 327–1924.

Washington, D. C., *May 14, 1924*.

To: All naval hospitals.
Subject: Hospital accounting system.
Inclosure: (1).

1. The instructions contained in inclosure will be followed by each hospital at the end of each fiscal year.

2. A comparative "balance sheet" will be forwarded to the bureau as soon after the close of the fiscal year as possible. This report will conform to the sample included in the instructions.

E. R. Stitt.

INSTRUCTIONS FOR CLOSING HOSPITAL BOOKS AT CLOSE OF FISCAL YEAR

After preparation of the "Recapitulation" for the month of June the books will be adjusted as follows:

Step 1.—Obtain the net balances of all accounts.

Step 2.—Prepare a trial balance to prove the correctness of the net balance of accounts.

TRIAL BALANCE BEFORE ADJUSTMENT

1. Capital		$4,355,541.86
2. Real estate, land, and buildings	$3,944,726.85	
3. Equipment	346,616.17	
4. Stores	77,613.43	
5. Medical supply depots		19,770.23
6. Other naval supplies		76,547.04
7. Vouchers payable		317,075.09
8. Transfer vouchers issued	4,009.03	
9. Transfer vouchers received		111.50
10. Operating expense	390,936.60	
11. Inventory adjustments		767.56
12. Contingencies and losses	892.06	
13. Navy as a whole	5,019.14	
	4,769,813.28	4,769,813.28

Step 3.—Prepare journal entries to close out balances of nominal accounts (accounts 5 to 13, inclusive) and transfer totals to "Adjustment account" (a temporary account raised in the books at the close of the fiscal period for collecting balances of nominal accounts).

June, 1924

30

Medical supply depots	$19,770.23	
Other naval supplies	76,547.04	
Vouchers payable	317,075.09	
Transfer vouchers received	111.50	
Inventory adjustments	[1] 767.56	
To: Adjustment account		$414,271.42

For adjustment of nominal accounts at close of fiscal year

30

Adjustment accounts	$400,856.83	
To: Transfer vouchers issued		$4,009.03
Operating expense		390,936.60
Contingencies and losses		892.06
Navy as a whole		5,019.14

For adjustment of nominal accounts at close of fiscal year

[1] If this account had a debit balance it would be included in the second entry.

Step 4.—Open an account designated as "Adjustment account" and post the foregoing entries.

After posting the foregoing entries, accounts 5 to 13, inclusive, will be closed out (that is, the debit side will be the same as the credit side); the adjustment account will appear as follows:

ADJUSTMENT ACCOUNT

To sundries	$400,856.83	By sundries	$414,271.42

Step 5.—Transfer by journal entry the balance of the "Adjustment account" (difference between the debit and credit side of ledger) to "Capital account."

30		
Adjustment account	$13,414.59	
To: Capital account		$13,414.59

For adjustment of capital account

NOTE.—If the debit balance of the "Adjustable account" exceeded the credit balance, the above entry would be reversed; i. e., capital account would be debited and adjustment account credited.

After the above entry is posted the adjustment and capital accounts will appear as follows:

ADJUSTMENT ACCOUNT

To sundries	$400,856.83	By sundries	$414,271.42
To capital account	13,414.59		
	414,271.42		414,271.42

CAPITAL ACCOUNT

		By sundries	$4,355,541.86
		By adjustment account	13,414.59

A trial balance taken after adjusting the books will reveal the following facts (accounts 5 to 13, inclusive, have no balances as of July 1):

1. Capital		$4,368,956.45
2. Real estate, land and buildings	$3,944,726.85	
3. Equipment	346,616.17	
4. Stores	77,613.43	
	4,368,956.45	4,368,956.45

The "Balance former month" column in the "Recapitulation" for the month of July will be the same as the trial balance taken after adjustment of books.

United States Naval Hospital ______________________________

COMPARATIVE BALANCE SHEET AS OF JUNE 30, 1924

	1924 (July 1, 1924)	1923 (July 1, 1923)	Increase
1. Capital	$4, 368, 956. 45	$4, 355, 541. 86	$13, 414. 59
2. Real estate, land and buildings	3, 944, 726. 85	3, 930, 730. 40	13, 996. 45
3. Equipment	346, 616. 17	346, 613. 07	3. 10
4. Stores	77, 613. 43	78, 198. 39	[1] 584. 96
	4, 368, 956. 45	4, 355, 541. 86	13, 414. 59

[1] Decrease.

NOTE.—Sample of balance sheet to be submitted to bureau.

Circular letter. AWD MET 132694–0(53).
Serial No. 328–1924.

WASHINGTON, D. C., *May 19, 1924.*

To: All naval hospitals.
Subject: Fire hazard from X-ray films.

1. The bureau has to invite attention to the necessity of providing proper regulations for the handling and for the safe storage of X-ray films in view of their high combustibility.

2. It is presumed that this matter has received careful attention from those responsible, as evidenced by the absence of any report of conflagration due to this cause at any naval hospital.

3. The following general instructions are furnished for the guidance of commanding officers of hospitals in the issuance of fire regulations:

In case proper facilities are not available in a hospital the bureau will favorably consider requisitions therefor.

Handling of films.—Smoking or the presence of naked lights in the rooms where X-ray films are handled or exhibited shall not be permitted.

All discarded films or clippings from films shall be stored in covered metal containers while awaiting disposal.

Care shall be exercised that no accumulation of combustible litter be permitted in the vicinity of X-ray rooms.

Illuminators should be so constructed as not to be unduly hot, and films are not to be kept thereon when not being actually viewed.

Storage of films.—Unexposed films shall be kept in fireproof containers and only in such amounts as may be needed for current requirements.

Used films contained in the files shall be limited to those of value for reference.

All those which for any reason are of little or no value should be disposed of.

Retained films should be divided into those of present value and those to be stored for future reference if required. The former may be retained in the X-ray department if not in excess of 50 pounds weight, and shall be stored in metal containers, filed in heavy manila envelopes, either separately or by case. The approximate weight of 1,000 negatives is as follows:

14 by 17 inch weighs 118 pounds.

10 by 12 inch weighs 60 pounds.

8 by 10 inch weighs 40 pounds.

Other sizes being proportional to the area.

Bulk storage of films.—The room selected for the permanent storage of negatives should preferably be on an upper floor or in a detached structure and not in the vicinity of stairways or other exits and not in a basement. The room selected should have the following characteristics:

(*a*) Constructed of fire-resistant material.

(*b*) Have direct outlet to the atmosphere, the aperture having an area equivalent to 140 square inches to each 1,000 pounds of films stored. This aperture may be protected by glass or coarse screening, provided it is designed to open under gas pressure.

(*c*) If the space selected communicates with the hospital proper, a self-closing fire door shall be provided.

(*d*) Overhead sprinkler heads shall be provided.

(*e*) The room selected should not be adjacent to sources of heat.

(*f*) Chemical fire extinguishers should be provided convenient to all spaces in which X-ray films are handled or stored.

4. It is directed that this bureau be informed as to the instructions issued in accordance with the above.

E. R. STITT.

Circular letter. AWD/JBC 124920(61).
Serial No. 329–1924.

WASHINGTON, D. C., *June 3, 1924.*

To: All medical officers.
Subject: Arsphenamine and neo-arsphenamine.
Reference: Circular letter M and S, 236–1922.

1. In view of the repeated requests from naval hospitals to be permitted to continue the use of neo-arsphenamine in special cases where its administration is indicated, the bureau revokes paragraph 7 of the above reference in so far as applies to naval hospitals and hospital ships, and directs that the supply depot furnish neo-arsphenamine on requisitions from naval hospitals.

2. In order to avoid unfortunate results from mistaking arsphenamine for neo-arsphenamine, commanding officers will take special precaution to prevent such an occurrence.

E. R. STITT.

Circular letter. AWD/JBC 125884(61).
Serial No. 330–1924.

WASHINGTON, D. C., *June 5, 1924*.

To: All naval hospitals (continental limits).
Subject: Foodstuff expended during the fiscal year.

1. It is directed that each hospital submit to the bureau, as soon as practicable after July 1, an itemized total of all foodstuff expended during the last fiscal year. These totals to be compiled from the 12 monthly totals of the commissary ledger. This statement to show the *quantity* of each item, cost not to be considered or reported.

2. The total number of subsistence days for the fiscal year 1924 will also be given.

E. R. STITT.

Circular letter. WEE:SS 131334(61).
Serial No. 331–1924.

WASHINGTON, D. C., *June 6, 1924*.

To: All medical officers.
Subject: Physical examination in the case of an officer in the Naval Reserve Force.

1. A physical examination is required as follows:
   (1) Upon enrollment (original) in a provisional rank or grade.
   (2) Reenrollment in a provisional rank.
   (3) Reenrollment in a confirmed rank or provisional rank but holding a confirmed rank in a lower grade.
   (4) Confirmation in grade.
   (5) Promotion.
   (6) Upon reporting for active duty for training and release therefrom.
   (7) Reexamination for any purpose.

2. In (1), (2), and (6), the physical examination may be conducted by one medical officer.

3. In (3), (4), (5), and (7), the examination must be conducted by a board of medical officers.

4. When the physical examination is conducted by one medical officer in (1), (2), and (6), a report should be submitted in detail, and the medical officer should certify whether or not the individual is physically qualified to perform the duties required in time of war. Where physical defects are present, care should be taken to enumerate them in detail.

5. When the physical examination is conducted by a board, certification by the board that the individual is or is not physically qualified to perform the duties required in time of war, and for class 2 also for duty on combatant ships, and for class 5 for duty as a naval aviator, if necessary. Where physical defects are present, the board should mention the defects and then state their findings. No recommendation for waiver should be made. The present provisions of the Navy Regulations are to the effect that officers before the board should be viewed in the same manner as are officers of the regular establishment appearing for promotion, and that all due allowance shall be made for length of service, the examining board to arrive at their findings in the same manner and to the same extent as would pertain to the case of an officer of the regular establishment.

6. In the event of Naval Reserve Force personnel proceeding on active duty and active duty for training and release therefrom, a physical examination is required by the medical officer for the purpose of determining and recording what defects, conditions, or diseases existed prior to the individual engaging in the active duty and at the termination of this period of training. This is for the protection of the interests of the Government as well as of the individual.

7. In submitting their report, medical examiners must take pains to show in the papers the exact status of the officer as to whether or not he is enrolling or reenrolling in a provisional or comfirmed grade. Where confirmed grade is held, this must be distinctly shown. It is further essential that physical defects shall be carefully and exactly recorded. Where data are not available, medical examiners should call upon the bureau for a transcript of the medical record for their guidance in any particular case.

8. A medical officer serving as the sole member of a board of medical examiners should submit his report in accordance with procedure outlined in "Courts and Boards" and not in letter form.

E. R. STITT.

Circular letter. LCW/JBC 132679(63).
Serial No. 332–1924.

WASHINGTON, D. C., *June 16, 1924.*

To: All medical and dental officers.

Subject: Changes in Supply Table, 1922, Part II.

1. Additional dental instruments and appliances have been added to the Supply Table of the Medical Department, 1922, Part II, and should be inserted in all copies of the Supply Table as listed below:

(*a*) On page 37, immediately below "Cup, rubber, polishing, etc.," insert:

Curette, alveolar, metal handle, Bogle type, Nos. 2, 3, 22, 23___number__	4	4

(*b*) On page 37, after "Cutting instrument, with handle, black, etc.," insert the following numbers: "49, 50, 51, 52, 53, 54, 61, 62, 63, 64, 65, 66, 81, 82, 83, 84, 85, 86, 89, 92"; and change allowance column from "4 4" to "24 24."

(*c*) On page 37, after "Elevator, root, crossbar handle, etc.," insert the following numbers: "120, 121, 136"; and change allowance column from "2 2" to "5 5."

(*d*) On page 38, first item, after "Bur, crosscut, fissure, flat end, etc.," insert: "No. 561"; and change allowance column from "3 3" to "4 4."

(*e*) On page 38, sixteenth item, after "Bur, crosscut, fissure, flat end, etc.," insert: "No. 561"; and change allowance column from "3 3" to "4 4."

(*f*) On page 39, immediately below "Forceps, etc.," insert:

Forceps, Rongeur, small, side-cutting____________________number__	1	1

(*g*) On page 39, immediately after "Matrix retainer, ivory No. 1, etc.," insert:

Matrix retainer, ivory No. 9___________________________number__	1	1

(*h*) On page 40, immediately after "Matrix bands, for ivory No. 1," insert:

Matrix bands, for ivory No. 9___________________________dozen__	1	1

2. A supply of these instruments is now on hand and may be obtained on requisition from the naval medical supply depots at Brooklyn, N. Y., and Mare Island, Calif.

E. R. STITT.

Circular letter WRJ-ML 124842(64).
Serial No. 333–1924.

WASHINGTON, D. C., *June 26, 1924*.

To: All medical officers.
Subject: Error in printing "Quarterly reports of expenditures and obligations" forms.

1. Through a misunderstanding the new "Quarterly report of expenditures and obligations" forms were printed on thin paper and cut to a larger size than the previous form. As these forms will not fit in the bureau files, a new issue is in the course of preparation and will be available for issue within a few days.

2. The forms printed on thin paper may be used as file copies by the activity, but in no instance are they to be forwarded to the bureau.

3. As some of these forms have already been issued to the service, it will be necessary for all activities to request a supply of the proper form.

F. L. PLEADWELL, *Acting*.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

THE ANNUAL PHYSICAL EXAMINATION

By W. M. KERR, Lieutenant Commander, Medical Corps, United States Navy

There is no subject which is of more general interest to the naval officer than the question of his health and bodily vigor, although unfortunately it is not usually given any serious consideration by the average individual until he has noted some sign or indication of failing health or that his efficiency has begun to decline. The first appearance of many of those maladies which have the most important bearing upon the efficiency and length of life of an officer usually is noted in middle life, a period during which the majority of officers attain their greatest usefulness and value to the service.

Nearly all of these disease processes which make their first appearance in middle life are most amenable to treatment during their early stages, at a time when the evidence of their presence is first manifested. After they have become well established or advanced, our therapeutic measures can only serve as a means of checking the progress or as an aid in counteracting their injurious effects. The recognition of the presence of these disease processes in an officer and the institution of corrective measures is essential if the individual is to enjoy the greatest possible degree of usefulness to the service during the remainder of his active career and to himself in his later years.

During recent years periodic physical examinations have been strongly recommended by many authorities as a method of discovering the first signs of disease in the early stages of the process, and numerous contributions have been made to medical literature indicating the signs to be sought in these examinations and what interpretations should be placed on their presence. The significance of these variations from the normal, from the standpoint of the future usefulness of the individual, and the treatment to be followed to prevent further development have not received the attention on the part of naval medical officers that their importance would warrant.

This has not always been due to lack of care in conducting the annual physical examination of officers required by Navy regulations, but rather to a misconception of the purposes of the examination.

The annual physical examination of officers of the Army and Navy was first instituted for the purpose of eliminating individuals who were manifestly unfit for active service. The purpose of the test was accomplished in a few years, after which, as a rule, only minor defects were found. A note of these minor physical disabilities was entered annually in the official record of the officer concerned, and he might or might not be advised by members of the examining board or the medical officer with whom he was serving concerning means to be employed in overcoming his disability. Generally, however, at the time of the examination very little attention was given to these physical defects unless there was some indication that the officer was unfit for active service, in which case he would be ordered before a retiring board with a view to his separation from the active list.

When promotion by selection became effective, some officers found that they were passed over because of minor physical defects noted in their records at the time of the annual physical examination. This fact has produced an unfortunate effect upon the officer personnel. Many officers have come to view the annual physical examination as an undesirable ordeal, and even hesitate to consult medical officers in the interval between examinations concerning minor ailments in view of the possible effect a record of such disabilities might have on their selection for promotion.

Because of this unfortunate state of affairs the medical department of the Navy is losing an opportunity to be of real service to officers, for it is just these minor physical disabilities, now minimized by the individual directly concerned or even concealed, which are often the first evidence of beginning disease, the first indications of wear and tear, or signs suggestive of the effects of previous disease or injury and which the medical officer should be cognizant of in order to advise the individual how best to overcome their deleterious influences.

The Bureau of Medicine and Surgery is extremely desirous that the annual physical examination be made to benefit each naval officer and that the examination be conducted with a view to life conservation rather than to elimination from the active list. In order that this examination shall conserve defective officer personnel by the detection of the earliest signs of disease and the institution of proper measures to remedy defects, it should be conducted most thoroughly by a board composed of two or more medical officers. The officer undergoing examination should be told frankly that the examination is being conducted largely for his own benefit, in order that he may know whether or not he is in sound health, and, if he has defects, how they may be corrected.

A properly conducted physical examnition has a value besides that of being the starting point for the correction of discovered defects. In the first place the examination is of great value because of instruction in rules of health which should accompany it when necessary. In the second place, the physical examination is perhaps just as important in ridding a person of notions that he has defects as it is in discovering the defects which are unknown to the individual. A physical examination often does the greatest good in establishing the fact that the individual is entirely sound.

An adequate physical examination should fulfill three important purposes: (1) The detection of organic pathology, to be followed by the necessary measures for the correction, compensation, or control of morbid processes; (2) the detection of nonorganic functional disturbances, to be followed by the necessary measures for the correction, compensation, or control of these disturbances, so far as possible; (3) the correction of faulty personal hygiene by appropriate measures.

The differentiation between organic and functional conditions often requires nice discrimination on the part of the medical examiners. When a defect is found on physical examination it should be carefully investigated in order that the board may be certain that it is not a functional or temporary disability. If necessary the officer should be given the benefit of a short period of observation at a naval hospital, and no entry should be made in the health record or on the Bureau of M. and S. Form, unless the defect is determined to be organic. The board should then decide whether or not the defect can be remedied by operation or treatment, or if it is of such a nature as to disqualify the officer for future service. This opinion should be definitely expressed both in the officers' health record and on the report of physical examination, with due consideration to the evaluation of the officer as an entity in the service; that is, to his length of service, his experience and value to the Navy, and the probable duties which shall be required of him in the future.

Defects in height, weight, vision, and so forth, which were waived by the Navy Department on the appointment of an officer, should not be considered to his detriment at the time of the annual physical examination; they should, however, be noted in the report, together with a notation of the waiver.

The official test for color perception is the Holmgren skeins or Jenning's self-recording test, except in the case of candidates for appointment as midshipmen or ensign, who are required to pass the Stilling's test and the Edridge-Green lamp test. Defective vision corrected by glasses without evidence of organic disease of the eye should be noted. Defective hearing should be tested on several successive days by whispered and spoken voice as well as by the watch and acumeter. When available, a Navy specialist should be asked to render an opinion as to the degree and permanency of any defect found. Special study should be made to determine if albumin in the urine is of a temporary nature or if renal disease exists. A high-blood pressure should be observed for several days in order to ascertain if it is constant. A cardiac murmur should be carefully studied with a view to determining if it be functional or organic. Constancy of the murmur associated with cardiac enlargement and cardio-vascular disturbance is of importance in this respect.

Particular attention should be given to the officer's habits, his personal hygiene, his past medical history, and the defects noted at the last annual physical examination and the measures taken for their correction.

An officer undergoing examination should always be informed of any defect found sufficiently serious for notation in the report. If it is believed that some modification in personal hygiene will be helpful, the officer should be advised as to corrective measures. If a defect requiring treatment is found he should be advised to consult the medical officer with whom he is serving. As has been previously stated, every effort should be made to render the annual physical examination one of conservation of officer material rather than to emphasize the elimination factor.

As the final opinion of the board concerning an officer's fitness for service will have great weight with the Bureau of Medicine and Surgery, the economic value of every officer to the Government and the loss to the Navy in particular when highly trained officers are retired should be carefully considered in reporting defects. Adverse reports become part of an officer's medical record which is reviewed by selection boards. Such reports should not be made except after careful investigation of all the facts bearing on the physical defect noted.

The following forms have been prepared by the Bureau of Medicine and Surgery with a view to assisting medical examiners in conducting the annual physical examination of officers. The "Report of annual physical examination" is designed to replace the Bureau of Navigation Form No. 253. The "Medical history" form is required to be filled out when any defect is discovered. If no defects are found, there may be the possibility of defective personal hygiene. In this case it should be explained to the officer under examination that if he will supply the data required in this form, the board will advise him concerning his personal hygiene.

These forms are self-explanatory. It will be noted that they are both confidential. However, the "Report of annual physical examination" form is the only one to be forwarded to the department. This form should be forwarded to the Bureau of Medicine and Surgery in the manner prescribed in article 2048, paragraph 4, United States Navy Regulations. The "Medical history" is merely for the convenience of the board of medical examiners. This form will be found of value in naval hospitals in connection with history taking.

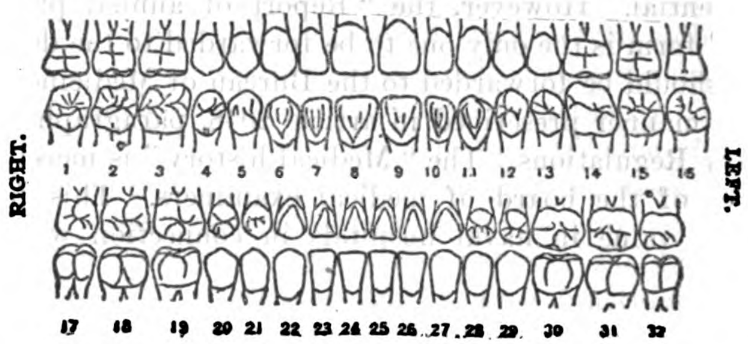
Confidential.
Bu. M. & S. 125111(63).
(1 July, 1924.)

REPORT OF ANNUAL PHYSICAL EXAMINATION

[For officers only, G. O. 31]

Name ____ Rank____________________
[Surname first.] [Christian names in full.]
Place____ Date____________________
Born____
[Place and date.]
Appearance____
[Pallor; cyanosis; obesity; emaciation.]
Defects previously noted and corrective measures taken____________________
____
____
Illness or injury since last annual examination (medical history and health record) ____
____
____
Posture_________________ Figure_________________ Frame_________________
[Erect; stooped.] [Slender; medium; obese.] [Light; medium; heavy.]
Height__________ Weight__________ Recent {Loss_____________ / Gain_____________} Circumference of abdomen at umbilicus____
Chest_________ Inspiration_________ Expiration_________ Temperature________
Skin ____
Bones, joints, feet, muscles, glands____
____
Hemorrhoids ____
Eyes V. O. D.____/20; corrected to____/20. V. O. S.____/20; corrected to____/20.
Pupils (unequal; irregular; sluggish)_____________________________________
____
[Diseases and anatomical defects.]
Color perception____
Ears: Hearing (loud whisper), right___________/15; left___________/15. (Low whisper) right___________/40; left__________/40.
____
[Diseases and anatomical defects.]
Nose and throat (diseases and anatomical defects)__________________________
____

Teeth



____

Caries, periapical or pericemental foci of infection, abscess or fistula, nonvital teeth. Calculus ____________ Pyorrhœa ____________ Stomatitis ____________
[Slight; medium; heavy.]

____

Cardio-vascular system: Pulse { Before (av. normal 72) / After (av. normal 105) / 3 min. after (av. normal 80) } Blood pressure { Before S____D___ / 3 min. / After S____D___ }

(Exercise test, 20 standing hops each foot, not faster than 1 hop a second.

Condition of arteries ________________ Character of pulse ________________

Heart (abnormal sounds—thrill, hypertrophy, etc.) ________________________

____

____

Respiratory system (dyspnœa, râles, etc.) ________________________________

____

____

____

Nervous system (organic or functional disease)—Symptoms or history of neurasthenia or psychasthenia ________________________________

____

____

____

Romberg's test ______________ Incoordination (gait, speech) ______________

Reflexes, superficial ____________ deep (knee) ____________ Tremors __________

Abdomen (abnormalities of viscera) ________________________________

____

Genito-urinary system ____

____

____

Urinalysis: Sp. gr ________ Albumin ________ Sugar ________ Microscopical ________

____

Abnormalities not otherwise noted ________________________________

____

Defects found and measures recommended for correction __________________

____

____

____

Is this officer unfit to perform the active duties of his rank at sea?______________
Temporarily____________Permanently__________Limited service____________
Nature and degree of disability (1)__________________(2)______________
(3)________________________________(4)______________________________
Recommendation ____

____,
(Rank) *Medical Corps, U. S. Navy.*

____,
(Rank) *Medical Corps, U. S. Navy.*

____,
(Rank) *Medical Corps, U. S. Navy.*

I have reviewed the above report. Should I be eligible for selection I {do / do not} request a physical examination prior to the meeting of the selection board.

____,
(Rank) *U. S. Navy.*

Place______________________________ Date______________________________
To: Navy Department (Bureau of Medicine and Surgery).
1. Forwarded.

Confidential.
Bu. of M. & S.

124680(63)

MEDICAL HISTORY

CASE DATA FOR HEALTH RECORDS AND ANNUAL CONSULTATION

[To be filled out by individual when possible]

Name.. Rank (or rate)................................

Character of duty performed..

Family record	Age if living	Health	Age at death	Cause of death		Age	Health	Age at death	Cause
Father.....					Brothers..				
Mother....					Sisters....				

1. State whether you eat sparingly (S), Moderately (M) or Freely (F), of the following foodstuffs:

Meat	Bread	Vegetables	Fowl	Sweets	Fruit	Fresh milk		Pepper, spices, etc.	Cereals
Cheese	Fish	Pastry	Potatoes	Eggs	Salt	Butter	Cream	Sour milk or buttermilk	Raw vegetables, salads, etc.

2. a. Number of hearty meals daily (state which).	2. a. ....
b. Do you eat rapidly, slowly, or in an intermediate way?	b. ....
c. How often do you eat meat?	c. ....
3. a. How many glasses of water do you drink daily?	3. a. ....
b. How many of these at meals?	b. ....
4. How many cups do you drink daily of—	4. Tea.. Coffee.. Milk.. Chocolate.. Cocoa..
5. What has been your past habit in the use of alcohol?	5. ....
6. What is your practice in the use of tobacco? (State how much daily and the form.)	6. ....
7. Do you sleep well? How many hours?	7. ....
8. Do you sleep in a well-ventilated room or quarters?	8. ....
9. How many hours do you work each day?	9. ....
10. Do you follow any special pursuit or recreation aside from duties?	10. ....
11. Do you secure regular daily exercise; if so, is it in the open?	11. ....
12. State your habits in regard to exercise as clearly as possible. (When, duration, and form.)	12. ....
13. State bathing habits.	13. Warm baths......; how frequently........ Cold baths.......; how frequently.......
14. Are you nervous or apprehensive about your health? Why?	14. ....
15. Are glasses used? Were they prescribed by a physician; oculist?	15. ....
16. Do you suffer from headaches? If so, how often and how severely?	16. ....
17. Do you often take headache powders or patent medicines for any condition?	17. ....
18. a. Are you constipated?	18. a. ....
b. How often do the bowels move freely?	b. ....
c. Do you use laxatives or purgatives frequently?	c. ....
19. a. Have you suffered any severe illness or injury?	19. a. ....
b. If so, has it affected your present health?	b. ....

20. a. Do you suffer or have you ever suffered from the following troubles (if you write "Yes," please also give full information on lines below):

Vertigo or dizziness............................	Pain in the region of the heart..................
Rheumatism of joints............................	Frequent coughs or colds..........................
Other forms of so-called rheumatism.............	Acid dyspepsia (sour stomach).....................
Severe abdominal colic..........................	Other stomach or bowel trouble....................
Blood spitting (lungs)..........................	Rupture...
Shortness of breath.............................	Frequent or difficult urination...................
Vomiting of blood...............................	Chronic skin disease..............................
Gout..	Other serious diseases or injury..................
Discharge from ear	

20. b. Name of disease.... Number of attacks.... Date.... Duration.... Severity.... Results....

21. Is your health now in any way affected; if so, state particulars.	21. ....
22. State verbally any other very confidential matter on which we should be informed, or any question you may wish to ask regarding your health.	22. ....

The total number of officers examined during the annual physical examination of officers of the Navy and Marine Corps completed in the month of January, 1924, was 8,922.

The results of this examination are shown in Table A.

TABLE A.—*Physical defects found in officers, United States Navy (1924 annual physical examination); number and rate per 1,000*

	Line		Staff		United States Marine Corps		Warrant, Navy and Marine		Total	
Average complement	4,485		1,905		979		1,553		8,922	
Defects	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Defective vision	58	12.93	49	25.72	10	10.21	26	16.74	143	16.03
Weak color perception	7	1.56	4	2.10	1	1.02	4	2.57	16	1.79
Defective hearing	25	5.57	10	5.25	7	7.15	13	8.37	55	6.16
Otitis media, chronic	3	.67	1	.52	2	2.04	0	.00	6	.67
Perforated ear drum	8	1.78	3	1.57	1	1.02	3	1.93	15	1.68
Abnormalities of nose and throat	4	.89	2	1.05	1	1.02	2	1.29	9	1.01
Tuberculosis, pulmonary, chronic, active	0	.00	0	.00	0	.00	1	.64	1	.11
Asthma, bronchial	0	.00	1	.52	0	.00	2	1.29	3	.34
Bronchitis, chronic	4	.89	1	.52	2	2.04	4	2.57	11	1.23
Pleurisy chronic fibrinous	0	.00	1	.52	0	.00	0	.00	1	.11
Definite cardiac pathology	3	.67	1	.52	1	1.02	1	.64	6	.67
Indefinite cardiac pathology [1]	35	7.80	30	15.75	16	16.34	13	8.37	94	10.53
Arterial hypertension, moderate	86	19.17	25	13.12	27	27.58	32	20.60	170	19.05
Arterial hypertension, high	19	4.24	3	1.57	4	4.08	6	3.86	32	3.59
Arterial hypotension	5	1.11	3	1.57	2	2.04	4	2.57	14	1.57
Arteriosclerosis	2	.44	0	.00	1	1.02	2	1.29	5	.56
Abnormal urinalysis (albumin, casts, etc.)	16	3.57	17	8.92	7	7.15	15	9.66	55	6.16
Syphilis, secondary	2	.44	0	.00	1	1.02	3	1.93	6	.67
Hydrocele	4	.89	2	1.05	0	.00	2	1.29	8	.90
Diseases of the skin	2	.44	0	.00	2	2.04	0	.00	4	.45
Flat feet	3	.67	4	2.10	0	.00	4	2.57	11	1.23
Amputation of extremity	0	.00	1	.52	0	.00	2	1.29	3	.34
Ankylosis of joints	6	1.34	1	.52	3	3.06	2	1.29	12	1.34
Defective teeth	5	1.11	2	1.05	2	2.04	10	6.43	19	2.13
Gastritis, chronic	0	.00	0	.00	0	.00	1	1.02	1	.11
Fistula in ano	1	.22	2	1.05	0	.00	0	.00	3	.34
Hemorrhoids	10	2.23	7	3.67	4	4.08	6	3.86	27	3.03
Diseases of the nervous system	2	.44	0	.00	2	2.04	3	1.93	7	.78
Hernia	13	2.89	14	7.35	1	1.02	6	3.86	34	3.81
Relaxed abdominal wall	11	2.45	3	1.57	0	.00	3	1.93	17	1.90
Glycosuria	2	.44	6	3.15	0	.00	3	1.93	11	1.23
Bunion	0	.00	1	.52	0	.00	0	.00	1	.11

[1] Arrythmia, tachycardia, extra systole and functional murmurs.

TABLE A.—*Physical defects found in officers, United States Navy (1924 annual physical examination); number and rate per 1,000*—Continued

	Line		Staff		United States Marine Corps		Warrant, Navy and Marine		Total	
Average complement	4,485		1,905		979		1,553		8,922	
Defects	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Gonococcus infection	0	0.00	0	0.00	0	0.00	1	1.02	1	0.11
Enlarged thyroid	3	.67	2	1.05	1	1.02	1	1.02	7	.78
Varicose veins	4	.89	3	1.57	1	1.02	4	2.57	12	1.34
Overweight (more than 10 per cent)	93	20.73	51	26.77	17	17.36	89	57.31	250	28.02
Underweight (more than 10 per cent)	41	9.14	7	3.67	4	4.08	5	3.22	57	6.39
Total	477	[2]106.35	257	[2]134.91	120	[2]122.57	273	[2]175.79	1,127	[2]126.32

[2] Rate per 1,000.

Of the 8,922 officers examined, 1,127 were found to have physical defects which were considered by the examiners of sufficient importance to justify notation in the report. The greater proportion of the physical abnormalities discovered are not incapacitating at the present time, but will, in most instances, if allowed to persist, tend to impair the future health and efficiency of the individual.

The rates per 1,000 for the defects which occurred with the greatest frequency among all officers are as follows:

Overweight	28.02
Arterial hypertension, moderate	19.05
Defective vision	16.03
Defective hearing	6.16
Hernia	3.81
Arterial hypertension, high	3.59
Hemorrhoids	3.03
Defective teeth	2.13
Weak color perception	1.79
Perforated ear drum	1.68
Ankylosis of joints	1.34
Varicose veins	1.34
Bronchitis, chronic	1.23
Flat feet	1.23
Glycosuria	1.23

These defects actually or potentially affect the health and efficiency of the individual, and comments upon them may be profitable.

OVERWEIGHT

Overweight was the most common of the more serious defects found at the 1924 examination. In determining overweight the average body weight for height and age was considered to be the normal weight. A variation of 10 per cent or over above this normal was considered to constitute a physical defect.

The comparatively large number of officers found to be overweight indicates the need of instruction regarding the dangers of overweight and the methods of preventing the accumulation of or removing excess fat. Overweight will not develop except as a result of improper habits of living on the part of the individual. In fact, overweight is always, except in rare instances, due to eating too much or to exercising too little, or both, habits which are easily cultivated on board ship.

In practically all cases excess fat can be removed by the individual himself if he so desire. In a few cases, such as the older officers who have been overweight for a number of years and who have already developed other physical defects, rapid reduction in weight might not be advisable and possibly could not be accomplished without a great deal of discomfort and some danger to health. However, in the case of the younger and more active officers there is no excuse for overweight.

There is no other source of fat than the food taken in through the mouth. The body requires food for the purpose of rebuilding or repairing worn tissues and providing energy for the muscular activities. An excess of food, especially fats and carbohydrates, tends to be deposited in the body tissues as fat. The maintenance of the proper body weight is then a question of balance between the intake of fat and carbohydrate and the energy expended in muscular exercise. In a person overweight, if the amount of fat and carbohydrate consumed are less than required for the daily activities of the body, a reduction in weight will occur.

At the age of 30 the average person approaches more nearly to normal development than at any other period of his life. A man under 30 may weigh a number of pounds more than the average called for in the height, weight, and age tables without cause for regret. After 30 it has been found that the longest life span prevails among those whose weights are uniformly below the average. At 40 an individual seems to be at his best when he weighs 30 or 40 pounds less than the average. Persons who weigh 20 per cent more than the average have a mortality rate one-third greater than the average, and those who weigh 40 per cent more than the average have a life expectancy of only 50 per cent.

Dr. H. K. Beall, writing in the Southern Medical Journal of May, 1924, on "The parasitism of fat," offers an ingenious explanation of the manner in which fat shortens one's life.

"If we recall for a moment the histology of fat, we remember that there is a good blood supply to this tissue. Each minute lobule, perhaps about one-thirty-second inch cube, is supplied with an arteriole, which breaks up within the lobule into a fine capillary meshwork gathered into, usually, two veins. In 1 cubic inch of fat there are about 30,000 lobules, each with an arteriole, a capillary mesh, and two veins. The linear measure of the arterioles and veins is at least 30 inches and the capillary mesh at least 60 by 30, or 1,800 inches. A pound of fat constitutes about 30 cubic inches, so that in each pound of fat there are about 4,500 feet of blood vessels, or five-sixths of a mile. Therefore, in 30 pounds of fat, the ordinary amount of excess fat in four-fifths of Caucasian adults, there are 25 miles of blood vessels, through which the heart has to pump blood every five-sixths of a second or less. This parasite needs oxygen and the lungs must work for it. It needs its daily food, the digestive organs must assimilate an extra amount to care for it, and the muscles have to work to carry around this incubus. The spleen, liver, and all the vital organs, except, perhaps, the brain, must contribute to its upkeep. Perhaps the kidneys suffer most, for the excretory products of this tissue must be removed. To take an example, let us consider a man of 150 pounds weight, who has only enough fat to pad his tubera ischiorum, cover his intestines, and fill up his eye sockets. This man's organs, his heart, lungs, and kidneys are capable of running his machine for a certain time. How long can not, of course, be measured, but let us say 70 years. Suppose this man lets his weight increase to 180 pounds, as most men do who should weigh 150. In other words, let him begin to carry around and nourish 30 pounds of useless fat, with 25 miles of blood vessels to be filled every five-sixths of a second, increasing the work of his blood, heart, lungs, liver, spleen, muscles, and all organs except perhaps his brain and reproductive organs. Will he live out his 70 years? Of course he will not."

Reduction in weight should be accomplished gradually and at a rate not greater than 5 to 8 pounds a month. When 15 to 20 pounds have been lost a period of rest should follow. Any method of weight reduction should include systematic and consistent physical exercise, the extent of which must be determined for each case. This serves to burn up the useless fat, harden the muscles, tone up the nervous system, and encourage the elimination of waste products from the body.

In this connection it is interesting to note that the bureau has recommended that all officers be advised of the value of a daily setting-up exercise similar to the Walter Camp "daily dozen," in order to maintain correct posture and muscular tone, especially in the abdominal region.

The number of calories required to maintain the body while at rest and under varying amounts of physical exercise will, of course, vary with the size of the individual. The following table indicates the requirements of an average man weighing 154 pounds:

Calories required during 24 hours by an adult weighing 154 pounds

Conditions	Calories per pound body weight	Total calories
At rest	11 to 14	1, 750 to 2, 100
At light work	16 to 18	2, 450 to 2, 800
At moderate work	18 to 20	2, 800 to 3, 150
At hard work	20 to 27	3, 150 to 4, 200

The energy required by the body does not vary directly with the weight, but is dependent on the surface area of the body. In obesity the caloric consumption should be somewhat less than would be required by the normal man in order that the excess of fat may be utilized as energy. Therefore as a rough measure of daily caloric requirements the normal weight in pounds may be multiplied by 15 when only light work is performed or by 20 when more strenuous exercise is undertaken. Thus, if the actual weight is 200 pounds and the normal 165, then 165 should be multiplied by either 15 or by 20 as indicated, giving as the required food consumption per day 2,500 calories for light work and 3,300 for strenuous muscular activity.

In reducing the body weight one must consume a proportionately less amount of carbohydrate and fat than of proteins. The following diet list will be found useful in effecting reduction in weight when combined with appropriate bodily exercise.

SKELETON DIET (880 CALORIES)

Morning.—One cup (250 cubic centimeters) coffee or tea with one tablespoonful (15 cubic centimeters) milk; one small slice (50 grams) brown bread, or one-half slice (30 grams) white bread.

Forenoon.—One small orange or one small apple, or similar amount of fresh fruit.

Afternoon.—One-half cup (126 cubic centimeters) coffee with one tablespoonful (15 cubic centimeters) milk.

Evening.—One slice (100 grams) meat or a little chicken or fish; one portion (100 grams) green vegetables; one-half slice (25 grams) brown bread; one cup tea (if desired).

At bed time.—A little raw fruit.

ACCESSORY DIET (EACH PORTION EQUALS 100 CALORIES)

Three-fourths slice (20 grams) roast beef; eight oysters (40 grams). A good slice (40 grams) white bread, graham bread, or rye bread, size of thick slice of bread (20 grams); zwieback; ordinary ball or patty (12½ grams) butter. One and one-half cubic inches (20 grams) Swiss cheese. Three teaspoonsfuls or one and one-half lumps (25 grams) sugar. Potatoes, baked, one good sized; boiled, one large sized; mashed (creamed), one serving; steamed, one serving

(100 grams). One-half ordinary cereal dish (30 grams) rice, peas, beans, or buckwheat. Four teaspoonfuls (20 grams) flour. Two (200 grams) apples. Ordinary serving (150 grams) apple sauce. Ordinary serving (500 grams) cranberries. One-half glass (150 grams) milk.

ACCESSORY DIET OF FILLING FOODS OF LOW CALORIC VALUE

One ordinary serving (100 grams):	Calories
Cooked asparagus	43
Cooked green beans	20
Cooked peas (green)	108
Cooked tomatoes	20
Cooked spinach	52
Cooked turnips	40

UNDERWEIGHT

All officers whose body weight was 10 per cent below the average weight for the height and age have been classed as underweight, but underweight per se should not be considered as a defect, but as a symptom of some underlying pathological condition. Where underweight is excessive the officer should be subjected to a thorough physical examination with a view to determining the cause. Occasionally hospitalization is necessary for this purpose.

Measures aimed at the correction of this condition are largely dependent on the cause. About one-half of all thin persons are so from hereditary causes, and time and energy are almost wasted in an attempt to fatten them. When there is a definite cause for the condition, and this can be discovered and removed, much can be accomplished. In these cases relief from worry, bustle, and excitement may be all that is necessary. Often there is a starch dyspepsia, or the individual may be unable to take sugar without inducing fermentation and flatulence.

In a general way the following suggestions for the relief of underweight may be made. Plenty of open-air life, free from care and excitement. Sufficient sleep. Ample meals and as much carbohydrate and fatty food should be taken as is possible. Cream, milk and cream, butter, cocoa and chocolate, bread, cereals (well cooked), farinaceous puddings, potatoes, legumes, and sweet fruits should all be partaken of in abundance. All sweets, honey, sirups, cakes, and the like may be taken if they agree with digestion. Avoid strong alcoholic liquors, acids, spices, and the like, as well as many green vegetables.

To increase body weight one must consume a proportionally greater amount of carbohydrate and fat than of protein.

ARTERIAL HYPERTENSION

Arterial hypertension in a moderate or high degree was observed in 202 officers, the majority of whom were overweight. Each of these individuals should be subjected to a comparative study of frequent blood-pressure estimations in order to determine the permanency of the high blood pressure. Cursory and perfunctory examinations are worse than useless in that they mislead. One should not fail to remember that high pressure may be physiologic as well as pathologic. High blood pressure is not to be regarded as a disease. Temporary rises observed in pain, neurasthenia, excitement, and after exercise bear out the statement that a rise in blood pressure may be physiologic. Even when persistently high in certain conditions, as may be the case in arteriosclerosis, for example, it would seem to be nature's method of supplying blood to vital tissues which otherwise might be more or less anemic. An increase in blood pressure when due to disease is persistently above the normal of the individual. Temporary supernormal blood pressure is found, for example, in the nervous excitement incidental to a medical examination. The detection of supernormal blood pressure in its incipient stages is of great practical importance from the treatment standpoint.

The condition may be met with in individuals who habitually indulge in overeating, drinking, or smoking, in autointoxication, the various forms of chronic rheumatism, and gout, diabetes, certain forms of heart, kidney, arterial, and thyroid gland diseases. Prolonged mental stresses and strains are often a factor. There may be a complete absence of subjective symptoms for some years. The individual is, however, apt to suffer from a sensation of fullness and throbbing in the head, headache, flushing, ringing in ears, flashes of light before the eyes, giddiness, sleeplessness, and palpitation of heart. Kidney symptoms may be absent for years, or the individual may have to urinate frequently at night, the urine occasionally showing a trace of albumin or casts, or both.

As to the correction or alleviation of the condition, each case should be carefully considered by itself before any corrective measures are employed. Treatment is mainly prophylactic, hygienic, and dietetic—actual specific treatment being of far less value.

DEFECTIVE VISION

Defective vision was the cause of 143 notations in the reports of the annual physical examination. These defects were due to various causes, of which error in refraction was the principal.

Excluding direct contamination of the conjunctival sac, the effects of radiant energy, refractive errors, neoplasms, and conditions resulting from trauma, practically all the manifestations encountered in ophthalmology are secondary to pathological changes in adjacent or distant structures. Even the refraction, through the ciliary muscle and various media, may be influenced by the general or distant conditions, while a certain number of new growths are metastatic.

These facts are generally known, but are frequently lost sight of in connection with the annual physical examination. Considering the relation of the eye to the cerebrospinal system, of which certain of its structures are in a sense a part, the fact that it may be affected by diseases of the respiratory tract; focal infection of the teeth; diseases of the gastrointestinal and genito-urinary tracts; the cardiovascular system, as well as diseases of the blood; the endocrines; diseases of the skin; the exanthemata; certain general conditions such as tuberculosis, syphilis, gout, and rheumatism, and metabolic conditions such as diabetes, the importance of visual defects is apparent. Therefore whenever a visual defect exists a complete ophthalmological examination should be made with a view to determining the cause. It must not be forgotten that faulty illumination on board ship is a frequent cause of defective vision.

DISEASES OF THE EAR, NOSE, AND THROAT

Reference to Table A will reveal the fact that 40 officers were found to have disease of the ear, nose, and throat in some form; 25 were found to have defective hearing; 3 chronic otitis media; 8 perforation of the ear drums; and 4 possessed abnormalities of the nose and throat, such as deviation of the nasal septum or diseased tonsils.

This small number would seem to indicate that more attention should be directed to this region. The fact that only 2 officers out of nearly 9,000 examined were found to have diseased tonsils would indicate that the examination of the tonsils was not carefully made. The incidence of diseased tonsils among seaboard populations is high, and one might reasonably expect to find a similar incidence among naval officers.

There are many factors which enter into the appearance of diseases of the ear, nose, and throat. The exanthematous diseases are accountable for many of the chronic irritations of this region which occur later in life. An example of this kind may be found in those cases of progressive deafness which occur in middle life, not being very noticeable until after the twentieth year, and which have their origin in an acute inflammatory condition of the ear, occurring in conjunction with scarlet fever or measles in childhood.

Among the important conditions which tend to give trouble with the nose, throat, or ear in middle life are those which impair the general physical condition of the individual. The nose, throat, and ear are an integral part of the body, and when any diseased condition occurs there it is associated with some general physical debility. Diseases of the nose, throat, or ear, especially those of a subacute or chronic nature, do not clear up readily if the individual's physical condition is below par. Among the factors which lower vitality sufficient to make the mucous membranes of these parts particularly susceptible are the fatigue of overwork, worry, mental strain, the frequent changing of atmosphere, such as going from a heated engine room into the cold air, the lack of proper exercise, improper attention to the bowels with stagnation of fecal matter in the intestines, and the general sedentary habits of ship life. Occupation has a great deal to do with the inflammatory condition of these parts, particularly of the subacute and the chronic types. Men who are working in a dusty atmosphere or where there are irritating fumes are bound to have irritated conditions set up in the nose, throat, and ear, which may result in serious injury. Men who work in excessive noises, on account of the constant impact and vibration set up an irritative condition in the ear which sooner or later results in deafness.

In acute conditions of these parts much will depend on the type of infecting organism. Some of these organisms, such as the *Streptococcus hemolyticus* and the *Streptococcus muscosus capsulatus* attain a peculiar virulence and produce annoying aftereffects.

Much deafness results from improperly treated suppuration in the middle ear. After the suppuration has disappeared, it is important that the patient's hearing be tested in order to find out definitely how much impairment of hearing has occurred. Following suppuration, hearing, in many cases, can be restored to normal by proper massage to the middle ear, either by politzerization or by catheterization, or by dilation of the Eustachian tubes with sounds or bougies. Deafness is often brought about, even in adult life, by neglect of the middle ear after a suppurative process has ceased.

A large number of adults suffer from diminution in hearing which is not apparent to them until the hearing becomes acutely disturbed. This may be noticed only when the individual has a bad cold in the head. Upon examination, there may be little evidence of any trouble within the ear itself; a moderate retraction of the drum may have taken place, the drum may have lost its translucency and its glistening appearance, and the light reflex may not be brilliant. In the majority of these cases there is an inflammatory condition within the nasopharynx giving rise to Eustachian salpingitis and resulting deafness. Any gross deflection of the septum, any chronic suppuration within the sinuses, any inflammatory condition of the mucuous membrane of the nose, any polypoid condition of the posterior tips of the inferior turbinates, any granulation tissue in the nasopharynx or adenoids or diseased tonsils, may cause a subacute inflammatory condition which will extend up through the Eustachian tube to the middle ear and eventually result in deafness unless properly treated. Parenthetically, one may remark here that deafness is caused occasionally by the improper blowing of the nose, the patient forcing the air into the middle ear cavities until the drums are stretched. Impacted cerumen is also a factor in deafness. After the wax is removed, one will sometimes find that the hearing is still diminished and it will be necessary, under these circumstances, to make a definite test to find the cause of the trouble. For it is always possible for a progressive catarrhal condition in the middle ear to be present, associated with a ceruminous accumulation, and one must pay attention to the proper exercise of the middle ear after the cerumen has been removed. It may happen that the pressure of the wax against the drum has arrested its action for a considerable length of time, and that after its removal a few mild treatments to the drum will be necessary to restore the hearing to normal.

In the Navy defective hearing occasionally results from improper protection of the eardrum during target practice, and from diving and swimming.

Chronic otitis media is usually associated with perforation of the eardrum through which a discharge seeps. Occasionally the entire drum membrane has been destroyed. This discharge may be either intermittent, recurring at intervals when the individual has a cold, or it may be a continuous process. Such ears deserve careful attention. They should never be neglected with the idea that they will clear up themselves, for they are often the cause of a brain abscess or meningitis.

In the intermittent cases, it will frequently be noted that the discharge only occurs when the patient has an acute process within the nasopharynx, with the result that he draws the secretions from his throat up through the Eustachian tube into the middle ear. When the Eustachian tube is open at both ends, as happens when there is a perforation of the drum, secretions are forced up through the tube by capillary action. This has a twofold action. The middle ear, having been previously diseased, has a tendency to discharge from the condition within, but, secondly, the discharge is often aggravated by the secretions which come from the throat. Strange as it may seem, frequently, when the Eustachian tube is closed off, the middle ear will take care of itself, and will remain dry. This fact led Yankauer to devise his operation for closing off the Eustachian tube in middle-ear disease.

In the majority of instances, chronic suppurations in the middle ear can be kept under control by treatment with applications of silver nitrate, or iodine, or the instillation of alcohol and boric acid. In some cases the administration of an autogenous vaccine is of value. In other instances, where there is actual necrosis of bone, or where there has been a cholesteotomatous degeneration of the bone within the middle ear, antrum, and mastoid, it will be necessary to perform a radical mastoid operation to clear up the condition.

If an individual is subject to inflammatory conditions of the naso-pharynx, or if he has a chronic process in the sinuses, or suffers from chronic tonsillitis, or has any abnormality within the nose or throat which may set up sufficient irritation to produce a discharge from the ear, it is frequently possible to clear up the condition in the ear by the removal of the causative agent in the nose or throat. Among conditions which increase the discharge from the middle ear are an abnormal placement of the muscles of the Eustachian tubes and polypoid conditions of the posterior tips of the inferior turbinates which act as direct irritants. In the first instance, the abnormal relationship of the muscles is often due to adhesive bands or polypoid tissue in the fossa of Rosemuller. These bands, or this tissue, may readily be removed by inserting the finger behind the palate into the fossa of Rosemuller and breaking down the tissue. In the latter instance, it is frequently necessary to remove the posterior tips of the inferior turbinates so that better drainage is given for the nasal secretions.

Serious consideration should be given to the question of chronic tonsillitis or chronically diseased tonsils. Many individuals who are examined show systemic reactions from small tonsils which are deeply buried. It is not always possible to determine by the size of a tonsil exactly the amount of infection that is present. In fact, some tonsils which are extremely small cause the most trouble. In order to determine a pathological tonsil, one should first search for enlargement of the tonsillar gland. If this gland is markedly palpable, one may rest assured that some absorption is taking place from the tonsil, no matter what its size.

The next step is the examination of the tonsil itself, both by inspection and palpation. The latter procedure will give an idea of the depth of the tonsil. Finally, massage of the anterior pillar will allow the expression of infectious matter, which can be readily cultured. These examinations are decidedly better than the mere inspection of the tonsil, which, very often, will tell us nothing. Decision as to whether a tonsil should be removed or not will depend upon a great many factors, chief among which are the amount of local infection seen, the cultural characteristics of any pus, the size of the tonsillar glands, and the extent and degree of severity of the systemic infection.

SURGICAL CONDITIONS

In Table A data concerning certain surgical conditions found during the annual physical examination of officers may be noted. Hernia was found in 34 individuals; ankylosis of joints in 12; hydrocele in 8; amputation of extremity in 3; fistula in ano in 3; hemorrhoids in 27; bunion in 1; varicose veins in 12; relaxed abdominal wall in 17.

As these conditions are all amenable to surgical treatment, no comment on them is necessary. Among those officers found to possess a relaxed abdominal wall is included all with relaxed inguinal rings, which may be a factor in the production of hernia.

DENTAL DEFECTS

Only 19 officers were reported as having defective teeth. This small number would indicate that the dental examination was not carefully conducted by medical officers, and that only gross defects were recognized. Dental officers are available for this examination and should be employed.

The dental examination should determine the condition of every tooth present in the mouth. Each tooth should be tested for vitality, and special attention should be directed toward teeth which are restored by large fillings or inlays, those carrying crowns of any description, and teeth used as the abutments of bridges or as supports for other appliances. All artificial restorations should be examined for overhanging edges which impinge on the gingival tissue and form lodging places for infectious organisms. The extent or absence of alveolar absorption should be noted by direct examination and by reference to radiographs of the teeth. Malocclusions or traumatic occlusion of individual teeth and the presence of impacted or malposed teeth should be noted. Evidences of decay and focal infection should be noted.

Notations of all conditions found should be made on the dental chart in the examination form, with such abbreviated remarks as are deemed necessary to make clear their meanings. The record thus obtained will serve to indicate at regular intervals of one year the need of performing dental operations for the officer concerned. By comparing the dental examination chart with the dental abstract sheet in the health record the latter can be brought up to date by the insertion of such entries as have not already been made. This periodical correction of the dental abstract sheet will insure its maximum value for the purpose of identification.

WEAK COLOR PERCEPTION

In examining for color perception it is well to remember that the official Holmgren skein test is not very accurate even under the most favorable conditions. It is, however, a practical method that has stood the test of time in our service, although it is realized that a small percentage of those who are partially color blind can pass the test. For this reason, therefore, every effort should be made to conduct the test carefully on a white background, being sure that the skeins have not faded, that the light is good, and that the confusion skeins are used. If the Stilling or Ishahara charts are available, they can be used as sensitive tests to detect those with weak or partially defective color perception, but the final decision shall be based on the ability to pass the wool test. The Jennings self-recording test has its value to furnish a record for the failure. When available the Edridge-Green lamp can also be used as one of the most accurate tests which closely simulates service conditions. For 15 years this has been used at the Naval Academy as an official test, in addition to the wools, hence failure to pass this lamp should be considered final. It is not a question of knowledge of colors, but only that of ability to see a red, green, and white light under the same conditions that are met at sea, during a fog, rain, or haze from smoke. It must be remembered that in this and all these tests *intensity* of illumination is one of the strongest factors for those who have weak color perception; therefore a standard distance of at least 10 feet should be required. The open lights, without fogging, can generally be differentiated by those who only have partial color blindness, hence the railroad test lamp is not suitable. In order that there be more uniformity as well as greater accuracy of examination for color blindness, the Stilling chart is to be used as the final test of entrance to the Naval Academy, commencing this year. Eventually it may be used for the annual physical examination of all officers, but for the present the official tests are the Holmgren and Edridge-Green lamp.

FLAT FEET AND FOOT STRAIN

Eleven officers possessed flat feet of sufficient degree to produce disability worthy of note in the record; undoubtedly some borderline cases giving no symptoms were encountered and, quite correctly, not recorded. An allied condition, namely, foot strain, is frequent, and may be revealed in an officer's medical history.

What should we consider a satisfactory foot from a service standpoint? Apparently not much importance is attached nowadays by the orthopedic surgeon to the height of the longitudinal arch, and the Feiss measurement and the height of the lower border of the scaphoid tubercle above the floor have not the significance they formerly had. Crandon (United States Naval Medical Bulletin, January, 1919), having in mind the foot bordering on abnormality seen in the recruiting office, came to the conclusion that if a man can balance with any degree of steadiness on one foot held straight forward, with the other foot curled around the ankle, he might safely be accepted for enlistment, as 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 alone. In order to pass this test successfully, of course, the musculature of the lower extremity must be in good condition. If a weakness exists allowing any degree of pronation of the foot, the candidate's balance will be deranged.

Leaving aside the question of anatomy, it appears that from a service viewpoint a foot may be considered normal if there is unrestricted motion of the foot joints and the line of weight bearing passes over the second toe. According to Mebane (Military Surgeon, October, 1920), men accepted for the service on this basis during the war had little foot trouble, and if trouble did develop it responded to treatment in the great majority of cases. Men accepted in violation of these requirements, such as cases of flaccid flat feet with abduction and eversion, rigid or spastic flat feet, rigid arthritic or post-traumatic feet, marked cavus, ankle valgus or varus following fracture, marked hallux valgus, hallux rigidus, and amputations or severe derangements of the joints of the great toe could only in a few instances be made fit for duty.

GLYCOSURIA

Sugar was found in the urine of 11 officers. This is a finding which deserves careful investigation because of its association with diabetes. Sugar in the urine is not always dependent upon an increase in the blood-sugar content, although the latter is usually increased when glycosuria is present. Glycosuria may be present for a considerable length of time, without any concomitant symptoms or without any impairment of health. There have been numerous forms of glycosuria described, the adjective usually defining the condition: Intermittent glycosuria, alimentary glycosuria, renal glycosuria, and diabetic glycosuria. Diabetes, as a general rule, is an insidious affection. It is not ushered in with the full symptom complex from the very beginning. Glycosuria, the first symptom, no doubt early in the disease is intermittent in character and is present only after an unusually heavy meal or one of high caloric content. This form of glycosuria is called intermittent glycosuria. If the intermittent glycosuria shows a tendency to become constant it is significant of a diabetic glycosuria.

In normal individuals a meal rich in carbohydrates, especially if it contains carbohydrates very readily convertible into glucose, may show sugar temporarily in the urine. If the body is suddenly overwhelmed with carbohydrate, which is readily converted into glucose normally, it is unable to properly care for it, and in order to maintain the normal concentration in the blood the excess is excreted in the urine. The term alimentary glycosuria is applied to this form. The limit of assimilation of glucose is about 100 grams given at a single dose. If no glycosuria or deviation in the normal blood sugar curve is present after this amount is ingested, the individual is considered to have a normal carbohydrate metabolism.

Experimentally glycosuria can be produced by giving phlorizin to an animal. This drug produces sugar in the urine regardless of whether food is withheld from the animal temporarily, and it is a matter of indifference as to the kind of food ingested. The glycosuria disappears when the administration of the drug is discontinued. Phlorizin causes glycosuria, not by impairing the ability of the body to utilize carbohydrate, but by liberating the carbohydrate already stored in the body, the function of the kidney not being altered.

Renal glycosuria, or renal diabetes, as it is also called, because glycosuria is the only symptom, is a condition the identity of which is seriously doubted by very eminent authorities; reliable observers, on the other hand, have been fully satisfied that such a condition exists. The condition is believed to be due to increased permeability of the renal cells. Though glycosuria exists, the blood sugar content is either normal or subnormal. In this condition the glycosuria is continuous, or may be interrupted for periods which bear no relation to the carbohydrate intake. The blood sugar curve presented in these cases of renal glycosuria are of the greatest importance in establishing the presence of the condition. The sugar content of the blood must not exceed the percentage present in normal individuals following a single dose of 100 grams of glucose taken by mouth, and is usually less than the maximum allowed under normal conditions. If 100 grams of glucose are given by mouth the percentage of blood sugar must return to the fasting level within two hours and be accompanied by the presence of glycosuria. The more or less persistence of glycosuria during fasting, the normal blood sugar concentration regardless of carbohydrate content of the diet, and the absence of other symptoms of diabetes mellitus characterize the condition described as renal glycosuria.

Diabetic glycosuria, of course, is characterized by having associated with it the clinical and laboratory findings of diabetes.

ABNORMAL URINALYSIS

Fifty-five officers were noted in whose urine albumin or albumin and casts occurred.

Albuminuria is not in itself a sign of kidney disease. On the other hand, it can never be regarded as a sign of health, and a careful search for the cause is indicated. The causes of albuminuria may be classified as follows:

1. Acute or chronic inflammation of the kidneys (nephritis).
2. Infection, acute or chronic. The following foci of infection are mentioned in the order of their importance: (*a*) Teeth, (*b*) tonsils, (*c*) sinuses, (*d*) gall bladder.
3. Cardiac (Chronic congestion).
4. Postural (orthostatic). This occurs particularly in young people, and a simple way to verify this condition is to have the individual void in the morning before arising, which specimen shows no albumin. If there is no other evidence of nephritis, albumin under these circumstances may be regarded as not significant.

The presence of both albumin and casts in the urine points more definitely to disease of the kidneys. They do not necessarily indicate, however, a permanent or progressive injury to the kidney. If red blood cells are also present and it can be definitely determined that they do not come from the lower urinary tract, the evidence points strongly to kidney disease.

When these urinary findings are present the individual should always be subjected to the various kidney function tests and a study of his blood chemistry.

The routine examination of patients with positive urinary findings must be thorough and complete and should always include an examination of eye grounds, heart, blood vessels, and blood pressure. The examination should not be hasty, and sufficient time and care must be taken with each case to determine whether or not the condition is merely temporary and dependent upon some focus of infection which can be eliminated, thereby restoring the patient to health, or whether he has progressed beyond this point with permanent kidney damage.

CARDIAC DISEASE

Six officers presented evidence of definite cardiac pathology at the time of the annual physical examination, and 94 showed cardiac derangement of an indefinite character.

A careful history and a complete physical examination are important in a cardiac diagnosis. The close relationship between the rheumatic group and heart disease is well recognized. It is important, therefore, to determine whether there is an antecedent history of rheumatic fever, chorea, tonsillitis, scarlet fever, diphtheria, pneumonia, syphilis, or any other acute infection. Local foci of infection are potential causes of primary acute endocardial trouble or of recurrent endocarditis in old valve lesions.

As has been mentioned before, cardiac abnormalities should be carefully studied with a view to determining whether they be functional or organic. A permanently enlarged heart is a diseased heart, and in this condition varying degrees of hypertrophy and dilatation coexist. A certain amount of dilatation when extra work is thrown upon the heart is normal, but in pathological conditions of dilatation the heart recovers with difficulty or fails to recover. The determination of fixed enlargement suffices to establish the fact that the heart is diseased.

The size of the heart in normal individuals varies with their body weight, age, circumference of chest, and position of the body.

Orthodiagraphy and teleoröntgenography are satisfactory methods for determining the *actual* size of the heart in cases of suspected hypertrophy. Smith and Bloedorn, in a large and carefully controlled study of clinically normal hearts, conclude, however, that due to the "great and unexplained variability of the organ * * * any conclusion as to the *relative* size of the heart based on comparative dimensions, ratios, or relations to body landmarks is fallacious and should be applied clinically with great reserve."

Bordeen has found that there is a constant relationship between the body weight and the size of the heart. In infants of normal weight at birth the greatest transverse diameter of the heart shadow is 5 centimeters. At one year it has increased to 7 centimeters. From 1 year to 14 years it gradually rises to 11 centimeters, which is the adult lower level. In a normal adult of 100 pounds the greatest transverse diameter of the long distance is 11 centimeters. Increasing parallel with increasing weight, it rises to 15 centimeters at 200 pounds. From 200 to 300 pounds it slowly attains a maximum of 16½ centimeters. The majority of normal people vary between 120 and 180 pounds, therefore 12 to 14 centimeters will be satisfactory numbers to bear in mind as representing the variations in the normal transverse diameter in the teleoröntgenogram.

The normal point of maximal impulse, the so-called apex beat, is a sustained thrust definitely palpable, in the fifth interspace, 3 to 4½ inches from the median line of the sternum. A definite maximal impulse lying more than 4½ inches to the left of the midsternal line is direct evidence of enlargement of the heart, especially if it lies in the sixth interspace.

Percussion will show only approximately the size of the cardiac dullness. Definite cardiac dullness to the right of the sternum means a displaced heart or engorged right auricle.

A satisfactory test for the determination of impaired cardiac function has not been developed. The test of Schneider, abstracted and recommended in the NAVAL MEDICAL BULLETIN of November, 1922, has been found satisfactory by certain flight surgeons who have applied it to aviators.

The general observation of the effects of a rapid and forceful stationary run or a series of standing hops and the degree of distress induced is often of use. These tests tend to indicate those with the neurocirculatory syndrome, whose response to forcible exercise is much poorer than that of many organic cardiacs.

A careful inquiry into the activities of the past three or four years, comparing previous accomplishment with present capacity for the same efforts, is probably the best index of cardiac function. How far or how long could the officer walk, run, or swim two years ago and how much can he do at present, and the reasons for any discrepancy, offer a satisfactory basis of comparison.

Cardiac murmurs.—In the diagnosis of cardiac pathology, murmurs present much opportunity for confusion. The detection of a diastolic murmur is decisive evidence of organic heart disease. Systolic murmurs are decidedly less helpful to us in arriving at a diagnosis, because many of them are functional. W. S. Thayer suggested the following classification for functional murmurs:

1. Cardio-respiratory murmurs.
2. Basic pulmonary systolic murmurs.
3. Systolic murmurs at the apex, present only in the recumbent or left lateral position and disappearing on assuming the erect position.

The cardio-respiratory murmur may be heard best at the apex, over the precordium, or even at the angle of the left scapula. It is of short duration, commonly appears in late systole, and is limited to one phase of the respiratory cycle, being heard best during inspiration. Cardio-respiratory murmurs rise and fall with respiration and disappear on full expiration. They are of no importance diagnostically.

The basic pulmonary systolic murmur is usually heard best in the third left interspace, especially when the patient is recumbent; it is increased on forced respiration and may disappear on assuming the erect posture or during deep inspiration. Unlike the murmur of pulmonary stenosis, it is inconstant, does not show the transmission along the clavicle, is not accompanied by a thrill in the region of the pulmonary cartilege, and there is no history of cyanosis in the individual. This murmur frequently accompanies anemia and is sometimes found in overacting hearts in health. Pulmonary stenosis should never be diagnosed on the murmur alone. Where there is a genuine lesion the murmur is well transmitted in the line of the left clavicle; also there should be a well-developed thrill in the region of the pulmonary cartilege and constant or transient cyanosis of the lips.

A systolic murmur, heard best at the second right cartilege, very rarely means aortic stenosis; more often it means stiffening of the valves, roughening of the intima of the aorta, or some abnormal hemic state. Especially in men past middle life, with dilatation of the ascending aorta, the aortic systolic murmur may be harsh or musical, but the ringing second sound differentiates it from stenosis.

Thayer recognizes two functional murmurs occurring at the apex. The first and most common one is a bruit heard only in the recumbent or left lateral position and disappearing when the erect position is assumed.

The second murmur is a constant systolic murmur, present in all positions and unaffected by the respiratory cycle. It may be differentiated by: (1) Its occurrence late in systole; (2) the first sound at the apex is normal in quality; (3) the second sound in the pulmonary area is not accentuated; and (4), as with all functional murmurs, there is no cardiac enlargement.

Formerly a systolic murmur with maximum intensity at the apex and transmitted into the axilla was considered diagnostic of mitral incompetence. Murmurs of this sort occur with crumpled valves, in the insufficiency due to a relaxed ring, and with no demonstrable lesion post-mortem. Clinically, it is impossible from the murmur alone to say whether it is due to valvulitis or to a relative insufficiency of the mitral opening. A systolic murmur at the apex suggests that we search for an antecedent history of rheumatic disease or infection and that we try to discover a diastolic or a presystolic murmur also in the individual, as mitral incompetence and mitral stenosis may often coexist. Such a murmur is best heard with the patient in the left lateral position, and when it is absent it may frequently be brought out by exercise. A systolic murmur at the apex which is constant is likely to have an organic basis. This is especially so if enlargement can be demonstrated and if symptoms of cardiac insufficiency are present.

Cardiac arrhythmias.—The most frequent arrhythmias encountered are premature contractions or extra systole and normal or sinus arrhythmia.

A premature beat or extra systole may be recognized by its early appearance, by weakness of the heart sounds—sometimes the second sound is absent—and by weakness or absence of the radial pulse.

They are more commonly present when the pulse is at the ordinary rate and the individual is upright. They are abolished by anything like exercise which increases the pulse rate.

Sinus arrhythmia is a condition found in young adults. It is closely connected with respiration, the pulse rate increasing during inspiration and decreasing during expiration. This form of arrhythmia may be exaggerated by deep breathing and is abolished by anything that increases the pulse rate as exercise.

Simple prolongation of conduction resulting in heart block is usually accurately demonstrated only by exact methods. In the grade of heart block where there is an occasional or regularly recurring dropped beat, the irregularity is to be differentiated from premature beat, thus: On listening at the apex, instead of a premature beat, one will find silence over the heart almost twice as long as the normal interval. A regular pulse rate of 50 may be bradycardia, but it suggests heart block. A regular pulse rate of 40 suggests two-to-one heart block. In complete block the ventricular rate is usually 30. Two-to-one heart block may be difficult to differentiate from slow normal rhythm, but two-to-one block is an unstable condition. Sudden halving or doubling of the pulse is suspicious. Again, in two-to-one heart block, by means of posture, exercise, or atropine, we may be able to change the grade of the block or abolish it.

Paroxysmal tachycardia is characterized by a regular apex rate of 150 or more, uninfluenced by any change in posture of the patient and unassociated with any of the toxemias causing simple tachycardia. Simple paroxysmal tachycardia comes in spells, as its name implies. Auricular flutter, on the other hand, when once established tends to be a permanent condition and is more influenced by position, exercise, and drugs, especially digitalis.

A persistent irregular rhythm of the heart, with a pulse rate of 100 or over, is almost always due to auricular fibrillation. It is the maximal irregularity of the heart, and once established it is usually permanent. At the apex one hears a jumble of loud and weak sounds with varying pauses. The count at the apex and the count at the radial generally do not agree—there is a pulse deficit. In slower fibrillation, with a pulse around 80, there may be difficulty in differentiating this irregularity from extra-systolic arrhythmia. Exercise the individual, and when you raise the rate to 120 or more, the arrhythmia of auricular fibrillation increases; the other disappears.

REPORT OF SMALLPOX

The following case of smallpox has been reported to the bureau: The patient, an engineman, third class, appeared at sick call on board the U. S. S. *Oklahoma*, at San Pedro, Calif., May 27, 1924, with a suspicious eruption most marked about the axillæ and inner sides of the thighs; temperature, 100.8; pulse, 90. He did not feel sick. He was isolated and transferred to the U. S. S. *Relief* as soon as practicable, where the case was also considered to be smallpox.

He had last been ashore on liberty in Bremerton, May 4, 1924.

His vaccination history is as follows: Enlisted September 6, 1922. At that time he presented one scar indicative of previous successful vaccination. He was vaccinated September 21, 1922, and the result was recorded as an immunity reaction.

In this connection it is pertinent to observe again that an immunity reaction can not be relied upon to indicate that a given individual is as fully protected as he can be, unless the cowpox virus that provokes the reaction is known to be potent. In view of this well-known fact, immunity reactions previously recorded in health records can not be taken altogether for granted, and, in any event, to be certain of the vaccination status of a crew one would prefer to see immunity reactions himself.

A few individuals, of course, tend to lose immunity acquired against smallpox more rapidly than a large majority of protected individuals do, and it is a matter of no great interest that a mild case of smallpox should develop in the person of a man who exhibits a pitted scar resulting from a primary "take" more than two years previously, even though it appears that he has also given a reaction indicative of immunity within two years.

With the knowledge that societies and individuals opposed to vaccination are on the lookout for cases of smallpox in vaccinated individuals, the interests of preventive medicine can best be promoted by presenting the straightforward truth as clearly as it can be ascertained in all instances. No member of any community who is mentally accessible and able to grasp plain facts will refuse to indorse vaccination for the protection of his loved ones because it can not be guaranteed that no successfully vaccinated individual will develop smallpox. Vaccination can be guaranteed to prevent and suppress epidemics of smallpox and to prevent many deaths that would otherwise occur.

The history of smallpox for more than 100 years furnishes convincing proof of the efficacy of cowpox virus in its prevention and control. The story is one that leaves no doubt in the mind of a logical being. Fortunately, we may count on a safe majority of the citizens in any community to be intelligent and open to reason. Indifference on the part of the public is the difficult thing to overcome, and too often apathy can not be overcome until an outbreak of the disease actually occurs. It is never worth while to expend time and energy in wrangling with the small minority of people who are not mentally accessible and who would interfere with safeguarding the health of the community if they could.

ANOTHER CASE OF GONOCOCCUS INFECTION OF THE EYE ATTRIBUTED TO A WASH BUCKET USED IN COMMON WITH OTHER MEN—IMPORTANCE OF CONCURRENT DISINFECTION IN GONORRHEA

The infected individual in this case was a seaman, first class. There was no evidence that he had had gonorrheal urethritis. The left eye was intensely inflamed and there was a thick muco-purulent discharge which contained many gonococci.

The patient stated that he had lost his own bucket and had used buckets belonging to other men in his division to wash his face and hands. This is the third case of gonorrheal ophthalmia within a year presumed to have resulted from the use of a bucket in common with other men.

This case occurred on board the same ship in which a few weeks previously two officers developed gonococcus infection of the eyes. It was assumed that they were infected by handling papers or some other article in the engineer's office. A yeoman on duty there had active gonorrheal urethritis at the time. These three cases should serve to remind medical officers of the requirement that all patients reporting with veneral disease are to receive emphatic instructions regarding the care of their hands, the danger of infecting their own eyes, and the fact that they are a potential menace to other persons.

Wherever practicable the Bureau of Construction and Repair authorizes the installation of a hopper with fresh-water faucet in venereal-disease treatment rooms to promote cleanliness and disinfection of patients' hands. Reasonable security in the practice of concurrent disinfection also demands the employment of a chemical disinfectant.

Bichloride of mercury solution and other prepared solutions do not serve the purpose very well. The idea of having one patient after another dip his hands in the same basin is not attractive. Chlorinated lime is suggested as a useful chemical agent because a small amount can be put into the patient's hands dry. When triturated with boric acid powder in equal parts it is not irritating to the skin. This mixture is sometimes spoken of as eusol. Bacteriological tests made by the Pennsylvania State Health Department a few years ago indicated that a strong solution of eusol would kill nonspore-bearing pathogenic microorganisms in 15 seconds under conditions where a 1 to 1,000 solution of bichloride of mercury could not be relied upon to disinfect in less than one minute. To avoid the use of a standing solution a small amount of the chlorinated lime-boric acid mixture may be taken in the hands, rubbed up with a little water into a thin paste, worked into the skin while being gradually diluted by the addition of more water under the faucet, and finally rinsed off.

STUDY OF THE DIPHTHERIA CARRIER AS AN AGENT IN THE SPREAD OF DIPHTHERIA IN DETROIT, MICH.

The following interesting report of findings resulting from an investigation of the relationship between known carriers of diphtheria bacilli and new cases of diphtheria among persons in contact with them was published in the Weekly Health Review, department of health, city of Detroit, for the week ending June 7, 1924.

The findings are consistent with those recently obtained elsewhere and tend toward the synthesis of evidence that the diphtheria carrier is not by any means as great a menace to the public, including school children, as was formerly thought. From such a conclusion we should except the carrier who has acquired the bacillus from contact with an actual case of diphtheria. Theoretically, at least, such a carrier harbors a dangerous organism during the period, brief though it may be and doubtless often is—in open weather under good hygienic conditions—before descendants of the original disease-producing bacilli have undergone decline in their virulencies.

As quoted in previous remarks on the epidemiology of communicable diseases, Park has been led by similar considerations to formulate the statement, " cases of disease and direct contact carriers are more dangerous than carriers infected by carriers. The further the carrier is from a case of disease the less virulent the microbes."

The Detroit report, edited by Carl E. Buck, D. P. H., epidemiologist, follows:

" During the past year a study has been made of the incidence of diphtheria carriers associated with 478 cases of diphtheria. Associated with these cases were 853 contacts, of whom 197 were diphtheria carriers. A study of the incidence of carriers among contacts when the patient went to the hospital or when the patient remained quarantined at home indicated that the number of carriers was relatively greater when the patient was quarantined at home."

"Another group of 97 diphtheria carriers who were not associated with a clinical case of diphtheria were allowed to return to school. These carriers returned to 49 different schools. Assuming that on the average the number of pupils in the rooms which they attended was 20, the number of contacts in the rooms attended by these cases would be 980 children. Estimating the number of home contacts as 314, we have a total of 1,294 contacts with these cases. Cases of diphtheria developed in these rooms in nine instances only, but the time of incidence of these cases was so long after the return to school that in no instance could the carrier be considered as the source of infection.

"It is, therefore, the belief of this department that diphtheria carriers unassociated with a clinical case may be disregarded so far as their danger to public health is concerned, whereas diphtheria carriers who are associated with a clinical case of diphtheria must receive restrictive measures and should be treated in order that they may not be a menace to the public health."

Last year Park, in a paper dealing with some of the factors leading to the increase and decline of communicable diseases among men and animals, wrote, with reference to diphtheria carriers, "Some very interesting work by Doctor Frost has been going on in Baltimore, and I have repeated it in New York City. One of the students working for a degree took this as a subject: 'What danger is there from a diphtheria carrier of virulent diphtheria bacilli who has not, so far as we know, had any contact with a diphtheria case?' This student has followed 20 families during the winter for from two to four and a half months, and in no instance in the 20 families with one or more carriers has diphtheria developed. The same thing is true in Baltimore. We all know that carriers, whether these be nurses or physicians or parents, who developed as carriers from contact with a diphtheria case, do frequently transfer diphtheria; in the instances cited the carriers were without known contact with cases of diphtheria, but in all probability had been carriers from carriers, etc., for a long time. They did not start disease in their families, although a number of the members were Schick positives. This bears out the work on mice that the germs [an organism belonging to the paratyphoid group] from the carrier are less dangerous than those from the case itself and that the germs at each transfer are getting less and less virulent. There is a very hopeful side to this because, undoubtedly, to some degree at least, these carrier microbes, which, wile still producing toxin have lost much of their virulence, are still able to immunize. The only reason we know of as to why children in the city have a higher percentage of Schick negatives than children in the country is that in the city at any one time at least 1 per cent of the people are carriers of diphtheria bacilli and that probably these carriers are constantly changing: consequently, although only few children develop diphtheria, a great many become immune."

EPIDEMIOLOGICAL OBSERVATIONS BY THE MEDICAL OFFICER OF A DESTROYER ATTACHED TO THE UNITED STATES ASIATIC FLEET

The following comment relating to communicable disease hazards in Chinese and other ports visited on the Asiatic station was taken from the annual sanitary report of the U. S. S. *Pruitt* for the year ending December 31, 1923, as submitted by Lieut. W. P. Day, Medical Corps, United States Navy:

"On the Asiatic station the health of the personnel to a great extent is due to the individual's capacity to learn to exercise extreme care at all times regarding food. On board ship, where the water is boiled, all vegetables cooked, and fruits peeled or cooked after being first immersed in some anticeptic solution, there is little chance to become infected. However, on shore, where all sorts and degrees of restaurants abound and cater to the men, it is rarely, if ever, that the food can be depended upon as fit for human consumption. It is a well-known fact that it is the common practice on this station to use night soil to grow vegetables; that these are served uncooked; that myriads of flies swarm over the food that is being served and while being prepared. Inasmuch as cholera, the dysenteries, and typhoid are epidemic, it is little wonder that every year a certain quota do contract these diseases. All men are repeatedly warned, lectured to, and otherwise instructed by means of placards (sent by the bureau), but on liberty, under the influence of alcohol, the majority become more or less indifferent. The same thing applies to the high venereal disease rate that exists in this fleet. Prostitution is rife, and the prostitutes are of the lowest order. Alcoholic liquor is cheap, and healthful forms of amusement and recreation scarce. A large percentage of the men sent over are young and unsophisticated, and notwithstanding the constant efforts of all officers to drill into them, by all means known, the dangers of exposure and insistence on the use of the prophylactic in the event that they do expose themselves, the venereal disease rate continues to be high.

"It is the consensus of opinion of medical officers here that fewer, if any, men in their first enlistments should be detailed to the Asiatic station. Original admissions for the past year show the average age to be 23.5 years. While the methods of prophylaxis now employed have lowered the venereal disease rate somewhat, it is practically impossible to enforce its employment within reasonable time limits. Especially is this to be seen in ports where all-night liberties are granted. In these ports the admission rate promptly rises."

PREVENTION OF PHLEBOTOMUS FEVER

The following abstract by M. A. Barber of the article which appeared in Transactions of the Royal Society of Tropical Medicine and Hygiene, volume 17, No. 5, November, 1923, by Wing Commander Harold E. Whittingham and Flight Lieut. Alan F. Rook, Royal Air Force Sandfly Fever Commission, was taken from Public Health Engineering Abstracts published by the Bureau of the United States Public Health Service February 16, 1924:

"Phlebotomus, or sandfly fever, is an acute specific fever caused by a virus, possibly a leptospira, conveyed to man by the bite of a midge, *Phlebotomus*, as a rule of the species *papatassii*. According to a map shown by the authors, this disease is found almost universally in the coastal regions of tropical and subtropical regions of both hemispheres, including the coastal regions of the southern United States and of California. It is chiefly responsible for the present high sickness rate of British troops serving in such regions. The virus has been shown to be transmitted from generation to generation of *Phlebotomus papatassii*, either by "heredity" or by the infection of the larvæ through feeding on the excreta or the dead bodies of the parent flies. The larvæ are chiefly found in places which are dark, damp, and filthy, such as dirty cellars, garden soil, base of crumbling walls, walls and woodwork of privies, and the like.

"The authors' work had mainly to do with the prevention of the disease in army quarters on the Island of Malta. Their methods are summarized as follows:

"1. Abolition of breeding grounds through leveling and packing the soil and subsequent treatment with concrete, tar, or some crude oil; repair of buildings and walls, painting, tarring, whitewashing, and pointing of crevices; removal of gardens, chicken yards, and the like from the vicinity of dwellings—all with the aim of getting rid of possible accumulation of moist filth.

"2. Destruction of the adult fly; swatting, to be done daily during the hour prior to sunset; spraying of rooms with 1 per cent cresol at least twice weekly.

"3. Prevention of biting; keep quarters as free as possible from spare kits or any unnecessary hiding place of the insects, removal of cobwebs and dirt of all kinds; raise furniture from floor; cotton nets of 45 or more meshes to the square inch for windows or bed nets; repellants, camphor in the form of a sachet placed under the pillow or worn as an amulet, or paraffin (abstractor's note: Possibly some derivative of petroleum other than paraffin as we know it. The writers mention its 'fumes') smeared over ventilators, bedsteads, and the lower corners of the room; air currents, natural and artificial; sufficient clothes after sundown to properly protect the skin.

"The case incidence of phlebotomus fever in 1922 was half that in either of the two preceding years, a reduction attributed by the authors to the prophylactic measures employed."

THE QUESTION OF KEEPING IN STOCK SUFFICIENT QUANTITIES OF MEDICAL STORES AND SUPPLIES

Quite a number of medical officers attached to cruising ships in their annual sanitary reports stated that allowances in the Supply Table were insufficient for their ships. These were either ships serving as tenders for destroyers or submarines, or vessels acting independently under conditions where the medical department served a larger personnel than the authorized complement of the vessel itself.

It is not necessary that the Supply Table be changed in order that sufficient quantities of supplies may be requested and provided. Study of annual sanitary reports having indicated that a number of medical officers lack information on this point, the Division of Finance of the bureau was requested to furnish a suitable memorandum, which it did in the following language:

"Paragraph 3067, Manual of the Medical Department:

"'The allowances in the Supply Table are intended as the basis of supplies for a ship when fitting out for cruise. Needful additions may subsequently be made from time to time by requisitions, but it is not necessary or expected that these additions shall bring the amounts on hand fully up to those given in the Supply Table.'

"Paragraph 3066, Manual of the Medical Department:

"'Requisitions for stores and supplies that may be required from naval medical supply depots shall be made on the prescribed forms, as follows:

"'(*a*) For hospitals, on the 1st of March and September.

"'(*b*) For yards and stations, on the 1st of April and October.

"'(*c*) For receiving ships and ships in reserve, on the 1st of May and November.

"'(*d*) For cruising ships, when necessary or when near a convenient source of supply. Frequent requests for small quantities should be avoided, however, and care should be exercised to anticipate the needs for six months when practicable.'

"Paragraph 3412. Form B. Requisition and priced invoice.

"'This form shall be prepared and submitted semiannually and when necessary in accordance with instructions on the form, in the Supply Table, in fleet regulations (for ships), and in paragraphs 3062 to 3069 of this manual.'

"Paragraph 832 (2), Manual of the Medical Department:

"'Timely requisitions for stores and supplies must be made to cover ordinary expenditures, but they shall not be filled by purchase if it can be avoided.'

"Paragraph 3, bottom page 3, Supply Table. Submit to the Bureau of Medicine and Surgery—

"'Requisitions for items which are in themselves in excess of the allowance or when the amounts required, together with those on hand, exceed the allowance.'

"The paragraphs quoted from the Manual of the Medical Department and the Supply Table indicate in a general way the object of the allowance columns in the Supply Table. They represent estimated quantities of the different items listed which, under usual conditions, are considered the maximum stock required on board at any one time, and the maximum amounts to be requested on any one requisition.

"It is realized that the supply must be regulated by the demand which will vary under different conditions even for ships with the same complements and of the same type. For this reason cruising ships are instructed to 'submit timely requisitions for stores and supplies to cover ordinary expenditures,' and 'when near a convenient source of supply,' although 'frequent requests for small quantities should be avoided.'

"The idea that the allowances in the Supply Table represent six months' supply is wrong. Requisitions may be submitted at any time it may become necessary; this is a matter entirely within the province of the local medical officer, and the responsibility of keeping on board an adequate supply of medicines and medical supplies rests with him. However, as before stated, he should look ahead and make convenient arrangements for procuring the supplies, bearing in mind the itinerary of the ship.

"In general, it is believed that the allowances for nonexpendable items are sufficient and under usual conditions there should be no necessity for exceeding them. But when requests for either expendable or nonexpendable items, in excess of the allowance, are considered necessary, the requisitions should be submitted to the bureau with a letter explaining why the excess is considered necessary.

"A request for any item considered necessary for the proper care and treatment of the sick will be considered if made to the bureau with a letter of explanation, even though it is in excess of the Supply Table allowance, or, for that matter, if it is not listed in the Supply Table at all."

COMMENT REGARDING DATA REQUIRED ON FORM F CARDS IN CASES OF INJURY OR POISONING

The bureau has to return many Form F cards in the case of injuries for additional information, in order to gain a clear understanding of the various factors surrounding the injury, preparatory to their coding and classification.

The following examples are cited from Form F cards forwarded from the U. S. S. *Tennessee*. The conditions and circumstances surrounding the accidents are so succinctly and clearly stated that there could be no error in classification. They are published to illustrate just what is desired by this bureau in furnishing the additional data required by M. and S. circular letter, Serial No. 290-1923.

Fracture, simple, first phalanx, left great toe; fall of powder can. "I."

1. Within command.
2. Work
3. Negligence not apparent.
4. While at general quarters and battle drill a powder can accidentally fell on this man's left foot, causing a simple fracture first plalanx of left great toe.

Contusion, right knee, fall; slipped on ladder. "G."

1. Within command.
2. Work.
3. Negligence not apparent.
4. While at work this man slipped and fell on a slippery ladder, which caused contusion of right knee.

Fracture, simple, left radius (Colles's), fall, slipped on ladder. "G."

1. Within command.
2. Work.
3. Negligence not apparent.
4. While at work carrying stores this man slipped on ladder and fell, causing a Colles fracture of the left forearm.

Contusion, left great toe, handling of punt. "I."

1. Within command.
2. Work.
3. Negligence not apparent.
4. While at work over the side this man accidentally got his foot caught between the punt and the side of the ship, causing a contusion of the left great toe.

Contusion, upper lip and alveolar tissue, with loss of teeth Nos. 7 and 10, boxing. "J."

1. Within command.
2. Not work.
3. Negligence not apparent.
4. During authorized boxing bout man received fist blow upon mouth with result of loss of teeth and injuries as stated.

Burn, chest and left arm, steam. "H."

1. Within command.
2. Work.
3. Negligence not apparent.
4. Man was at work on steam valve. While the cause of the accident can not be definitely determined, it is believed that steam backed up behind the water in the pipe which was being drained off.

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO MAY, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and May 31, 1924, notified injuries and poisonings as follows:

	Within command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work of prescribed duty		
Injuries	1,324	663	331	2,318
Poisonings	5	24	12	41
Total admissions	1,329	687	343	2,359

Of these admissions, 85.45 per cent were for injuries or poisonings occurring within the command, and 14.55 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 65.92 per cent were connected with the actual performance of prescribed work or duty. and 34.08 per cent were not so connected. Of the total admissions for injuries and poisonings, only 56.34 per cent were connected with the actual performance of work or prescribed duties; i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases are of special interest from a preventive medicine viewpoint:

Marines, Dominican Republic.—Burn of face. Caused by some one putting gasoline into fire.

Ship.—Multiple burns. While cleaning engine of power boat, match was thrown accidentally into bucket of gasoline, setting fire to same. (Reports are frequently received of burns resulting from the careless use of matches and smoking in the presence of gasoline.)

Ship.—Lacerated wound followed by blindness in one eye. Resulted from the bursting of a gauge glass. Lack of safety device reported.

Battleship.—Fracture of arm. Patient stepped on a board which gave way. A fall of 12 feet to the deck below resulted. Sixty-one sick days were incurred in this instance.

Navy yard.—Sprain of wrist caused by fall over loose plank in dock.

Marine barracks.—Sprain of ankle caused by stepping on loose board in sidewalk. (As noted in previous numbers of the BULLETIN *loose and broken planks and boards* in docks and boardwalks are responsible for quite a number of admissions under sprains and fractures.)

Repair ship.—Wound of hand caused by using a broken emery wheel.

Ship.—Wound of scalp. Hook of stay for mess table legs jarred loose, permitting legs to drop and strike patient on head. This is a frequent cause of injury incident to the taking down and putting up of mess tables and benches.

Ship.—Gunshot wound of hand caused by explosion of a pistol which the patient was cleaning. It is amazing how often this accident occurs in the naval service. He thought it was not loaded. There is evidently need to teach more vigorously the old, old doctrine that every piece of firearms is invariably to be regarded as loaded until shown not to be at the instant of handling.

Ship.—Multiple contusions incurred by fall in attempting to descend a vertical ladder while carrying material in one hand.

Ship.—Dislocation of wrist. Patient was engaged in lowering stores into hold. He had the control end of the line wrapped around his wrist. When the load jerked suddenly, he was carried off his feet with sufficient force to dislocate the wrist.

Ship.—Wound of index finger. While wiping oil from deck about steering engine, ship rolled and patient lost his balance. In attempting to regain same he stuck his finger in gears of steering engine. Reported as due to his own carelessness.

Ship.—Foreign body in eye. While chipping paint work, a particle of hardened paint became embedded in eye. It was not stated whether the injured man was wearing protective goggles, but in view of the injury incurred it is assumed that he was not. There was a loss of this man's services for six days in addition to the damage to his eye. Injury to eyes as a result of chipping is reported repeatedly and is clearly preventable if protective goggles are worn. Artificers and mechanics working at emery wheels, drilling, and using chisels, etc., where flying particles are a danger, are also frequently the victims of injury to the eyes which could be prevented by the wearing of protective goggles.

Ship.—Burns of thighs caused by heating water with live steam: When a steam hose or pipe is used to heat a bucket of water and the steam valve turned too far, violent ebullition of the water occurs, which splashes over, causing burns. This is a frequent cause of preventable disability. In this connection it should be mentioned that admissions are reported from time to time for burns caused by the splashing over of hot water from containers which are being carried. In most instances, presumably, more hot water has been put into the container than can be safely carried. A considerable proportion of such burns are incurred while ascending or descending ladders.

It is suggested that the monthly digest of accidents and injuries, a regular feature of this section of the BULLETIN, contains information that will serve well as the basis of an accident prevention bulletin for the crew's bulletin board. Unfortunately, our experience indicates that a considerable variety of striking cases of preventable injuries may be cited every month. While officers in charge of work, leading men, and the members of the crews themselves are actually responsible for "safety-first" methods and the exercise of reasonable care to prevent accidents, it is an obligation of the medical officer to do what he can in an educational way and to disseminate as widely as possible the information relating to the nature and causes of accidents which it is a function of the medical department to collect and analyze. It is believed that the practice of systematically publishing this information for the benefit of the personnel throughout the service can not fail ultimately to have definite value as a preventive measure.

HEALTH OF THE NAVY

This report is for the month of July. The general admission rate, based on admissions to the sick list for all causes, was 505 per 1,000 per annum. Last month the rate was 489. The median rate for July computed for the preceding five years is 522.

The comparative freedom from communicable diseases and infectious diseases in general of the respiratory type, which is to be expected in midsummer, continues. Malaria continues to be less prevalent this year than in most previous years. Removal of the marine expeditionary forces from Santo Domingo accounts for part of the reduction, indicated in the table below.

There appears to be a slight downward trend in the admission rate curve for accidental injuries beginning last January, although the rate for the current month, 55 per 1,000 per annum, is not much below the five-year median rate for the month of July, 59.

The following table shows rates per 1,000 per annum for the principal communicable diseases, July, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive:

	July, 1919–1923	July, 1924
Cerebrospinal fever	0	0
Diphtheria	0.78	0.10
German measles	1.08	.91
Influenza	11.69	4.97
Malaria	17.10	10.75
Measles	3.58	1.01
Mumps	10.76	7.41
Pneumonia	2.33	2.51
Scarlet fever	.63	.91
Smallpox	0	0
Tuberculosis	4.65	1.42
Typhoid fever	.09	.10

VITAL STATISTICS

The Monthly Health Index, which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the Monthly Health Index.

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$, or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

TABLE No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of July, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	78, 526	39, 768	118, 294	20, 776
All causes:				
Number of admissions	2, 790	2, 191	4, 981	986
Annual rate per 1,000	426. 46	661. 14	505. 28	617. 96
Disease only:				
Number of admissions	2, 469	1, 954	4, 423	887
Annual rate per 1,000	337. 30	589. 62	448. 68	556. 01
Communicable diseases, exclusive of venereal disease:				
Number of admissions	503	455	958	189
Annual rate per 1,000	66. 87	137. 29	97. 18	118. 26
Venereal disease:				
Number of admissions	1, 102	388	1, 490	227
Annual rate per 1,000	168. 40	117. 08	151. 15	142. 04
Injuries:				
Number of admissions	315	232	547	99
Annual rate per 1,000	48. 14	70. 01	55. 49	61. 95
Poisons:				
Number of admissions	6	5	11	2
Annual rate per 1,000	. 92	1. 51	1. 12	1. 25

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of July, 1924*

	Forces afloat Navy and marines (strength, 78,526)		Forces ashore Navy and marines (strength, 39,768)		Total (strength, 118,294)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases	2, 469	377. 30	1, 954	589. 62	4, 423	448. 68
Injuries	315	48. 14	232	70. 01	547	55. 49
Poisons	6	. 92	5	1. 51	11	1. 12
Total admissions	2, 790	426. 46	2, 191	661. 14	4, 981	505. 28
Class II:						
Varicocele	8	1. 22	17	5. 13	25	2. 54
Class III:						
Appendicitis, acute	41	6. 27	30	9. 05	71	7. 20
Autointoxication, intestinal	3	. 46	10	3. 02	13	1. 32
Cholangitis, acute	18	2. 75	4	1. 21	22	2. 23
Cholecystitis, acute	3	. 46	0	0	3	. 30
Cholelithasis	1	. 15	0	0	1	. 10
Colitis, acute	2	. 31	13	3. 92	15	1. 52
Constipation	9	1. 38	26	7. 85	35	3. 55
Entetitis, acute	40	6. 11	22	6. 64	62	6. 29
Gastritis, acute catarrhal	11	1. 68	20	6. 04	31	3. 14
Gastroenteritis	39	5. 96	34	10. 26	73	7. 41
Hemorrhoids	22	3. 36	25	7. 54	47	4. 78
Ulcer, duodenum	1	. 15	5	1. 51	6	. 61
Ulcer, stomach	1	. 15	2	. 60	3	. 30
Total	191	29. 19	191	57. 63	382	38. 75
Class V:						
Laryngitis, acute	2	. 31	3	. 91	5	. 51
Pharyngitis, acute	4	. 61	7	2. 11	11	1. 12
Rhinitis, acute	4	. 61	1	. 30	5	. 51
Total	10	1. 53	11	3. 32	21	2. 13
Class VIII (A):						
Chicken pox	7	1. 07	0	0	7	. 71
Diphtheria	0	0	1	. 30	1	. 10
German measles	2	. 31	7	2. 11	9	. 91
Influenza	31	4. 74	18	5. 43	49	4. 97
Measles	6	. 92	4	1. 21	10	1. 01
Mumps	34	5. 20	39	11. 77	73	7. 41
Pneumonia, broncho	4	. 61	6	1. 81	10	1. 01
Pneumonia, lobar	10	1. 53	3	. 91	13	1. 32
Scarlet fever	2	. 31	7	2. 11	9	. 91
Total	96	14. 67	85	25. 65	181	18. 36

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of July, 1924*—Continued

	Forces afloat Navy and marines (strength, 78,526)		Forces ashore Navy and marines (strength, 39,768)		Total (strength, 118,294)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class VIII (B):						
Angina, Vincent's	15	2.29	27	8.15	42	4.26
Bronchitis, acute	84	12.84	81	24.44	165	16.74
Catarrhal fever	93	14.21	44	13.28	137	13.90
Tonsillitis, acute	159	24.30	100	30.18	259	26.27
Total	351	53.64	252	76.04	603	61.17
Class IX:						
Dysentery, bacillary	0	0	4	1.21	4	.41
Dysentery, entamebic	2	.31	1	.30	3	.30
Typhoid fever	1	.15	0	0	1	.10
Total	3	.46	5	1.51	8	.81
Class X:						
Dengue	15	2.29	31	9.35	46	4.67
Malaria	32	4.89	74	22.33	106	10.75
Total	47	7.18	105	31.68	152	15.42
Class XI:						
Tuberculosis (all forms)	6	.92	8	2.41	14	1.42
Class XII:						
Chancroid	305	46.61	104	31.38	409	41.49
Gonococcus infections	702	107.28	215	75.94	917	93.02
Syphilis	95	14.52	69	20.82	164	16.64
Total	1,102	168.40	388	117.08	1,490	151.15
Class XVIII:						
Pleurisy, acute fibrinous	7	1.07	4	1.21	11	1.12
Class XX:						
Herniæ	21	10.85	23	6.94	44	4.46

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for June, 1924, and from various shore stations for the four-week period, July 6, 1924, to August 2, 1924*

	Annual rate per 1,000, June, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	167.99	1,450.55	0	183.86	1,028.57
Battleship divisions—						
Battle Fleet	55.00	137.28	216.22	79.65	132.09	256.19
Scouting Fleet	60.74	141.20	152.14	85.18	164.38	211.07
Asiatic Fleet [1]	0	570.06	808.29	144.00	417.02	534.12
Light cruiser divisions—						
Scouting Fleet	84.91	185.35	413.79	120.32	197.78	473.50
Destroyer squadrons—						
Battle Fleet	0	88.39	436.36	0	150.42	314.81
Scouting Fleet	0	141.59	512.82	19.97	184.72	376.12
Asiatic Fleet [1]	0	644.30	1,309.09	174.86	419.34	1,028.57
Miscellaneous [2]—						
Battle Fleet	0	91.20	256.68	51.07	174.98	303.80
Scouting Fleet	0	115.79	444.44	0	185.08	398.79
Asiatic Fleet [1]	0	353.38	1,272.73	24.00	341.55	457.48
Naval forces, Europe	0	156.40	436.36	150.94	230.60	520.90
Special service squadron (based on Panama)	154.84	208.99	294.12	159.09	227.14	297.34
Naval transportation service	0	111.49	424.78	53.17	164.94	248.89
Special duty	0	132.69	1,450.55	0	163.70	403.59
Miscellaneous and district vessels	0	72.12	371.13	0	122.76	509.43

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for June, 1924, and from various shore stations for the four-week period, July 6, 1924, to August 2, 1924*—Continued

	Annual rate per 1,000, July 6, 1924, to Aug. 2, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	63. 61	141. 30	0	59. 85	176. 11
First naval district	0	31. 47	141. 30	27. 70	36. 39	74. 69
Third naval district	0	69. 87	125. 00	13. 40	49. 73	71. 86
Fourth naval district	18. 57	54. 58	69. 56	21. 06	44. 56	61. 79
Fifth naval district	0	78. 03	103. 28	0	70. 68	106. 90
Sixth naval district	51. 79	68. 47	71. 77	50. 64	63. 06	170. 85
Seventh naval district	0	0	0	0	0	0
Eighth naval district	106. 68	106. 78	107. 44	56. 67	65. 09	66. 32
Ninth naval district	66. 05	66. 05	66. 05	73. 34	73. 34	73. 34
Eleventh naval district	0	41. 011	89. 79	40. 54	58. 09	74. 86
Twelfth naval district	32. 02	49. 09	54. 94	37. 11	50. 03	85. 49
Thirteenth naval district	45. 22	75. 73	134. 02	45. 35	86. 19	176. 11

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASES

	Per cent Jun, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	57. 06	10. 73	60. 35	8. 41
Battleship divisions—				
Battle Fleet	61. 33	12. 00	68. 99	11. 43
Scouting Fleet	58. 43	10. 11	70. 91	5. 51
Asiatic Fleet [1]	45. 45	10. 10	45. 54	14. 15
Light cruiser divisions—				
Scouting Fleet	48. 72	23. 08	47. 22	9. 03
Destroyer Squadrons—				
Battle Fleet	85. 71	4. 76	64. 24	7. 29
Scouting Fleet	67. 86	1. 78	61. 74	3. 29
Asiatic Fleet [1]	50. 00	7. 81	54. 97	8. 08
Miscellaneous [2]—				
Battle Fleet	62. 22	24. 44	58. 95	9. 05
Scouting Fleet	58. 73	4. 76	55. 87	5. 87
Asiatic Fleet [1]	51. 06	8. 51	38. 79	7. 33
Naval forces, Europe	36. 36	18. 18	53. 16	8. 18
Special service squadrons (based on Panama)	77. 42	0	69. 19	4. 65
Naval transportation service	46. 67	10. 00	59. 22	8. 16
Special duty	61. 54	15. 38	67. 66	9. 58
Miscellaneous and district vessels	0	100. 00	40. 00	15. 00

	Per cent July 6 to Aug. 2, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All naval districts in the United States	69. 57	19. 57	73. 21	12. 81
First naval district	77. 78	22. 22	88. 16	5. 26
Third naval district	73. 33	20. 00	80. 26	15. 79
Fourth naval district	90. 00	0	82. 50	15. 00
Fifth naval district	62. 90	22. 58	65. 89	13. 95
Sixth naval district	87. 50	0	70. 00	6. 66
Seventh naval district	0	0	0	0
Eighth naval district	75. 00	0	72. 22	11. 11
Ninth naval district	83. 33	16. 67	77. 78	18. 52
Eleventh naval district	75. 00	25. 00	73. 96	10. 42
Twelfth naval district	33. 33	50. 00	74. 47	12. 77
Thirteenth naval district	66. 67	33. 33	74. 00	18. 00

[1] Month of May. [2] Vessels of train, base, air squadrons, etc.

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rates per 1,000, entire Navy, for the four-week period, July 6 to August 2, 1924, inclusive*

	Navy (strength, 97,518)		Marine Corps (strength, 20,776)		Total (strength, 118,294)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of blood	1	0. 13	1	0. 63	2	0. 22
Diseases of circulatory system	31	4. 13	16	10. 01	47	5. 17
Diseases of digestive system	339	45. 19	127	79. 47	466	51. 21
Diseases of ductless glands and spleen	3	. 40	0	0	3	. 33
Diseases of ear	227	30. 26	55	34. 41	282	30. 99
Diseases of eye and adnexa	101	13. 46	19	11. 89	120	13. 19
Communicable diseases transmissible by—						
Oral and nasal discharges (A)	135	18. 00	26	16. 27	161	17. 69
Oral and nasal discharges (B)	486	64. 79	96	60. 07	582	63. 96
Intestinal discharges	2	. 27	5	3. 13	7	. 77
Insects and other arthropods	84	11. 20	60	37. 54	144	15. 82
Tuberculosis (all forms)	11	1. 47	2	1. 25	13	1. 43
Venereal diseases	1, 184	157. 84	227	142. 04	1, 411	155. 06
Other diseases of infective type	194	25. 86	65	40. 67	259	32. 42
Diseases of lymphatic system	35	4. 67	17	10. 64	52	5. 71
Diseases of mind	40	5. 33	14	8. 76	54	5. 93
Diseases of motor system	83	11. 06	30	18. 77	113	12. 42
Diseases of nervous system	31	4. 13	6	3. 54	37	4. 07
Diseases of respiratory system	32	4. 27	8	5. 01	40	4. 40
Diseases of skin, hair, and nails	55	7. 33	34	21. 27	89	6. 48
Herniae	32	4. 27	8	5. 00	40	4. 40
Miscellaneous diseases and conditions	66	8. 80	33	20. 65	99	10. 88
Parasites (fungi and certain animal parasites)	77	10. 26	10	6. 26	87	9. 56
Tumors	17	2. 27	3	1. 88	20	2. 20
Injuries	475	63. 32	97	60. 70	572	2. 86
Poisoning	8	1. 07	2	1. 25	10	1. 10
Dental diseases and conditions	22	2. 93	5	3. 13	27	2. 97
Total	3, 807	508. 51	986	617. 96	4, 793	526. 73

TABLE No. 5.—*Deaths reported, entire Navy, for the four-week period, July 6 to August 2, 1924, inclusive*

	Navy (strength, 97,518)	Marine Corps (strength, 20,776)	Total (strength, 118,294)
Pneumonia, broncho	1	0	1
Pneumonia, lobar	2	0	2
Tuberculosis, all forms	1	0	1
Malaria	1	0	1
Syphilis	1	0	1
Tetanus	0	1	1
Malignant growths	2	0	2
All other diseases	9	2	11
Drowning	5	2	7
Injuries	5	4	9
Poisons	2	0	2
Total	29	9	38
Annual death rate per 1,000, all causes	3. 87	5. 63	4. 18
Annual death rate per 1,000, diseases only	1. 07	1. 88	2. 20

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UNITED STATES NAVAL MEDICAL BULLETIN

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INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
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PREFACE

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

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

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

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

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

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

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

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U. S. NAVAL MEDICAL BULLETIN

VOL. XXI — OCTOBER, 1924 — No. 4

SPECIAL ARTICLES

THE ANNUAL PHYSICAL EXAMINATION

By W. A. BLOEDORN, Lieutenant Commander, Medical Corps, United States Navy

The time is near for the annual physical examination of officers in the naval service and it may not be amiss for us to survey the situation in the light of past experience and to formulate a method of approach which is consistent both with the needs of the service and the interests of the officer himself.

Originally the object of this examination was probably to detect and eliminate from the service those who were manifestly unfit for active duty.

While this undoubtedly is still one of the objectives it is not the sole one and is probably not the most important. If we approach the candidate with this idea solely in mind we are failing sadly in our duty toward him. The individual who has reached the point where retirement from the service for physical disability has become a necessity, as a rule, has already been under observation by medical officers for some time and has passed the point where preventive medicine is applicable.

The annual physical examination is an ideal opportunity to practice preventive medicine about which we hear so much and about which we are apt to do so little.

The public-health movement which is making such rapid strides in this country is urging upon everyone the advisability of a complete and careful annual physical examination by a competent medical man at least once a year, not with the view of advising him when he should retire from active business but with the object of keeping him from such a necessity.

It will be a matter of several years, perhaps, before public opinion swings sufficiently in this direction to see the necessity of these frequent examinations, but the time will come when the average citizen will not only realize the advisability of this examination but will demand it of his physician.

The opportunity which we in the naval service have to apply this important procedure from the standpoint of preventive medicine should be seized upon and utilized to the utmost if we would do the greatest good for our clientele.

Furthermore, we can expect cooperation from the officer personnel itself in this matter. A careful examination, designed to discover disease in its incipiency, at which time it is most susceptible to treatment, is welcomed by the candidate. It is rare indeed for an individual to approach middle life without a careful examination revealing some defect which is capable of correction by instituting proper measures.

We are apt to neglect advising the candidate specifically concerning these measures and the tendency is rather to leave him with a vague sense of irritation at the realization that his physical condition is not what it should be. Not only this but the question of retirement may suggest itself to him or even be suggested by the medical officer, which in itself may put him in the proper frame of mind to accept or actually desire such an outcome. In other words, we may in this manner actually bring about a retirement for physical disability several years before such a necessity actually exists. On the other hand, we may simply make a notation on the physical examination report, and there the matter rests until the next examination, to come up again to the annoyance of both the candidate and the board.

It is not an uncommon experience to have an officer approach one following the annual overhaul during which some defect has been called to his attention with a comment similar to this, which occurred in the case of an officer who had been told by three successive boards that his blood pressure was a little too high. "For three years," he said, "I have been told by each board that examined me that my blood pressure was too high, but in no instance was any suggestion made as to what I should do to lower it and I am beginning to wonder if it is one of those things about which nothing can be done and whether I would eventually reach the point where my high blood pressure would necessitate the board telling me that I was no longer fit for active service." In this particular case a thorough overhaul of the patient revealed several foci of infection about the teeth, a ragged, diseased pair of tonsils, faulty habits of life, dietary indiscretions, and withal a lack of peace of mind, which factors were certainly conducive to hypertension and which were also capable of correction providing they were not allowed to continue too long.

The defects noted in the annual examination vary from minor affairs to those which constitute a serious menace to longevity.

If the defect is of minor nature such as must inevitably accompany advancing years, we would do well to reassure the candidate regarding notations of this character. Under this head we may put lessened acuity of vision, inability to withstand violent exertion which a younger individual would accept easily, varicocele, and slight varicose veins.

If the defect noted is capable of correction or can be prevented from becoming more marked, it then becomes our duty to instruct such an individual carefully regarding the proper methods to be employed.

Frequently important points are derived from knowledge of the candidate's daily life. This is best acquired by a careful history which will bring out facts as to his surroundings and daily work, the amount and regularity of food, the amount and kind of exercise, presence of nervous strain, the amount of recreation, the hours and regularity of sleep, the frequency and length of vacations, the character of duty, the presence of mental conflicts, and other details of like character which may have an important bearing on the physical and mental health of the individual.

A questionnaire designed to bring out the facts, which can be filled out by the candidate when he appears for an examination and which can be supplemented by additional questions from the examiner as they suggest themselves during the course of examination, would help materially in forming a correct estimate as to the candidate's physical fitness.

This procedure, however, involves time and considerable care and means the examination must be unhurried and conducted with some degree of privacy.

One of the commonest defects which will be noted, perhaps, will be the deviations from the normal weight.

It has now been definitely established that after the age of 30 the longest life span prevails among individuals whose weight is uniformly below the average. The great majority of candidates who are overweight can be brought within the normal standards by adequate dietary regulations, and this procedure in itself may be a valuable factor in promoting longevity. To accomplish this result, however, it is necessary to obtain the full cooperation of the candidate, which can only be done if he understands thoroughly the advantage of bringing himself within the normal weight.

Individuals who are underweight may frequently be entirely normal, but when there is a definite cause for this condition, which can be discovered and removed, much may be accomplished. About one-half of all thin persons are so from hereditary causes, and in this class of individuals time and energy are almost wasted in an attempt to increase their weight.

Cardio-vascular disease now heads the list of all causes of death, and preventive measures instituted sufficiently early are of great benefit. These patients offer a rich field for preventive medicine and frequently respond in a remarkable way to corrective measures. Even if hypertension can not be entirely relieved it may often be kept within reasonable limits by proper habits of living and by the removal of factors which tend to make it increase. While we are unable to replace arterial tubing, we may still keep it functioning over long periods by avoiding unnecessary wear and tear and eliminating disastrous strain. The stress which actual service entails and the added responsibility of increasing length of service are reflected all too frequently in the cardio-vascular system. The great value of vacations at frequent intervals is often overlooked, but is one of our most valuable assets. Regular hours of sleep should be established and not infringed upon. Errors of refraction with resulting eye strain are a frequent source of irritation and should be corrected. The morning saline or small dose of mineral oil is often helpful. Hurry and worry should be reduced to a minimum and composure and a serene mental state should be cultivated. It is important to acquire interests outside the daily routine, and the cultivation of hobbies often plays an important part in keeping an individual fit and leaves less time for useless introspection during leisure moments.

In candidates showing a low blood pressure one should exercise care in placing a proper value on this condition. It must be remembered that many individuals show a blood pressure below the average normal without showing any indications of not being in good health as far as one can determine. A persistently subnormal blood pressure is sometimes an indication of disturbance of the thyroid and suprarenal glands and may occur in chronic wasting diseases, dysentery, gastro-intestinal disorders, neurasthenia, and after prolonged rest in bed.

The presence of a heart murmur in a candidate, while it serves to focus attention on the heart, is rarely in itself sufficient to justify a diagnosis of cardiac disease. If one is satisfied that the murmur in a given case is functional, it is better to raise no doubt in the mind of the candidate about the integrity of his heart. In examining a retired officer recently such a murmur was discovered and the patient immediately volunteered the information that the murmur was first called to his attention seven years previously on his annual physical examination at which time retirement was suggested and actually came to pass as the result of this examination.

Irregularities in heart action, particularly extra systoles, will be rather frequently found, which in themselves have no significance, unless there is other evidence of cardiac abnormality.

Increased rapidity of heart action or tachycardia may be normal in certain individuals or may indicate an unstable nervous mechanism. It may depend on excessive use of tobacco, alcohol, or other drugs and one should be careful to eliminate the thyroid gland as a possible cause.

Another large class of patients for which preventive medicine offers much are the early cases of nephritis. It is a well known fact that these individuals may continue for years at their usual occupation with little or no subjective evidence of disease until there has been extensive damage to kidney substance. With our modern methods of detecting early renal disease there is little excuse to offer for not instituting corrective measures at an early date. Albuminuria is not in itself a sign of kidney disease. On the other hand it can never be regarded as a sign of good health and always indicates the need of careful search to determine its cause. The presence of albumin and casts in urine points more definitely to disease of the kidney although it does not necessarily indicate in itself a permanent or progressive injury to the kidney. Renal functional test have now been developed to the point where they are simple, accurate, and easily applied.

Tuberculosis as a cause of morbidity and mortality has steadily decreased and the incipent case may frequently never advance beyond that state if through proper advice he avoids the pitfalls which give the disease an opportunity to progress. The exponents of preventive medicine already foresee the time when tuberculosis as a cause of death will be entirely eliminated.

Mental disease as a cause of disability in the service offers a large field for preventive medicine. The various neuroses, psychoses, and psychoneuroses may frequently be forestalled if at their earliest manifestation, proper measures be taken. If we correct conditions in service life which may be conducive to their development, these early manifestations may never appear. Alterations in the normal conduct of an individual call more frequently for investigations of his mental state than for disciplinary measures and of this fact were kept in mind more frequently, many disagreeable occurrences might be avoided.

Individuals whose conduct tends to deviate from normal and who may be regarded as somewhat eccentric by their associates may under the proper environment develop actual evidence of mental disturbance. This is particularly apt to occur at isolated stations where the restraining influence of service associates is less apparent. An uncongenial service environment offers a fertile field for the development of mental disease and frequently a change to a new environment may be sufficient to avert such a disaster.

The presence of foci of infection of which the candidate may be entirely unaware may be detected during the axamination. The fact that he is carrying the burden without his knowledge is not evidence that this state of affairs will continue indefinitely and preventive medicine demands that focal infection be eradicated early, if possible before the development of symptoms.

One of the commonest sites of focal infection is the teeth and no examination is complete without their careful overhaul. The presence of devitalized teeth, crowns, bridge work, pyorrhoea, periapical disease or malocclusion offers splendid opportunity for the practice of prophylactic medicine. Reference of these cases to the dental officer for comment is an excellent procedure.

Diseased tonsils are a well known source of danger and their examination is particulary important.

We have mentioned specifically only a few of the opportunities which the annual physical examination presents. It becomes apparent at once that the board conducting this examination should have ample time and every facility in order to make the examination a real benefit to the candidate. The services of the internist, the surgeon, the eye, ear, nose, and throat specialist and the dental officer would seem to be almost a necessity and the laboratory and the X ray indispensable adjuncts.

The span of life has increased markedly in the passed few decades and is still being lengthened. The great life insurance companies have contributed valuable data regarding factors which tend to increase and to diminish longevity and their statistics covering literally hundreds of thousands of lives can not well be disregarded.

It would appear that if we would discharge our full duty toward the candidate we should keep in mind primarily the principles of preventive medicine.

A FLUOROSCOPIC STUDY OF THE CHEST WITH SPECIAL REFERENCE TO SYSTEMATIC ROUTINE OPERATIVE TECHNIQUE

By O. B. Spalding, Lieutenant, Medical Corps, United States Navy

Following a careful survey of all the available literature, including several of the latest textbooks on X-ray technique, very little definite instruction on fluoroscopic technique will be found to aid the medical officer who desires to acquire the rudiments of screen technique.

It is with the idea of assisting, rather than instructing, the beginner in this very important field of roentgenology that the following notes have been compiled.

The first essential to successful screen work consists in a well equipped, well ventilated, properly located dark room. In the older hospitals the X-ray laboratory and the dark room were generally relegated to the basement, but in the more modern institutions. following the general, if reluctant, acknowledgement by the profession at large, of the very great importance of the X ray as an aid to diagnosis, adequate quarters are in most instances furnished. The ideal location for the dark room and laboratory would be near the surgical suite, on the same floor if possible. The size of the dark room would be in proportion to the number of beds in the hospital, and the value of the room to the service will depend entirely on the ability of the radiologist to interest the members of the medical and surgical services so that they may avail themselves of the opportunity not only to study their cases but to compare and check their clinical findings. In this manner the operator not only benefits the service but is able to perfect his own clinical knowledge. A satisfactory dark room for a hospital of 500 beds should contain at least 600 square feet of floor space. It should be adequately ventilated. Ordinary wall ventilators are not satisfactory—suction fans should be employed. The walls should be tinted either black or a color in the red portion of the spectrum. For the room light whenever a light is required, a red ceiling light connected to the operator's foot switch should be provided; also a desk light of the same color. The doors of the dark room should be sufficiently wide to admit a wheel chair or a stretcher, and a second door with an offset partition to exclude the outer light should be provided so that consultants and assistants can come and go at will. A wall cabinet containing the necessary supplies and utensils for the opaque meal and enema, a small sink with hot and cold water faucets, face masks and sputum cups for tuberculosis patients, and a small locker for the operator's gloves, apron, and glasses are convenient accessories. The room should also have proper heating facilities.

The combined vertical screen apparatus and table.—There are many varieties and makes of fluoroscopic tables on the market, but any one of several widely advertised standard tables, that are stanchly built, easily operated as to the various positions desired and have a satisfactory adjustable diaphragm and current control should be used.

The Rieber fluoroscopic unit almost universally used in the local San Francisco hospitals, and recently installed at the United States Naval Hospital, Mare Island, Calif., is practically foolproof and generally speaking satisfactory. All screen work can be done with a Coolidge radiator 30 milliampere tube, using a current of from 3 to 10 milliamperes depending entirely on the size and shape of the patient and the operator's familiarity with the machine. Four to five milliamperes on the tube circuit will usually suffice. Before commencing an examination, with the room dark, always test out the machine by turning on the pilot light over the milliampere meter, step on the foot switch, and read the dial; by turning the filament control knob the desired milliamperes can be obtained. Next with the current on, open the diaphragm wide and see if the tube focus is correct, as shown by a symmetrical shadow on the screen. This is very important to the operator, for if the tube has become tilted from tipping the table, he will be subjected to excessive secondary radiation. This can be corrected by loosening the nuts on the tube stand and slightly changing the angle of the tube until the desired focus is reached. Remember never to attempt to make adjustments of any kind with the current on; a serious accident might result.

For the ordinary chest examination it is sufficient to strip male patients to the hips, if they are well enough to stand; bed patients must be examined in the supine position, a thin robe or blanket will not interfere with the examination. Women may wear a thin gown devoid of metal buttons; the underskirts should be fastened below the abdomen; they should always be accompanied by a nurse for obvious reasons.

The most important step from the operator's standpoint in preparing for a routine screen examination, is accommodation. He should be prepared to remain in the dark room at least 15 minutes before beginning the examination, a pair of close fitting dark goggles are useful in case it is necessary to open the door to admit a patient or leave the room.

Carmen says, "Mindful of the numerous disasters that have befallen the pioneers in roentgenology, many have a lively sense of possible danger to the operator from the use of the screen. I can only say that after several thousands of examinations, I have experienced thus far no evil effects." Carmen also states that "the tendency of the rays to produce stirility is well known, and perhaps may not be overcome by the usual protective measures, if exposures are long, or frequently repeated." Certain blood changes also have been noted by Portis and others, but workers with the ray who take the customary precautions are not likely to develop roentgen dermatitis or carcinoma. The operator should provide himself with a well fitting lead impregnated rubber apron, long enough to protect the genetalia, the old lead aprons are unnecessarily heavy and cumbersome. He should also wear lead impregnated rubber gloves, preferably gauntlets, as both hands are exposed during the entire examination. The use of lead glasses are optional with the operator, as the eyes are supposed to be resistant to the ray. Personally I believe that they should always be worn, if many cases are to be examined, as I attribute a rather severe case of conjunctivitis to overexposure. The operator should sit squarely in front of the screen; first assuring himself that the tube is in proper position, and bear in mind constantly that he must keep the diaphragm closed to as small an aperture as possible to insure a satisfactory examination, thereby avoiding as far as possible needless exposure to the secondary rays reflected from the patient's body. Never under any circumstances palpate with bare hands, it is altogether too easy to acquire the habit.

The safety of the patient is reasonably assured by the protective devices of the apparatus and the brevity of the examination, the time required depending entirely on the experience and skill of the operator. Until he is fairly proficient in screen technique, however, accuracy must not be sacrificed for speed. Regarding time exposure, Carmen says, "With reasonable care as to the character of the tube, say one backing up 12 or 15 centimeters on the parallel spark gap, using 5 millimeters with a suitable filter and an exposure of 10 minutes or less, no patient will be harmed."

A permanent record should be kept of every case examined. The operator may either dictate his findings to an assistant during the course of the routine examination or as many prefer make brief notes on each patient's request blank, to be compared later with the plate findings if any are made, before submitting a final complete report on the permanent record sheet. The ideal report should include all the variations from the normal seen by the observer during the progress of the examination, together with such conclusions deduced from his knowledge of anatomy and pathology, brief, concise, and shorn of all the superfluous technical terms employed by some operators, as will enable the clinician to form a mental picture that will enable him to reconcile and combine, or reject, as his experience may dictate, all the facts in the case, and thereby enable him to arrive at a satisfactory conclusion.

The screen examination.—The patient is placed with his back to the table in the erect position or the table lowered with the patient supine and the screen adjusted so that there is room to palpate. In the case of nervous or apprehensive patients, it is well to reassure them before proceeding with the examination, that there is no danger, the table is thoroughly insulated and so forth; they will then relax and a much more satisfactory examination can be made. The first step in a routine examination of the thorax is a brief inspection of the entire chest with the diaphragm wide open, the operator can thus at a glance visualize the entire field, then with the diaphragm cut down, the heart shadow is inspected. The shadow of the aorta is brought into view by turning the patient slowly into the right anterior oblique position; i. e., left shoulder to the table, right to the screen. The left border of the heart and the mediastinum are best seen in the left anterior oblique position. The movements of the diaphragm are next studied with a wide diaphragm narrowed down to a slit. It is best to observe the normal respiratory excursion first, then by turning the patient into the oblique position or with his back to the screen have him take a few deep breaths, then any variation in movement can be readily seen. The esophagus is best studied in the left anterior oblique position, the right arm at the side, the glass containing the opaque meal held in the left hand; have the patient drink slowly and watch the progress of the barium from the mouth to the cardia. The lung fields, if your first glance has caused you to suspect involvement, should now be inspected closely through a small diaphragm, covering both sides from apex to base, the apices are best seen by having the patient drop his shoulders forward a little, the left apex will be found normally darker than the right, also the shadows case by the scapulæ, the pectoral muscles and the breast in the female must be recognized. This last procedure completes the usual routine examination and the value of the findings to the clinician and to the patient depends entirely on the observer's patience, skill, and experience. In order to demonstrate the wide field of opportunities that such an examination can and should cover, a brief review of the literature concerning the normal and pathological lung fields is submitted. There are certain well marked body types of frame structures which are constantly associated with definite types of visceral typography. Carmen divides these types into the hypersthenic, apoplectic or broad habitus person, with robust frame, great body weight and musculature, long abdomen, short broad and deep thorax, ribs running almost horizontally to the sides and an obtuse epigastric angle. The lung fields are widest at their bases and become narrower toward their apices which project but little above the clavicles. The heart occupies an oblique or nearly transverse position. Contrasting strongly with the hypersthenic type of person is the asthenic type—the asthenia universalis congenita of Stiller, or enteroptotic habitus. This type differs markedly from the hypersthenic habitus. The asthenic person is of slight build with a long, narrow shallow thorax, steeply falling ribs, wide intercostal spaces, acute epigastric angle, short abdomen, weak musculature, and poor paniculus. The lung fields are largest in the upper thorax and the apices extend well above the clavicles. The heart is long and occupies a verticle position. The sthenic or normal habitus lies between these two extremes. It resembles the hypersthenic type except that the characteristics are less prominent.

The shadow of the chest, according to Holmes and Ruggles, may be divided for study and comparison into the bony cage including the ribs, clavicles, and scapulæ, the central shadow consisting of the supraposed sternum, heart, great vessels, mediastinum and spine, the diaphragm, and the lung fields. The most common pathological processes involving the thoracic wall are injuries to the ribs, infections, tumors. The central shadow is continuous with the outlines of the thymus and thyroid glands; of mediastinal masses, and with the outlines of the aorta, pulmonary vessels, and heart. The shadow of the pericardium can not be seen unless distended by fluid. Normally the thymus and thyroid are not visible. A substernal thyroid or enlarged thymus appears as a dilatation of the upper end of the central shadow with sharp margins which extend upward beyond the clavicles. Mediastinal masses may be due to enlarged glands, inflammatory or neoplastic growths, aneurysms, abscesses, and dilatations of the esophagus. Gland enlargement is usually due to tuberculosis, Hodgkin's disease, or malignancy; their outline is sharp and irregular or lobulated, the process is usually bilateral; they seldom show pulsation, although large masses may transmit the impulse of heart or aorta. The most common tumors are lympho-sarcoma, Hodgkin's disease and carcinoma, primary or metastatic. They produce dense shadows with sharply defined borders and they displace or compress the surrounding organs, often showing transmitted pulsation. Mediastinal tumors are often mistaken for aneurism, but by careful study of the shadow from different angles it may be possible to differentiate the mass from the aorta or, better still, to demonstrate a normal aorta. Plates at different angles should always be taken. Primary malignancy of the lung is extremely rare, it usually occurs as a unilateral irregular enlargement of the hilus shadow which shows a tendency to grow in the direction of the affected bronchi. Metastatic malignancy, in addition to the enlargement of the hilus shadows as the disease progresses, may show characteristic anular, sharply defined patches throughout the lung fields. Teratoma may invade the mediastinum in rare cases, causing an increase in the width of the central shadow without distinguishing characteristics. Dermoid cysts may occur, and should be recognized by their cystic wall and from the fact that they arise from the mediastinum. Endotheliomata and lipomata may also develop in this region, but can not be identified by the screen alone.

The normal lung markings consist of small areas of increased density at the hilum which corresponds to the lung root markings, i. e. smaller bronchi, blood vessels and lymphatics; and strands of density corresponding to the bronchial tree, spread out fan-like through the lung fields for a considerable distance, never quite reaching the pleura. The descending branches on both sides are usually more dense than those above; a few scattered small discrete areas of increased density are usually present in both hilus regions;

they may represent calcified lymphnodes and have no pathological significance. One characteristic feature of the normal lung field that should be remembered is that the lung markings are of equal density on both sides. They are slightly obscured by the pectoral muscles and the breasts, the left apex does not light up as well as the right normally. When in doubt regarding a lung shadow, if a corresponding shadow can be seen on the other side, it probably has no pathological significance. Pathologic changes in the lung field occur as a diffuse increase in density, that is suggestive of (1) thickened pleura, most often seen at the costophrenic angle or extending in a thin half moon from the bases along the midaxillary border upward into the apices or as a dark line running transversely across the lung field and representing a thickened inter lobar pleura; of (2) fluid, from a small collection at the costophrenic angle, to large collections obscuring practically the entire lung field, the upper border being concave. By changing the patient's position it may be possible to demonstrate the changing fluid level. If incapsulated the upper border is apt to be convex and there may be air above it, represented by an oval area of increased luminosity; of (3) consolidation, represented by fairly homegenous, dense areas with a more or less definite outline, depending upon the position and amount of lung tissue involved up to an entire lobe; of (4) bronchial stenosis. A general increase in radiability is due to emphysema; the bases are generally involved; there is also a noticeable widening of the rib spaces, and if chronic, a barrel shape to the rib cage. Local areas of increased radiability may be due to pneumothorax, (spontaneous or artificial), or cavity formation, single or multiple. In order to interpret either of the above conditions one must have a thorough knowledge of the regional anatomy and the underlying pathology in order to visualize the condition. Experience, and practice with a large series of chest examinations, here as elsewhere, is the most dominant factor in screen work.

Localized areas of increased density, depending on their location, may represent lung abscess, single or multiple, localized pneumonia, caseous pneumonia, malignancy, primary or metastic or pneumonoconiosis. Without a knowledge of the clinical history it is practically impossible to differentiate on the screen abscess from pneumonic consolidation, unless the abscess has partly drained through a bronchus and a fluid level can be seen.

Heavy root shadows may and probably are due to infection, but may be due to neoplasm.

Increased thickening of the bronchial markings means infection: again the clinical history will help. In fibrosis the markings are less fuzzy and are apt to be more matted together. Plates, especially lateral and three-fourths lateral, are useful, together with all possible clinical data. Fine mottling along the bronchi or small cloudy areas of infiltration beneath the clavicle or second rib are usually due to early manifestations of tuberculosis and can not be visualized on the screen, but can be demonstrated by a good plate. Fine mottling in the lung tissue usually means tuberculosis, fibrosis or malignancy. Here again, unless the mottling is dense enough to cast an appreciable shadow, it can not be seen on the screen. Coarse mottling in the lung tissue is due to bronchiectasis, tuberculosis, metastatic malignancy, or pneumoconiosis. Tuberculosis is confined generally to the upper lung fields, at least in the earlier stages, while bronchiectasis is more often confined to the lower half of the lungs, the thickened bronchi presenting a peculiar sponge-like appearance often best seen in the oblique position; for a positive diagnosis plates must be taken. It is characteristic of typical pneumoconiosis that the apices and extreme bases are spared.

Displacement of mediastinal contents occurs with effusion, adhesions, fibrosis, and tumors. In the case of neoplasm the heart and mediastinal contents are often displaced toward the side affected by the growth, whereas in effusion, the mediastinum is displaced to the opposite side—a very important diagnostic point.

It is impossible to differentiate between an exudation or effusion and pus, but the shape and position of the shadow will help. Simple fluids are not encapsulated and for this reason are seen in the most dependent portions of the chest, usually the costophrenic angles from which they extend upward and inward, the axillary margin always remaining the highest point, the upper border remaining convex unless pneumothorax is present, when it will show a fluid level.

Pneumothorax occurs as an area of greatly increased radiability in the periphery of the lung field. Lung markings are absent. Its borders are sharply defined and consist of the walls of the chest cavity and the margins of the compressed lung. This condition is vividly shown by the screen, and once seen can never be mistaken. When the pneumothorax is complete and there are no adhesions, the lung collapses to a dense, dark lobulated mass at the hilum in which can usually be distinguished some of the larger bronchi. When pleural adhesions are present all degrees and variations of collapse may be seen. The shadow of the pneumothorax may be divided by bands of adhesions which give it a sacculated appearance, and pneumothorax and lung tissue may overlap each other. A small localized pneumothorax might be overlooked or mistaken for cavity.

Malignancy of the pleura casts a shadow resembling a small effusion or greatly thickened pleura, but can not be diagnosed from the screen appearance alone. Fluid in, or disease of the pleura, may be confused with a process in the lung structure, but if the patient be rotated in all positions, or if stereoscopic plates are taken, the true location of the process can usually be determined. The diseases which are most apt to cause confusion are lobar and broncho-pneumonia, lung abscess, and possibly infarct or bronchostenosis.

Lobar pneumonia is characterized by areas of increased, uniform density, which are sharply outlined and where fully developed usually occupy the position of a lobe. In the early stages the shadow, while uniform, is less dense and may be triangular in shape, with the base at the pleura and the apex toward the hilum. The lung markings distributed to this area are thickened and fuzzy and the hilus glands are enlarged. As resolution appears the shadow becomes distinctly mottled, later increased bronchial markings or large glands persist for some time. In unresolved pneumonia there may be extensive fibrosis.

Broncho-pneumonia: Owing to the absence of physical signs the diagnosis may depend largely on the roentgen examination and the history. It occurs more often on the right side and appears as single or multiple areas of increased density with hazy outlines, usually situated near the larger bronchi.

Bronchitis: Acute bronchitis can not be demonstrated.

Chronic bronchitis: The chronic inflammation appears as an increase in the size and density of the bronchial markings and glands. In asthma, the low diaphragm with the increased bronchial markings give a rather characteristic picture.

Lung abscess: In lung abscess the history is most important, the frequency with which they follow tonsillectomy, acute infection, and foreign bodies is well known. Clinically it is a disease of symptoms rather than physical signs so that the roentgen examination is of the greatest help to the surgeon in indicating the site and extent of the process from its early stages. Lung abscess is usually single, but may be multiple. Lung abscess occurs in either lung field, but is generally found on the right side, frequently at the right base. The picture is that of an irregular area of increased density, most marked at the center, fading out toward the periphery. An area of increased radiability representing cavity formation is usually present in the areas of infiltration; when filled with fluid they can not be demonstrated, but become evident when they become filled with air or contain sufficient fluid to establish a fluid level. They are best demonstrated in the upright position. The screen examination is often more reliable than the plate as the operator can visualize annular shadows by turning the patient that can not be demonstrated on a flat plate. Their localization is not always satisfactory to the surgeon due to the zone of pneumonic infiltration surrounding them which magnifies the area of involvement.

Localization of abscess: If the cavity of the abscess can be seen the patient should be rotated until the point nearest the chest wall is reached and this point marked on the skin. If possible, this point should be selected by the surgeon for his approach. The distance from the point marked to the cavity should be indicated by a second mark on the chest, where the shadow of the cavity appears when viewed with the parallel ray from the tube passing through the chest at right angles to the one of approach.

Atelectasis: When the stenosis is due to a tumor the shadow of the atelectatic lung may merge with that of the tumor so that the latter may appear larger than it really is. A valuable sign of stenosis of a bronchus consists of displacement of the mediastinum toward the affected side on inspiration and is caused by the expansion of the normal lung, which is unopposed by that of the atelectatic lung.

Bronchiectasis: There is an extensive thickening of the lung markings along the course of the larger bronchi, enlargement of the hilus glands, with the presence of single or multiple areas of increased density in the lung fields near the bronchi, generally best seen on the right side toward the base in the anterior and lateral positions. The punched-out appearance as seen on a good plate is due to small ringlike shadows of dilated bronchi. There is an associated emphysema in long-standing cases.

Foreign bodies most commonly lodge in the right bronchus and may be seen if of sufficient density to cast a shadow. Examination for foreign bodies should include observation of the entire respiratory tract from different angles, including the larynx and neck.

Gangrene of the lung casts an extensive shadow which may occupy an entire lung field. Its characteristic features are the presence of large irregular areas of diminished density and a general coarse mottling of the lung. The heart and mediastinal contents are not displaced. It would be best to rely on good plates before expressing an opinion.

Primary malignancy of the lung is rare. It is practically always unilateral. The usual growth is carcinoma, which occurs in two types, nodular and infiltrating. The former consists of dense, rounded masses, sharply defined, occurring near the hilum. Ragged, irregular cavity formation in the tumor mass sometimes occurs. In the infiltrating type the tumor arises from a bronchus and infiltrates the lung along the bronchial ramifications, the growth may be confined to the bronchial tree or it may involve the surrounding tissue, seen as a mass with fairly smooth edges, except along the advancing margin, which is irregular and fades off, tending to grow in the direction of distribution of the affected bronchi. These growths may extend toward the root and form large masses at the hilum. Collapse of the lung with displacement of the heart to the affected side may take place. Fluid in the pleural space occurs early.

Metastatic malignancy appears in three forms. In the first there is progressive enlargement of the hilus shadows unrecognizable in the early stages, unmistakable in the later, when large masses have developed at the lung roots accompanied by an effusion at one or both bases. In this form a dense infiltration starts at the hilum and extends out along the bronchi, especially those of the middle and upper lobes of the lung. The affected bronchi become sharply defined, enlarged, and increased in density, presenting a characteristic moss-like appearance.

A second and more characteristic form, also more common, is that in which the growth (sarcoma) takes the form of a shower of thin, rounded plaques of variable size, with sharp, clear-cut margins; as seen on the plate, they are unmistakable.

In the third type there is a fine mottling throughout the lung fields suggesting miliary tuberculosis, but the small areas of increased density are larger, more dense, and more sharply outlined than those of tuberculosis.

Hypernephroma: According to Stephens, "of 22 cases of hypernephroma collected from the literature by Wolley there were metastasis in the lungs in 13. Malignant deciduoma involves the lungs secondarily in nearly 50 per cent of the cases; both these growths closely resemble carcinoma and sarcoma in their morphologic characteristics. Pleural endothelioma has been somewhat frequently reported. It arises in the cells of the subpleural lymph spaces. (Wagner, Volkmann, Adler) begins as multiple nodules, which subsequently fuse and usually invade the lungs; extension to pericardium or peritoneum may occur."

Syphilis of the lung: Jaches believes that the majority of so-called cases of pulmonary syphilis are of tuberculous origin, and such a diagnosis should only be made following the disappearance of the infiltrations under antiluetic treatment. He states that "it is common knowledge that syphilitic lesions are rarely found in the lung at autopsy, and therefore the clinical diagnosis of lung syphilis even in the luetic patient is always precarious." Ruggles says, "There is considerable discussion on the subject of lung syphilis, but undoubted cases have been reported." An undoubted case occurred in our own service at the Mare Island naval hospital. A routine chest examination for bronchitis revealed on the plate an extensive infiltration of lung without corresponding clinical symptoms. A luetic history with positive Wassermann was obtained and the medical officer given a possible diagnosis of lung lues, later confirmed by vigorous antiluetic treatment, as the plates taken at biweekly intervals showed rapid progressive clearing up of the infiltration with full recovery. According to Ruggles, lung syphilis is evidenced in three types.

In the first there is a general thickening of all the bronchial markings, starting from the hilus and spreading out into the lung field as a fan-shaped shadow.

In the second form one or more dense discrete masses supposed to be gummata occur in the region of the hilum.

The third form occurs as a dense diffuse shadow obscuring one entire side of the chest. In this type the lesion is probably in the primary bronchus and the finding the result of bronchial stenosis.

Ruggles says, "A characteristic feature of these patients is that the lesions are much more extensive than their condition would lead one to suspect."

Echinococcus cyst of the lung occurs usually in the lower part of the lung field, is usually a unilateral single lesion, but may be bilateral or multiple. The appearance on the fluoroscopic screen will depend upon the size and condition of the cyst as well as its position. Three distinct appearances have been observed.

1. Closed cysts which occur as dense, circular or oblong, sharply defined areas of increased density within the lung field. The dull area is of even density throughout, and the surrounding lung field is clear.

2. Open cysts which may have ruptured into a bronchus or into the surrounding lung. In the first, due to its diminished density, the appearance suggests a large cavity with sharply defined borders.

3. When rupture occurs into the lung structure the appearance closely resembles a lung abscess—the borders are no longer sharply defined and the pleura may be involved, causing a marked limitation of motion of the diaphragm on the affected side. Actinomycosis usually occurs in the form of lung abscess and the diagnosis is made bacteriologically.

Pneumoconiosis (anthracosis, chalicosis) occurs as a diffuse, fine mottling symmetrically distributed throughout both lungs. The apices may be involved, although in a typical case, the apices and bases are spared. The mottling may take the form of heavy, dark, irregular shadows which are symmetrically distributed. Such a picture with the accompanying history of occupational exposure to dust as in the case of gold miners can not be mistaken. This condition may be associated with a tuberculous infection. In both cases the lung is the seat of a chronic, more or less benign inflammatory process. There is an associated emphysema. According to Jaches a normal hilum is rarely seen. Pathological studies show the almost universal occurrence either of hyperplasia or anthracosis of the bronchial lymph nodes and caseation or calcification resulting from tuberculosis involvement of these nodes. In addition there is often an increase in the connective tissue about them. The root shadows which we see in adults thus far practically never reflect a normal condition. Nevertheless so common are these changes at the root and so rarely are they responsible for any symptoms that no clinical importance need be attached to them.

The earliest tuberculous lesions according to Jaches are located in the infraclavicular regions, less often in the apices. The axillary half of the lung is more apt to be involved in the beginning than the mesial half. If there is no evidence of tuberculosis at the sites of selection mentioned it is best to disregard nodular shadows in the mesial half which are generally due to distended blood vessels and lymphatics. Isolated tuberculosis of the mesial part of the lung is uncommon whereas involvement in other localities is the rule. In very rare cases the first evidence of tuberculosis may be found in the lower part of upper lobe or even in the lower lobe. This location is not uncommon in infants and children. (Juvenile type extends downward to the bases from the hilum; the apices are clear.) Is the Röntgen appearance of tuberculosis typical of the disease? Jaches says, "Strictly speaking a single shadow or group of shadows has no intrinsic tuberculous character. Any inflammatory deposit or even a neoplasm may cast shadows which occasionally simulate those of tuberculosis. In exercising his judgment the Röntgenologist must take into account such facts in the clinical history of the case and in the pathology of lung diseases which will help him to exclude causes for the abnormal shadows other than those caused by tuberculosis. We may accept it as a cardinal rule, however, that infiltrations in the apical and infraclavicular regions are tuberculous, especially if they are small, nodular and occur in groups." A complete Röntgen examination in cases of suspected tuberculosis should always include a preliminary fluoroscopy.

The almost universal tendency of tuberculosis in adults, at least in its early stages, to undergo fibrosis, determines from the beginning its chronic character. Only in the later development does the process at times take on sudden activity which will convert an indolent infection into an active one. Tuberculosis may assume, however, an active course from the very beginning which may be marked by an excessive toxemia out of all proportion to the extent of the changes in the lungs. As a rule the infection in these cases is blood or lymph borne, the tubercle bacilli being deposited in the lungs in large numbers from a focus either in the lung or in a remote part of the body.

Acute tuberculosis occurs in two forms, each of which has a distinct pathology and Röntgen appearance. The first we speak of as miliary tuberculosis which in the one case is a general infection which attacks every organ of the body and in the other is confined to the lung. The pathological process in this group of cases is a proliferative one, the second form comprises the various tuberculous pneumonias in which the pathological process is essentially an exudative one.

The first and perhaps most common type of tuberculous cavity is the annular cavity, found especially in early tuberculosis. It results from slow breaking down of the more chronic proliferative type of infiltration in which caseation is not extensive and is gradual in its development. It therefore lies in lung which is not densely infiltrated and may often only be recognized by a thin line of demarcation from the surrounding lung. It is probable that in some cases these annular shadows represent a zone of demarcation about an infiltration which will eventually result in a cavity. This explains the occasional absence of aïr within them and the persistence of lung markings which traverse them. These cavities are practically always situated near, but not in, the apex of the lung. Their favorite site is in the infraclavicular region near the axilla. It may be stated as a general rule that cavities of moderate size usually do not occupy the extreme apex. This form of cavity is commonly not discovered by the physical examination as it is not surrounded by consolidated lung and as in many cases it does not communicate with a bronchus, the characteristic physical signs of a cavity are either not produced in it or are not transmitted to the surface of the chest.

The second type of cavity lies in densely infiltrated lung in which it probably arises from a rapid breaking down of caseous tissue. It has a punched-out appearance, is air-containing, and often shows a fluid level. It is surrounded by a dense, well-defined wall which is composed both of fibrous tissue and the adjacent consolidated lung. Pneumothorax accentuates the outline of these cavities. Like the cavities of the first variety, these are also most frequently seen in the upper lobe, but they may be found in any situation where there is a rapid softening of the lung. Their shape will be determined by the character of their walls, which in turn will depend on the degree to which a fibrous capsule is formed about them. Thus the rapid necrosis which occurs in acute caseous pneumonia may give rise to an irregular excavation with no evidence of a limiting membrane. On the other hand, when time is afforded for the formation of a capsule they are usually circular in outline. German investigators who made frozen sections of the thoraci of hundreds of tuberculous soldiers state as a result of their study that the majority of cavities lie deep in the lung toward the posterior surface. It is this form of cavity whose progressive invasion of the adjacent diseased lung is responsible for the cases of extensive excavation of a lobe or a whole lung. Under certain conditions it is possible to make out trabeculations in the walls of the cavities; at times they are multilocular.

The third type of fibrous-walled cavity represents the terminal stage of either type described, in which conservative influences limit its extension and attempt to encapsulate it. The indurative tendency of apical disease here manifests itself in its most pronounced form and as a result we find cavities of moderate size at the apex surrounded by a zone of connective tissue of varying depth and density. They are frequently adherent to the chest wall by a much thickened pleura, which often prevents their collapse by artificial pneumothorax. Clinically these cases are often characterized by remarkable chronicity. The cavities are completely lined by smooth connective tissue, the expectoration may be slight and contain no tubercle bacilli.

In cases of pulmonary congestion, the question will occasionally arise whether in addition to the valvular lesion, the patient also has pulmonary tuberculosis. Râles and dullness are common accompaniments of pulmonary congestion and infarction of the lung may be associated with frequent hemoptysis and fever. The clinical picture may therefore closely resemble tuberculosis. It is important to recognize the changes that are due to vascular engorgement and not confuse them with tuberculosis. It may be difficult to distinguish between mitral disease in which the blood vessels in the para vertebral part of the upper lobes are often enlarged and nodular so that they closely resemble tuberculous infiltration. However, Jaches states that "tuberculosis of the lungs rarely complicates a valvular defect." The coincidence of these two diseases is so uncommon that in a case of chronic endocarditis the Röntgenologist will wisely interpret the abnormal pulmonary shadows as the result of pulmonary congestion unless there are unmistakable evidences of infiltration in the periphery of the lung.

Due to the fact, that any slight deficiency in aeration, especially of the apices, may be determined by comparison with the other side, the various causes for such deficiency must be kept in mind. The air content of an apex may be diminished and the apex appear less illuminated because of actual infiltration which reduces the amount of aerated lung. In cases of this type the apex remains darker even after deep breathing or coughing. Such a persistent atelectasis is therefore strongly suggestive of actual disease of an apex, often corroborated by a positive plate finding. The same condition may be observed, however, in cases of healed lesions with thickened pleura and fibrosis with retraction. As such healed lesions are common in otherwise healthy individuals, the value of unilateral diminution of aeration is of little importance. Bilateral diminution of aeration of the apices, aside from tuberculosis, may be due to fat deposits in the superclavicular regions. Excessive muscular development, or an unusual conformation of the bony thorax, cervical ribs, calcification of costal cartilages, overlapping of the sternal ends of the clavicle and the ribs may obscure the apices (drop the shoulders). Some individuals habitually underaerate their apices; this occurs in mouth breathers in whom so-called collapse atelectasis is found at both apices. A corroborative sign of apical tuberculosis is immobility of the diaphragm on the affected side. This occurs in a large percentage of early cases, and in conjunction with a cloudy apex, creates a strong presumption of recent disease. The reason for this immobility is unknown; it is not due to paralysis of the diaphragm because the latter is not found in the expiratory position as in acute pleurisy or pneumonia. The diaphragm appears rather to be in a condition of tonic contraction; it is normal or low in position and the immobility may perhaps be best explained as a reflex rigidity similar to that of the intercostal and pectoral muscles in the vicinity of the apical process.

Study of the heart. Ruggles says "In an examination of the heart we should obtain the following data: Size, shape, its movements with respiration, pulsation of the various chambers, and any change in shape which may occur with change in position of the patient. By combining this data with the data obtained from a plate taken at a 7-foot target film distance, all the required findings are present. To interpret the findings one must have a thorough knowledge of the anatomy of the heart and great vessels and of the normal radiographic shadow.

"Normally, the central shadow extends from the junction of the first rib with the clavicle to the diaphragm. At the top, on the left side, about the level of the second rib, a slight concavity of the shadow represents the edge of the arch of the aorta with the descending aorta descending downward from it. Below it at about the level of the fourth rib the slight prominence of the pulmonary artery and the small left auricular appendage in the angle between it and the left ventricle in the fourth interspace may be seen. The rounded mass of the left ventricle makes up the largest part of the shadow as it curves downward and outward to disappear below the diaphragm line. The location of the apex is a matter of considerable uncertainty, as it varies with the size, shape, and position of the heart and of the patient, and the position, i. e., inspiration or expiration, and shape of the diaphragm. The right border begins at the top with a poorly defined shadow, in the a. p. position, of the superior vena cava above, and overlapping the ascending aorta, which is sometimes indented by the right bronchus in its lower portion. The line then curves outward over the right auricle to join the right diaphragm at an acute angle, at the apex of which the inferior vena cava is sometimes apparent. The normal right ventricle is not visible in the a. p. view as its shadow is superimposed upon that of the left ventricle and auricles." It must be remembered that the normal pericardium can not be demonstrated by the screen or plate.

Organic disease of the heart as seen on the screen presents certain distinctive types that are best reported as

1. Aortic type.
2. Mitral type.
3. Combined type.
4. The dilated decompensated type.
5. Congenital type.

In the aortic type the shadow of the left border is more curved convexly; the apex is blunt, the measurements are increased downward and to the left, the ascending portion of the aorta is more prominent, the heart usually lies more horizontally in the chest, giving it the characteristic L shape. In aortic regurgitation there is marked exaggeration of the pulsation of the arch.

The mitral type is characterized by a straight left border, the shadows of the auricles are increased. In regurgitation the increase of the shadow to the right is marked, and this is usually accompanied by a general increase in the size of the heart shadow. In stenosis there is prominence of the shadow in the region of the left auricle and pulmonary artery, with only a slight general increase in size.

In the combined type there is a general enlargement of the heart shadow, the shape depending on the predominant lesion. In the dilated decompensated type there is a general enlargement of the heart shadow, more marked on the left, with a weak pulsation, often wave-like in character, and an absence of the rounding of the apex seen in hypertrophy. There may also be varying amounts of fluid seen at the bases.

Auricular fibrillation may be demonstrated by the tremendous enlargement of the auricles and absence of visible pulsation in them. In certain cases the heart shadow seems to rock.

Heart block: In this condition with the diaphragm cut down to closely approximate the heart shadow and the patient rotated sufficiently to the operator's left to bring out the auricular shadow prominently; if the pulsation is not too rapid, it is possible to compare the beats of the auricle with the ventricle and determine their respective rates.

The congenital type: In this condition a marked prominence of the heart shadow is seen in the neighborhood of the pulmonary artery, probably due to a patent ductus arteriosus. This may be confused with pulmonary stenosis. With an open foramen, the heart shadow is enlarged to the right and the pulmonary artery may be seen to pulsate with the ventricles.

Pericardial effusion: There is a general enlargement of the heart shadow. In the erect position the shadow is more triangular in shape, with the greatest diameter at the base or the shadow may assume a water-bottle shape; in the prone position there is an increase in the width of the apex. Pulsation is diminished or can not be seen, or it may appear wavelike. In every suspected case plates should be taken in both erect and prone positions for comparison. To differentiate from dilated heart, the absence of change in shape with change in position will tend to exclude the later condition.

Adhesive pericardium: The outline of the heart shadow is irregular, the respiratory excursion of the heart is limited, there is marked haziness of outline of the heart shadow; it is almost impossible to identify auricle from ventricle and there is an apparent obliteration of the cardiophrenic angle.

Dilatation of the arch: In increased arterial tension, arteriosclerosis and most commonly lues, dilatation of the aorta is seen. In luetic aortitis various degrees, from a simple prominence of the arch to a general bulging commencing at the root and involving the arch and descending thoracic aorta, may be demonstrated by turning the patient first in the right anterior oblique position or at least far enough to get a good exposure of the posterior mediastinum and then to the left anterior oblique exposing the auricle, ascending aorta, and arch. It is well to compare the screen findings with plates taken a. p., lateral and three-fourths lateral.

Aneurysms of the aorta: These are seen on the screen or plate in sharp contrast to the surrounding lung structures. Aneurysms of the ascending aorta are seen to the right of the heart shadow, while aneurysms of the arch usually show to the left of the spine high up, while those of the descending aorta, if they are not hidden by the heart shadow, may be seen in the lower portion of the aortic shadow to the left. If a suspicious aneurysmal shadow should be found, especially if the shadow appears to pulsate, it should be studied from all angles, and plates in the different positions taken. Large diffuse aneurysms may appear as a general increase of the shadow of the great vessels. Ruggles says: "Pulsations of aneurysms are not always seen on the screen. It is extremely difficult to differentiate between expansile and transmitted pulsations so that the presence or absence of pulsation as observed fluoroscopically is not of conclusive value in the diagnosis. The position of the sack is of more importance, its outline should be sharply defined and the shadow of the normal aorta should not be seen through it. Jaches says, "In general we may distinguish two types of aneurysm, the fusiform and the sacculated. The simplest form of aneurysm consists of a fusiform enlargement of a localized portion of the aorta, or the entire vessel may be involved. They rarely reach the great size attained by the sacculated form.

Mediastinal tumors other than aneurysms are usually less sharply defined. They may be nearer the front or back of the chest than the position of the great vessels or they may occupy a position higher or lower than is usually occupied by aneurysms and occasionally the shadow of a normal aorta may be seen through them. They are more likely to displace the heart and aorta than an aneurysm and do not in themselves cause enlargement of the heart, which is a frequent accompaniment of aneurysm.

In mediastinal abscess, a large amount of pus may form in the mediastinum following infection of the glands of pleura. The shadow may resemble pericardial effusion, the borders of the shadow are sharply defined and do not pulsate, but the heart shadows can be seen, which would probably serve to exclude fluid in the pericardium, as the heart is not visible unless air is present in the pericardium.

The diaphragm: The normal diaphragm curves smoothly from the pericardium downward to form a sharp angle with the pleura, it should move freely and equally on the two sides, both on quiet and deep expiration the right side is normally higher than the left (1 or more c. m.). To obtain a good view of the costaphrenic angles cut down the diaphragm to a narrow horizontal slit and have the patient take a few good deep breaths. In a female if the breasts are large have the patient raise them out of the way and pleural thickening, adhesions or small collections of fluid may be identified.

Changes in outline: Marked irregularities on the surface of the liver may be transmitted through the right dome. Bands of adhesions to the pleura may cause tent like elevations accompanied by limitation or absence of motion.

Changes in mobility: Slight changes may be noted when the patient is breathing quietly which will disappear completely when the patient takes a deep breath. This condition usually is due to pain and its cause lies frequently below the diaphragm. Bilateral limitation of motion may be due to emphysema, the low diaphragm of asthmatics, ptosis, ascites, peritonitis, pleuritis, at base of both lungs or fibrosis from an old inflammatory process. Unilateral limitation may be due to tuberculosis or disease of pleura on that side, subdiaphragmatic liver or perinephretic abscess, diseased appendix, or gall bladder, or paralysis due to nerve lesion.

Paradoxical excursion of the diaphragm is seen in paralysis of the phrenic nerve and diaphragmatic hernia; the affected side rises during inspiration and falls during expiration.

Changes in position: Low in ptosis and emphysema, high in adiposity, ascites, subdiaphragmatic tumors, abscess, eventration, and hernia of diaphragm. Extensive effusions obliterate entire diaphragm shadow.

Subdiaphragmatic abscess: This condition causes marked upward displacement of the diaphragm; the top is usually considerably flattened and excursion is abolished, if the collection of pus is in contact with the diaphragm, otherwise it will be limited. When the infection has extended into the chest and involves the pleura the outline of the diaphragm becomes obscured and it is not possible to determine from screen or plate whether or not there is disease below it. Rarely an abscess below the diaphragm contains a gas bubble, below which there is a fluid level which changes with change of position of the patient. For this reason always examine in upright position when possible. Encapsulated fluid above the diphragm may strongly resemble subdiaphragmatic abscess if the collection of fluid lies between the lung and diaphragm.

Diaphragmatic hernia and elevation of the diaphragm (eventration): Diaphragmatic hernia, with protrusion of the stomach or other abdominal viscera into the thoracic cavity, and a related condition, i. e., elevation of the diaphragm, though not common, are of some practical importance. Both may give rise to marked gastric symptoms. The former is an actual rupture of the diaphragm; the latter is not, although the term "eventration," which is frequently used as a synonym, implies a rupture. While either may affect the right half of the diaphragm, nearly all the cases reported have been left sided. Elevation is usually, if not always, congenital. It is not surgical (due to weak muscle). Diaphragmatic hernia may be either congenital or acquired. It is generally surgical. Examination with the opaque meal is preferable, although much can be determined without it. With patient recumbent, either prone or supine, the elevation or herniation is more accentuated than in the standing position. In left-sided diaphragm elevation the left arch of the diaphragm, which is normally lower than the right, is now seen to be markedly higher and its convexity is increased. The heart is either raised or displaced to the right. The gas bubble (patient standing) is forced upward with the arch, is increased in size, and no shadows of lung tissue are seen within the transparent area of bubble. Both arches show respiratory movement, though the excursions may be shorter. On filling the stomach with barium meal its high-lying position becomes evident. In left-sided diaphragm hernia the Röntgen signs are usually more marked—the heart is displaced to the right by the herniated stomach. Through the gas bubble, which is usually increased in size, lung markings may be seen. The dome shape of the left arch is lost if the arch can be made out at all. Paradoxic respiration is marked—this point differentiates hernia from elevation. Plates in all positions should always be taken for record and study. In some cases the colon also takes part in the hernia and this may be shown by examination with an opaque enema.

Examination of the esophagus: While in most cases no special preparation is necessary, in cases of obstruction in which retained food or secretion may interfere with the examination or impair its accuracy it is advisable to have the esophagus cleaned out by the voluntary efforts of the patient or by tubing and lavage. Standing with his back to the tube and with the screen against his chest, the patient should first be given a general survey in the anterior position. With the diaphragm widely extended the entire chest should be inspected. The patient is then turned to an angle of about 45 degrees. In this position, the right anterior oblique, the rays pass through the patient obliquely and the esophagus, with the exception of its subdiaphragmatic portion can thus be studied to the best advantage. Particular attention should be paid to the retrocardiac space. Encroachment on this space should suggest aneurysm or mediastinal tumor. The exact angle desired can not be determined beforehand, but under the screen the observer can rotate the patient slightly in either direction until the greatest space is attained between the shadow of the vertebral column behind and that of the heart and aorta in front. The horizontal leaves of the diaphragm are extended to their limit while the vertical leaves are approximated until only the esophageal region is in the clear field. Screens of average size will not accommodate the whole extent of the esophagus, and hence require raising and lowering in order to cover the entire course. This fact is to the operator's advantage and applies to all fluoroscopic work, as it insures clear vision and avoids distortion to have a small field with the tube and screen in the plane of any point which is to be closely studied. After the patient is satisfactorily posed he is given a glass containing a barium mixture and told to drink slowly. Each bolus is carefully observed throughout its course. The anterior position is desirable for inspection of the subdiaphragmatic portion of the esophagus and also for determining the position of lateral diverticula. Variations of technique must be improvised to suit the individual case. Both obliques, the posterior position (back to screen), lateral position, right and left, if the patient is not too broad-chested, should be used. In all gastrointestinal examinations when the opaque meal is used the esophagus is examined as part of the routine technique.

Carmen says: " Interpretation of esophageal findings unless they are extraordinarily typical should be made cautiously. If the examiner is not thoroughly acquainted with the clinical facts in the case. he had better report simply what he sees without attempting to translate his observations into a diagnosis. He may say, for example, that obstruction of a certain degree was noted with or without irregularity of contour at a certain point, or he may report whether or not there is evidence of a lesion outside the esophagus. The information may be associated by the clinician with his own data and a conclusion formed. This caution is necessary because of the frequent Röentgenological similarity of various esophageal lesions."

This very apt warning should serve as a signboard to inexperienced operators, pointing the safe, conservative way not only to examination of the esophagus but to all other parts of the gastrointestinal tract.

Anatomic memoranda: There are five cardinal points to be remembered and inspected. 1. At the introitus, where the esophagus swerves to the left so that it projects slightly beyond the left border of the trachea.

2. At the aortic arch, above the bifurcation of the trachea it is pushed to the right and somewhat posteriorly by the aorta.

3. At the crossing of the left bronchus, passing behind the beginning of the left bronchus it descends with the aorta which it half entwines so as to lie in front of the aorta just above the diaphragm.

4. At the hiatus esophagus, running obliquely to the left it passes through the diaphragm at the hiatus-esophagus, which is about at the level of the tenth dorsal vertebra and thence continues very obliquely to the left into the stomach.

5. At the cardiac opening, the average total length of the esophagus is about 25 centimeters, of which 3 to 5 centimeters, the epicardia, lies below the diaphragm. The caliber is somewhat irregular. The entire epicardia is distinctly narrower than the rest of the esophagus.

For a satisfactory examination of the esophagus the patient should be examined in the standing, prone, supine, and right lateral positions. The esophagus is grossly outlined with the ordinary barium meal. In cases of suspected new growth a thick mixture of barium and malted milk is of value. In the right anterior oblique position the esophagus is easily seen throughout its course. It is smooth in outline and the opaque mass passes readily through it, a momentary pause at the arch of the aorta and a longer delay at the cardia will be seen.

Pathological esophagus: The esophagus may be greatly dilated in cardiospasm or benign stricture. There is no irregularity of outline and the shadow ends at the cardia in a smooth funnel-shaped mass. Dilatation of the esophagus resulting from cardiospasm may be so extreme that the margin of the esophagus overlaps the lung field on the right. Malignant tumors of the esophagus generally are found in the lower half of the tract and when large enough to cause obstruction can be readily recognized by irregular annular ragged filling defects, through which a thin stream of barium can be seen to trickle. The esophagus above the defect is rarely dilated. Scar tissue within the esophagus, ulceration, or the ingestion of corrosives results in multiple constrictions of its course. These irregularities differ from carcinoma in that their margins are sharply defined and there is dilatation above the point of stricture. Pressure from mediastinal tumors, aneurysms, effusion, fibrosis, or diseases of the spine may cause change in position or irregularity in outline, but as a rule there is no accompanying dilatation.

Diverticula may be found anywhere in the course of the esophagus, most commonly the upper and lower ends. They appear as rounded pouches; may be recognized as isolated collections of residual barium following a test meal.

Fistula: In rare cases the opaque meal may be seen to enter a descending bronchus through a bronchoesophageal fistula, usually due to carcinoma of the esophagus.

Résumé.—To complete a successful examination it is absolutely essential that the operator be thoroughly familiar with the appearance of the normal chest and abdomen and to bear in mind the various pathologic conditions which have been briefly enumerated. He is then in a position to recognize any variation from the normal that a careful routine examination will develop and to arrive at a conclusion that taking into account the clinical findings will aid the clinician in forming a correct diagnosis, or, as is not infrequently the case, he may observe a lesion that in the absence of symptoms was entirely unsuspected. It is hoped that this brief résumé of the pathological conditions that may be encountered during a routine examination will make the operator realize the necessity for careful study and extensive practice before his work can be of any practical value to his associates or himself.

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ACIDOSIS

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Sir William Osler once remarked that chemistry would open many locked doors of medical science. Investigations in biological chemistry especially have opened up new lines of thought and are destined to solve many perplexing problems relating to pathological conditions. A noteworthy example of the important part played by chemistry in our knowledge of certain aspects of disease is the accumulation of facts regarding acidosis.

Before taking up a consideration of acidosis and the abnormal metabolism accompanying it, it would probably be well to set forth a few of the important facts of normal metabolism.

The living body is at all times concerned in the welfare of its component parts by utilizing the food and oxygen taken into it and disposing of the waste. It is constantly giving off the products of its combustion by way of the lungs, skin, and kidneys.

The digestible carbohydrates upon being introduced into the body are digested by the action of the enzymes of the salivary and pancreatic juices. In this process they are reduced to the monosaccharides—glucose being the main one. They are absorbed and carried to the liver and the muscles mainly, being stored as glycogen until needed. Some are used for heat and energy directly after being absorbed. As the stored glycogen is needed it is reconverted into sugar and transported by the blood to the different places in the body where it is required. The sugar is finally reduced to carbon dioxide and water. The intermediate steps are not definitely understood but lactic acid seems to be a possible intermediate product.

Fats are acted upon by the pancreatic lipase and reduced to fatty acids and glycerine. The glycerine is absorbed as such, while the fatty acids combine with an alkali and form a soap. This soap is absorbed. In the cells of the mucosa of the intestine the soap and the glycerine unite to form a neutral body fat, the alkali being returned to the intestine. The fat is carried by the lymphatics to the general circulation. It is either stored for further use or it is in part used to supply immediate demands.

Fat has its most important and conspicuous use in the body by acting as a reserve fund for fuel. Halliburton says, "The storage of 100 calories in the form of fat may be effected in the space of about 12 c. c. of tissue, weighing about 11 grams; the storage of the same amount of potential heat as glycogen is never effected in less than ten times that bulk of liver tissue weighing about 130 grams and rarely in less than double that amount."

Another use of fat is to help in the actual construction of protoplasm. This is mainly, though not entirely, a rôle played by protein.

The liver prepares fat for combustion into its final products (carbon dioxide and water) and helps in synthesizing and complex fatty compounds. Fat may arise from ingested fat or from the carbohydrate of the food. The liver seems to be the place where it occurs. As stated, the final products of fat metabolism are carbon dioxide and water, but the intermediary products are probably betahydroxybutyric acid and acids of similar molecular size. A healthy normal person can, on a properly mixed diet, oxidize betahydroxybutyric acid in the liver to acetoacetic acid and finally burn this acid into carbon dioxide and water.

Proteins are acted upon both by the gastric and the pancreatic juices. In the intestine they are finally reduced to aminoacids. These acids are absorbed.

After absorption some are broken up at once into the carbonaceous portion and the nitrogenous portion. The latter is formed into urea and is excreted. The carbonaceous portion is utilized. Some of the aminoacids are synthesized to proteins and used in the body as such.

Water forms a very important factor in all reactions in the body, as they could not occur without water. Dry sulphuric acid and dry sodium would not react together, but if water were present they would immediately unite. Water is present in all the fluids of the body and is indispensable.

Vitamines, salts, and oxygen are concerned in the bodily functions.

Heat and energy are liberated combustion of the food principles. And normally all the processes concerned are perfectly regulated in health. In the oxidation of the food principles carbon dioxide and water are end products either wholly or in part. In fat and carbohydrate metabolism they are the sole end products, while in protein metabolism they are the end products of the carbonaceous portion of the aminoacids. And as oxidation takes place in the tissues carbon dioxide is formed there and is a waste product that must be removed. The water combines with the carbon dioxide to form carbonic acid. Also the sulphur and the phosphorus of proteins are transformed into sulphuric and phosphoric acids, respectively. Organic acids are also formed in the body, but usually they are reduced to carbon dioxide and water. Yet lactic acid and uric acid may sometimes be excreted as such in the form of their salts. In fact, uric acid is a normal urinary constituent and it is constantly present.

We are safe in saying that the composition of the blood depends on tissue reactions. Yet on the other hand we note that the blood plays a big part in tissue reactions. By its power to bring in new, fresh materials and take or carry away waste products it regulates normally the tissue reactions.

In the metabolism of the body, acids are being formed normally as by-products and in order to allow normal metabolism to continue these acids must be removed. If the blood is to remain at its proper reaction these excess acids must be disposed of as there is a limit to the amount of acids the blood can neutralize. The excess acids are not disposed of or the condition corrected by spontaneous changes in diet. The processes concerned in their disposal are oxidation, neutralization and excretion. The carbon dioxide is disposed of by the lungs as are most of the volatile acids which might appear in the body. The fixed or nonvolatile acids are excreted mainly by the kidneys and to a small extent by the skin. A limited amount of the nonvolatile acids are neutralized by the fixed bases. One of the most interesting facts concerning these regulation factors is that the kidney has the power to excrete an acid urine from an alkaline blood plasma.

When acids are added to the blood, either by ingestion or by their production within the body, the alkalies of the blood react immediately with them and their elimination takes place in the following characteristic way:

Let us say that the acid is hydrochloric acid.

$$1.\ NaHCO_3 + HCl = \underset{\text{Kidneys}}{\underset{\downarrow}{NaCl}} + H_2O + \underset{\text{Lungs}}{\underset{\downarrow}{CO_2}}$$

$$2.\ Na_2HPO_4 + HCl = \underset{\text{Kidneys}}{\underset{\downarrow}{NaCl}} + \underset{\text{Kidneys}}{\underset{\downarrow}{NaH_2PO_4}}$$

Also the following reaction may take place in case of need:

$$3.\ NaHPO_4 + H_2O + CO_2 = \underset{\text{Kidneys}}{\underset{\downarrow}{NaH_2PO_4}} + \underset{\text{(if not needed)}}{\underset{\text{Kidneys}}{\underset{\downarrow}{NaHCO_3}}}$$

The reaction of the blood is maintained by the following constituents being present and in a certain quantity for each:

1. Sodium bicarbonate and carbon dioxide which are present in amounts to give nearly a neutral reaction.

2. Sodium dihydrogen phosphate and disodium hydrogen phosphate, which are also present in amounts to give nearly a neutral reaction.

3. Proteins, which are amphoteric and unite with acids or bases without undergoing any change in reaction.

The above formulae indicate the disposal of an acid and the keeping of the normal blood reaction when an acid enters the blood. Howland says, "The important constituents of the blood so far as the regulation of the reaction is concerned are: 1. Sodium bicarbonate in the plasma and the cells. 2. Acid and alkaline phosphates of potassium found mostly in the red blood cells. 3. Proteins."

By introducing a strong acid there is a weak acid liberated, and this weak acid does not influence the reaction of the blood as readily as would the strong acid. The weak acids that are formed are carbonic acid and phosphoric acid, which are eliminated by the lungs and the kidneys respectively. Sellards holds that much acid is neutralized by ammonia. As we are having a liberal production of acids in the body continually, and arising for the most part from the combustion of carbon, sulphur, and phosphorus, he claims that a slightly alkaline reaction of blood is obtained by the following means:

1. Ingestion of alkalies in the food.
2. Elimination of carbon dioxide by the lungs and of fixed or nonvolatile acids by the kidneys.
3. Neutralization of acids in the body by ammonia.

Just what part ammonia plays depends upon the conditions present. Ammonia only occurs in the urine normally or physiologically in amounts that is needed to neutralize acids. The rest is transformed into urea. To prove this we can show that the ingestion of sodium bicarbonate causes a sudden fall in the urinary ammonia output.

Oxidation is important in the metabolism of acids. By this process of oxidation organic acids are practically destroyed. They are being oxidized to carbon dioxide and water. Also now we know that mineral acids such as sulphuric and phosphoric are coming from the proteins, but these can not be oxidized any further. The end products in either case above are disposed of by two ways, and these ways are neutralization and excretion.

When acids are added to the blood we do not expect a change in the reaction of the blood. We only have a shifting in the usual balance between the volatile and the nonvolatile acids. True reaction itself varies only slightly during life. As will be noted later small changes of reaction are dangerous.

Carbon dioxide being formed in the tissues is taken up by the sodium carbonate of the blood and sodium bicarbonate is formed.

This is carried by the blood to the lungs where the reverse condition occurs; that is, where the bicarbonate liberates carbon dioxide, forming the carbonate again. During this latter process the liberated molecules of carbon dioxide are discharged in the expired air. This power of the blood to transport carbon dioxide may be greatly reduced by the presence of acids in excess which acids combine with the fixed alkalies and lead to the excretion of these alkaline bodies by the kidneys as neutral salts.

By the transportation of carbon dioxide to the lungs from the tissues a person normally eliminates an equivalent of several hundred cubic centimeters of concentrated hydrochloric acid daily. When carbon dioxide is formed in the tissues, as has been stated, it enters the blood and is transported by the blood. It comes in contact with the respiratory nervous center and stimulates it to increased activity. This then causes increased pulmonary ventilation and hence carbon dioxide is removed from the lungs and thus allows more to enter from the blood.

This mechanism is so keenly adjusted that a slight increase of carbon dioxide causes increased pulmonary ventilation whether it be physiological, such as would occur after exercise, or pathological, such as occurs in certain diseases. Not only does carbon dioxide increase pulmonary ventilation, but any acid in the blood does likewise. The body controls large amounts of acids. The venous blood gives off its excess of carbon dioxide and this is prevented from accumlating by respiratory ventilation. In the breaking down of alkalies and bases energy is produced and this is attended by the formation of acid by-products. The kidneys and the skin dispose of the fixed acids that are in solution. All the body fluids are alkaline but the urine. Crile says that increased carbon dioxide causes an increase in the output of adrenalin which is turn stimulates the respiratory center and mechanism to increased activity thereby causing increased pulmonary ventilation and as a consequence an excretion of the excess carbon dioxide. As the vital function of the respiratory center is virtually controlled by the hydrogen ion concentration of the blood, it is obvious that increased acid is more dangerous to life than lessened oxygen supply.

Hawk says, "Owing to the operation of laws which govern the reactions of solutions of weak acids and their salts, the blood is able to take up a quantity of carbon dioxide without any appreciable change."

Normally the blood is slightly alkaline in reaction. This reaction of the blood may be said to be an important physiological constant. In this respect it resembles the body temperature. Chemical reactions, generally speaking, and especially those reactions involving enzymes, take place best in an optimum hydrogen ion concentration.

In fact, life depends on the maintenance of the reaction of the blood and the tissues within very small normal limits. Most chemical changes of metabolism are intracellular or else they are the result of the actions of the substances formed in the cell. And their elimination depends on the balance of acid and alkali in the cell.

There is no effect upon the normal working body of the ingestion of or the formation of acids within limits. It does not cause a change in the reaction of the blood because of the chemical composition of the blood and because of the power of the body to rapidly excrete acids.

The power that the kidney has of separating acids from bases, secreting the acid urine from an alkaline blood plasma, and retaining the bases in the body for neutralizing more acids is one of the most striking functions the body possesses in retaining a constant reaction. Also the excretion of carbon dioxide by the lungs, while it appears more simple, probably is just as important and just as finely adjusted. Even exercise or a close room containing carbon dioxide in excess increases respiration; and this is an index in a way, to the necessity of waste products being eliminated. Exercise may even produce lactic acid in the blood above or in excess of that secreted.

At rest, the carbon dioxide in the alveolar air is fairly constant. When given a carbohydrate diet it is high and when given a protein diet it is low. The percentage of carbon dioxide in the alveolar air corresponds to the tension of this same gas in the blood; that is, the amount of carbon dioxide in simple solution in the plasma.

Marriot says, "The blood, due to the buffer action of the carbonates of the plasma and the phosphates of the corpuscles takes up large amounts of acid or alkali without reaction change." For plasma alone, bicarbonates, alkali protein compounds, and small quantities of alkali phosphates together make up the alkali reserve.

The blood must be kept at a constant reaction. Increase of the hydrogen ion concentration interferes with cellular oxidation. A very slight change in reaction may cause very grave symptoms. Ordinary tap water is more alkaline than blood is. Distilled water is more acid than is blood. And a change of reaction equal to that of the difference between tap water and distilled water would probably be fatal.

A neutral solution is a solution containing an equal number of hydrogen and hydroxyl ions. An acid solution is a solution containing an excess of hydrogen ions; while an alkaline solution is a solution containing an excess of hydroxyl ions. A normal solution is a solution containing 1 gram of replaceable hydrogen or its equivalent in 1 liter of water.

Absolutely pure water is neutral and it has a hydrogen ion concentration of 10–7. It is one ten-millionth normal acid and one ten-millionth normal alkali.

$$\text{Pure water} = \frac{N}{10{,}000{,}000} \text{ acid and } \frac{N}{10{,}000{,}000} \text{ alkali.}$$

$$P^{H}1 = \frac{N}{10} \text{ acid}$$

$$P^{H}6 = \frac{N}{1{,}000{,}000} \text{ acid.}$$

$$P^{H}7 = \text{Neutrality.}$$

$$P^{H}8 = \frac{N}{100{,}000{,}000} \text{ alkali.}$$

$$P^{H}13.2 = \frac{N}{10} \text{ alkali.}$$

Blood serum has a hydrogen ion concentration between P^{H} 7 and P^{H} 8. It is usually given as P^{H} 7.35. P^{H} 7 and P^{H} 8 are the maximum variations. Normal urine has a hydrogen ion concentration of P^{H} 6. Gastric juice has a hydrogen ion concentration of P^{H} 1.77.

The efficiency of an acid in altering the reaction of a solution is generally said to be determined by the amount of ionization which it is capable of undergoing. For instance, decinormal hydrochloric acid is about 70 times as strong as decinormal acetic acid. This is explained therefore by the fact that hydrochloric acid ionizes to about 91 per cent while acetic acid ionizes to about 1.3 per cent.

The manner of cleavage of fatty acids and their relation to the acetone bodies needs a word of explanation. Fatty acids containing an even number of carbon atoms break down with the formation of the ketone bodies, while those with an odd number of carbon atoms do not. First there is an oxidation in the beta position, and then in consequence of a further oxidation there is a split in the chain between the carbon atoms in the alpha and the beta position and we get an acid formed with two less carbon atoms. Carbon dioxide and water are also formed. Therefore it is plain that the higher fatty acids are broken down into the lower fatty acids, losing two carbon atoms with each oxidation. Fatty acids with an odd number of carbon atoms are not found in the animal body fats. Butyric acid can be formed from all the fats of the different tissues and foods.

Amino acids, after there has been a cleavage which separates the nitrogenous from the carbonaceous portion, go on as fatty acids do. That is, the carbonaceous portion of the amino acids may form a fatty acid and this go on in the course mentioned above which a fatty acid pursues.

Betahydroxybutyric acid is formed in normal metabolism. Dakin found an enzyme, calling it betahydroxybutyrase, in the liver which acted upon betahydroxybutyric acid and formed acetoacetic acid. An example of the above statements is indicated below diagrammatically:

CH_3.CH2.CH2.CH2.CH2.COOH (Caproic acid)

$\downarrow$ O

CH3.CH2.CH2.CH2CO.COOH

$\downarrow$ O

CH3.CH2.CH2.COOH (Butyric acid)

$\downarrow$

CH3.COCH2.COOH (Diacetic acid)

Normally acetoacetic acid is oxidized to acetic acid and carbonic acid and then to carbon dioxide and water.

The relationship between the different members of the acetone bodies may be indicated thusly:

CH3.COCH2. COOH $\longrightarrow$ CH3.CO.CH3 + CO2
(diacetic acid) (acetone)

$\uparrow$ O $\downarrow$ H (REDUCTION)

CH3.CHOH.CH2.COOH (betahydroxybutyric acid)

The brain has two important parts which it plays in metabolism and they are as follows:

1. It furnishes the driving power which causes a transformation of energy.

2. It also controls the neutralizing mechanism for acid products of energy transformation.

The brain, thyroid, ardenals, liver, and body fluids are all supposed to have a certain function in relation to neutralization.

The term acidosis has been used rather freely in the literature and perhaps rather loosely also. A great many interpretations have been placed upon the condition. As a matter of fact different writers have different meanings at times when they use the term acidosis. It depends upon what condition we are speaking of when we try to define acidosis.

As death occurs before any changes of importance occur in the blood reaction, it shows that the condition is not as much an excess of free acid in the blood as it is a diminution in the fixed bases.

It is probably best to limit the term acidosis to a condition in which systemic changes occur and the body as a whole shows some abnormality.

Acidosis may be defined as a condition arising through the excessive withdrawal of bases by the presence of acids in the body. It is a diminished reserve supply of fixed bases in the blood and other tissues of the body. The physicochemical reaction of the blood remaining unchanged as a rule. However, in the very extreme conditions alterations of reaction may occur. It is not a depletion of the carbonates alone. It also includes a depletion in the other fixed bases of the body as well. We consider the body as a whole and not the blood alone, as the depletion affects more than the blood. The blood has the power, in trying to keep its normal composition, of taking constituents from the tissues. This point is well illustrated by the " draw " made upon the tissues when there is a depletion of water in the blood; and the same probably holds true in the case of alkalies.

In the changing from a state of health to that of acidosis, it is a quantitative rather than a qualitative change; and it is probably the quantitative aspect which determines whether or not the whole is systemically involved. If so we should consider the condition of acidosis as present. Naunyn employed the term acidosis to a perversion of metabolism in which betahydroxybutyric acid is formed. Subsequently it has been used by others to indicate a condition in which acids of any kind have been in the body and tended to upset the acid-base equilibrium. While we do not wish to restrict the term to a depletion of the bicarbonates of the blood, we are probably safe in saying that this is the most important depletion. Some would say that acidosis is a diminution of the alkali reserve of the body. And this is characterized by alterations in the urinary composition, the blood composition, and the composition of the alveolar air.

Austin and Jonas define acidosis as any condition in which the buffer substances of the blood and other body fluids are reduced below normal.

There may be a slight relative increase in the acid content of the body in acidosis but we must remember that acidosis does not mean acidity of the blood. It implies a reduced amount of the alkali reserve of the blood plasma but not necessarily a change in the hydrogen ion concentration.

Allen suggests the word " ketosis " for the metabolic condition in which the acetone bodies are abnormally present. And to the presence of them in the urine he would use the term " ketonuria."

Acidosis may be mild or it may be severe. It may be severe enough to cause certain definite clinical symptoms; or it may be so mild that laboratory methods would be necessary to detect it. It was once thought that acidosis occurred only in connection with diabetes, but this has been proven to be incorrect. Other diseases or conditions are accompanied by acidosis. It also occurs in food intoxications, diarrhea, and recurrent vomiting of children, chronic diffuse nephritis, primary contracted kidney, and in the acute nephritides. It probably does not occur in the parenchymatous, chronic interstitial, and arterio-sclerotic types of nephritis. It is probable, in fact, that acidosis occurs in any infectious disease which is accompanied by acute nephritis. A very striking example is the acidosis occurring in Asiatic cholera due to the accompanying nephritis. Again in liver diseases, especially, in atrophic cirrhosis, acidosis may occur. Severe febrile diseases may be accompanied by acidosis, especially rheumatic fever. Cachexias and severe anemias may show a tendency toward acidosis. In the severe anemias there is about 20 per cent only that show it.

Anaesthesia always produces acidity. The disturbance of the carbon dioxide capacity of the blood which occurs in anaesthesia is probably dependent on the disturbance of respiration.

Diseases of the brain, pneumonia, excessive exercise, starvation, pancreatic trouble, phosphorus poisoning, wasting diseases, fevers, carbohydrate free diet, salt free diet, shock, certain cardiac diseases and cardiorenal affections, emotion, pernicious vomiting of pregnancy, operative trauma, infection, hemorrhage, excessive exertion, injury, autointoxication, Grave's disease, strychnine convulsions, and injections of such as indol, skatol, amino acids of foreign proteins, or placenta extract, in addition to the above-mentioned conditions are by some supposed to be accompanied by a greater or less degree of acidosis. In fact Crile says, "Acidosis is present in every abnormal condition of the body in which the origin can be traced to excessive kinetic activations from any cause." He further adds that a maintenance of a normal potential alkalinity of the body is of vast clinical importance.

As seen from the occurrence, it is a fact that acidosis may be physiological or it may be pathological. And it goes without saying that the pathological cases are the more important. Acidosis arises as a secondary condition. That is, it is not the cause of the disease but it is a condition accompanying the disease with which it is associated.

Two general causes of acidosis are:

1. A lack of proper oxidation of organic acids.
2. A lack of proper elimination of the mineral acids.

An example of the first would be diabetes; and an example of the second would be the nephropathies.

The causative factors in the production of acidosis are:

1. Production or formation of acids.
2. Ingestion or introduction of acids.
3. Lack of alkali in the food.

4. Decreased excretion of acids or failure to excrete them.
5. Loss of bases.
6. Failure to produce and eliminate the neutralizing ammonia.

All of these above factors involve a depletion in the alkali reserve. Acidosis is then really caused by an excessive withdrawal of bases through the presence of acids in the body, the origin of which may vary. Diabetes and nephritis have or show the fundamental features that are present in any acidosis.

We have imperfect oxidation or imperfect neutralization of certain substances in acidosis. And inasmuch as the intermediary products are acids, they may form a stimulus to respiratory movements as any acid will do, because the stimulation has a relation to the hydrogen ion concentration of the blood. When acid products increase the carbon dioxide content decreases. The alkali reserve being diminished by the acids causes a condition whereby the carbon dioxide is not taken up from the tissues as it should be. In diabetes there is this imperfect oxidation. There is an increase in the amount of acids produced compared with normal. Observation shows that the acidity of the urine is increased, that there is an increase in the ammonia formation and a lowering of the carbon dioxide pressure of the alveolar air. As these acids influence the carbon dioxide capacity (for carrying) of the blood, and in as much as the vital function of the respiratory center is controlled by the hydrogen ion concentration, we would say that increased acid is dangerous. In fact, increased acid is more dangerous than is lessened oxygen supply. Life is incompatible with acidity.

In diabetes there is a lack of proper oxidation of the acetone bodies. Acetoacetic acid is probably the most important of the acetone bodies. It arises from fats and amino acids. It is not oxidized to carbon dioxide and water in diabetes as it is in health. The fat is only incompletely combusted. As the blood and the urine contain the acetone bodies in diabetes it shows that the body either can not oxidize them or else they are formed in excessive amounts. The former seems the more probable explanation. The body looses the power to handle carbohydrates, and in the absence of these carbohydrates there is incomplete oxidation of the fats—as fats are said to burn in the flame of the carbohydrates—and the acetone bodies make their appearance both in the blood and in the urine. It is possible that betahydroxybutyric acid comes from acetoacetic acid, because an ingestion of acetoacetic acid gives rise to betahydroxybutyric acid; while the ingestion of betahydroxybutyric acid does not give rise to acetoacetic acid. The amount of the acetone bodies excreted in the urine is not an index of the degree of the acidosis. It may be small in a severe case of the disease which shows a marked acidosis. And also it may be rather high when the patient is on the road to recovery. At first the bases of the tissues and the blood can neutralize these bodies as they are formed, and they are excreted by the kidney as salts of the acids and as acetone, but in time the reserve of bases becomes exhausted. Even though the body can handle a large amount of acids there is a limit to the power it has of doing so.

The increase of the acids stimulates the respiratory center to greater activity than normal. Increased pulmonary ventilation occurs which lowers the carbon dioxide tension of the blood. The balance in the acid-base equilibrium is disturbed and there is an increase in the nonvolatile acids and a drop in the carbon dioxide tension of the blood and the alveolar air. This is what we might say the beginning of serious acidosis. The base reserve supply is rapidly being used up, the regulation apparatus in the blood is breaking down, and now the organism calls on its last reserves. A fall occurs steadily in the carbon dioxide tension and poison symptoms become manifested. In the final stages the production of acids is so great that both the kidneys and the lungs together can not maintain the blood conditions in the proper way. The acid causes increased respiration to such an extent that the patient gasps for air. And else something can be done to reduce the formation of the acids or to neutralize them in some way the patient will die. The excess acid will in time really change the hydrogen ion concentration slightly. It is only slight, but a change from what it normally is to that of neutrality is sufficient to cause death. Being a physiological constant, the reaction can not be changed to any degree without fatal results. Much change in the hydrogen ion concentration indicates a failure of the protective mechanism and the presence of significant acidosis.

When betahydroxybutyric acid is found it indicates that fat or amino acids are not being completely oxidized even though the cause for such may not be known. If the "buffer" substances are being reduced and the body can not replace them fast enough, acidosis inevitably results. The carbonates are called the first line of defense. The so-called "buffer" substances are the sodium phosphates and the sodium bicarbonate. Any time that the alkali reserve of the blood is lowered it can not carry carbon dioxide efficiently and the carbon dioxide will accumulate in the tissues.

As has been stated, the respiration lowers the carbon dioxide in the lungs and this in turns permits carbon dioxide from the blood to come into the alveoli of the lungs leaving less in the blood; and now the blood can take up more carbon dioxide from the tissues. In acidosis, however, the concentration of carbon dioxide in the lungs is less because of the excess pulmonary ventilation and also because the blood has lost part of its power to transport carbon dioxide.

In diabetes, the partial pressure in the alveoli of carbon dioxide falls with increasing acidosis and during coma reaches a low point. The amount of carbon dioxide in the venous blood rises and falls with the alkalinity of the blood serum, but the two are not exactly parallel however. The average alkalinity of the normal is equivalent to from 0.3 to 0.6 per cent sodium carbonate solution. And the average amount of carbon dioxide in healthy venous blood is from 40 to 50 volumes per cent. Carbon dioxide is carried away from the tissues by venous blood. It is the chief acid product of metabolism. It causes only an infinitesimal change in the reaction of the blood but this is sufficient to cause a stimulation of the respiratory center. As the carbon dioxide in the tissues enters the plasma circulating through them, it is taken up partly as dissolved carbonic acid and partly in combination. Due to the pulmonary ventilation and the getting rid of the excess carbon dioxide no depletion of the alkali reserve results. If we were to add a nonvolatile acid, such as sulphuric, phosphoric, or betahydroxybutyric acid to the blood plasma, some of the alkali reserve would be neutralized and the reaction of the plasma would shift very slightly toward acidity. Increased respiration would occur but would not remove these fixed acids. It would, however, remove carbonic acid below its normal amount and in this way compensate for the fixed or nonvolatile acids. The alkali reserve would be somewhat depleted and when the plasma, with its depleted alkali reserve, again went around to the tissues, the carbonic acid normally produced in those tissues would cause a greater change in the reaction than it normally does. There would be overaction of the respiratory apparatus evidenced by hyperpnea and lessened carbon dioxide alveolar tension. Neutrality may be caused and death occur. The body, however, before giving up, responds finally by producing ammonia and excreting the acids in part as ammonium salts. One gram of ammonia can neutralize five times as much betahydroxybutyric acid as can one gram of sodium bicarbonate.[1]

In acidosis then there is an increase usually in the nonvolatile acids. The carbon dioxide tension of the alveolar air is the same as that of the blood. All free carbon dioxide is present in the body fluids in such concentration that it converts all bases into bicarbonates, which are not bound up by some other acid. Therefore the bicarbonate represents the excess base left after the nonvolatile acids have been neutralized. It is available for the neutralizing of

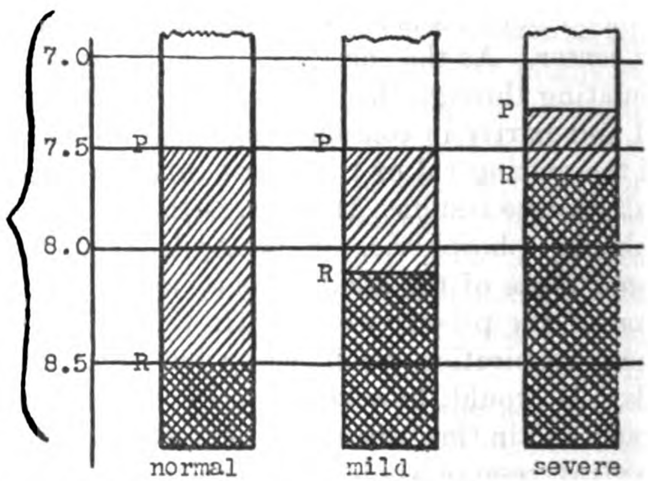
[1] In cases of need, ammonia is formed within the body. It is intercepted before it has a chance to be transformed into urea. And some even say that ammonia is formed from urea in cases of need. In either case it is a pure gain of alkali.

further acids. To look at it from this standpoint it constitutes the alkali reserve of the body. The other body fluids in general have about the same general concentration of bicarbonate as the blood.

To show the relation of the alkali reserve and the reaction of the blood plasma (in acidosis of diabetes), Marriot draws the following diagram: (It is generally applicable to acidosis of any type.)

When we find small percentages of carbon dioxide in the alveolar air it probably is an indication of excess fixed acids in the blood. It is also an indication of a severe case of acidosis, even to the point that it is suggestive of an impending coma. Some would call it a danger signal of an impending coma.

Negative logarithm of hydrogen ion concentration.



7.0 represents neutrality. The alkaline reserve is between 7.0 and R in each case.

Nonvolatile acids.

Volatile acids (carbonic acid).

The acetone bodies are probaly not toxic in their action in diabetes, but the effect is due to the robbing of the alkalies from the tissues by these acids.

In nephritis there may be an accompanying acidosis in which the power of the kidney for excretion of alkalies or acids is markedly impaired. There is no disturbance of oxidation or of carbohydrate metabolism in nephritis. There is a loss of alkalies and this is caused by a neutralization of acids. The exact source of the acid is probably not well established. It is quite probable that the acidosis is due to an impairment of the function of the kidney. With impairment of the function of the kidney, acid excretion is hindered and acid radicals, which are usually excreted in the urine, neutralize fixed bases and there will be a loss of alkalies. There is no acetone increase in the urine and no increase in the ammonia output in nephritis with acidosis—except in the acute nephritis accompanying Asiatic cholera, which has a large output of ammonia. It is fairly well established that the acidosis of nephritis is due to retention. The urine in acidosis of nephritis is of but little value. Acidosis has some relation to uremia—the exact relation, however, is not known.

Dyspnea which is the result of overstimulation of the respiratory center, caused by an excess of carbonic acid in the blood or abnormal acids in the circulation, is a common symptom of cardiac trouble. Cardiac dyspnea, according to Lewis, is due to poor oxygenation of the tissues. The alveolar air, during the dyspnea, shows no marked signs of acidosis. There has been much controversy as to whether an acidosis is present or not. At the Peter Bent Brigham Hospital, after ruling out renal troubles, a slight acidosis in some cardiac cases was observed. There may or may not be an acidosis, but if it does occur it is only during the acute stages and disappears. It is true that acidosis may cause many cases of cardiac asthma (so-called), with no signs of cyanosis. We may, of course, have cardiorenal disease and get an acidosis due to the renal trouble.

An acidosis due to a salt-free diet is important only from a dietary standpoint. It is readily cured by the ingestion of salts. There is also a disturbance observed upon the ingestion of excessive amounts of acid forming foods such as meats, fish, cereals, eggs, etc.

Exogenous introduction of material into the body is bound to have an influence upon metabolism. A lack of any essential substance is bound to cause an alteration of normal function. An example of this latter is the condition caused by the withdrawal of carbohydrates from the diet. A carbohydrate free diet will cause an acidosis within 24 hours. This acidosis can be warded off if 50 to 150 grams of carbohydrate be given during the day.

The following table shows the effect of the withdrawal of carbohydrate from the diet. The acidosis is evidenced by the increased acetone bodies excreted:

Acidosis accompanying carbohydrate withdrawal

Day	Diet	Grams excreted (acetone bodies)
1	Protein, fat, and carbohydrate	None.
2	Protein and fat	0.8
3	do	1.9
4	do	8.7
5	do	20.2
6	Protein, fat, and carbohydrate	2.2

The above table is from Hawk's Practical Physiological Chemistry, showing some results obtained by Von Noorden. The excretion of the acetone bodies was as betahydroxybutyric acid.

The reason that long carbohydrate withdrawal or total fast causes acidosis in a normal person, or even in a diabetic individual, is explained by two facts: First, the fats burn in the flame of the carbohydrates; that is, fats are oxidized secondarily through the combustion of carbohydrates; secondly, by this withdrawal of carbohydrate (and there is usually a limitation of protein) more fat is called upon to supply the necessary heat and energy. The call being great, incomplete combustion leads to the formation of the acetone bodies.

During acidosis we may find a glycosuria or a hyperglycemia. This is explained by saying that the acidosis may affect the liver and the muscles and cause a mobilization of glycogen, and also it may interfere with the elimination of sugar by the kidney, thereby holding it in the blood.

Restriction of carbohydrate in the diet has a very important influence in increasing the excretion of the acetone bodies but entire withdrawal is probably contraindicated. When the ketones appear in the urine they are the result of carbohydrate deprivation, and the appearance of betahydroxybutric acid only indicates an incomplete normal metabolism.

After anaesthesia there is a depression of the carbon dioxide capacity of the plasma. From ether anaesthesia there is a lowering of the carbon dioxide capacity of the plasma of from 2 to 20 volumes per cent, depending upon the duration of the anaesthesia. Anaesthesia disturbs the carbon dioxide capacity of the blood, in part at least, by disturbing the respiration. Henderson says, "Under ether, the alkali reserve of the blood follows and is controlled by the carbon dioxide content and the carbon dioxide content is, in turn, dependent on the alveolar carbon dioxide, which is determined by breathing."

Acidosis or acid-intoxication after anaesthesia is also called acetonuria or delay poisoning by the surgeon. If before the operation there is acetonuria, glucose may be given as a prophylactic. Acidosis following anaesthesia does not mean that the patient operated upon is a diabetic. There is lessened alkalinity of the blood and the presence of free fat in the blood. The urine may show acidity, casts, albumin, and the acetone bodies. Acidosis is much more common after chloroform than after ether. It may occur, however, after the use of any general anaesthetic. I have seen no reports showing the relation of the new anaesthesia ethylene to acidosis. An operation should be done as quickly as possible, and as small an amount of the anaesthetic should be used as possible.

Among the many developments along medical lines which the recent war has brought about, are certain facts regarding acidosis in its relation to shock. There is an old saying that in shock a man bleeds into his own veins. There is a lowering of the blood pressure. This is supposed to cause a reduction in the alkali reserve, and the blood consequently takes up less carbon dioxide. In shock, acidosis occurs before there is any effect on respiration noted. Shock has been said to be due to suprarenal or nerve exhaustion. The temperature falls in shock; and the alkalinity of the body fluids decreases.

In addition to the low blood pressure, sweating occurs giving a loss of fluid and heat from the body. The blood becomes stagnant and concentrated in the capillaries. The low blood pressure, slowed circulation, cold, and corpuscular stagnation help to increase the acidity by lowering the oxidative processes. The acidosis, in addition to the depressive effects on the blood pressure tends to affect the cardiac contraction by the increased carbon dioxide. Also the increased carbon dioxide, increases the viscosity of the blood and it also increases the size of the corpuscles. Henderson in 1910, pointed out that the impaired circulation in cases of shock, would probably lead to acidosis.

The greater the degree of acidosis from shock, the greater is the danger of operation and the giving of anaesthesia, because there is a reduced alkali reserve anyway and anaesthesia only aggravates and adds to the depletion. Marshall advises the use of nitrous oxide and oxygen when operations are to be done on men who are in a condition of shock.

Cannon in summarizing his experiments on shock from war wounds, etc., says:

" 1. Cases of low blood pressure due to shock, hemorrhage, or gas infection with the gas bacillus have a reduced alkali reserve. As a rule, the lower the blood pressure the greater the acidosis and the lower the alkali reserve.

" 2. The pulse is rapid in these cases, but does not vary with the degree of the acidosis.

" 3. The respiratory rate is more rapid, and even true air hunger may be shown.

" 4. The blood sugar is usually somewhat increased in shock and hemorrhage, and therefore the acidosis is not due to a lack of carbohydrates.

" 5. Operations on men suffering from shock and acidosis result in serious and rapid sinking of the arterial pressure and a decrease in the alkali reserve when they are both already low. This may not occur if nitrous oxide and oxygen be given.

" 6. Shocked men suffering, after operation, from extreme acidosis with air hunger can be quickly relieved of distress by intravenous sodium bicarbonate injections, and the blood pressure will be restored to normal."

In acidosis the tension of the carbon dioxide in the blood or, what is the same thing, the tension of the carbon dioxide of the alveolar air gives an accurate index of the amount of the nonvolatile acids in the blood. And in the excretion of these nonvolatile acids the urine does not tell the conditions which are present in the body itself directly as does the blood. The urine only gives what is being excreted and not what is being retained. And it is the amount which is retained that is dangerous.

The following features of acidosis, which are presented in tabular form, are taken from Sellards' Principles of Acidosis:

Table showing certain diseases in which acidosis occurs and the evidences of an acidosis

Evidences of acidosis	Diseases in which acidosis occurs			
	Diabetes	Ordinary nephropathies	Nephritis of Asiatic cholera	Food intoxication of children
Constant fundamental features:				
Tolerance to sodium bicarbonate.	Increased	Increased	Increased	Increased.
CO_2 content of blood and alveolar air.	Decreased	Decreased	Decreased [1]	Decreased.
Titratible alkalinity of blood.	do	do	do.[2]	Do.
H^+ conc. of blood	Terminal increase.	Terminal increase.	Terminal increase.[2]	Terminal increase.[2]
Variable features:				
Acetone bodies	Increased	Normal	Usually normal.	Slightly increased.
Ammonia output	do	do	Increased	Often increased.

[1] Not yet demonstrated for the alveolar air.
[2] These features have not been determined experimentally but theoretically they must occur.

In the diagnosis of acidosis we must use both the clinical signs and symptoms and the laboratory methods. The character of the acidosis may help materially in the diagnosis.

The clinical signs and symptoms are not always the same. The respiration becomes rapid. There is dyspnea, the striking feature of which is an increased depth with a prolonged expiration. This is more striking than the rapidity. There is a bright color of the mucous membranes and no signs of cyanosis. By examining the chest there are no alterations to account for the dyspnea. This dyspnea is present only in more or less advanced cases of acidosis.

Coplin gives the symptoms of acidosis as follows: "Air hunger, dyspnea, hypernia, without cyanosis, dullness of the senses and intellect, stupor and deep coma in the later stages, and a rapid pulse usually of high tension at the onset of stupor but becoming weaker as the coma progresses."

DaCosta says, "Coma in acidosis comes on commonly rather rapidly, with vomiting, abdominal pain, weakness, restlessness, and drowsiness. Sometimes it is ushered in by collapse, at other times by confusion of thought and speech. In coma the respiration is usually slow and deep but may be sighing. The pulse is small, of low arterial tension, and usually rather frequent. The temperature becomes subnormal although during the onset it may be elevated. Cyanosis arises, the breath smells of acetone, the patient lies quietly in bed, and the pupils are dilated."

After a person has recovered from anæsthesia and reacted from shock, the symptoms of acidosis, if it is present, come on. There is persistent vomiting of a thin, foul fluid; there is restlessness and excitement or maybe delirium. Dullness and heaviness may lead to coma. The temperature is usually subnormal though not always. Jaundice may arise; and acetone can be smelled on the breath.

There is nearly always thirst in acidosis. Increase of acid in the blood causes the thirst. Also acidosis is accompanied by sweating—and this helps the lungs and the kidneys with their work of elimination.

Crile claims that the so-called post-operative hyperthyroidism is chiefly an acute acidosis.

A progressive rise in blood sugar content in diabetes associated with a gradual fall in the alveolar carbon dioxide is indicative of impending coma.

The general laboratory methods of aid in the diagnosis of acidosis involve an examination of the blood, respiration, and the urine. In the blood we look for a lowering of alkalinity, lowering of the carbon dioxide content (Barcroft's method for determining acidity may be used).

The respiration is examined for a lowering of the carbon dioxide tension of the alveolar air.

The urine may be examined for excess of acids which are normal in certain amounts or for the presence of abnormal acids, change in fixed bases, and for an increase in the ammonia output.

We recognize the presence of acidosis by—

1. An increase in the ammonia output.
2. A decrease in the carbon dioxide tension of the alveolar air.
3. The finding of abnormal acids or an excess of normally present acids in the blood and in the urine.
4. An increase in the alkali tolerance.
5. A diminished alkalinity of the blood serum.

6. Changes in the hemoglobin dissociation curve.
7. A determination of the hydrogen ion concentration of the blood (this does not change to any marked degree).

It should be said that all of the above tests are not always positive in every case of acidosis, as different cases of acidosis present different features as a rule.

The following are the tests which are usually employed in the detection of acidosis. I am only giving the principles and interpretations and not the technique. They are taken from Hawk's Practical Physiological Chemistry.

1. *Alkali reserve.*—Direct method. The carbon dioxide capacity of the plasma. (Van Slyke and Cullen.)

Principle.—Plasma from oxalated blood is shaken in a separating funnel filled with an air mixture whose carbon dioxide tension approximates that of normal arterial blood, by which treatment it combines with as much carbon dioxide as it is able to hold under normal tension. A known quantity of the saturated plasma is then acidified within a suitable pipette and its carbon dioxide is liberated by the production of a partial vacuum. The liberated carbon dioxide is then placed under atmospheric pressure, its volume carefully measured and the volume corresponding to 100 c. c. of plasma calculated.

Interpretation.—The carbon dioxide capacity of the plasma as determined by this method appears to indicate not only the alkali reserve of the blood but also of the entire body. The average normal value for man is about 65 volumes per cent of carbon dioxide.

2. *Alkali reserve.*—Indirect method. Alveolar carbon dioxide tension. Fridericia's method.

Principle.—The method of determination being based upon the absorption, by means of KOH, of carbon dioxide from a known amount of alveolar air. The apparatus is so graduated that the decrease in volume may be read in percentage.

Interpretation.—The sample of air obtained by this method represents more nearly air whose carbon dioxide tension is the same as that of arterial blood, i. e., true alveolar air, than does air obtained by rebreathing. Results by this method are 5 to 10 per cent lower than those by the Marriot method. Average normal value for men is about 5.5 volumes per cent of carbon dioxide. In women and children the normal value is lower. In acidosis the carbon dioxide falls and in diabetic coma may go as low as 1 to 2 per cent. A value of 2 per cent means that coma may supervene within 24 hours. A value of 3 or 4 per cent is less dangerous; in the worst event coma will not come on for at least two or three days.

3. *Alkali reserve.*—Indirect method. Alveolar carbon dioxide tension. Marriot's method. This method is widely used even though

there might be errors in getting the sample, and conditions other than acidosis may alter the alveolar air.

Principle.—Rebreath air under certain definite conditions, and we obtain a sample with the carbon dioxide tension nearly that of venous blood. The method of analysis of the sample depends on the fact that if a current of air containing carbon dioxide be passed through a solution of sodium carbonate or sodium bicarbonate until saturated the final solution will have sodium bicarbonate and dissolved carbon dioxide. The reaction will depend on the relative amounts of carbon dioxide and the sodium bicarbonate. This in turn depends on the tension of carbon dioxide in the air with which the mixture was saturated, and will be independent of the volume of air blown through, provided saturation has once been obtained. High tensions of carbon dioxide change the reaction of the solution toward the acid side. Low tensions have reverse effect. Hence the reaction of such solutions is a measure of carbon dioxide tension of air with which it was saturated. A suitable indicator is added to the solution and its reaction (after the passage of alveolar air) is determined by comparison with suitable standards.

Interpretation.—At rest the carbon dioxide tension in normal individuals varies from 40–45 mm. In mild acidosis from 30–35 mm. As low as 20 is dangerous. Coma with acidosis may be 8–10. Children are lower than adults and may be 3–5 mm.

Other conditions than acidosis may effect the carbon dioxide tension. Stimulation of the respiratory center lowers the carbon dioxide tension. Caffeine or intracranial lesions may stimulate the respiratory center. Infections or morphine might depress this center and give an increased carbon-dioxide tension. Changes in the respiratory center are rarely enough to effect the alveolar air.

Alveolar air (as collected in this experiment) is in equilibrium with the pulmonary venous blood. Tension of the carbon dioxide is about that of venous blood. Alveolar air collected by the Haldane or the Fridericia methods is air which is about that of arterial blood and hence is 10 to 20 per cent lower in carbon-dioxide tension.

Changes in the pulmonary epithelium such as would prevent air in the lungs from coming into equilibrium with the blood in the capillaries would of necessity affect the composition of the alveolar air. Then if there are pulmonary affections we probably should not use this method.

4. *Alkali reserve.*—Indirect method. Index of acid secretion in the urine. Method of Fitz and Van Slyke.

Principle.—It depends upon the determination of the rate of excretion of acid (ammonia plus titratable acid) from which plasma carbon-dioxide capacity is calculated.

Interpretation.—After careful investigation in which the relationship between the carbon-dioxide capacity of plasma and the excretion rate and the concentration of total urinary acid excreted in excess of mineral bases was determined, Fitz and Van Slyke concluded that no other equation, including excretion rate and concentration, was so satisfactory as the simplification of that used by Ambard for urea and chloride.

The value $80-50\sqrt{\frac{d}{w}}$ indicates with an error, which is usually less than 10 volumes per cent, the level of plasma carbon dioxide. Diabetics receiving bicarbonates are exceptions, the blood bicarbonate in such cases as a rule being much higher than indicated by the urine.

Of the two indirect measures of the alkali reserve the alveolar carbon dioxide determination appears the more accurate in measuring the more severe stages of diabetic acidosis, such as are encountered in threatened coma, while the index of acid excretion is more accurate in measuring the more common intermediate stages. In nephritic acidosis (lowered blood bicarbonate) may occur without increase in the acid excretion, or even with a decrease of the latter. Consequently excretion can not be used as an indicator of acidosis when nephritis is present.

5. *Alkali tolerance.*—Sellards' Test.

Principle.—Sodium bicarbonate is administered until the urine becomes alkaline, and then the amount of bicarbonate necessary is noted.

Interpretation.—This test is quite reliable for proving absence of acidosis, but not particularly dependable for showing the presence of acidosis (or the degree) when it exists, because the power of the kidney to excrete may be impaired. In other words, it is a good negative test but not a good positive test. Five to 10 grams normally is tolerated by the average man.

6. *Relative hydrogen ion concentration of the blood.*—Method of Levy, Rowntree, and Marriot.

Principle.—Blood is dialyzed against normal salt solution, and the hydrogen ion concentration of the protein-free dialysate is determined by the indicator method, using phenolsulphonephthalein.

Interpretation.—This test is not of so very much service because the hydrogen ion concentration does not change materially even in bad cases of acidosis.

7. *Ammonia determination.*—Folin's method.

Principle.—Ammonia of the urine is set free by the addition of an alkali, and this ammonia is then carried over by an air current into a flask containing a measured amount of standard acid. The excess acid is titrated, and calculations are made accordingly. (This same principle can be applied to the blood examination for ammonia.)

Interpretation.—Ammonia is increased by the ingestion of acids or acid-forming foods, and it is decreased by the ingestion of alkalies or alkali-forming foods. In acidosis it is increased very greatly in certain cases. It is in combination then with betahydroxybutyric acid and other acids. It is also said to be high in certain liver disorders.

8. *Acetone bodies.*—Method of Schaffer and Marriot.

Principle.—The preformed acetone and acetoacetic acid are distilled off together as acetone and determined by the iodine titration method. The betahydroxybutyric acid remains in the residue from distillation and is oxidized by means of potassium bichromate. Acetone being formed is distilled off and determined as such.

Interpretation.—The acetone bodies in the urine indicate altered carbohydrate metabolism even though they come from fats or amino acids. In acidosis from altered carbohydrate metabolism they may be present in large amounts.

9. *Barcroft's method.*—Barcroft has devised a method for acidity by affinity of hemoglobin for oxygen under standard conditions. The specialized technique makes it rather impracticable.

10. *The titratable alkalinity of the blood* is not often done. It has no advantages over the other tests.

Principle.—Is based on the fact that normal blood serum is acid to phenolphthalein while heated serum is alkaline. The interfering proteins are removed with alcohol. After filtering the proteins off, the filtrate with a few drops of phenolphthalein is evaporated to dryness. Normally the residue is pink. In acidosis it is colorless.

The best tests probaly are:

1. The alkali reserve tests.
2. The alkali tolerance test.
3. The carbon dioxide tension test of the alveolar air.
4. The hydrogen ion concentration of the blood test. (A test which is the least valuable of the four mentioned here).

For plasma alone bicarbonates, alkali protein compounds, and small quantities of alkali phosphates together make up the alkali reserve. Normally these are present in very constant quantities.

In nephritis, the carbon dioxide test is not so good as it is in diabetes. Even after the phthalein excretion falls below normal and after the alkali tolerance shows much tissue acidosis there is rarely any change in the alveolar air.

Again the alveolar carbon dioxide content is lowered by other things than acidosis. Two examples are: First, increased pulmonary ventilation noticed in high altitudes; and secondly, changes in the lungs and circulation which interfere with the exchange of gases between the alveolar air and the blood. Some would really hold that these conditions are acidoses. It might be said that the tension of the carbon dioxide in the alveolar air in uremia is in general proportional to the symptoms.

A constantly falling carbon dioxide tension is a serious warning; and is of considerable prognostic value. It also may aid in treatment. It is valuable in determining the effects of giving alkali treatment. The urine will not show this.

The alkali tolerance test is considered to be of importance in the diagnosis of acidosis. It was first tried out on a series of cases of Asiatic cholera.

Because the reaction of the blood is more or less constant in acidosis, it does not mean that there is no alterations in the body metabolism. In fact, it is by an alteration or compensatory changes that the reaction is maintained normal. If a deficit in the alkalies were to occur from compensation there would be a tendency toward acidosis. It is believed by some, even in nephritis, that the tolerance noted to bicarbonate in acidosis is not due to retention but to a restocking in the body tissues with this alkali.

In health the introduction of from 3 to 5 grams of sodium bicarbonate will cause a change in the reaction of the urine from acid to alkaline. In acidosis there will be greater tolerance to alkali and that amount and more will be ingested without changing the urinary reaction. According to the degree of the acidosis we note a tolerance from 10 to maybe 100 grams or more.

Sellards says, "The alkali tolerance test is the most delicate of the tests which are specific for acidosis. That when the tolerance to bicarbonate is normal, acidosis can be excluded."

The alkali tolerance test is not only a diagnostic measure, but by the ability that sodium bicarbonate has to replace the deficiency of bodily alkali it is a good therapeutic measure.

Since it is only in very grave conditions of acidosis that the hydrogen ion concentration of the blood changes, it may be said that the hydrogen ion cencentration measures the excitability of the respiratory center rather than the degree of the acidosis.

The following facts on the hydrogen ion concentration are taken from the work of Marriot and others.

1. The indicator method of determining the hydrogen ion concentration is made applicable to blood and serum by use of dialysis through a collodion membrane which excludes the disturbing influences of color and proteins. It is a simple, rapid, accurate, and well-adapted method for clinical use.

2. The technique consists in dialysing 3 c. c. of blood or serum at room temperature against 3 c. c. of 0.8, a 1 per cent salt solution, for five minutes and adding an indicator and comparing with colored standards of phosphate mixtures of known hydrogen ion concentration.

3. Phenolsulphonephthalein is used as an indicator. It is found to exhibit easily distinguishable variations in quality of color with minute differences of hydrogen ion cencentration between limits of P^H 6.4 and P^H 8.4.

4. Oxalated blood from normal individuals gives a dialysate with a P^H varying from 7.4 to 7.6, while that of serum ranges from 7.6 to 7.8.

5. Variations from these figures toward acidity were encountered only in conditions which clinically and from the standpoint of laboratory findings evidenced an acidosis.

6. In a small series of acidoses, the serum varied from 7.55 to 7.2 and the oxalated blood varied from 7.3 to 7.1. In experimental acidosis in dogs a P^H of 6.9 has been encountered in both serum and blood just before death.

It is difficult to get the hydrogen ion concentration. A direct method can be done by electrochemical methods and difficulties of technique are very much enhanced by the necessity of measuring the blood at a known carbon dioxide tension.

A study of the changes of the dissociation curve of hemoglobin and the diminished titratable alkalinity of the blood serum in acidosis are probably not so good as are the other above-mentioned tests.

The common tests done for the acetone bodies are the qualitative more so probably than the quantitative. The usual qualitative tests are for acetone and acetoacetic acid. These do not give any idea of the excretion of betahydroxybutyric acid. In bad cases of acidosis and even in diabetic coma the ferric chloride test is sometimes very weak so we can not rely on the degree of the reaction for the amount present. After the ingestion of alkali the reaction is frequently more pronounced and intense. There may be dangerous acidosis and we get weak tests; and again we may get well pronounced tests with the patient returning to normal. The ferric chloride test is not so sensitive as the nitroprusside test. The urine does not always give a positive reaction when the blood shows a positive test. Therefore the excretion of acid bodies is not necessarily an index of acidosis.

The ammonia coefficient is a fairly good test but it is not always reliable. The amount of ammonia in the urine will depend upon its production and upon its excretion by the kidneys. If either of these be disturbed there will be alteration in the amount of ammonia appearing in the urine.

Hutchinson and Rainy say that the ammonia nitrogen rises greatly in all conditions leading to acidosis.

It is true that many cases of acidosis show a high ammonia coefficient (ammonia nitrogen: total nitrogen), yet dietary changes may cause a high ammonia output. And again acidosis in uremia and nutritional disorders of children have been noted which have no increase in the ammonia nitrogen—and these cases having an acidosis.

In making a diagnosis of the condition of acidosis accompanying any disease it is necessary that we should not rely upon a test or upon a sign alone. The clinical and the chemical aspects should be studied together and then the diagnosis made.

In treating acid conditions it is well to give water and sodium bicarbonate.

In surgical procedures, the things tending to produce acid by-products such as emotion, operative trauma, starvation, infection, inhalation anaesthesia, etc., need to be controlled by the surgeon in as far as it is possible. The patient should be protected by giving water, glucose, and sodium bicarbonate before operation. This will also improve the post-operative condition and be favorable to convalescence. Hare advises treatment of a patient, having acetonuria after anaesthesia, as if he had acetonuria of diabetes. The danger of acidosis is increased by starving a patient before the operation. Carbohydrates are fed as they tend to hinder ketone formation. It is not good to give morphine where there is increased acid production, as it hinders the neutralization of the increased acidity.

In prolonged fasting in diabetes, sugar may disappear and also the acidosis. But, on the other hand, both the acidosis and the sugar may be increased. In fact, in some cases, carbohydrates are specific in reducing the acidosis even when the body is not burning them well. Carbohydrate withdrawal helps some diabetics and harms others.

Felsen and Epstein say, "A liberal but judicious administration of carbohydrates may control acidosis provoked by the withdrawal of carbohydrates or by complete fasting, and thus leading to a general amelioration of the diabetes."

Since acetoacetic acid may come from butyric acid, a diabetic person is not given very much butter, as the butter contains butyric and other low fatty acids. For the sake of energy it is best to give the higher fatty acids. Overfeeding of fat may increase acidosis in diabetes and bear some relation to lipoidemia (this is not yet understood).

Alcohol in diabetes tends to be antiketogenic. Its use must be well watched and guarded.

Care must be given to regulate the bowels, give rest and warmth, stimulate as necessary, and wash out the stomach when needed.

It is well to keep a diabetic patient with acidosis as quiet as possible in order to minimize the amount of carbon dioxide formed. When carbon dioxide is low in the alveolar air it can be raised by the administration of sodium bicarbonate.

The treatment of diabetes has been much revised since insulin was discovered. Insulin is not curative and all cases do not need it.

Mild cases if symptom free on proper diet need no insulin; but in acidosis, infections, and severe diabetes it is given freely. It is best given subcutaneously, in the ordinary case, occasionally intravenous, never by mouth or rectum.

In treating an ordinary case of diabetes without complications (if severe enough for insulin) give 50 to 75 grams of carbohydrate and protein and eliminate most of fat for first few days. Too much fat is often not agreeable to the patient and is dangerous. Over 100 grams of protein or 150 grams of carbohydrate are not necessary as a rule (Allen). In conjunction with these dietary measures insulin is given. Small doses at first, 4 to 6 units first day and increase as necessary. If bad case, 20 units or more may be needed. Insulin should be given two or three times a day before meals. Patient should be kept 5–10 pounds below normal weight. In infections high dosage is usually needed, because of the accompanying acidosis. In acidosis take a blood sample at once and inject 25 units of insulin into a vein without removing needle and give 25–50 units subcutaneously. Then give subcutaneously every 3 or 4 hours as long as necessary. Allen gave 485 units to a fatal case in one day. No food should be given but carbohydrate; give 100–200 grams the first 24 hours, no matter what the urine or blood shows. Alkali in form of sodium bicarbonate should be given in doses of 10–40 grams daily. Plenty of fluids, including saline in certain cases, should be given. The results from the use of insulin in acidosis have been almost miraculous.

Thalhimer has treated some cases of nondiabetic acidosis with insulin and glucose intravenously. They were preoperative and postoperative cases and cases of pernicious vomiting of pregnancy. He claims success in all cases.

As glucose is a diuretic itself, Fisher and Snall advocate the use of fluids by rectum as well as insulin and glucose as outlined by Thalhimer.

I have found no literature dealing with the effects of insulin in the treatment of the acidosis accompanying the many other conditions; but it seems logical to suppose that the effects would be similar to the tried forms. Might this not suggest a derangement of the pancreas in cases of acidosis?

Of course the ideal treatment of acidosis would consist in the removal of the cause. When we inject sodium bicarbonate into the body, to relieve the symptoms of acidosis, it does not neutralize acid; it is stored as such in the body. No free acid is present. The air hunger is due to a loss of alkalies and not to the presence of acids. The injection of the alkalies relieve the air hunger if they stay in the body as carbonates and carry on the function of transporting carbon dioxide.

In approaching uremia, it is sometimes possible to prevent the attack by injections of alkali, if the effort is made before typical uremia occurs. Also in cases of uremia, where the urine is suppressed, injections of alkali—that is, sodium bicarbonate preferably—will cause a voiding of the urine rather freely. After the urine has become alkaline in reaction the amount of the sodium bicarbonate should be administered less freely and with the greatest care and precaution. In fatal uremia, the alkali treatment seems to be the only thing that will relieve the air hunger. And again, it controls the restlessness; and it does it even better than does the giving of morphine.

The effect of the injections of sodium bicarbonate in nephritis lasts longer than it does in diabetes. Some authorities advise the use of the sodium carbonate instead of the bicarbonate; but the carbonate of sodium, even though it is more strongly alkaline than the sodium bicarbonate, can not be given in as large doses as the sodium bicarbonate.

The acidosis accompanying the food intoxications of children has been helped very materially by the judicious injection of sodium bicarbonate.

In the conclusion it might be well to emphasize the fact that acidosis is a secondary condition and not the causing factor of the disease with which it is associated. It is a condition caused by the excessive withdrawal of bases through the presence of acids in the body. Acidosis does not mean "acetone bodies in the blood or in the urine." Acidosis may occur without the acetone bodies being concerned in the condition at all.

The alkali tolerance test and the alkali reserve determination are probably the best tests for acidosis that we have. Sellards feels that the tolerance test when positive is pathognomonic of acidosis. At least it is valuable.

Again I wish to state the fact that the body is wonderfully adapted to the formation of ammonia when in need.

Also emphasis should be placed upon the fact that acidosis does not mean acidity of the blood. Yet it will be admitted that the composition of the blood is maintained at a constant condition at the expense of other tissues of the body.

Most of the knowledge concerning acidosis has been gained through studies of diabetes, the nephropathies, and diseases of children. The knowledge is by no means complete. In fact, no adequate explanation has, as yet, been given for the extreme acidosis occurring in children.

Many other diseases are supposed to be accompanied by acidosis but the extent to which the acidosis occurs remains to be determined by findings obtainable through no better path than careful research.

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GRAPHIC AIDS IN RECORDING LESIONS IN THE LOWER GENITOURINARY TRACT

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In a urological examination a definite method of procedure, some systematic method of approach to the case, is vitally necessary. The examinations may be said to consist of three parts: (1) History of the patient and symptoms; (2) examination of the patient, including instrumental means; (3) special examinations, including such features as examination of secretions and excretions, microscopical and chemical tests, X ray, blood examination, functional tests, etc.

These various phases of urological technique are described in textbooks covering this field and are generally familiar. This paper is intended to deal with the second part of the urological examination, and more particularly with the keeping of records. A description of the examination and the facts learned is necessary. But a complete written record is time consuming and difficult to accomplish. Here a graphic representation of findings may be used to good advantage. A stock diagram is of value; it can shorten the written record; it leads to accuracy of observation and to brevity and accuracy of recording the findings noted in the different steps of the examination.

For routine use only a few charts need be had. These may be made up as outline rubber stamps at small cost. The following have been found to be serviceable:

(*a*) Outline diagram of body surface to show superficial lesions, areas of pain, etc.

(*b*) Outline diagram of the urethra and neck of the bladder.

(*c*) Outline of the prostate and seminal vesicles.

(*d*) Chart for recording the results of cystoscopic examinations of the bladder.

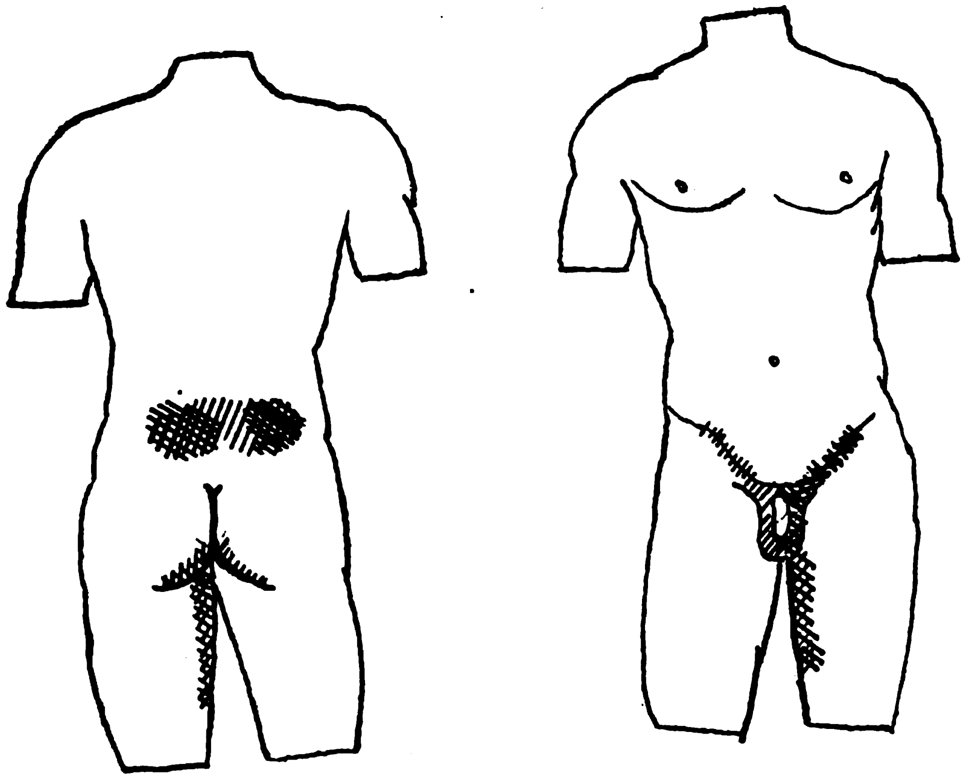
(Most of the diagrams discussed in this paper can be secured as rubber stamps made up in size 3 by 3 inches.)

BODY OUTLINE DIAGRAM

The superficial lesions found on examination, such as ulcers, buboes, scrotal masses or enlargements, masses found on abdominal palpation, and lesions of such a character may be indicated in position on the body outline diagram. The extent and position of areas of pain may be definitely outlined.

A prominent feature of genitourinary symptoms is pain. This may be primary and located in the diseased part, or it may be a referred pain and its cause discovered only after most painstaking investigation. At times an altered sensation may be the complaint.

An example of referred pain is the occasional case of prostatitis that shows pain in the back or groin or thighs, while occasionally a patient having a strictured urethra may complain of pain in the rectum. The understanding of such pains in the diffusion area, rather than in the viscera actually affected, calls for a detailed knowledge of nerve supply and regulation. The use of a diagram in this connection is illustrated by Figure 1.



FIGS. 1 and 2.—Outline diagram of body surfaces

Figures 1 and 2. Areas of referred pain anteriorly and posteriorly, case of chronic prostatitis. Heavily shaded areas indicate severe pain, lightly shaded areas less severe pain. In this case the pain disappeared after treatment of the prostate and the posterior urethra (Young).

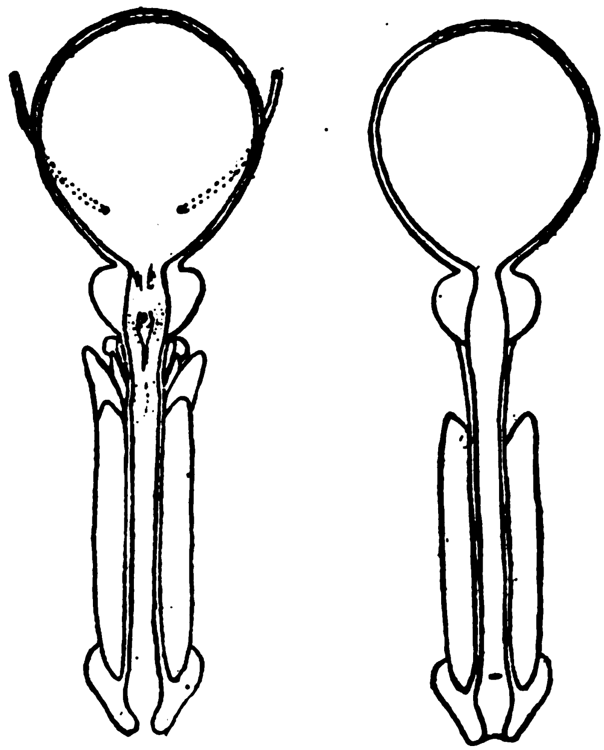
URETHRAL DIAGRAM

Lesions of the urethra are many and varied. Any part of the canal may be the seat of a pathological process and a diagnosis can not be made without instrumental examination.

Pederson is of the opinion that no case of chronic gonorrhea should be discharged without a thorough urethroscopy and especially in those who give a history of long-continued discharge and much treatment. Caulk says 90 per cent of gonorrhea infections become posterior. In regard to chronic prostatitis Barringer states it usually begins insidiously, but he notes as etiological factors, gonorrhea, masturbation, and sexual excesses.

In the diagnosis of urethral lesions, a simple outline diagram can be of much use in recording and locating the findings noted upon examination. Inasmuch as modern treatment of such conditions is carried out in steps and stages, sometimes with an interval of a week or more between treatments, the recording and charting of the diagnosis and the actual position and character of the lesion becomes of importance.

Pederson's charts, see Figures 3 and 4, show the urethra and bladder in outline in both the floor and roof aspects. The chart of the



FIGS. 3 and 4.—Outline of urethra and bladder

floor shows the verumontanum with the utricle and ejaculatory ducts indicated, Cowper's glands and ducts, prostatic duct orifices, and the outline of the bladder with some indications of the trigone and the lower end of the ureters. The chart of the roof aspect shows the outline of the urethra with the follicles of Littré, and also the bladder in outline. Pederson uses his figures in the following way. The diagnosis is made by means of the urethroscope, the Buerger or the McCarthy instrument being used, and the findings are charted on the diagrams, indicating where necessary cysts, infected follicles, and glands, granular areas, ulcers, polypi, papillomata, and so forth. The treatment is given, the record completed, and filed away. At the subsequent visit of the patient, a brief and accurate résumé is at hand.

A simpler diagram than that of Pederson is one devised by Young and used by him for years. It shows the posterior urethra in relation to the prostatic outline, the neck of the bladder, the trigone with the ureteric orifices indicated, the position of the seminal vesicles, and the outline of the bladder. (Fig. 5.)

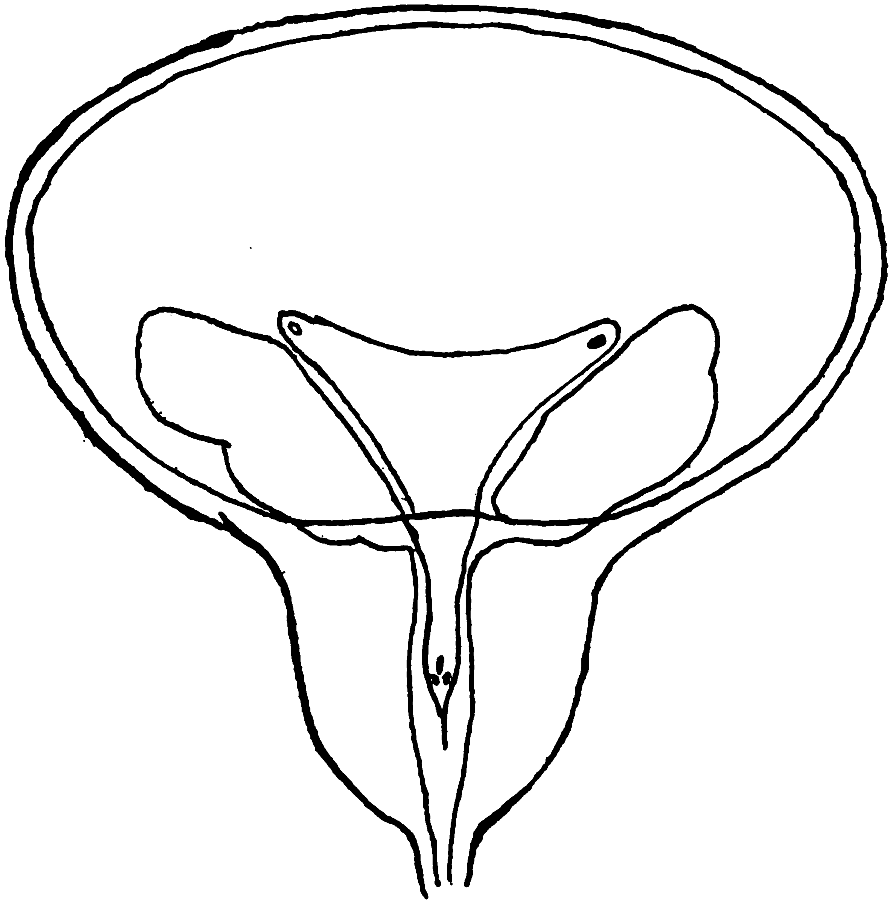


FIG. 5.—Young's outline of posterior urethra and bladder

The use of such a figure does not do away with the necessity of written description, but it can greatly simplify such writing. It is less complicated than Pederson's figures and has the advantage of being a single diagram.

PROSTATIC AND SEMINAL VESICLE CHART

In the conduct of the urological examination it becomes necessary to know the condition of the prostate and the seminal vesicles. This can only be accomplished by rectal palpation. Prostatitis and vesiculitis occupy a very important position in urological conditions, and it becomes necessary to know of their presence or absence.

Young states that in these cases the diagnosis is only made by rectal palpation and microscopic examination of the expressed secretion. One expert in genitourinary disorders may be able to recognize

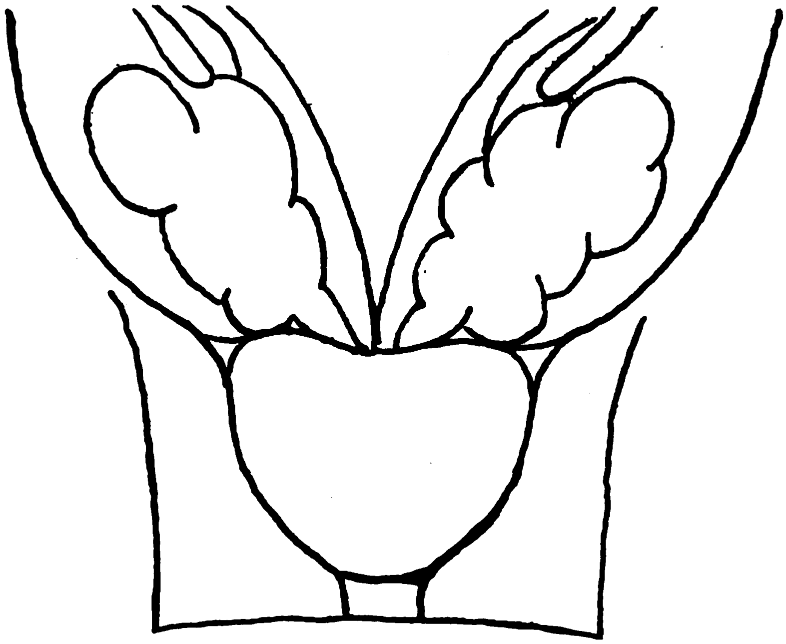


Fig. 6.—Young's prostatic and seminal vesicle chart

prostatitis from the history alone—slight discharge, pain in the back and legs, testicular pain, perineal discomfort, intermittent frequency of urination and burning, weakened sexual vigor, premature ejacula-

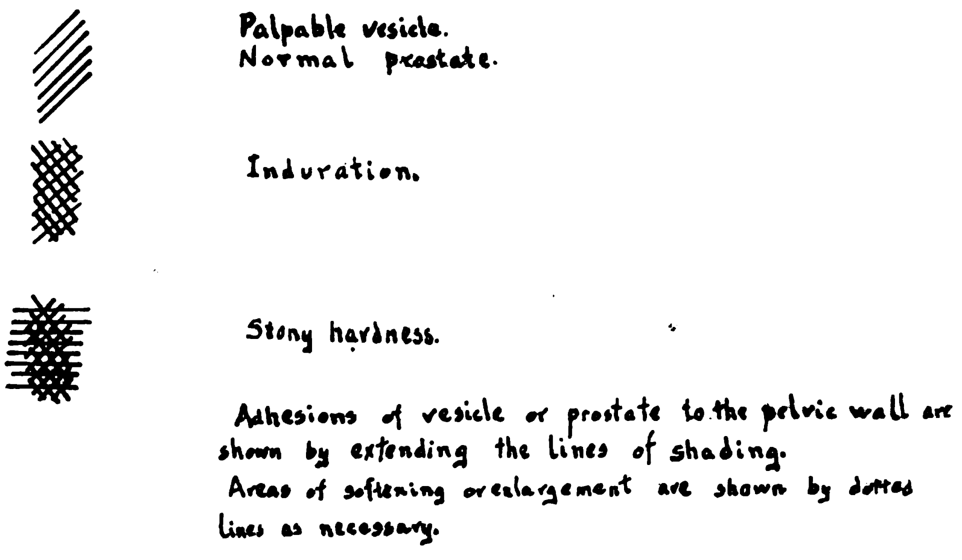


Fig. 7.—Graphic notations used

tions, nocturnal pollutions, and so forth. But upon finding rectally a condition of irregular induration, together with pus in the expressed secretion, the diagnosis is made.

Young's chart was devised as a means of promoting accuracy of observation in performing rectal palpation and as a help in recording the results of the examination. The chart is best filled out at the time of the examination. The form of the chart and the scheme of notation used in completing it are shown in Figures 6 and 7.

The use of this diagram is illustrated by the following cases:

Figure 8. Patient appeared with a history of a recent Neisser infection, self-treated. A few days previous his discharge had stopped, the left epididymis became swollen and painful, and he complained of a burning in his perineum, accompanied with difficult bowel movements. Rectal palpation showed an enlarged,

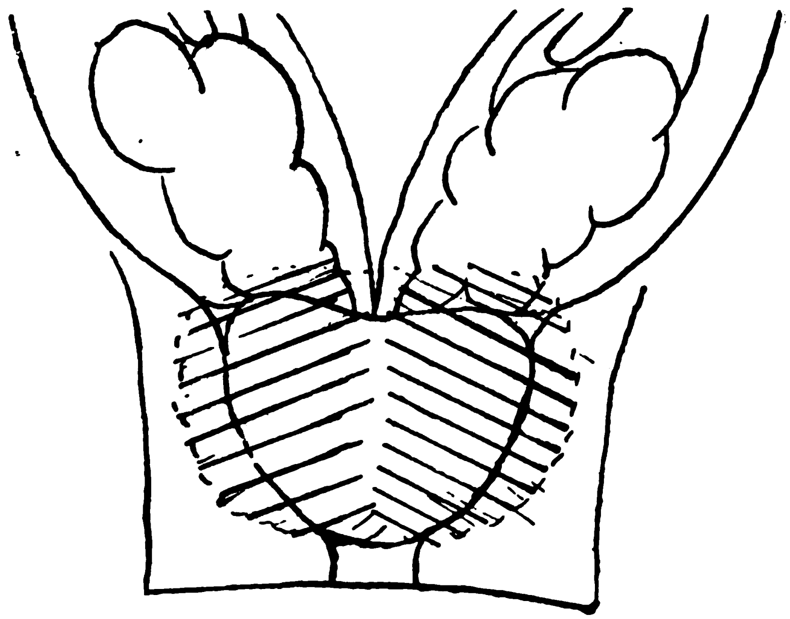


FIG. 8.—Illustrating use of graphic notation

swollen, and tender prostate. The vesicles could not be felt over the swollen gland. Acute prostatitis.

Figure 9. Patient, aged 35, appeared complaining of some perineal discomfort and shreds in his urine. On rectal examination both seminal vesicles were palpable, the right being markedly thickened and drawn over to the pelvic wall by adhesions. The prostate was of normal size. On the right, anteriorly, near the vesicle was an indurated area, and a lesser area of induration posteriorly on this side. The right sulcus was very shallow anteriorly from adhesions. The left lobe was of normal consistency except for some induration along the edge of the gland. Examination of the expressed secretion in this case showed 100 white blood cells to the high dry field. This patient showed also a large hyperemic verumontanum. Under prostatic massage and occasional topical

applications to the posterior urethra he showed some improvement in spite of irregular visits for treatment.

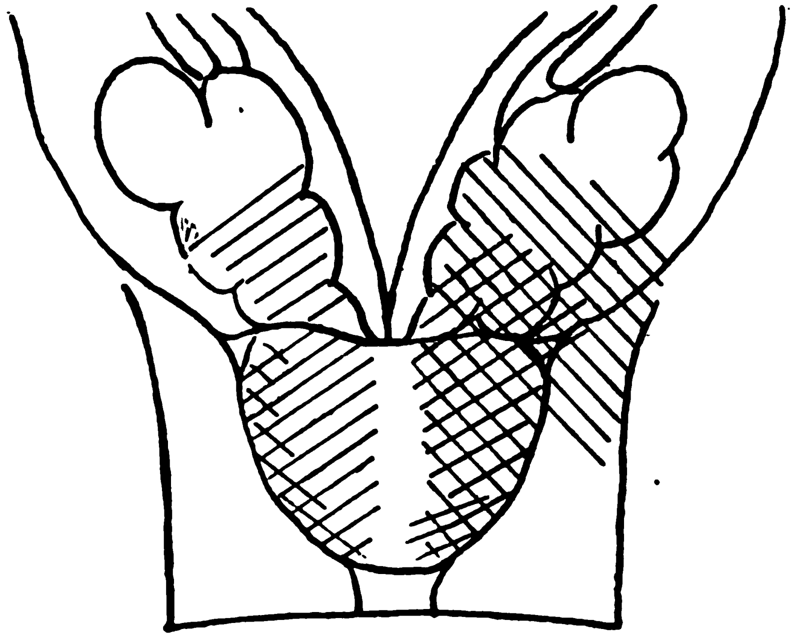


FIG. 9.—Illustrating use of graphic notation

Figure 10. Patient aged 55 appeared for frequency of urination. His urine showed heavy sugar content. Further routine examina-

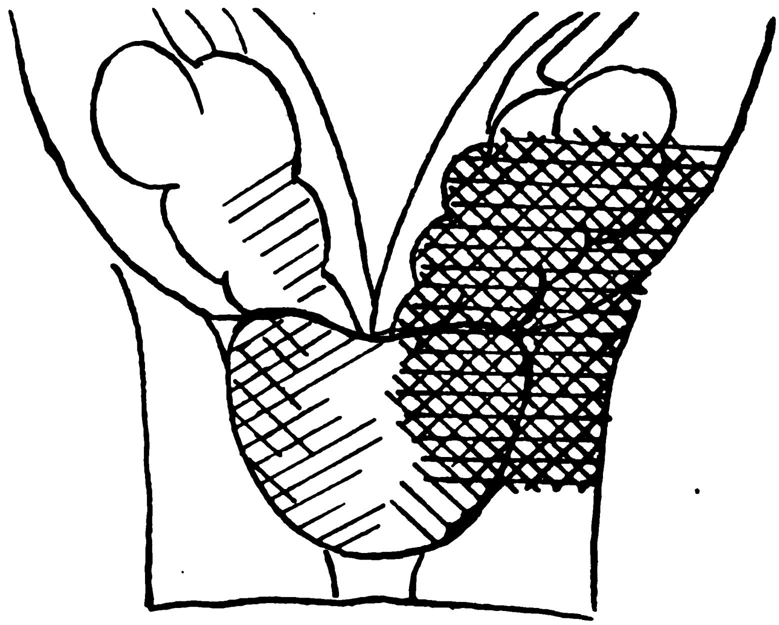


FIG. 10.—Illustrating use of graphic notation

tion by rectal palpation showed a large, hard, rounded mass involving the right seminal vesicle and anterior part of the right lobe of the prostate and extending into the pelvic wall. Carcinoma was suspected. X ray showed areas of destruction in the sacrum and lumbar vertebræ.

Young finds a still further use for his charts of the posterior urethra and the prostate. In his treatment of desperate cases of enlarged carcinoma of the prostate by means of the application of radium needles, through the cystoscope, he uses these diagrams to show the position of the needles. He has, by this, a ready picture of the field, and finds it a help in the recording of the technique of the operation.

Young also pictures the condition found by rectal palpation in cases of tuberculosis of the seminal tract. Enlargements and thickening of the seminal vesicles and of the ampulla of the vas are very clearly shown in his charts.

A case was recently reported by Davis where rectal palpation showed high up beyond the prostate at the base of the bladder, dilated and boggy ureters. He showed no chart of this finding, though a diagram would have well illustrated his point.

CYSTOSOPIC CHART

The value of the cystoscope in investigating pathological conditions within the bladder is unquestion. Textbooks describe in detail the cystoscope and the technique of using it. Yet very few methods have been proposed for recording the results of the cystoscopic examination by diagram or chart. While some record in writing of these findings is necessary, a chart here can add very greatly to the detail and the value of the record.

In 1904 Young's complete chart of the vesicle neck was outlined. Cunningham in 1905 proposed a chart for showing both the shape of the vesicle orifice and the length and distortion of the prostatic urethra from which he made wax models of the prostate and urethra. In 1913, Pederson, in publishing his urethral charts, advocated using their upper portion, the bladder outline, for cystoscopic recording. He divided the bladder into four quadrants by imaginary planes; posterior lower (uretero-trigonal), posterior upper (subperitoneal), anterior upper (urachal), and anterior lower (retropubic) quadrants. By using a systematic examination of the bladder by quadrants and the use of his figures, he endeavored to chart out his findings.

Since 1904 the chart devised by Young and its modification in 1918 by Hinman have been found to be of greater assistance in outlining conditions at the vesicle neck.

In order to picture the circumference of the prostatic orifice, Young takes as a basis eight circles arranged around a common point. In these are recorded the views obtained at intervals of 45° around the entire orifice, and called as to position, anterior, posterior, right, left, right anterior, right posterior, left anterior, and left posterior positions. The normal vesicle neck seen by the cystoscope is shown in Figure 11.

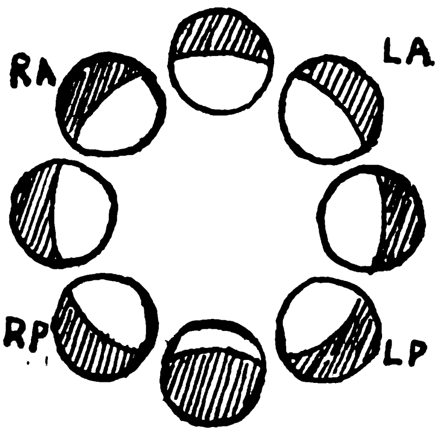


FIG. 11.—Chart of normal vesicle neck

In order to add space for further views to give all possible information as to size and contour of intravesical structures, in the complete chart a square of circles surrounding the circular prostatic set was added. In these, changes of view are recorded, brought out by changing the position of the cystoscope, also views of stones, diverticulæ, tumors, changes in ureteral orifices, etc. (See fig. 12.)

The point indicates the position of beak of the cystoscope. If a series of views is given with the beak in one direction, the lowest

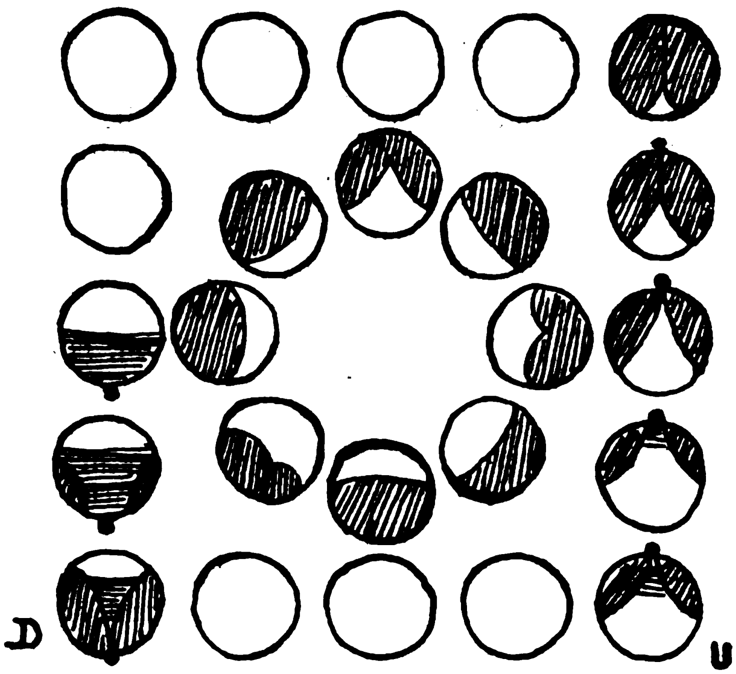


FIG. 12.—Chart for recording intravesicular structures
Young's complete chart, showing cystoscopic picture of moderate bilateral hypertrophy with small posterior fold. (Compare fig. 13)

picture corresponds to the lowest position of the handle (outer end) of the cystoscope; the farthest to the right or left, the corresponding direction of the handle.

Hinman takes as the basis of his chart the eight circles of Young representing the 45° octants of the vesicle outlet. But recognizing that the cystoscope may occupy the near, mid, or horizontal, or far position in any one of these views, giving changes in the cystoscopic field accordingly to the distance of the lens from the object, he has added a second and a third ring of circles. These rings of circles, inner, middle, and outer, give opportunity for charting the image seen at the corresponding octant with the cystoscope in the

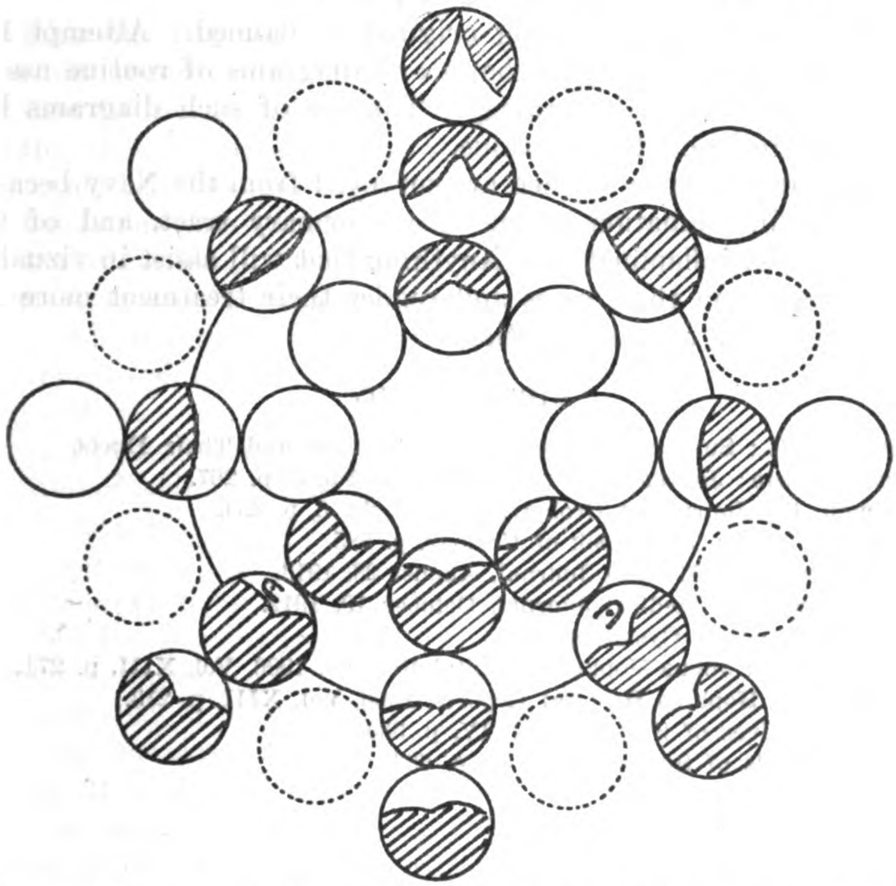


FIG. 13.—Hinman's chart showing cystoscopic picture of small median and bilateral prostatic hypertrophy

near, mid, or far position, respectively. There are thus 24 views for recording observations. If the images noted in all three views in any given position are similar, for convenience only one picture is charted and that in the middle group of circles with connecting lines.

Eight additional fields are added in dotted lines. These serve a double purpose. First, if upon repetition of an observation in a given octant and position, the cystoscope may occupy a different position relative to an intravesical lobe and an entirely different image be obtained. In the accessory circle this additional picture may be charted. It is there properly oriented by drawing a line to the circle representing the position of the cystoscope when the observation was made. Second, conditions of the bladder itself may be charted. The bladder is arbitrarily divided into three zones, lower, middle, and upper, by imaginary planes represented by the numbers 1, 2, and 3, respectively. Any object on the bladder wall, such as a diverticulum, tumor, etc., may be diagramed by drawing it in an accessory circle with its zone number and then connecting this circle to its proper octant and position by a straight line. Hinman's complete chart is shown in Figure 13.

In this short paper nothing original is claimed. Attempt has been made to collect certain charts and diagrams of routine use in well-organized clinics in urology. The use of such diagrams has been found to be of definite value.

Each year a number of men are surveyed from the Navy because of chronic inflammation of the genito-urinary tract, and of the results of such inflammation. Anything that will assist in vizualizing the lesions in these cases and render their treatment more accurate is worthy of consideration.

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CLINICAL NOTES

INTRAVENOUS TREATMENT OF GONORRHEAL EPIDIDYMITIS

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

Within the last few years the treatment of gonorrheal epididymitis has undergone a marked change. Formerly a condition that was dreaded by both patient and physician, thanks to intravenous therapy, it is now approached with some degree of equanimity.

It is not believed that the old conservative method of treatment of this condition, consisting of rest in bed, free purgation, elevation of and hot and cold applications to affected parts should be scrapped—rather it should be supplemented.

In 1915 Murata (1) reported that he had successfully treated gonorrheal epididymitis by the intravenous injection of a calcium salt solution.

In 1920 Stern and Ritter (2) noted the effect of the intravenous injection of sodium iodide in epididymitis of gonococcal origin.

Ravich (3) in 1922 reported excellent results in 160 cases in which sodium iodide was used.

Radnai (4) reported two cases which were favorably influenced by a few intravenous injections of 10 c. c. of a 10 per cent solution of calcium chlorid.

Wright (5) in a series of cases reported uniformly good results from the intravenous injection of a sterile 20 c. c. solution containing 31 grains of sodium iodide. He repeated the injections every 48 hours until subsidence of symptoms. The number of injections in his cases varied from 4 to 8. He believes sodium iodide has a favorable effect on certain cases of impotence.

The number of cases in which I have either used or observed the use of the sodium iodide treatment is admittedly few, but, considering the excellent results obtained and those referred to by the urologists quoted above, it has seemed worth while to report this small series.

The plan of management used in these cases is essentially as follows: The patient is placed in bed if possible, free catharsis instituted, affected parts elevated with jock strap or other suitable support, and in bed patients a hot water bag is placed over symphysis pubis. One gram of sodium iodide in 10 c. c. sterile water is injected intravenously. This injection is repeated every 48 hours until pain, tenderness, and elevation of temperature are absent. In no case has it been necessary to administer over four injections. The solution is best given at room temperature and slowly.

All patients stood the treatment well and were much pleased with the results obtained. No reaction was noted in any case.

In two or three cases there was a drop in temperature from 102–103 to normal within 6–8 hours. In all cases there was a decrease in intensity of pain and tenderness within 24 hours after the first injection. This diminution in pain and tenderness was progressive, being noted after each injection. Usually all pain and tenderness was entirely absent after the third injection.

The swelling of the epididymis was favorably affected in all cases. In some cases all evidence of swelling and induration was entirely absent within one week after institution of treatment.

The method of action of sodium iodide in these cases is but little understood, but that its action is most favorable can not be gainsaid. It has been claimed that any foreign protein substance, such as sterile milk, for instance, would give equally good results. However, as far as the writer has been able to ascertain, no one has supported this contention with clinical results.

As all induration about the epididymis is frequently absorbed when the sodium iodide method of treatment is followed, it is believed that its wide usage will cause a most pleasing lowering of the percentage of sterility following bilateral epididymitis. Complete results along this line will be reported in a later paper.

CONCLUSIONS

1. Sodium iodide intravenously acts most favorably in all cases of gonococcal epididymitis.
2. Treatment is easily administered and apparently free from danger.
3. There is reason to believe that widespread adoption of this treatment will result in a most gratifying reduction in cases of sterility.

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A SIMPLE PROCEDURE FOR PREPARING BACILLUS ACIDOPHILUS MILK

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

The procedure and equipment described below has proven entirely satisfactory in the writer's hands for the past year. For the past six months an average of 50 gallons of Bacillus acidophilus milk per month has been made by this method. This procedure is presented because of its simplicity.

MATERIAL AND EQUIPMENT NEEDED

Sterilizer.—Any steam pressure sterilizer.

Incubator.—If there is no incubator available one can be made by placing the required number of electric lights in a box; however, a regular incubator with thermostat is desirable.

Refrigerator.—The refrigerator can be dispensed with, in lieu of which the milk can be placed in a cold cellar.

Flame.—A force flame is absolutely necessary, i. e., Bunsen burner or blowtorch.

Bottles.—500 or 1,000 mil bottles and corks to fit. Alcohol, liquid petrolatum, or medical department bottles may be used.

Pointed instrument.—A screw driver, old scissors blade, or file may be used for puncturing the cans of evaporated milk.

Thumb forceps.—Any thumb forceps may be used for removing cotton stoppers.

Water.—Any tap or cistern water is satisfactory.

Milk.—Any brand of evaporated milk can be used. (Do not use condensed milk.)

Cultures.—Cultures of the Bacillus acidophilus can be obtained from the Navy Medical School or from dependable biological houses.

The procedure for preparing Bacillus acidophilus milk is the same as when planting any culture where contamination is to be avoided. After experimenting for a considerable time I have adopted the following technic which is a modification of Dr. N. P. Norman's method.

THE TECHNIC

1. Fill the number of 500 or 1,000 mil bottles which are to be planted half full of water.
2. Place temporary cotton stoppers in the bottles.
3. Wrap the number of corks necessary in a piece of muslin.
4. Sterilize the bottles of water and the package of corks by steam under 15 pounds' pressure for 30 minutes.
5. Remove the water and the package of corks from the sterilizer and allow to cool.
6. Evaporated milk is provided for the completion of the culture medium.
7. Each can of evaporated milk as it is used is flamed on one side of the top until it is hot enough to be sterile. When the heat expands the milk until there is a cracking noise the can is shaken and

the heat again applied. After the edge of the can has been sterilized a pointed instrument, which has been rendered sterile by flaming, is plunged through the sterile area in the top of the can. The hole made answers for an air hole. The can is turned to the opposite side and another area sterilized. The opening made on this side by the sterile pointed instrument is made large enough so that the milk will pour freely. A screw driver, old scissors blade, or file may be used for puncturing the cans.

8. The top of the bottle is flamed, and with a flamed pair of thumb forceps the temporary cotton stopper is removed and discarded. The top of the bottle is again flamed. The stopper of the culture is removed, the top of the bottle flamed, and about 1 ounce of the culture is poured directly into the bottle which has just been prepared. Fill the bottle with evaporated milk and stop with a sterile cork stopper.

9. After the bottles have been treated as described place them in an incubator at 37° C. for from 24 to 36 hours, the time depending upon the degree of sourness desired. Usually around 30 hours makes a palatable milk. A good product will show a smooth white clot and there will be no gas formation.

10. Place the milk in a refrigerator where it will keep palatable for a considerable time. We have kept it for two months.

THE CLINICAL ASPECTS OF LOBAR PNEUMONIA

By E. L. LANMAN, Lieutenant (Junior Grade), Medical Corps, United States Navy

Every medical practitioner, particularly in temperate climates, is more or less familiar with the symptoms, diagnosis, and treatment of lobar pneumonia. It is a common disease characterized by inflammation, engorgement, hepatization, and resolution in the lungs or any section of them, with a toxaemia of varying intensity and a fever usually terminating by crisis. Secondary infective processes are common. It is common during all seasons, but most cases occur in the first four months of the year. It is known to be much more prevalent in males than females (probably on account of exposure to the elements) and hence occupies an important place in the health reports of the Navy. On that account a short résumé of the main clinical aspects of the disease is not out of place.

The organism responsible for this malady, according to Hiss and Zinnser, is almost regularly the diplococcus pneumoniae, of which there are four types or groups. Pneumonia caused by the pneumococcus is far less fatal than that caused by other organisms. The pneumococcus is commonly found in the upper respiratory passages of healthy persons, and it was formerly thought that there was a continual fight by the body against these harbored organisms to prevent the disease from developing. However, it has been found by workers at the Rockefeller Institute "that over 50 per cent of the mouth organisms found in and about New York City belong to the heterogenous Type IV group, whereas over 80 per cent of lobar pneumonias are due to Types I, II, and III." The obvious inference from this reversed percentage is that lobar pneumonia is in most cases caused by organisms transmitted to the victim from an extraneous source and that autoinfection with the patient's own mouth organisms can not be regarded as a very common occurrence. It seems probable that the origin of most cases of lobar pneumonia is best explained by the acquisition of a virulent pneumococcus strain of whatever type it may be. Coincident with or following this acquisition, the history often reveals a depression of resistance due to cold, exposure, and so forth. The association of virulence of the strain with lowered resistance or heightened susceptibility of the patient is responsible for the disease, the severity of which will depend upon the relation or balance between the before-mentioned factors. It follows that epidemics may easily arise in camps or on board ship, especially where there is any element of crowding.

As Osler states, pneumonia makes one of the clearest of clinical pictures. The ordinary lobar pneumonia of adults is rarely overlooked. Errors are particularly liable to occur in the intercurrent pneumonias, in those complicating chronic affections and in the disease as met with in children, the aged, and drunkards. Tuberculo-pneumonia phthisis is frequently and pleurisy with effusions not often confounded with pneumonia. Terminal pneumonias are frequently overlooked.

Typical symptoms which mark this disease may be briefly summarized as follows: The disease as a rule sets in suddenly with a severe chill which may last for several minutes and which may come on abruptly in the midst of work or it may awaken the patient out of a sound sleep. The temperature taken at this time may show 104° to 105° F. The breathing is hurried. There is often a short expiratory grunt. The face is flushed, eyes bright, expression anxious. Patient often lies on affected side or else flat on the bed. Short frequent coughs cause patient to wince and hold his side. The pulse is full and bounding. Expectoration soon becomes blood tinged and is very tenacious. The pain, caused from involvement of the pleura, comes early and is of sharp agonizing character referred to the region of nipple or lower axilla of the affected side. It is absent in central pneumonia and is not very frequent in apex pneumonia. It may be referred to the abdomen, and operations for appendicitis have been performed on this account.

The crisis, which is the chief point of interest of this paper, comes as an abrupt drop in the fever. There is often a slight precritical rise in temperature and also a postcritical rise the day following. In from five to twelve hours, or often less, there may be a drop from around 107° F. to 96° or 97°. Following this there is usually an abundant sweat and a comfortable period of sleep. Pseudo crises occur in some cases which are a drop of 2° or 3° with a subsequent rise. The crisis may occur from the third to the twelfth day. Osler states that he has seen it as early as the third day, but it is very uncommon before that day. Fever persisting until after the twelfth day usually falls by lysis.

Physical signs to be looked for are as follows: Increased compensatory movement of sound side. Lack of expansion on affected side may be felt better than seen. Vocal fremitus is usually greatly increased if the bronchi are not filled. It is always well to have patient cough before testing this. The percussion note varies. In the stage of engorgement it is higher pitched and somewhat tympanitic. In the stages of red or gray hepatization the note is dull, and may vary from one having a certain tympanitic quality to one of absolute flatness. Osler remarks, however, that it is not the wooden flatness of effusion and that the sense of resistance to the finger is not so great. During the stage of resoluton the tympanitic quality of the note gradually returns. Auscultation shows quiet, suppressed breathing in the affected part, more or less greatly diminished voice and breath sounds with finely crepitant to large mucous râles.

But with all these symptoms and signs there are frequent cases when one feels better satisfied when an X-ray plate has confirmed the findngs. X ray in typical cases shows a more or less opaque area in some one section of the lungs often in the right base, the size depending on extent of involvement.

Although in a short three-day crisis case we do not worry much as to prognosis, the following points are well to bear in mind: Prognosis in general depends upon four factors—1. Virulence of the infecting organism. 2. The resistance of the patient. 3. The extent of the pulmonary and associated lesions. 4. The effect of the toxaemia and associated lung lesion on the cardio-vascular system.

The virulence of the strain has a direct influence on the prognosis of the disease. Experiments with virulent strains show a bacteremia present in all fatal cases (16 per cent). With nonvirulent strains the same typical lesions of lobar pneumonia were found, but there was no mortality and no bacteremia. Dochez is quoted (Monographic Medicine Vol. IV) as saying that there was pneumococcemia in 50 per cent of 37 cases studied bacteriologically, and that the course is more severe in these cases, and that 77 per cent of these died; while

79 per cent of patients with negative blood cultures recovered. The conclusion is justified that the anatomic changes in pneumonia are not the immediate cause of death, and they do not present the essential features of the disease; on the contrary, they are manifestations of the body's fight against the disease. Improvement and favorable termination after crisis occur without material change in the structures involved in pneumonia. The heart is relieved of its burden in spite of the practically unchanged area of consolidation through which it must, for a few days at least, continue to force the blood. This leads to the supposition that there is at the time of crisis a change in character of the toxins, a neutralization of the intoxication rather than a destruction of bacteria existing in the body. The prognosis depends largely upon the baneful influences which the toxins exert upon the vasomotor centers in the cord. Added to this is the cardiac asthenia, degenerative myocardium, and mechanical obstruction in the lungs.

Blood-pressure readings are valuable; systolic blood pressure below normal is unfavorable and any great fall is ominous. Gibson's rule is "when the arterial pressure in millimeters of mercury does not fall below the pulse rate the fact may be taken as an excellent augury, while the converse is equally true. An abnormally high blood pressure with a slow, tense, thick pulse early is always of serious significance."

The resistance offered by the patient varies with age. During the first year mortality is high. From the second year to puberty it is low. From 35 to 40 it is high and from 60 to 70 about three-quarters of all pneumonics die. The obese, the diabetic, the negro, and the alcoholic offer an especially grave prognosis.

The extent of the pulmonary and associated lesions in the majority of cases influence the prognosis greatly, e. g. double pneumonia. However, it is never, in any case, safe to offer a prognosis from the extent of the consolidation alone as there are virulent infections which offer the gravest outlook in which only a small part of one lung is involved. Associated lesions which influence our judgment are thrombosis, endocarditis, pericarditis, and nephritis.

Temperature is significant—sudden fall of temperature, but continuously rapid and unchanged weak pulse without true crisis is not interpreted as favorable. A febrile pneumonia in the aged is always serious. Slow lysis is more or less unfavorable and due probably to some complication.

As regards the respiratory system: Severe pain after the first 24 hours is evidence of a severe pneumonia. Respirations of 40–50 per minute with corresponding increase of pulse and fall of blood pressure offer a doubtful forecast. Respirations of 50–70 with other corresponding symptoms are found in malignant cases offering slight hope. Rapid respirations early, and large moist and crepitant râles, with profuse, watery, pinkish or prune juice sputum are all evidences of pulmonary edema, and death is rather prompt.

In regard to the circulation Elsner says that "the fight for life is successful or fails in accordance with our ability to favorably influence the circulation during the active stages of the disease, when with weakness of the right heart, the liver and spleen are enlarged and there is marked meteorism with albumiuria, casts and reduced quantity of urine, the outlook is bad." Cyanosis with air hunger, hurried respirations, rapid, feeble pulse, and lowering systolic blood pressure are among the most dreaded of all symptoms. Previous disease of the heart, particularly mitral stenosis and aortic insufficiency, always handicap the pneumonic; but the valvular lesions, particularly mitral insufficiency, are more favorable than are the degenerative processes of the aorta and myocardium.

The leucocyte count is valuable. A count of 18,000 to 25,000, other symptoms being moderate, is favorable. The cure of pneumonia depends upon the destruction of the bacteria in the lungs and blood, and the nullification of their toxins so that phagocytosis is demanded early. The average mortality in cases without a leucocytosis is over 50 per cent. As far as clinicians have been able to observe the leucocyte count bears no relation to the extent of consolidation. High counts during the first day or two with rapid decided fall following is always grave.

Treatment of pneumonia will vary with the practitioner but in every case it seems that attention to the condition of the heart is vital and digitalization or similar measure should be begun early, if necessary. Small doses of digatalis will slow the pulse, strengthen and support the heart and render a lethal result much less liable. Good nursing care is important with good hygienic surroundings, fresh air, etc. There is no cure for pneumonia as yet. Attention to diet and the bowels, with liberal use of hydrotherapy, both external and internal, particularly in delirium cases are essential. Symptomatic treatment is to be used; anything for the comfort of the patient. Rest and plenty of sleep are imperative. As the crisis approaches, constant watch is necessary for signs of collapse. Atropine is of assistance in profuse sweating with signs of weakening in the patient. Timely stimulation and absolute rest saves many lives.

Bleeding many years ago was used extensively. In well selected cases bleeding can be of benefit; for example in robust individuals in whom the disease sets in with great intensity and high fever. Bleeding at the very onset Osler believed good practice. Also dilatation of the right heart late in the course of the disease is a common indication. However, I have always considered that nearly every patient with pneumonia needs all his blood elements to combat the disease.

Vaccines and serums have been used in the treatment of pneumonia and the vaccines for. vaccination purposes, prophylaxis. (F. T. Lord in "Vaccine and Serum Therapy in pneumonia.") However, vaccines only stimulate an active immunity and " in the presence of the existing infection it can not be assumed that the production of an active immunity will be more rapidly induced by the injection of a few million dead organisms under the skin than by the natural infection itself, and there is the danger that the patient's power of resistance may be taxed beyond its power to respond." In regard to serums it has been found that only serum from horses immunized to Group I pneumonia is effective in treatment. Sufficiently potent serum can not be obtained in the other groups. It seems, however, that injection of the serum does not hasten the crisis, but it does, in the case of Group I, cause improvement in the case and the earlier it is given the more striking are the results. In order to be effective at all, however, the serum must be given in the first three days of illness.

John, in Deutche Med. Wochenschr, 1923, No. 12, says that the disease may be cut short if on the first or second day injections of 25 per cent solution of quinin bihydrochlorid are given; 2 c. c. daily. If given later the duration is said to be not shortened but the general condition of the patient is improved to a remarkable degree and the mortality rate is cut down several per cent. The first one or two doses is given intravenously and the next two or three intramuscularly.

Report of case with three-day crisis.—H. E. C., private, marine, 21, was admitted on stretcher to Chelsea Naval Hospital, January 12, 1924, with a diagnosis of influenza. There was no previous history of pneumonia or influenza. Patient had been generally healthy. No sick days since enlistment in Marine Corps, November 20, 1922.

While doing guard duty on afternoon of January 11, 1924, patient was seized with hard chill which he says kept up about two hours. During the night this was followed by another severe chill and the following morning patient reported at sick bay with temperature of 103° F. and complaining of muscular pains and aching in his bones. Examination showed congested eyes, flushed face, harsh and rapid respirations, and pulse of 102, but otherwise negative. Patient was transferred immediately to hospital where temperature, pulse, and respiration were 104° F., 120, 28. Signs of severe prostration and an annoying short cough where present.

By 5.30 p. m. patient was delirious, moaning and vomiting. Physical examination showed dullness, increased vocal and tactile fremitus and râles, with diminished breath sounds over the right upper lobe. X-ray plate taken the next morning, January 13, 1924, showed an opaque area just below the right clavicle extending from the midline to periphery and circular in outline. Sputum at this time was a little bloody. Blood count was 27,500, 90 per cent were polymorphonuclears. Urine showed cylindroids and hyalin casts. Wassermann and sputum for tubercle bacilli done as routine, were negative. Diagnosis was changed to pneumonia, lobar.

At 8 a. m. January 13, temperature was 104.6° F., pulse 128, respiration 34. By 4 p. m. the temperature was 102° and at 8 it was 96.4°, drop of 8.2° in 12 hours, most of which occurred in last 4 hours. Patient perspired freely meanwhile and was still vomiting. Pulse dropped to 72 and respiration to 28.

On the following day at 8 a. m. the temperature showed a marked post critical rise to 103°. At noon it was 103.3° following which it dropped to 101.6° at 4 p. m., 99.2° at 8 p. m. and at 8 a. m. next day it was 96.4° again. Patient perspired profusely and vomiting persisted. Patient was uncomfortable and restless and complained of pain in his chest. The pulse showed a similar drop over this period to 58 with respirations at 24. Respirations were down to 18 by 8 p. m. of the same day, January 15, 1924.

Convalescence from this point was uninterrupted. Temperature was subnormal for four days, there were subnormal remissions until seventeenth day, pulse remained around 60 and below until thirteenth day when it rose to 72 and remained flat.

The pneumococci in this case were of Group IV. Had serum of Type IV, or nonspecific serum, or quinin bihydrochlorid, etc., been given on the first or second day, the succeeding events would have been very deceptive.

A TYPICAL CASE OF LUNG ABSCESS

By F. G. Merrill, Lieutenant (Junior Grade), Medical Corps, United States Navy

When the patient was first seen he was bleeding from the mouth, appeared to be quite weak, exhausted, and looked thoroughly sick.

The family history was essentially negative except for the fact that his father died at the age of 33 of an unknown cause, though the patient is sure he did not have tuberculosis. His mother and two sisters are living and well. He is unmarried. His habits are regular and he does not smoke, drink, or use drugs.

Past history.—He does not recall ever having had any of the usual diseases of childhood, although he had a tonsillectomy and adenoidectomy performed at an early age. In 1918 he had submucous resection at the Rhode Island hospital. From 1916 to 1920 he was a professional prize fighter and as such took excellent care of his physical condition. In January of 1920 he entered the Rhode Island Hospital with a diagnosis of typhoid pneumonia and was discharged from there on March 16 of the same year. In September he was seen by his family physician, who thought he had tuberculosis. On September 5, 1920 he entered the Wallum Lake Sanatorium. There he was told he was suffering from a moderately advanced pulmonary tuberculous process. On November 29 of the same year he left this institution of his own accord, and was at the time "in the pink of condition." On April 6, 1921 he enlisted in the United States Navy. After being in the Navy for a short time he was persuaded by his shipmates to box, and in 16 weeks he participated in 12 bouts. His wind was good, he was "hard as nails," and he suffered no ill effects. In the winter of 1922 he had a slight attack of influenza. In 1922 he fought twice with no bad results. In January, 1923, his sputum was streaked with blood all one day and that evening while changing his clothes he fainted. He was seen by his medical officer, who made a diagnosis of tuberculosis. He was then transferred to the naval hospital at Norfolk, from which he was discharged from the service on July 6, 1923 with a diagnosis of tuberculosis, pulmonary, chronic. From that time until five days before admission to the hospital he felt fine, except for intervals of about 10 months apart when his sputum has been streaked with blood. During these attacks, which usually lasted about 24 hours, he felt poorly.

His appetite has been good, and he has lost no weight. He has not felt weak and has had no night sweats. There is no history of any shortness of breath, cough, or pain in his chest. He has had a morning and afternoon temperature taken and there has been no afternoon rise. His pulse has not been accelerated, and although he has had his sputum examined at varying intervals, at no time has it ever shown tubercle bacilli.

Present history.—About five days previous to admission to the hospital he began to feel mean and to cough up sputum heavily streaked with blood, and for the two days just previous to entry he had a frank hemorrhage from his mouth. Associated with this hemorrhage were sharp pains in his right chest, increased on deep inspiration and by cough.

Physical examination showed a young man, bleeding from the mouth and appearing quite weak and exhausted. Well developed and nourished, height 5 feet 6½ inches, weight 140 pounds. Nothing of importance was noted except in his chest.

Chest expansion was very slightly greater on the left side than on the right. Apices were clear and the entire left lung apparently normal. On the right side there was dullness over the fourth rib in front with diminished and almost absent voice and breath sounds. Just below the angle of the scapula behind was an area of intense bronchial breathing, suggesting amphoric breathing and a cavity with high-pitched râles.

Urinalysis was negative.

Wassermann negative.

Blood: 4,500,000 R. B. C., 10,300 W. B. C., 70 per cent hemoglobin, 73 per cent polymorphonuclears, 27 per cent lymphocytes.

Sputum negative for tubercle bacilli, 22 examinations made.

X ray: There was an irregular opaque area in the middle third of the right lung with partial pneumothorax to the outside of this area. This pneumothorax undoubtedly was nature's method of combating the cavity formation.

For 12 days following admission to the hospital he bled steadily in spite of treatment. At the end of this time frank hemorrhage stopped, though his sputum remained streaked for 16 more days. On the fourteenth day he was seized with a coughing spell, expectorated about four ounces of material which when placed in a graduate separated into three layers, indicating the presence of an abscess cavity. From this time on for the next four weeks this cavity was emptied every few days. During this time the temperature was irregular, varying between 99 and 103; the main became extremely anæmic and lost about 12 pounds. Beginning with the sixth week following admission the patient showed a marked improvement. Since that time he has had no bleeding, a very slight cough with little expectoration, and has gained rapidly in both weight and strength. Now, after 10 weeks, he is ready to be discharged from the hospital and states that he is feeling fine.

This case is deemed by the writer to be of sufficient importance to report for the reason that it shows the fallacy of making a definite diagnosis of tuberculosis with insufficient evidence. In this instance, the man is an Italian, the family history is negative, the past history is negative, and there is no story of any exposure to infection. He has had no feeling of lassitude, no loss of appetite or weight, no night sweats and no afternoon rise in temperature or increased pulse rate, no chronic cough, and no pain in his chest or shortness of breath. Furthermore, in spite of his history of hemorrhage, blood counts show no evidence of secondary anæmia.

Résumé of clinical findings.—X-ray examination disclosed a definite irregular opaque area in the middle third of the right lung, and a partial pneumothorax to the outside of this area. This would, of course, be consistent with a tuberculous cavity, but both apices and the entire left lung were clear. Sputum examinations made on 22 different days have all been negative for tubercle bacilli; and the man states that a positive sputum has never been obtained although he has had sputum examinations made at varying intervals through out the past year.

The only positive findings have been a history of recurrent pulmonary hemorrhages, in most cases this not being a real hemorrhage but only a streaked sputum.

Physical examination showed evidence of a bronchiectatic process with a probable large abscess cavity in the middle third of the right lung, with both apices and the entire left lung clear and resonant with no abnormal voice or breath sounds and no adventitious sounds.

In the face of a negative history, in the absence of more definite signs and symptoms, both subjective and objective, of tuberculosis; with a picture of the present condition which is so evidently that of a bronchiectatic cavity in the middle of the right lung, and a history of its following upon a typhoid pneumonia, we feel confident in making a diagnosis of lung abscess not tuberculous, but rather secondary to a pneumonic process.

CHRONIC DACRYOCYSTITIS

WITH CASE REPORT

By P. C. Supan, Lieutenant (Junior Grade), Medical Corps, United States Navy

Chronic dacryocystitis is a chronic catarrhal inflammation of the mucous membrane of the lachrymal sac.

The etiology of this process is eminently an obstruction of the nasal duct either from swelling or organic stricture, the result of an infection of the nasal cavity. This obstruction which eventually becomes a stricture of the tear passage is usually found at the junction of the tear sac and the beginning of the nasal duct.

It is the formation of this stricture that prevents the free flow of the tears into the nose with the result that the lachrymal sac becomes filled up and distended. The lachrymal fluid which thus accumulates and stagnates in the distended sac is kept at body temperature and offers a ready media for the development of any organisms that gain entrance through the tear passages. This forms the basis of an irritative reaction upon the lining membrane of the sac, which results in a purulent discharge that is virulent in that it contains pus cocci in great numbers. It is the presence of this virulent discharge that continually exposes the patient to the danger of infection and ulceration of the cornea, which readily occurs in chronic dacryocystitis. In the case report appended the patient gives a definite history of corneal ulceration of the right eye dating a few years after the onset of the original chronic process.

The course of chronic dacryocystitis if not properly treated extends over a period of years.

It has been only in recent years that extirpation of the lachrymal sac has been resorted to for the correction of this troublesome and dangerous condition. The average results obtained by probing, dilatation, and irrigation of the diseased sac and strictured passage did not warrant the continuation of this very disagreeable procedure.

Case report.—Mr. F., a white man, U. S. V. B. patient, age 27, mill hand from Vermont, was admitted to the hospital on April 28, 1924. Chief complaint: Epiphora from right eye, pus discharge in conjunctival sac. Slight swelling and tenderness over region of lachrymal sac right side.

Present illness.—Dates back to the fall of 1918 when patient was stationed at Camp Devens. At that time he states that his tear passages had been probed and dilated and the lachrymal sac irrigated. He obtained relief for a few months and was discharged from service in February, 1919. Patient insists that his condition has gradually become worse since the first onset.

Past history.—Received treatment over a period of two weeks shortly after discharge in spring of 1919. Gives a history of an attack of acute dacryocystitis and ulceration of cornea of right eye in 1920. Under care of family physician for about four weeks. Treated over a period of two months by his family physician in the summer of 1923. Relief obtained was only temporary.

Examination of eyes.—Lid margins of both eyelids thickened and chronically inflamed. Chronic conjunctivitis of both eyes. Signs of chronic inflammation more prominent in the right eye. Puncta of right eyelids stand out prominently. Slight swelling over region of lachrymal sac with no outward signs of an acute inflammation. Tenderness on palpation over lachrymal sac. With pressure over lachrymal sac about 3 c. c. of yellow purulent discharge was forced into the conjunctival sac. Examination of the nose revealed no signs of pus being discharged through the normal passage. Definite stenosis of nasal duct.

OPERATION FOR EXTIRPATION OF THE SAC

By Lieut. D. A. Heffernan, (chief of service)

Patient was given a general anaesthetic, ether being used. The field of operation was cleansed and prepared with aseptic precautions. A curved incision was made through the skin 3 mm. to the nasal side of the inner canthus of the right eye, beginning a little above the internal papebral ligament dividing the latter and running 2 cm. downward and somewhat outward.

The edges of the wound were separated with a small Muller's speculum which both exposed the field of operation and checked the profuse bleeding.

Beginning at the temporal side and using a blunt dissecting instrument the tear sac was exposed and appeared about the size of a large peanut kernel, i. e., 2 cm. long and 1 cm. in diameter.

After exposure of the sac careful dissection was made, as complete removal of the lachrymal sac is essential; if the smallest piece of mucous membrane is left behind suppuration will recur.

Successful and complete isolation of the sac was obtained and the latter was then divided with curved scissors close to the point where it passes into the nasal duct, that is, at the upper end of the bony canal, and removed in toto.

The bony fossa of the lachrymal sac was then thoroughly curetted to be certain that all tissue was removed. Drainage was instituted by breaking down a small portion of the thin lachrymal bone with a small curette and probe so as to insure drainage through the nose.

The wound was closed with three interrupted sutures of black silk suture material. Sterile vaseline was applied over the region of the closed incision and pads of gauze were placed over the corner of the eye in such a way as to insure firm pressure over the region of the lachrymal fossa.

May 1, 1924: Patient up and about ward. Dressing changed because of slight bleeding from the incision. Wound healing very nicely. Sterile-vaseline dressing reapplied.

May 5, 1924: Dressing removed. No further dressing needed. Wound healing by first intention.

May 7, 1924: Patient discharged from hospital.

Conclusion: This case was of particular interest in that the patient's history and physical findings were those of a typical textbook description of chronic dacryocystitis.

Owing to the failure of the conservative methods of treatment, i. e., probing, dilatation, and irrigation of the diseased sac, permanently to clear up the infection and restore the potency of the nasal duct extirpation was deemed advisable. With the removal of the diseased sac suppuration was removed and the eye rid of the constant dangers of infection, although tear overflow may not be relieved.

NOTES AND COMMENTS

ARSENIC AND ITS HISTORICAL ASSOCIATIONS

Arsenic, especially the organic salts, plays such an important part in modern therapeutics that a glance at its history is not without interest. The earliest record of arsenic, says a writer in the British Medical Journal of June 28, 1924, dates back to a period of about 400 B. C., although it is probable that it was known in India, China, and the Far East long before it came to the knowledge of the Greeks. Arsenic in the form of the native sulphides (orpiment, As_2S_3, and realgar, As_2S_2) was found both in Greece and Hungary. Hippocrates mentions the use of realgar as an external remedy for ulcers and other complaints, and orpiment is alluded to by Dioscorides as a remedial agent.

Orpiment, perhaps because of its bright golden color, seems to have exercised a certain fascination on the early alchemists, who looked on it as the key to the philosopher's stone. It attracted the attention of the Arab chemists at an early period, and is mentioned first by Rhases and afterwards by Jabir-Ibn-Hayyan (Geber). To him is attributed the discovery of arsenious acid, which he obtained by roasting the trisulphide, and he called it "white arsenic," the name it still bears. He apparently knew also of metallic arsenic, and that under certain conditions white arsenic would deposit a silvery mirror on bright copper. The discovery of its poisonous action was probably made soon afterwards. The danger arising from its use was well known in the fourteenth century, as is evident from a statute passed at Siena in 1365, which enacted that red arsenic sulphide and corrosive sublimate could only be sold by the principal or the director of a pharmacy, nor were these substances to be handed to any slave, whether freed or otherwise, nor to any servant, nor to children, nor to any youth under 20 years of age, but only to adults who were well known.

ARSENIC AS A POISON

The first direct evidence of its use for criminal purposes is in an official record of the trial of a minstrel named Wondreton in Paris in 1384. It contains a copy of the instructions alleged to have been given to him by Charles the Bad, King of Navarre, who employed him to poison Charles VI of France, his brother, two uncles, and others of the nobility at the court.

Wondreton was instructed to buy arsenic sublimate from certain apothecaries in the cities through which he would pass on his journey. He was to get into the kitchens of the residences of the persons against whose lives he was plotting, and was to sprinkle some of the powdered arsenic in the soup and other food served to the masters. According to the chronicle, "Wondreton was arrested before he killed anyone."

The word "arsenic" was first used in the English language in the fourteenth century. In a manuscript *De proprietatibus rerum*, 1389, Bartholomew Glanville alludes to "Arsenicum hyghte Auripigmentum for the colour of golde and is gardereyd in Pontus." It is mentioned by Chaucer in the *Canterbury Tales:*

> It nedeth not to reherce hem all
> Waters rubyfyeng, and boles gall
> Arsneke, sal armonyake, and brimstone
> And herbes coulde I tell eke many one.

In 1567 Maplet alludes to "The stone Arsenick . . . which also they call the golden earth," and in an edition of the *Salerne Regimenta* (1634) mention is made of "Auripigmentum, which some Arsenicke call."

That the poisonous properties of arsenic had become well known in the sixteenth century may be gathered from the name "ratsbane," by which it was popularly known. Davenant, in his *Wits* (1672), makes one of the characters say, "Arsenick my girl to strengthen thy aunts broth," and in 1675, in *Notes from Ringcross*, mention is made of "putting white arsenick into her broth."

As a lethal agent arsenic has probably figured more largely in history than any other poison; many deaths may, however, have been attributed to it by the imagination of the chronicler. Thus Catherine de' Medici is said to have attempted to poison Henry of Navarre by moistening the leaves of a book he was intended to read with a solution of arsenious acid. But the book, so the story goes, fell into the hands of her own son, Charles IX, who, moistening the pages with his fingers in turning over the leaves, became affected. He ordered the volume to be thrown on the fire. Whilst it was burning Ambroise Paré, then court surgeon, entered the room and exclaimed; "Who has been burning arsenic here?" "I have," replied the king.

The epidemic of poisoning that ran through France from the end of the seventeenth to the early part of the eighteenth century increased to such an extent that the "Chambre Ardente" was appointed to take drastic steps to stop it. Then and since arsenic has been a favorite instrument of the poisoner.

MEDICINAL USES

Orpiment, known in the seventeenth century as yellow sulphuret of arsenic or auripigmentum, became official in 16 of the pharmacopœias of Europe; it formed the principal ingredient in Lanfranc's collyrium, a preparation which for nearly two centuries enjoyed great popularity as an application to ulcers. Another preparation used for the external treatment of ulcers and cancer was Frère Côme's paste; it was composed of red sulphuret of mercury, arsenious acid, the ashes of a burnt shoe sole, and dragon's blood. Orpiment was known also as Rousselot's arsenical powder and formed the principal ingredient of Hellmund's ointment or cancer cure, the formula for which was purchased by the Prussian Government for a large sum so that it might be made known to the public.

The bibliography of arsenic and its preparations as therapeutic agents is considerable, and Waring records no fewer than 112 books dealing with this subject alone. One of the first was Castelli's account of arsenic, published in Rome in 1619. In 1686 Donzellus, in his *Formulæ*, mentions that arsenic was employed as an amulet against plague, and a small piece placed in a little bag was carried by many to ward off infection during the great plague of London.

Not apparently until the early eighteenth century was it found that boiling arsenious acid with an alkali rendered it more soluble in water, and this marked an epoch in the internal administration of the drug. Numerous formulæ began to be published at this time, the best known of these being Jacob's, Brera's, and Hein's solutions. These were superseded by the solution originated by Dr. Thomas Fowler, which came into general use and was officially included in the London, Dublin, and Edinburgh pharmacopœias. Fowler added the compound spirit of lavender to the formula, not for flavoring, as is generally supposed, but merely on account of its color, so as to give it "a medicinal appearance, lest patients intrusted to drop it for themselves might be tempted to use it with too much freedom."

CHEMICAL INVESTIGATION

The first to make an accurate investigation of the chemical nature of arsenic was George Brandt, a Swedish chemist, who recorded his observations in 1733. In 1775 Carl Wilhelm Scheele, who began life as an apothecary at Gothenburg, made arsenic acid (As_2O_5) and later on impure arseniuretted hydrogen (AsH_3). His name is still associated with the hydrogen copper arsenite known as Scheele's green. After his time Soubeiran and Pfaff made pure arseniuretted hydrogen; even then its toxic effects were not fully realized, and Gehlen, professor of chemistry at Munich, died in 1815 from accidentally inhaling a very small quantity in a pure state.

In the middle of the eighteenth century, probably on account of the increased frequency of its use for criminal purposes, the attention of chemists was directed to the discovery of some trustworthy test for its recognition. About 1750, Black, who was professor of chemistry at Edinburgh, in his evidence at the trial of Mary Blandy, said that he had recognized arsenic in the body of her victim by reducing it to the metallic state on heating with black flux in a tube, also by depositions of the brown lustrous metallic arsenic on a bright copper plate under the usual conditions. He mentioned the garlic-like odor and said he had been able to detect as small an amount as 1 grain of arsenious acid. Orfila (1787–1853), the great French chemist, also did much toward the discovery of efficient tests for arsenic in the body. In his time three chief tests by liquid reagents were well known—namely, the yellow, with sulphuretted hydrogen, soluble in ammonia; Hume's test, yellow, with ammoniated nitrate of silver; and Green's, with ammoniated sulphate of copper. Robert Christison, who was a pupil of Orfila, proved that no substance but arsenic gave these three reactions. Christison became professor of medical jurisprudence at Edinburgh.

It had long been known that metallic arsenic was deposited on a bright copper plate when a solution of arsenious acid was heated in the presence of pure hydrochloric acid, but this knowledge was made practicable as a test for arsenic by Reinsch in 1842. His investigations were followed by those of Marsh, who described his well known test in the *Transactions of the Society of Arts* in 1845. Marsh's test conclusively proves or disproves the presence of arsenious acid.

ORGANIC ARSENIC REMEDIES

Arsenic appears to have had a special attraction for the great Swedish chemists, and early in the nineteenth century Berzelius began an investigation of its compounds. In 1842 Bunsen obtained an organic radical containing arsenic and methyl (arsendimethyl, $As_2(CH_3)_4$), which, owing to the fetid smell, was known as cacodyl. The organic salts were found to be much less toxic, more rapidly absorbed, and less likely to produce the irritant effects of the drug. Many years later, largely through the work of Ehrlich, the organic arsenic compounds came again into prominence as therapeutic agents. They form, as is well known, the basis of such potent drugs as salvarsan, atoxyl, and their congeners. David Livingstone was probably the first to recommend arsenic for tstse-fly disease, for which atoxyl is being prescribed to-day, and though it is more than 80 years since Donovan published the formula for his solution of arsenic and mercury, which was then largely employed in the treatment of syphilis, the same drugs, though in a different form, are used to-day.

BOOK NOTICES

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

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

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

THE SCIENCE AND ART OF ANESTHESIA, by *Col. William Webster, D. S. O., M. D., C. M., professor of anesthesiology, University of Manitoba Medical School; chief anesthetist, Winnipeg General Hospital; formerly professor of practical pharmacology, University of Manitoba Medical School; demonstrator of practical physiology and chemical physiology, University of Manitoba; pathologist, Winnipeg General Hospital, Winnipeg, Canada.* The C. V. Mosby Co., St. Louis, 1924.

This book endeavors to place before the medical student and the physician in general practice the subject of anesthesia in concise form. The opening chapters on history and physiology of anesthesia are followed by discussion of ether, chloroform, nitrous oxid, ethylene and ethyl chloride. Each one is covered in a brief, clear, and readable style. A very short chapter is devoted to local and spinal anesthesia, and the following ones treat of anesthetic mixtures and sequences: Selection of the anesthetic; nature of the operation; heating of anesthetic gases; preliminary medication; preoperative and postoperative treatment; effect of temperature and moisture on postoperative cases; surgical shock; postoperative acidosis; the patient's viewpoint; the art of anesthesia; statistics; anesthesia records and the medico legal aspect of anesthesia.

Most surgeons, being human, are prone to bestow a reproachful look on the anesthetist when the patient does not relax completely or is difficult to anesthetise. Webster takes advantage of his opportunity to get back at the surgeons by telling how their rough and inconsiderate handling of tissues increases the difficulties of both patient and anesthetist. There are few surgeons who could not profit by reading these passages. The British influence is shown in the lengthy references to intratracheal insufflation. It is to be regretted that there are so few anesthetists in the United States skilled in this simple and very useful method.

Doctor Webster has done very well in achieving the object of his book, and it will find a wide field of usefulness.

THE HUMAN TESTIS. ITS GROSS ANATOMY, HISTOLOGY, PHYSIOLOGY, PATHOLOGY, WITH PARTICULAR REFERENCE TO ITS ENDOCRINOLOGY, ABERRATIONS OF FUNCTION AND CORRELATION TO OTHER ENDOCRINES, AS WELL AS THE TREATMENT OF DISEASES OF THE TESTICLE AND STUDIES IN TESTICULAR TRANSPLANTATION AND THE EFFECTS OF THE TESTICULAR SECRETIONS ON THE ORGANISM, by *Max Thorek, M. D., surgeon in chief, American Hospital; consulting surgeon, Cook County Hospital, Chicago, Ill.; president International Congress of Comparative Pathology, Rome Italy, 1924.* J. B. Lippincott Co. Philadelphia, 1924.

This valuable monograph represents an effort to gather, in one compact work, the present-day knowledge of the anatomy, functions, pathology, and endocrinology of the human testis. The chapters on anatomy, physiology, functions, and dystrophies are very thorough and well illustrated. Experimental testicular transplantation and Steinach's vasoligation experiments are fully described, both the methods and the results in animals and man. This section covers about 200 pages and is a most interesting description of what has been done and the results secured. Other chapters treat of testicular prosthesis, neuroses, and injuries of the testicle, diseases of the scrotum, varicocele, hydrocele, vasotomy, cryptorchidism, and castration.

In these days, when the human testicle holds the center of the stage and is the recipient of so much flattering publicity from the newspaper writers and novelists as well as from the scientific investigators, it is good to have an authoritative statement from a man of standing, covering what has been accomplished and what is actually known about the organ.

The book will be found valuable for those desiring to know when and how to do testicular transplants and what results may be expected from them. This will be found to be the real purpose and principal use of the book.

A MANUAL OF HISTOLOGY, by *H. E. Radasch, M. Sc., M. D., professor of histology and embryology in the Jefferson Medical College.* Second edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1924.

In the preparation of this book the author has borne in mind the desirability of keeping the text within practical limits and avoiding the general tendency of including too much in the way of theories and hypotheses. The volume opens with a chapter on technic as a preliminary requirement to the proper understanding of histology, and in the following chapters the minute structure of normal tissues and organs is revealed in a concise and logical manner.

The volume is profusely illustrated with diagrams and photomicrographs and it is noted that the functions of many of the organs have been discussed, as function is dependent upon structure.

COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION, by *Mrs. M. H. Mellish.* W. B. Saunders Co., Philadelphia, 1924.

To write a review of a new Mayo Clinic volume is as difficult as to write a review of a new edition of the Bible, Webster's Unabridged Dictionary or any other book which everybody knows is valuable, authoritative, and the best of its kind.

Of course it is full of meat with a minimum of waste verbiage. Of course it contains the latest knowledge in many branches of medical science. Of course it is indispensable to any one who is doing surgery. These things go without saying. Really, the only thing one can say in appreciation of the volume is that it is better than its predecessors.

HYGIENE AND PUBLIC HEALTH, by *George M. Price, M. D., director, Joint Board of Sanitary Control, New York City.* Third edition. Lea and Febiger, Philadelphia, 1924.

This is a small volume of about 300 pages in which the author presents an epitome of hygiene and public health. This subject is so vast that only an outline can be included in a book of this size, hence, the volume can not be used as a textbook. It is of value, however, as a handy reference to the essentials of the subject.

RADIODONTIA, (DENTAL RADIOGRAPHY AND DIAGNOSIS) QUESTIONS AND ANSWERS, by *Howard Riley Raper, D. D. S., formerly professor radiodontia, materia medica and operative technic, and junior dean, Indiana Dental College.* Dental Items of Interest Publishing Co., Brooklyn, N. Y., 1923.

This volume at first glance recalls the quizz compend of student days, the resemblance ends very speedily, however, as the text is the work of a specialist and not a compiler.

Radiodontia is assigned as the connecting link between dentistry and medicine, and to fail to know something of it is to fail to know what modern dentistry is all about.

One of the interesting subjects is an angle meter designed by the author for insuring mathematically correct angulation of the tube. It is a device, apparently with a spirit level, to be secured to the tube for the maintenance of perpendicularity. Movement of the tube causes a circular chart index to revolve and indicate when the proper angles are secured for the various classes of teeth. Angle designation, for each class is further refined to safe, average, and fine, the latter for operators of experience.

Attention is called to mistakes in the position of the head which are likely to occur while the exposure is being made, i. e. "It is a mildly amusing bit of perversity that the patient involuntarily moves the head to the correct position for the lower teeth when the operator is radiographing the uppers, and assumes the correct position for the upper teeth when the operator is radiographing the lowers."

There is a carefully worked out systematized method of taking whole-mouth radiographs. Fourteen-film sets are recommended as suitable for primary diagnostic survey, because cuspids and bicuspids may be placed on different films in correct angles and the malar-bone shadow can be cast forward on one molar radiograph and backward on the other, giving a clear view of all molars. This is illustrated with drawings. Ten-film sets are designated as an X-ray glance and 14-film sets as a scrutiny. Tables are given in connection with the taking of each set which set forth respectively:

Vertical angle, mathematical.

Horizontal angle, in relation to tooth surfaces.

Film holder and axis of the film.

Position of film, in relation to teeth.

Time of exposure factors, with variations.

An ingenious set of three-film holders has been devised by the author which apparently offer a happy means of securing the position of the films during exposure by pressure of the opposing teeth, flexible uprights lending adaptation.

Mathematical principles involved in the science are given in the form of statements and problems.

The estimated erythema dosage for the 3–10 (dental) Coolidge tube is given as about 600 milliampere seconds, and three weeks as the time which should elapse between exposures approximating such a limit.

Importance is stressed of checking clinically with electric vitality tests all doubtful teeth. When suspicious teeth only are to be rayed only those should be omitted which give a definite positive electric, or other, vitality test.

It is recommended that teeth causing systemic disease should be extracted serially; that is, one, two, or three at a time with a period of from 8 to 16 days between extractions in order that the patient may have time to recover between reactions.

An opinion is expressed that the most important thing seems to be the aid of the radiograph in its assistance in the discovery of caries before the pulp is involved. However, later a statement appears that small decalcified enamel spots which have not affected the dentine are scarcely an indication for filling. It would seem that caries sufficient to show in a radiograph would present an area of dangerous possibilities.

A chapter on dental infection and systemic disease reviews the elementary principles for the purpose of enabling the dentist to intelligently cooperate with the medical internist. Blood counts, etc., are discussed.

Two questions and answers illustrate the style.

Question. How may the operator judge when development is complete?

Answer. When the outline of the image is seen rather clearly on the nonsensitive side, and not much light is transmitted when the negative is held up to the ruby light.

Question. There is only one real solution of the pulpless-tooth problem. What is it?

Answer. Prevention of toothache. Delivery of the message to the people, "You musn't let your teeth ache." Fill cavities before they reach the pulp.

CONDUCTION AND INFILTRATION ANESTHESIA, by *Mendel Nevin, D. D. S., oral surgeon, Greenpoint Hospital; former oral surgeon, Hospital Deformities and Joint Diseases.* Dental Items of Interest Publishing Company, Brooklyn, N. Y., 1923.

This book is a successful endeavor to present the subject in a manner to be easily comprehended by the undergraduate and at the same time furnish details interesting to the experienced practitioner. The book is constant in repetitions of what not to do, and explanations of the reasons therefore make it interesting and instructive, with the result that a forceful impression is made of proper procedures by contrast of the unfavorable results attending errors in technique.

Procain anesthesia has attained a state of high efficiency, unfortunately coupled in the minds of many with severe afterpains, and often justly. The book is a treatise on the prevention of errors, which to a large degree are responsible for postoperative pain.

A thorough groundwork of anatomical relations is laid in skillful fashion in the fore part of the book, with special attention to dental anatomy in relation to blood and nerve supply. Wet specimens, actual photographs, and drawings have been prepared with this end in view.

In all injections the precautionary measure is advocated of withdrawing the plunger of the syringe slightly after the needle is fully inserted. If the needle is in a vein blood will be aspirated into the syringe, if it be free of vessels a vacuum will be felt. Blood being present the operator should change the position of the point of the needle without withdrawing from the tissues, and the test repeated. This is a worthy precaution as injections of various anesthetics into the blood stream of animals have shown that intra-arterial injections are about 4 times and intravenous injections about 16 times as toxic in comparison with subcutaneous injections.

Mandibular injections offer the only means of regional anesthesia, therefore the importance of obtaining satisfactory results. Also incidentally these injections are in the locality of most certain severe and lasting postoperative pain when an error of technique is permitted. Among the landmarks of the mandible attention is called to the investigation and findings of Dr. A. W. Cook, wherein it was found that the center of the depression which exists on the anterior border of the ramus is on a horizontal line which will generally extend above the lingula and across the mandibular sulcus. The position of the center of this depression is used as the height for the insertion of the needle and directed on that line it will reach the mandibular sulcus. The external oblique line being constant and well defined is used as a guide to locate the internal oblique line, the medial point of entry. To find the latter the needle should be inserted in a line with the buccal surfaces of the lower molar teeth. The beginner has a mental vision of this line being just posterior to and in line with the molar teeth.

As to the depth of insertion of the needle the author says it is quite evident that the only safe and sure guide as to the length of insertion is to find the posterior wall of the sulcus and then make the injection. There is nothing to indicate that we are not depositing the solution into the muscle unless the needle point comes in contact with the bone before the injection is made. By inserting the needle in a mandibular injection either too far medially or too low, the internal pterygoid muscle will be entered. In a tuberosity injection the external pterygoid muscle will be invaded by directing the needle too far backward.

Page 153 contains an illustration which graphically illustrates by means of fingers held against a mandible the relation of the insertion of the internal pterygoid in this bone, and the manner in which injection in this muscle may be avoided.

To determine anesthesia of the inferior dental nerve the mucous membrane of the bicuspids should be tested. Molar buccal and lingual anesthesia denoting only that the long buccal and the lingual nerves have been reached. The bicuspid membrane is supplied from the inferior dental via the mental branch.

Anastomosis is blocked by an injection in the opposite mental or incisive fossa.

Mental injections have been abandoned as unsatisfactory.

An improper mandibular injection made after a careful study of the text would seem to be possible only through carelessness or inability to grasp the principles set forth.

Practically painless insertion of the needle in all except mandibular injections may be insured by selecting the reflection of the mucous membrane, as there are comparatively few nerve filaments present.

The frequent failures of infraorbital injections are attributed to an improper direction of the needle, with a deposition of solution lower than the infraorbital foramen, and in the caninus muscle, occupying the canine fossa.

The bicuspids are almost invariably anesthetized by a correct infraorbital injection, the three molars being likewise affected in at least three-fourths of the cases. In one-half of the cases Meckel's ganglion is reached by induction, thus anesthetizing the inner nerve loop. Such anesthesia results from placing the solution at the opening of, or in, the infraorbital canal, the bulb of the finger pressing tightly over the foramen preventing the solution from escaping and diffusing outside of the canal. The line of direction of the needle (a $1\frac{5}{8}$-inch being used) is that of a straight line from the center of the second bicuspid to the center of the pupil of the eye. The syringe should rest on the lower lip to insure direction, otherwise bone may be encountered and the solution deposited in the caninus muscle, with absence of the desired anesthesia and the probability of after pain and ecchymosis.

A new technique is offered for the injection of the second division, this is termed the posterior infraorbital, certainly a less formidable term.

In those rare cases calling for extra oral injections the book is invaluable for reference for designation and use of landmarks. Light lines drawn on the face, with divisions, and relations, remove the uncomfortable uncertainty accompanying little used procedures.

Adrenalin from animals is considered more stable than synthetic products, and discolored solutions are not discarded unless the hue reaches a dark brown or chocolate.

A hypotonic solution is preferable to a hypertonic in conformity with the law of osmosis.

Animal experiments have proven that the anesthetic effect of apothesin is equal to that of procain, but the intravenous fatal dose has been found to be one-half that of procain. Butyn is regarded as two times more toxic than cocaine.

Some patients possess a peculiar idiosyncrasy toward procain. In the absence of this the author considers the following reasons why untoward symptoms occasionally occur:

(1) Injecting into the blood stream.
(2) Too rapid injection.
(3) Upright position of the patient during injection.

During the injection a reclining position of 45° is recommended.

Novesthine, powder or in paste, is recommended for insertion in the socket to lessen postoperative pain.

NAVY NURSE CORPS

THE NURSE AS AN ANESTHETIST

Seven members of the Navy Nurse Corps have completed the courses in anesthesia authorized by the Bureau of Medicine and Surgery. The following excerpts are taken from an address delivered at the convention of the American Hospital Association at Milwaukee, in October, 1923, by Dr. Warren L. Babcock, Director of Grace Hospital, Detroit, and should be of interest to Navy nurses:

A hospital that does not avail itself of the best talent in anesthesia training and service is indifferent to its responsibilities to the public. Highly trained anesthetists, or supervision of competent anesthetists, is absolutely necessary to safeguard the reputation of the hospital. Just here let me explain that, in my judgment, it matters not whether the anesthetist is a physician with years of practice, an interne, or a nurse. He or she must have the requisite training, not only in the fundamentals of medicine and surgery, but in practical anesthesia. It has been my good fortune to be associated with the postgraduate instruction of nurses in surgical anesthesia, with most happy results, and the hospital that I represent would consider it a backward step to revert to the old days when all anesthetics were given by indifferently trained or disinterested internes. It is a common axiom in any line of endeavor that, in order to do a thing well, you must like your work, take an interest therein, and make it a definite means of livelihood. In the past internes, upon whom devolved the administration of anesthetics, looked upon this branch of medicine lightly and considered it only a necessary, evil piece of routine in the course of their interneship.

A trained nurse who takes up this line of work, if carefully selected, contemplates making it a means of livelihood and concentrates her interest in the acquisition of the specialty. She is sensitive to instruction and criticism, conscientiously feels a well-balanced sense of individual and moral responsibility, and soon acquires efficiency in her work. When it is understood that the majority of graduate nurses taking up this course are usually women from thirty to forty years of age, it is realized that they enter this new field of nurse endeavor with the most serious intentions. During a period covering the last six years, anesthetic accidents, within our observation, have diminished very largely in the hands of these highly trained anesthetic nurses. In this connection, it should be stated that the nurse anesthetic personnel in all hospitals should be under the immediate direction of a physician who gives the greater part of his or her time to the supervision and training of these anesthetists. It should also be said that their training never ceases, as certain emergencies in anesthesia may arise only once or twice in a year, even in a service where from 20 to 40 general anesthesias are carried out daily.

Well-trained nurse anesthetists should be equally competent in the administration of either ether or gas-oxygen. The development of this type of anesthetic service has been found to give the greatest encouragement for the use of gas-oxygen in general surgery. In a total of over 6,000 anesthesias in 1922, fully 1,600 were gas-oxygen administrations in major operations, of which over 1,000 were laparotomies. It is a pleasure to record that this entire series, in the hands of nurse anesthetists, was carried out free from any serious accident which might be attributed to the anesthetic. The anesthetists are taught that no danger signal should pass unnoticed and that measures of prevention early in the course of the anesthesia will save many a life.

In obstetrical practice in hospitals, the elimination of chloroform—which for many years was the anesthetic of choice—in favor of ether and gas-oxygen has proven a decided step in advance. Here, again, the trained anesthetist is a requisite, and the practice of administering anesthetics in emergencies to the woman in confinement, by any untrained nurse or interne who is available, is no longer justifiable.

A CONSIDERATION OF DIETS FOR PATIENTS RECEIVING INSULIN

By Dr. Franklin Adams, of the Mayo Clinic, Rochester, Minn.

It is hardly necessary to mention some of the facts that led up to the present situation in the treatment of diabetes. You all know that about two years ago a group of physicians at the University of Toronto introduced a new medicine for the treatment of diabetes. At first it was thought by a number of people that this insulin, this new medicine, was a cure for patients who had diabetes, and it was simply necessary for them to have an occasional injection of this material and they could promptly forget all about their diabetes. Unfortunately, that wasn't true from the standpoint of an actual cure; but from the standpoint of taking a patient who was bedridden, and hopelessly sick, you might say, and placing him on his feet and making him an active member of society, insulin accomplished everything that was hoped for.

This was not as a result of insulin in itself, however. The result was because the insulin was used in conjunction with an extremely careful diet, and this is the part that has to be exercised in connection with the dietitian. Without the dietitian diabetes would not enjoy its present status, so to speak, as being a disease that can be very well controlled. The patient who appeals to the dietitian with the idea of being reduced because he or she may be too heavy, or with the idea of being increased in weight because he or she may happen to be too slender, presents a problem to the dietitian that certainly must be solved, but the solution merely adds to their comfort; the same holds true in a somewhat more important sense in a patient who has an ulcer of the stomach or duodenum; but the patient with diabetes who appeals to the dietitian for help comes to that dietitian with a question that means that patient's life. Without the solution of that problem the patient can not go on, and it is impossible to over emphasize the importance of the dietitian in this connection.

Another feature of the important work that the dietitian has to accomplish in connection with diabetes is that she must take up the teaching of the diabetic patient, and these schools that have been established in different clinics throughout the country are meeting with great success. Doctor Williams in Rochester and Doctor Rosenthal, Doctor Allen, Doctor Joscelyn, and Doctor Sanson at Santa Barbara, Doctor Nuzum, and so on, have all done this with great success. The dietitian plays a very important part here because she, in a measure, becomes the teacher of these people. They come to the hospital and learn the fundamental facts that are necessary for them to carry on. They equip themselves with the knowledge that allows them to keep healthy.

Our treatment at the clinic has been comparatively simple. We have recognized four principles in connection with the dietary feature of treating patients with diabetes. We have limited their intakes of starches and sugars, limited their intake of protein; we have not allowed them food comparable to that allowed to the normal individual—that is, it has been somewhat less—and, in fourth place, we have tried to strike a proper balance between the fat substances in the diet and the sugar substances in the diet, the so-called endo-ketogenic ratio. With these four principles in mind we have tried to adapt diets in connection with the treatment of diabetes with insulin.

I might mention in this connection that to us food is just as important a medicine in diabetes as insulin itself, and it must therefore be given with just as much accuracy as the insulin. If any of us were to appeal to a physician, if we happened to have, let us say, a treatment of the heart, and that physician gave us digitalis or some such remedy in a bottle and told us to take some now and then without any specific directions as to how much to take or how often to take it, I think that our confidence in that physician would weaken just a little. In the same sense the food is just as important to the sufferer with diabetes as digitalis would be to the patient with heart disease.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

COMMENT REGARDING CASES REPORTED AS FOOD POISONING AND REMARKS ON THE APPLICATION OF LOGIC TO THE PREPARATION OF EPIDEMIOLOGICAL REPORTS

Returns to the Bureau of Medicine and Surgery indicate that many of the cases notified by Form F cards with food-poisoning titles were probably not cases of food poisoning at all. In some instances it is apparent that food has been assumed to be the cause of symptoms without any definite evidence and even without information that would have made it possible to suspect any particular article of food ingested. In other instances, where food unquestionably seems to have been responsible for illness, by neglect to record easily ascertainable facts, opportunity to accumulate valuable evidence relating to the subject of food poisoning has been lost.

Primarily in the interests of accuracy in compiling morbidity statistics it has been necessary to seek additional information by letter in most cases recorded under food-poisoning titles. In view of the importance of this subject in the public health world, and the need for more study, particularly for the collection of reliable information in the single or isolated cases that occur from time to time, it would seem desirable for the Navy with its highly organized medical service to separate assumptions and mere guesses from facts and other useful information collected with deference to the principles of logic, with the hope that something may be contributed from the Navy's experience that will be of value to all who are engaged in the study of food poisoning in its various aspects.

For one thing, there is opportunity to study with greater care than has been exercised in the past the cases of apparent idiosyncrasies to food that are not infrequently encountered—cases in which sensitization to a foreign protein is presumed to be the cause of symptoms. To set down findings in such cases that will stand test as to reasonable probability and lend themselves to the synthesis of knowledge it is necessary to rule out properties that would have made the particular article of food poisonous to other persons. Often that can not be done. Sometimes the circumstances are such that it can be done with reasonable certainty. Ordinarily the medical officer who knows what he wants to find out about the case can determine by a few questions whether or not poisoning can be ruled out and whether or not an idiosyncrasy must be considered.

Too often readily ascertainable information is missing in the supplementary report requested by the bureau in such cases regarding previous experiences of the sick individual suggestive of an idiosyncrasy. Some of the reports received have been of little or no use because the writer neglected to include easily obtainable and essential information regarding the food which was supposed to be the cause of illness. It is important to know whether or not the suspected food was eaten by other persons at the same time; also, whether the food was mixed and eaten in common with others in the form of a salad or what not, or served individually and eaten separately as a small fish, a broiled whole or half lobster, a few clams or oysters, etc. Obviously under some circumstances it is possible for the affected individual to have received a poisonous portion of food while others at the table did not. The medical officer studying the case may be fully informed and yet fail to cover essential points in writing up the case.

Anyone who possesses the common attributes of a scientific mind must realize that the reader of a report that is honestly intended to inform is entitled to have before him the premises which led to the writer's conclusions. It is only the young graduate in medicine who may indulgently be permitted to speak *ex cathedra* and so nourish his ego until broadening experience has caused him to forget the dictatorial opinions of this or that teacher and the information conventionally compressed in some standard textbook. One who has passed the stage where mere questioning of his opinions provokes resentment realizes more and more how limited any individual's personal experience must be, and therefore how great the need for critical observation in the clinical practice of medicine in order that broad generalizations may be drawn from many cases properly pieced together. In this, the common synthetic method of reasoning, the probability of proof is of course directly proportional to the volume of the data collected. Cases can not be placed together in a series unless many or most of the essential details have been ascertained and recorded for comparison with similar cases. Several, at least, of the many links in the chain of circumstances extending from cause to effect must be covered in every instance. So far as method of reasoning is concerned it must be remembered that no event has a single cause, and that of all circumstances that precede an event only those that *must* have happened in order that the phenomenon may follow are a part of the cause. Allusion to elementary principles of logic at this point may seem to the reader a poorly concealed endeavor to fill in a certain amount of space with words. But reports forwarded to the bureau show clearly enough that too many medical officers are addicted to simple *post hoc, ergo propter hoc* reasoning and thus do not avoid the stupid fallacies that are almost inevitable for the lack of critical observation and care to establish *connection* between circumstances that seem to be related. One would think that the habit of jumping at conclusions must provoke so much intellectual dissatisfaction as to lead the individual given to this easy method of reasoning eventually to abandon the habit. But for many persons this apparently does not hold true. These remarks are not intended for the majority of our readers who are critical in observation and careful in analysis. If the advice seems to cause resentment, remember it is intended for the other fellow.

In any case of illness where, although an idiosyncrasy is probable, the possibility of poisoning must be considered, it is essential to find out exactly how the food was handled and stored from the time it was purchased until it was served. For, regardless of preconceived ideas and our personal views regarding the danger arising from spoilage, enough evidence has been collected to show that we must always consider the possibility of contamination with one of the members of the food-poisoning group of bacilli. Therefore, the conditions and circumstances surrounding the case must be analyzed to rule out opportunity for contamination and a subsequent period of incubation at a favorable temperature. It may not be practicable to search for a carrier among those who handled the food. It is always possible to ascertain whether the food was placed at any time where it could have been contaminated by flies, rats, or cockroaches, and to note the degree of infestation of the galley, pantries, etc., by insects and vermin. The fact that straightforward statements relative to sanitary conditions may be regarded as reflecting upon administration by those who are in charge of the organization should not deter one from describing existing conditions. It is of no little importance to demonstrate correlation through accumulated reports if it be that correlation does exist between the numerous cases of food poisoning reported from time to time and the presence of a rat population and many cockroaches on board ship. Concealment of the fact of such infestation will of course invalidate conclusions.

The object of inquiry about the handling of food is to determine the possibility or likelihood of contamination and subsequent incubation. The objective itself will suggest the evidence which should be collected. Circumstances seldom make it possible to write a report so complete as to present an unbroken chain of evidence that will conclusively establish the clinical diagnosis and complete the epidemiological picture. Therefore, usually all the more care is necessary not to overlook such links in the chain as it is possible to sort out of the mass of conditions and circumstances surrounding the case. Many incomplete reports will be of real value if care is exercised not to omit essential details that can be determined.

In a recent small outbreak of food poisoning attributed to lobster salad, which occurred on board a destroyer, four of six members of the wardroom mess had symptoms of poisoning. Two of the four officers had severe symptoms and two were but mildly affected. The weather was warm. Six lobsters (crawfish) had been purchased three days before. These were reported to have been alive when brought on board ship. They were cooked shortly afterwards and immediately placed in the refrigerator. Four of the lobsters were used in the salad. The other two remained in the refrigerator and they were examined by a medical officer the morning after the poisoning occurred. They presented no sign of spoilage. One misses in the report a definite statement as to when the meat was removed from the shells of the crawfish used for the salad, and how long, where, and under what temperature conditions the meat stood after it was handled by those removing it from the shells before it was eaten at luncheon, the meal presumably responsible for the poisoning. Also, some indication that those handling the food were questioned as to personal cleanliness, diarrhea, etc., would not be amiss. There is no reason why explicit statements about the cooking could not have been made. If lobsters and crawfish, which were put into boiling water while still alive, *thoroughly cooked*, and then kept in a refrigerator, can cause food poisoning without subsequent contamination and incubation, we should certainly begin to collect evidence of that possibility in a systematic way. Some believe that is possible; others do not. At any rate, carefully recorded cases will help to turn belief into knowledge.

The following is an example of failure to record all information that could have been obtained, although, it should be stated, the medical officer who furnished the report was not in a position to collect the evidence himself. The patient, a sergeant of marines with the expeditionary force from Quantico, Va., took dinner on board a certain ship as the guest of the chief petty officers' mess. Lobster (presumably crawfish) was served—in what form the report does not state. Symptoms developed about two hours after eating. No information is available as to other foods eaten, but we may deal with the probability that lobster was the food responsible for the symptoms. The illness began suddenly with violent cramps in the stomach, followed shortly by severe retching and vomiting. When seen by a medical officer 15 or 20 minutes later he was in great pain, was vomiting profusely, and was covered with perspiration. He had pain continuously and vomited at intervals for about six hours. During this period he had a profuse watery diarrhea. When first seen his temperature was 102.5° F. He stated that he had had a slight chill at the onset of symptoms. The pulse was regular but rapid and weak. Respirations were irregular. There was a certain amount of prostration but it was not marked. Salivation was marked and there was a bitter taste due to the vomiting of bile. The patient was quite pale before and during each vomiting period. Except for soreness of the abdominal muscles as a result of vomiting there was no general aching or soreness. There were no ocular symptoms. The pupils were normal. There was no headache. It was not practicable to make laboratory examination of urine, feces, or vomitus.

No information was obtained regarding the lobster except that known to the patient. According to his statement, it was fresh and appeared to have been cooked properly. The patient also stated that one other man had similar but less severe symptoms. The other members of the chief petty officers' mess appear not to have had symptoms.

The medical officer who wrote the report commented upon the case as follows: "There is no doubt in my mind that this man was made sick by eating the lobster, but it is believed that he had an idiosyncrasy for this type of food, in view of the fact that the other members of the mess were not made sick. The man stated to me that crab meats, oysters, and other sea foods sometimes made him sick, but the condition was never half so severe as it was on this occasion." The symptoms were of short duration, and the man was fit for duty on the morning after his attack.

The incubation period and symptoms in this case are consistent with poisoning by some member of the B. enteritidis-paratyphoid group of bacilli. A delay of two hours after ingestion before the onset of such severe symptoms is rather long if the symptoms were due to sensitization. The absence of skin disturbances and the character of the symptoms manifested are also rather against the assumption of an idiosyncrasy. To assume that sensitization was responsible for the illness is to disregard the statement that one other man had symptoms. This lead was not followed up. Apparently no inquiry was made as to the manner in which the lobster was served. If the lobster or crawfish was served broiled in the shell, each portion consisting of one-half of a lobster, as is commonly the case, it is understandable that there might be two persons affected by one shellfish rendered toxic by contamination with a microorganism of the food-poisoning group. Under such circumstances it is possible for both individuals eating the poisonous food to be severely affected; for one to be severely affected and for the other to have mild symptoms or no symptoms.

Of course, the possibility that the symptoms in this case were due to an idiosyncrasy is not to be ruled out merely by determining that the crawfish was served broiled in the shell. On the other hand we must remember that shell fish are often caught in polluted waters. It is important therefore, that commissary stewards, stewards of officers' messes and cooks be informed in order to insure prompt and thorough cooking in all instances and avoidance of an incubation period thereafter when practicable. Thorough cooking with complete penetration of heat will remove the danger resulting from contamination that has occurred before the shell fish was caught. However, if the shell fish is not alive when cooked, and particularly if an incubation period has been permitted, the meat may contain toxic products that will resist the temperature of water actually at the boiling point for a considerable period of time. Often the water does not boil during the cooking process although the cook may think it is boiling.

One other case notified during the month should be mentioned. The Form F card bore the diagnosis, "Anaphylaxis, tomatoes." In response to the inevitable request for additional information the medical officer replied as follows:

"Examination of this man at the sick bay revealed the entire body covered with a maculo-papular eruption. No other objective symptoms were present and the patient did not feel badly. He was isolated and the rash promptly cleared after thorough elimination and the administration of large doses of sodium bicarbonate. The patient gave history of eating a large quantity of raw tomatoes during the night, and on the strength of that history the tomatoes were considered the causative agent and a diagnosis of anaphylaxis made."

PREVALENCE OF VENEREAL DISEASES AND MEASURES UNDERTAKEN FOR THEIR PREVENTION AND CONTROL IN SHIPS OF THE UNITED STATES NAVAL FORCES, EUROPE

The following information was taken from the annual sanitary report for the calendar year, 1923, submitted by Lieut. Commander J. B. Helm, Medical Corps, United States Navy, force surgeon, United States Naval Forces, Europe:

"On account of the great prevalence of venereal diseases throughout the force, and in view of the fact that self-administered prophylaxis was apparently not producing good results in preventing these diseases, a force order, copy attached marked 'C', was published. From a wide experience in dealing with men, with special attention to the problem of venereal disease as related especially to instruction regarding the diseases, manner of acquiring, methods of prophylaxis, with its efficiency and limitations; results of exposure; necessity for early treatment properly applied; and the consequences of venereal disease, the undersigned is of the opinion that an order similar to the attached marked 'C', is the only way in which a marked reduction in venereal diseases will result, and that such an order is the fairest and most just way of handling the problem for the greatest benefit of the men and the Navy. In a measure, the final benefits will be derived by many families and social communities. (The order, force order No. 4–23, and Force Information Bulletin No. 1–23, which was distributed with the order, are reprinted below.)

"Forty-nine per cent of original admissions for disease were for venereal diseases. Venereal diseases were responsible for 3,452 sick days; 1,001 on original admissions, and 2,451 for readmissions; this represents 29 per cent of all sick days for diseases. An interesting point is that for the venereal diseases there were nearly two and one-half times as many sick days resulting from readmissions as were chargeable to original admissions, whereas for all other diseases readmissions were responsible for only about 20 per cent of the resulting sick days."

UNITED STATES NAVAL FORCES, EUROPE

U. S. S. Pittsburgh, Flagship

FORCE INFORMATION BULLETIN No. 1–23

BIRZERTA, TUNISIA, 7 *December, 1923.*

From: Commander, U. S. Naval Forces, Europe.
To: Force.
Subject: Venereal disease.

1. The following bulletin will be read by all officers, and explained to all men on board each ship. An energetic influence by officers in this matter will materially aid in reducing this evil.

2. A compilation of data submitted by the medical departments of the force shows that the admission rate of venereal diseases, while no higher than in the past, is still alarmingly high, and seems to indicate that all men exposed are not availing themselves of prophylaxis after exposure. In the winter months of the present year, when the respiratory type of communicable diseases was prevalent on all ships of the force, the venereal diseases showed a higher

admission rate than all the above diseases combined, as witnessed by the following figures:

Month of February, 1923

	Admissions	Rate per 1,000
Bronchitis, acute and chronic	26	98.95
Influenza	18	66.38
Pharyngitis, acute	1	3.68
Tonsillitis, acute follicular	16	59.00
Ulceromembranous angina	4	14.72
Total	65	242.73
Chancroidal infections	23	84.81
Gonococcus infections	48	176.69
Syphilis	2	7.36
Total	73	268.86

Total number of sick days for respiratory type diseases 324
Total number of sick days for venereal diseases 330

Thus the venereal diseases show not only a greater admission rate, but also a greater disabling rate, as witnessed by the greater number of sick days. It must also be considered that the 26 cases of bronchitis, the 18 cases of influenza, and the 16 cases of tonsillitis were treated and discharged as cured without the development of any complications, or of the more serious diseases, such as the pneumonias and tuberculoses. However, of the 23 cases of chancroid reported, 4 developed into chancroid of the lymph node (bubo), and of the 48 cases of gonococcus infections, 8 were admitted for gonococcus infection of the epididymus, or gonorrheal epididymitis, showing a complication rate for venereal diseases of about 16 per cent, as opposed to no complications in the respiratory type diseases.

3. The same alarming rate holds true when the venereal diseases are compared with any other class of equally serious affections. Of the 186 original admissions for all diseases in February, 1923, 73, or nearly 40 per cent, were for venereal diseases alone. In March, 1923, there were 198 admissions for all diseases, and 82 for venereal diseases alone, or over 40 per cent for venereal diseases. The following information is offered for comparison.

Mean annual rate per thousand

VENEREAL DISEASES ONLY

	Scouting Fleet	Battle Fleet	Asiatic Fleet	Naval Forces, Europe
February, 1923	185.14	73.83	302.76	268.86
March, 1923	150.68	86.78	258.28	304.24
April, 1923	181.89	171.94	551.46	440.88
Average of the three months period	172.57	110.85	370.83	337.78

4. The principle of prophylaxis against venereal diseases has been proven. and its prompt application under strict supervision has always been found to be practically infallible in the prevention of venereal disease. However, in addition to the supervised prophylaxis on board ship it is considered advisable to continue to issue prophylactic tubes to those desiring them.

5. In view of the above, Force Order No. 4–23 has been issued. Commanding officers and subordinate officers will exercise zeal and interest in carrying out the provisions of this order, with the view of reducing the damage done to their commands, and to the present and future health of the individuals, in preventing exposure or in prompt disinfection after exposure to venereal disease. Results accomplished by commanding officers and division officers in reducing venereal diseases in their commands will be considered in making efficiency reports.

PHILIP ANDREWS.

UNITED STATES NAVAL FORCES, EUROPE

U. S. S. Pittsburgh, Flagship

BIZERTA, TUNISIA, *December, 1923.*

From: Commander, U. S. Naval Forces, Europe.
To: Force.
Subject: Venereal prophylaxis.

FORCE ORDER NO. 4–23

1. All men returning from liberty or leave who have exposed themselves to venereal disease are required to report such fact at once, to the medical department of the ship.

2. All men reporting exposure shall immediately take a prophylactic treatment consisting of a solution of silver salts and the application of calomel ointment. This to be done under the direct supervision of the medical officer or a hospital corpsman, if possible.

3. All men who develop venereal disease, and who have not previously reported exposure, and taken a prophylactic treatment, will be punished as a summary court-martial may direct.

4. All men, who, upon inspection or examination at any time, are found with active venereal disease, which they have not previously reported to the medical officer, or the representative of the medical department, will be punished as a summary court-martial may direct, for concealing a communicable disease dangerous to the health of the command.

5. This order will be read to every liberty party before they leave the ship for a period of one month; after that at least once a week.

PHILIP ANDREWS.

In this connection a recent report by the same medical officer, submitted under date of June 22, 1924, discussing conditions among the crew of the U. S. S. *Pittsburgh*, flagship of the United States naval forces, Europe, subsequent to publication of Force Order 4–23, is of interest. The report follows:

There is attached hereto a chart showing graphically the extent to which venereal diseases have been reduced on board this ship.

For comparison the reports of this vessel for the calendar year 1920, are taken. During that year the *Pittsburgh* visited practically the same ports as she has during 1923 and 1924, and it is presumed that practically the same amount of liberty was given, or that certainly no more liberty was given than has been given during the present cruise.

Between the years 1920 and 1923, the venereal prophylactic tube was approved by the department, and has been issued to the service free of charge.

Therefore, the reduction in venereal disease during 1923, can be accounted for in a measure, at least, by the use of these tubes.

In January, 1924, Force Order No. 4–23 became effective, and the great reduction in the venereal-disease rate as shown by the figures for the first six months of this year can undoubtedly be accounted for by prophylaxis having been made compulsory on board ship, under supervision by the medical department. The same measures were taken in 1923 to prevent venereal disease as have been taken since January, 1924, except that the above-mentioned order has been in force during 1924. The figures for 1923 show a reduction of 40 per cent as compared with those of 1920 for new cases of venereal disease. So far, the figures for 1924 indicate a reduction of about 30 per cent as compared with the admission rate of 1923, and about 50 per cent reduction as compared with the 1920 rate.

The high rate, 366.01 per 1,000, for January, 1924, can be accounted for as the result of publishing the order. Out of a monthly total of 28 admissions, there were 21 during the first 10 days of the month, showing, in all probability, that some men who had been concealing disease reported soon after the publishing of the order to avoid punishment.

The following table presents the figures which are under discussion:

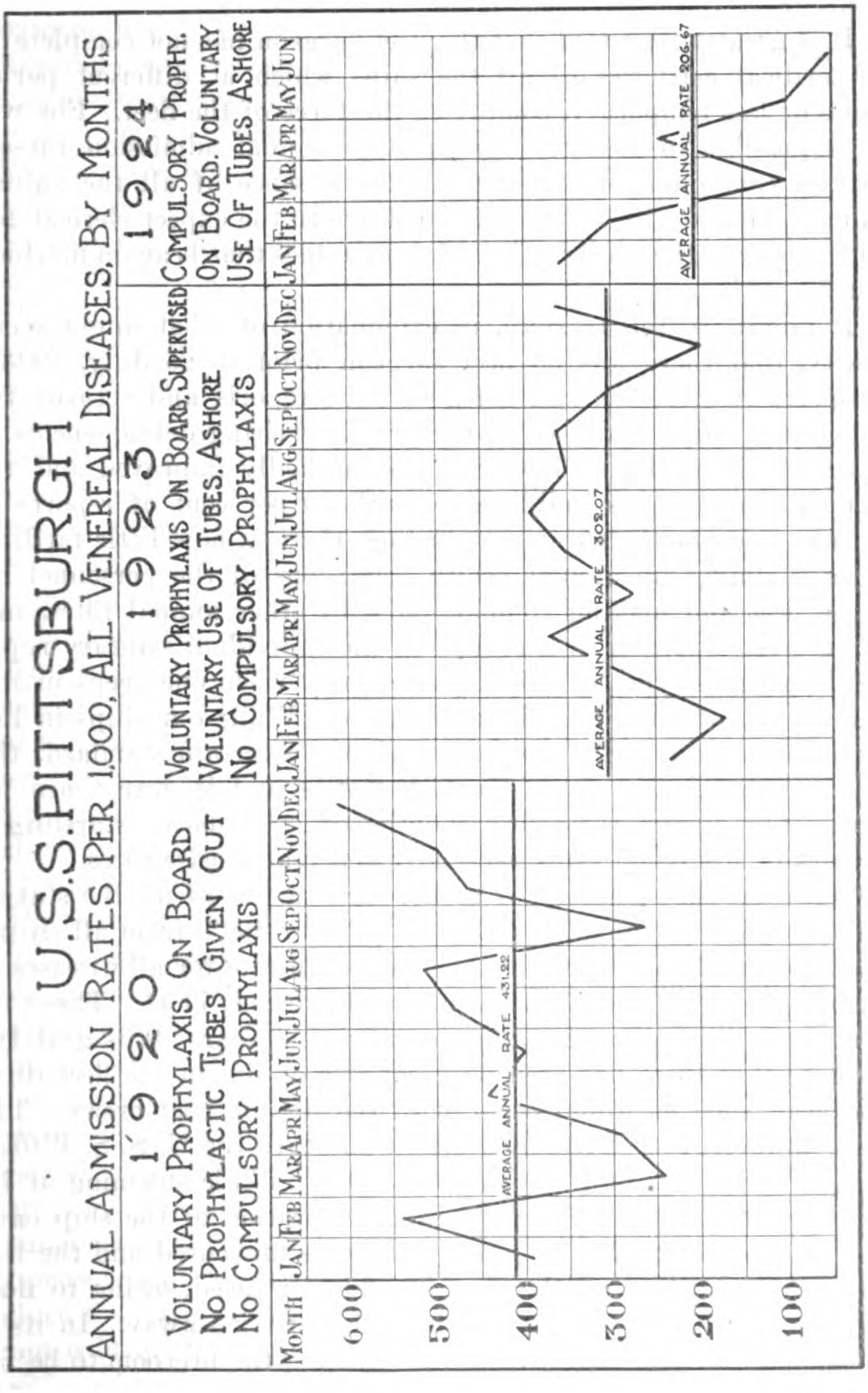
Monthly venereal disease

ADMISSION RATES OF THE U. S. S. "PITTSBURGH" WHILE ON THE EUROPEAN STATION

Month	1920		1923		1924	
	Annual rate per 1,000	Total prophylactic administered [1]	Annual rate per 1,000	Total prophylactic administered [1]	Annual rate per 1,000	Total prophylactic administered [2]
January	395.45	1,550	335.55	1,078	366.01	1,058
February	546.67	1,558	170.12	850	317.18	780
March	247.85	951	274.81	927	105.84	783
April	291.72	1,100	379.49	825	248.89	703
May	447.28	1,603	274.81	1,006	120.68	716
June	402.78	1,403	300.98	435	[3] 106.67	[3] 550
July	482.72	634	392.47	488		
August	527.94	417	353.32	696		
September	270.02	462	366.41	327		
October	471.68	113	300.98	538		
November	522.93	166	209.38	554		
December	626.33	497	366.41	516		
Average annual admission rate per 1,000	431.22		302.07		206.67 (to date)	
Total number of prophylactics administered on board		10,454		7,724		4,582

[1] Only prophylactics administered on board.
[2] Only prophylactics administered in accordance with Force Order No. 4–23.
[3] Based on number of cases already admitted in June, which are 5 to date; number of prophylactic treatments estimated.

REMARKS.—The reduction of the average annual admission rate per 1,000 from 431.22 in 1920 to 302.07 in 1923 can probably be ascribed to the introduction of the individual prophylactic tube to the service. The further reduction to 206.67 for the first 6 months of 1924 is undoubtedly due to supervised compulsory prophylaxis, as required by Force Order No. 4-23 of Dec. 7, 1923.


U.S.S. PITTSBURGH
ANNUAL ADMISSION RATES PER 1,000, ALL VENEREAL DISEASES, BY MONTHS
1920
VOLUNTARY PROPHYLAXIS ON BOARD
NO PROPHYLACTIC TUBES GIVEN OUT
NO COMPULSORY PROPHYLAXIS
1923
VOLUNTARY PROPHYLAXIS ON BOARD, SUPERVISED
VOLUNTARY USE OF TUBES, ASHORE
NO COMPULSORY PROPHYLAXIS
1924
COMPULSORY PROPHY.
ON BOARD. VOLUNTARY
USE OF TUBES ASHORE
MONTH
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
JAN FEB MAR APR MAY JUN
600
500
400
300
200
100
AVERAGE ANNUAL RATE 431.22
AVERAGE ANNUAL RATE 302.07
AVERAGE ANNUAL RATE 206.67

ANNUAL SANITARY REPORT OF THE SCOUTING FLEET, UNITED STATES FLEET, FOR THE CALENDAR YEAR 1923

By J. Stepp, Commander, Medical Corps, United States Navy, Fleet Surgeon

It is greatly regretted that the fleet surgeon has not complete files of medical activities of all the ships which at different periods, more or less temporary, comprised the force of the fleet. For while it is possible to give the comparative annual admission rates on certain communicable diseases, in the absence of all the valuable annual data it will be necessary to leave to the expect clerical force of the bureau the construction of those tables that bear on morbidity rates.

It might be well to state, in extenuation of what might seem a laxity, that there was no fleet surgeon prior to 25 July, 1923, to properly receive, file, and safeguard the reports and returns from individual ships, and even at the present writing delinquencies still exist. This condition, however, has markedly improved and from one of almost gross indifference, with 50 per cent of reports and returns one month late in forwarding, there is now little tardiness.

In summing up annual health conditions of the personnel of a large fleet and making comparison with other annual rates, much of interest is shown in a review of the individual sanitary reports of the various types of ships; particularly when one keeps in mind the variety of ports and climates visited. While our ships in home or adjacent waters for years have shown a certain standard, those on foreign missions as in Turkish waters and in war times have invariably during their first months of stay shown startling increases in admission rates, especially venereal-disease rates.

However, the summary of a thorough review of all the statistics embraced in the annual sanitary reports for 1923, from all ships of the Scouting Fleet, show that the admission rate for all diseases was 512.04 per 1,000, and for accidents and injuries, 71.41. These rates are somewhat higher than for the preceding year. It is gratifying to state that there has been no great loss of life in the fleet during the year, such as would occur with the loss of boat crews. There was, however, loss of life by accident on board the U. S. S. *Williamson*, off Newport, R. I., on June 30, 1923. While steaming at high speed on experimental torpedo range, vibration of the ship caused the hatch cover on No. 3 blower to become unsecured and the hatch cover fell, shutting off the air. The blower raced, owing to no air supply, and before it could be shut off it carried away. In its fall it carried away the main steam line, causing the fireroom to be filled with live steam which resulted in eight casualties, four men dying on board the ship. Another death caused by an accident occurred on board the U. S. S. *McFarland*. On September 19, 1923, at the entrance to Cape Cod Canal, the *McFarland* was rammed by the U. S. S. *Arkansas*, injuring 11 men and killing 1. The body of the deceased was found under the oil and wreckage in the seamen's compartment and a board of inquest stated that compression of the brain had caused immediate death. There were no deaths caused by accidents to airplanes. There were seven deaths by drowning. During the year there were no admissions for smallpox or typhoid fever. The year was not marked by outbreaks of any disease that could definitely be called epidemics, which perhaps is due largely to the fact that epidemics in general were not marked. Statistics show quite naturally a proportionate increase of epidemic cases in the service to those in civilian communities with which there is contact. Nevertheless, it is most unfortunate that we can not, so to speak, "snap out" of our dogged persistence in committing annually the same gross errors in military hygiene.

Discomfort.—While it is true that no epidemic of any moment prevailed, nevertheless each year of overhaul at navy yards, especially those of the North during the trying winter months, brings in a fat quota of disease when we foot up the annual array of cases of mumps, bronchitis, tonsillitis, and influenza. This is undoubtedly due largely to the discomfort and discontentment following on or resulting from the tiresome weeks of exposure to cold and dirt made necessary by the horde of workmen trecking in and out of the ship and the leaving of hatches and ports open for the leads of pneumatic hose, thus creating drafts. There is no doubt that such factors predispose to infection, when added to them are those of noise and disorder tending to mental impairment, and so naturally a tendency to lowered resistance.

Perhaps this is all reiteration, but I repeat that the time has come to get away from stubborn routine and not keep following over the same wall. Great hope is entertained for a betterment of the above conditions upon reading the article by Capt. R. Z. Johnson, United States Navy, in Our Navy of September, 1923. My plea, of course, is for barracks at navy yards, as has been set forth before. Suitable, comfortable barracks at navy yards, to be occupied only by a ship's company during overhaul periods, are made urgent in view of the many recommendations and pleas for such by commanding officers and medical officers of long experience. Such a measure, while preserving the distinctly military unit, would reduce the daily contact with civilian foci of disease. The freedom from cold, dirt, noise, and disorder would promote greatly the reduction of the rather high percentages of communicable diseases. A large building also permits expansion, and so the problem of overcrowding would be eliminated with its quota or rake-off of desertions. A place, so to speak, where the bluejacket can unbend after a cruise and have a change and a rest is very desirable. The very fact of sleeping in a cot or a bed and of living in quarters where he is not obliged constantly to clean up dirt, litter, and sometimes filth of workmen would do much to keep him happy and healthy. His Navy pride would not be so broken and he would take the greatest pride in keeping his barracks shipshape. With reception rooms and halls he would have a suitable place to receive and entertain his family and friends, especially week ends, and he would not be compelled, as he is now, to spend his honest pay to outside landlords when he is virtually forced to flee for rest and recreation from the "Navy nightmare," a ship undergoing extensive repairs during winter weather in northern latitudes. This is hardly the time to write an article on this one subject and, furthermore, it has been covered, and most ably so, in the article referred to above.

There are, however, one or two points or factors of value that might be added to the plea for barracks. One is the advantage of segregation for weeding out communicable diseases when prevalent. Another is the excellent opportunity for attention to that subject which makes such heavy calls or demands on the limited service of the fleet when operating, and that is dentistry. This would be an excellent opportunity for ships or units without a dental officer to comply with commander, Scouting Fleet's, circular letter of 26 November, 1923. Here one or two dental surgeons, depending on the complement, could be on regular duty, thus carrying out the regular fleet routine of inspection and treatment of teeth. Again, at the completion of the ship's overhaul she could and should be subjected to a thorough cleaning, followed by disinfection in accordance with United States Public Health Service methods as carried on annually and semiannually on most merchant vessels of the more important companies. In regard to suitable barracks, in my opinion, it would not be necessary to build such at navy yards, where there are now so many unoccupied, well constructed buildings which could easily be made suitable at much less expense than would be required for the construction of new ones. During my recent service as senior medical officer of the naval camp used as a receiving ship at Hingham, Mass., the question came up concerning the transfer of the unit of personnel to the navy yard at Boston, Mass. A board was appointed to report on this matter, and at least two very large well-built fireproof buildings were found that could easily be made adaptable for barracks by cleaning, painting, and the installation of a ventilating system, together with the necessary plumbing for drinking, bathing, scullery, and toilet arrangements. This plan was not carried out, however, owing to the fact that Vice Admiral H. A. Wiley, then in command. was able to bring about the transfer of the receiving ship *Southery* from the navy yard, Portsmouth, N. H., to the navy yard at Boston, Mass. It is suggested that the matter be again gone into and unoccupied buildings of the principal navy yards be converted into suitable naval barracks, as it can be seen from my summary above that this suggestion, if acted upon, would result in a marked lowering of the percentages of communicable diseases, and a proper opportunity would be given to segregate such and not continue the prevalence by carrying unnecessary diseases in the ships during winter maneuvers.

Since taking up my duties as fleet surgeon and the carrying on of the numerous inspections of the different types of ships of the Scouting Fleet many more undesirable features have been brought to my attention, which if remedied would lower disease rates still further.

Overcrowding.—One of the greatest factors in causing discontentment, disease, and desertions, as shown in past and present reports, is the matter of overcrowding on board. This applies especially to the larger vessels of the dreadnought type. The battleships comprising that unit of the Scouting Fleet are all in excess of the personnel originally set down for such, and in conference this is explained by the fact that the fire-control and modern system of gunnery makes it necessary. Nevertheless, crowding exists to the overtaxation of proper billeting and ventilation. This is relieved to some extent in suitable climates by the men taking advantage of sleeping in the open, but on return to colder climates they must again return to close contact and inadequate ventilation. This does not apply in those ships to the ship's company alone; modern installations call for a larger officer personnel, and in the case of junior, warrant, and chief petty officers there is marked overcrowding even to the extent of sleeping in passageways. As gunnery demands this personnel, the remedy is hard to see except in more quarters and billets, and such solution is only seen in the most recently built dreadnought.

Engineering competition.—A close second to the above as a cause of discomfort or illness, and one which might well claim the caption of discontent, is the effect of "engineering competition" on the personnel of the fighting ships. If memory serves right engineering competition came close on the heels of our Navy's excellency in gunnery. Such excellency in gunnery was eventually awarded to the individual turret or gun by the mark of "E," and has always been understood by officers of the Navy as a proper mark of merit for that primary and most important thing, in which the Navy has always excelled, "Excellence in gunnery." While engineering competition may also be necessary, yet from the standpoint of medical officers of long experience who are charged with safeguarding the health of the personnel it should not be carried out to the extent of curtailment of heat, ventilation, light, and refrigeration. In my extended inspections in the fleet and by much questioning and consultation with many officers and with reviews of reports on the subject in mind, I question whether we are arriving at real economy in the maddening engineering competition for "E's," especially when we consider the deleterious effects on the health and morale of a selected personnel, by permitting a reduction of the standard allowances of heat, ventilation, water, and light. Years of sea service and observation have shown a steady increase in the curtailment of these vital necessities to the comfort, contentment, and health of the command. Each cruise on a ship seems to find each engineer officer confronted with the economy record of his predecessor and he feels it is up to him "to make face" by still greater economy and so he reduces still further the fuel consumption to the degree or capacity of endurance. The condition necessitates a constant watchfulness on the part of the medical officer concerned, with constant requests and complaints of officers and men for more heat, ventilation, water, or refrigeration. A regular conflict, so to speak, ensues between the medical and engineer officer. The medical officer supported by the officers and crew on the one hand contending against curtailment of the necessary creature comforts, and on the other hand the engineer officer claiming the delivery adequate or standard or that the individual plant is carrying "a full load."

In private or public enterprise no corporation can afford to juggle with the proper hygiene of its establishment, and certain sickness and absence of special employees necessary for the teamwork, interest, and production of the concern resulting with improper hygienic conditions. The United States public health laws prohibit it. The corporation can easily show by actual facts and figures that the loss in production and profit by absence of skilled labor due to unnecessary illness far outbalances any "cheapness of operation" in the power concerned in the delivery and maintenance of those factors so vital to good health. This saving in health and working capacity of the individual has never been worked out in the Navy, for the pay goes on just the same, sick or well. The production, however, does not, and if engineering competition could cease and if the figures could be produced the great saving and true economy in the health and well-being of the personnel would easily entitle the medical department to an "E."

Ventilation.—The ventilation of the ships of the fleet in general is good, except that of the battleships. The fault in ventilation in ships of the destroyer squadrons is reiterated each year, and that is lack of ventilation in the quarters of the second deck at sea during heavy weather; under other conditions there is universal favorable comment. The fewer and less important faults of like nature in ships of the train are mentioned in their sanitary reports. The most important part of this subject relates to the battleships and should receive departmental consideration. This report can hardly take in the entire reports of these ships, but in general the thermoventilating system installed is very unsatisfactory. In the case of the *Wyoming*, the ventilating system is in poor condition. While at the navy yard a request was made to have the system cleaned and repaired. This work was started but later stopped, due to lack of funds. A request was then made to have it done during the next overhaul period, but this request was disapproved by the Bureau of Construction and Repair. In the case of the *Arkansas* the heating and ventilating system is very unsatisfactory and is the subject of complaint in every report since 1915. In the case of the *Utah* every sanitary report since 1911 has called attention to the faults of the ventilating and heating systems, and the present senior medical officer attached to her is making the same comments concerning them as he did when he was a junior on her 10 years ago. In the case of the *Florida* the claim of insufficient ventilation is also made owing to wear and tear and long service of the plant. Add to the above defects in the ventilating systems of these ships, economy of power, or fuel, and the air deliveries of the various louvers of the ships fall far below the original amounts stated in the specifications. With the above defective systems plus economy we also have difficulty in maintaining proper temperatures in severe winter weather.

Venereal disease.—In this modern day of increased discussion and prophylactic measures for the prevention of venereal disease we no longer see a report from one of our ships, of "no venereal disease for the year" as occurred in some ships in the past on the Asiatic station with the administration of regular navy prophylactic measures together with rigid enforcement of the same. Which is the better of the two standard measures used in the prevention of these diseases is of course a matter of opinion, each having its own merits, depending on time and place of exposure. Many medical officers state that there is practically no way of proving whether the men have used the prophylactic tube or not, there being considerable lack of care and cooperation on the part of the men. One of the medical officers of a large ship states that his experience over a period of six months has been wholly unsatisfactory. While he continues to issue the tubes, he says the old form of prophylaxis will be made compulsory on return from liberty, as there is no way of checking up whether or not the tube treatment was taken other than by the word of the man. In my various inspections I have laid stress on providing both methods of prophylaxis as advised by the bureau. It is interesting to note the following contents of the sanitary report of the U. S. S. *Rappahannock:* "Upon arrival at Panama City, after several weeks at Guantanamo, without general liberty, the commanding officer gave a talk to the whole crew assembled at quarters. He especially cautioned them as to the dangers of venereal diseases and the prevalence of these diseases in Panama City, urging all to avoid exposure. No mention was made of the medical prophylactic measures. When the liberty party assembled a few hours later, however, more than half had secured prophylactic packets from the dispensary and others reported for prophylactic treatment upon their return after a five-hour liberty ending at 6 o'clock p. m." It seems doubtful if the rate of exposure, or intended exposure, would have been greater without the "lecture." Nevertheless, whatever the reason, the fact remains that the rate of venereal disease for the year for many of the ships of the Scouting Fleet has been reduced. This is due largely, perhaps, to their return from duty in Turkish waters, where the rate at times is extremely high.

Mess gear.—There is marked improvement in the attention given to this, as shown in the reports and inspections, doubtless due to better knowledge of material as set forth in the fleet surgeon's report for the fiscal year 1923. Medical officers and assistants have learned that bubbling water, due to escaping steam, is not the boiling water necessary for sterilization, falling far below that in actual temperature. There are quite a few "Niagara" dishwashers in the fleet and with thermometer readings are used satisfactorily. Those having the older dishwashing type are making efforts to procure the "Niagara," the liberal installation of which would greatly reduce respiratory diseases.

Wash buckets.—Attention is directed to the dangers of the common wash bucket now so universal on crowded ships. In several of the reports medical officers draw attention to the use of one bucket by several men for bathing themselves and washing their clothing and sometimes for brushing their teeth. An interesting investigation by the medical officer of the *Florida* shows such to be the case. His investigation showed the number of buckets on board in relation to the number of men on board, 350 buckets being in use by the deck force made up of approximately 752 men or about one bucket for every two men. In the engineer's force there were found 160 buckets to a force of 308 men, or about two men per bucket. Herein is still further explanation of the causes for epidemics.

Ship inspections.—The inspections of the medical departments of the ships of the Scouting Fleet are constantly being held at every opportunity unannounced. By the order of the commander, Scouting Fleet, the commanding officer of each ship visited is informed that the visit is unofficial. Nearly every ship of the fleet has been so inspected when the opportunity presented itself and the coming week will suffice for the inspection of the remaining few. My recent inspections of the ships were a pleasant duty, much varied and instructive. The traditional high standard of the Medical Corps carries on and one feels a pride and honor in reviewing the respective departments of these officers. Many vital suggestions were made, the most important being reiterated in annual reports. From all this I have tried to corral and set down those which I feel should and undoubtedly will be acted on favorably.

Not only was the medical department inspected at such times but the questionnaires in the regular inspection reports were gone into, such as those bearing on living conditions, berthing, etc. A tally on complement and billets in the ships of the fleet showed no overcrowding except on the *Wyoming*, *Arkansas*, *Florida*, and *Utah*. There is always the explanation for this error of hygiene and sanitation that increased complement is necessary to operate modern fire control, and so the overcrowding remains, which, added to the effect of fuel economy with curtailed ship's comfort, makes a sad impression of the service when constantly fed to the crew, especially new recruits.

Hospital Corps.—Never in its history has the fleet operating in the Atlantic been so blessed with a sufficiency of hospital corpsmen. Effort toward this end dates back to when not only was there operative shortage but men of lower ratings were sent to the destroyer squadrons. Again, men were detached without a standby replacement stepping in, and so valuable property was often left uncovered. Action by the fleet commander has brought about not only complete authorized complements of rating but at this writing we have an excess of some 50 hospital corpsmen, about 30 of whom are hospital apprentices detailed on the hospital ship and ships with a "hospital ship annex," as the *Bridgeport* and *Denebola*, where they are getting an excellent schooling. It is gratifying to have extra men in this important branch as it enables sending one to relieve another a month before detachment, thus permitting proper training in new duties and the safeguarding of medical department property. Not least important is the fact that it is well to have such an excess in this fleet while operating in these waters, for my experience has shown that they are a most valuable asset when the usual revolutions are being staged.

As a type, judging from sanitary inspections, the destroyer squadrons of the fleet are efficiently served. The medical department of each is in charge of either a chief pharmacist's mate or a pharmacist's mate, first class. Never has the percentage of chiefs been so great, and this is as it should be, for no ship of the Navy with a valuable personnel should go to sea without an experienced man in charge of the medical department. During and especially after the World War, the destroyer class was not a popular duty with chief pharmacist's mates, but by assisting them in getting better allotted compartment space, more supplies, and by encouragement, it is gratifying to find that destroyer duty is becoming popular with chief pharmacist's mates. The thoroughness and interest in their duty shown by these men, together with their comments and investigations shown in the sanitary reports, are most satisfactory. A few have for some time been zealously and regularly studying medicine and surgery. These men have the firm support of every medical officer with whom they serve. The advantage of having a chief pharmacist's mate do a tour of independent duty on a destroyer lies in the fact that he is to a certain extent thrown on his own responsibility, with the advantage that it stimulates his ingenuity and ability, and makes him a more valuable assistant to a medical officer when later he is again so associated. It has been most gratifying to find in most inspections of the medical activities of the destroyer class the excellent condition of their departments and the interest displayed and the favorable comments of commanding officers. Such excellence and special service should appear on the individual's record and count toward the further selection for pharmacist.

Hospital ship.—A tour of inspection of the *Mercy* brought up much of interest. The efficiency of the staff and corps is excellent and quite able to cope with a full capacity of sick or wounded received at any time from the fleet. This refers to the personnel, to the medical, surgical, and dental supplies, and to the cleanliness which was also excellent. As all medical inspections of the fleet are made without any forewarning the value of the above statement is seen. In regard to the ship itself I quote from my " Comment report " on review of " Report of Inspection of Material, 1923;" " Not a Navy type hospital ship. The original large amount of installed woodwork together with the gradual increase of construction of wooden compartments by the ship's force are in my opinion a dangerous fire menace, and should not be a structural feature of any hospital ship, especially military. A very serious condition might result with full occupancy of sick and wounded during a fire on board at sea. However, expenditures for such alterations had best be applied to construction of a recent type hospital ship as such would ultimately be best economy." There are no water-tight compartments and practically no artificial ventilation. There are 12 recommendations in this ship's sanitary report for 1923, all of which are important and should be properly attended to if the ship continues on her errrand. "In the isolation wards, six in number, the ventilation is found to be poor in the Tropics. The four center wards of this section have a fore and aft bulkhead separating them, thus giving a closed effect without ventilation across the ship. It is considered that the port and starboard wards of these four should be converted into one ward by the removal of the wooden bulkhead thus giving greater and a better lighted space and better ventilation." Ventilation and water are of paramount importance and if this ship is not replaced by a properly built type of hospital ship, then special first consideration should be given to these matters. "The ship has not at present sufficient evaporator capacity to be self-supporting and the problem of having sufficient fresh water for a hospital ship is serious. New evaporators to make the ship self-supporting have been recommended." There is need of an additional dental surgeon on the *Mercy* and although the cammander, Scouting Fleet, in circular ltter of 27 November, 1923 (P2-5(1262)) directed that "Division and medical officers shall see that all men requiring dental treatment, eye examinations, glasses for the correction of vision, and those requiring removal of tonsils promptly to attend to same before departure of fleet for southern waters," nevertheless this could not be accomplished as per routine. The inadequate force of dental surgeons is swamped with neglected dental wark. Following a conference on the *Mercy*, a request was sent to the Bureau of Navigation for two dental surgeons with portable equipment to arrive by first public conveyance. Unfortunately a reply was received that no dentists were available.

It is recommended that the hospital ship remain in closer touch with the fleet in future maneuvers as much comment has been expressed regarding her need at times prior to arrival at base. While it is true that during the recent World War the hospital ship as a type did not function as planned, because hospital ships were not protected from attack; and while war problems should simulate actual conditions it is regrettable to have the hospital ship either at one end of the line or the other. It is under the above conditions, and when squadrons operate alone with their respective tenders, that the *Bridgeport* and *Denebola* play the part of a "hospital ship annex." The actual surgical and medical work performed by these ships is far in excess by actual record of any ship of this fleet other than the *Mercy*. It is to be regretted that the one-time appropriation at the close of war to carry out approved plans for a moderate hospital plant on the U. S. S. *Bridgeport* was turned in. This plan dealt with the port side of the bunk-house deck, which is still easily available and the plan should be carried out now that the ship remains commissioned and is carrying on such extensive medical and surgical activities. Given the equipment, the ship's force could install the same and thus save most of the sum once appropriated. One hundred and two operations (nose, throat, and eye) were performed on this ship during the past year. Extension of the medical department of the *Denebola* also applies, as this ship performs a like duty. It has always been necessary in order to properly care for the patients on these ships for the fleet surgeons to supply them with extra hospital corpsmen, as their authorized allowance simply can not handle the situation and so at the present time they are granted an excess over authorized complement. It will be seen by analysis that the authorized complement of hospital corpsmen for the actual complement of the ship is quite correct, but it is readily seen that no thought has been given by the department to the excess medical care and attention thrown on these ships by being, as I have stated, "hospital ship annexes." I recommend that a more liberal Hospital Corps allowance be authorized to support the good work or leave the remedy of supply, as in the past, in the hands of the fleet surgeon.

Refrigeration.—On the larger types of ships cold storage is being carried on successfully, but too often refrigerating machines fail to produce cold drinking water in sanitary scuttle butts or to make sufficient ice for water coolers. In my recent inspection of the hospital ship *Mercy* I was much interested and impressed with the work of the commercial "Kelvinator" or "electric refrigeration." It is easily installed in the ice compartment of any refrigerator, taking the place of a block of ice. The comfort and satisfaction to say nothing of the eventual economy were a revelation. Some of the officers' messes in the fleet have purchased this type of apparatus and in the case of the *Mercy* four units were presented to the ship, together with other necessities, by the "Daughters of the American Revolution." I think it a most unfortunate thing that we need be supplied by outside sources with any of the necessities to human comfort or be compelled to purchase the same. I took a similar stand at the medical conferences in the fleet during the war and thought it a sad commentary on the Medical Corps of the Navy, a medico-military organization of long experience, to permit themselves to accept medical supplies from the Red Cross rather than from the established organization on regular form. It seemed to admit inadequacy when nothing of the sort existed.

Inspection of the destroyers showed some 50 per cent of the ice boxes not being refrigerated sufficiently to permit long preservation of fresh food. On such ships the "Kelvinator" would be a boon. I urgently recommend the replacing of the many sad types of destroyer ice boxes by the above perfect economy in refrigeration.

Ration.—It is most gratifying to find in the yearly reviews in reports of the Surgeon General, also in the individual sanitary reports of each ship, for the past two years almost no criticism in a general way of our Navy ration. The few instances of spoiled food reported are within the percentage to be expected in the food supply of any large establishment, and it is found that the real type of Navy man takes pride in showing and explaining the ration and messing system of our supply department. Each year shows a steady advance with some addition or improvement of ration. In general it never retrogrades.

Medical, surgical, and dental supplies.—The medical, surgical, and dental supplies furnished by the naval medical supply depot at Brooklyn have occasioned for the past two years general reports of satisfaction from all ships of the fleet. It is most interesting to note in the individual reports of medical officers invariably the statement that the supplies are either ample, sufficient, satisfactory, adequate, excellent, or standard, all expressions tending to show that they are all that could be desired. Here again the department can stand on its pride. By having such universal satisfaction in a department of a ship much reporting, fault finding, and adverse criticism is eliminated.

COMMENT BY THE COMMANDER OF THE SCOUTING FLEET

Rear Admiral N. A. McCully, United States Navy, commander of the Scouting Fleet, commented upon conditions discussed in the report as follows:

"Overcrowding the living accommodations of vessels, particularly battleships, continues. These conditions are not conducive to either proper living conditions or efficiency. It is claimed that all the men are needed. It creates another argument for conversion of older battleships into oil burners, and for alterations of secondary battery of *Utah* and *Florida* both to give more living space and for increased efficiency in other respects.

"Repeated efforts have been made to provide proper means for men to wash and bathe themselves, but without effect. Deck buckets continue to be used, and will be until better means are provided."

The report is well thought out and based on practical observation.

COMMENT BY THE COMMANDER IN CHIEF, UNITED STATES FLEET

In forwarding the report to the Bureau of Medicine and Surgery, Admiral R. E. Coontz, United States Navy, commander in chief of the United States Fleet, commented upon the report as follows:

"The commander in chief fully realizes the conditions regarding the living accommodations on battleships. We are, however, confronted with certain conditions and facts which we must face until we reach opportunity to better these conditions either as stated in paragraph 2 of first indorsement—converting old battleships into oil burners and reducing secondary batteries—or, as we must do later on, build new battleships. Navies exist for certain purposes and those purposes must be met and conditions coordinated as best we can to meet them. In other words, sanitary conditions must be made the best military necessities will permit."

EPIDEMIOLOGICAL OBSERVATIONS BY THE SENIOR MEDICAL OFFICER, UNITED STATES NAVAL TRAINING STATION, HAMPTON ROADS, VA.

Sanitary conditions on the training station have been on the whole satisfactory for the month of April. The epidemic of measles which commenced last November and reached its peak in the last week of December has entirely disappeared, and mumps has greatly diminished, there being but 36 admissions for this disease during the month of April as against 81 for the preceding month. Mumps appears to be the most difficult of all communicable diseases to control, as the infection is present before any symptoms are manifested, and it is next to impossible to determine contacts and establish a quarantine. If one attempted such a procedure with mumps the whole command would be in quarantine and nothing practical would be gained. A medical officer is perhaps warranted in recommending that all be exposed to this disease and have it over with at once instead of a long drawn out affair extending over a period of months, much to the annoyance of all concerned. However, to seriously advocate such practice would be considered entirely too radical even with a disease in which the mortality is nil, but in a military service I am not so sure but that it would work to a practical advantage. At any rate I am at a loss to find any efficacious means of preventing mumps once an epidemic is started.

Sterilizing mess gear and mouthpieces of drinking fountains has been done, and free ventilation of barracks and class rooms has been adequately carried out, together with daily airing of bedding. Attempts at early detection of the disease have been made, and infected individuals have been promptly isolated, but it is doubtful in my mind if these measures resulted in any real prevention, or else the epidemic would have terminated more abruptly. As things stand, mumps is gradually dying out and will in all probability disappear as the expected season of mild weather and opportunities for open-air living advance.

One case of diphtheria was admitted from the detention unit. The recruit having this disease enlisted at Louisville and had been on the station less than 48 hours. Schick tests were done immediately on the personnel of the entire unit, and 20 found to be susceptible were given diphtheria toxin-antitoxin. Most all of these had reactions more severe than those usually observed which was attributed to the recent administration of antityphoid vaccine. No more cases of diphtheria have developed. A case of scarlet fever developed in one under training in the electrical school. The patient had not been on liberty for a month and there had been no previous recent cases on the station. The Norfolk Board of Health reported but one case in the city and that in a residential section quite beyond range of probable contact for enlisted men. This man's bungalow and classmates were put in quarantine for two weeks from the date of contact and no further cases developed. Where this case was contracted I am unable to determine. All milk and ice cream permitted for sale or delivery on this station are examined as a matter of routine semiweekly and have shown bacterial counts of less than 100,000 per c. c. Hemolytic streptococci were not present.

Admissions for venereal diseases combined totaled 22. Of these, 16 were gonococcus infection, 4 chancroid, 2 syphilis. The following table has been prepared from data on all admissions for venereal disease since February 1 of this year:

Admitted with gonococcus infection (alcoholic indulgence, 12)	73
Admitted with chancroid (alcoholic indulgence, 2)	8
Admitted with syphilis (alcoholic indulgence, 0)	2
Used prophylactic tube within 30 minutes	23
Used prophylactic tube within 30 and 60 minutes	•2
Used prophylactic tube after 1 hour	21
Contracted gonococcus infection prior to enlistment	12
Contracted chancroid prior to enlistment	2
Contracted gonococcus infection, used tube	41
Contracted chancroid, used tube	4
Contracted syphilis, used tube	1

As there is a "free gate" for liberty parties and the prophylactic tube is used exclusively there are no data on the number of exposures. However, I believe the tube has undoubted value as a prophylactic. The following formula of the contents, obtained from the medical supply depot, Brooklyn, seems to me to be sufficiently germicidal—

	Parts
Calomel	33
Camphor	2
Phenol	3
Lanolin anhydrosis	39
Benzoinated lard	20
Beeswax	3

but I am convinced that it is not sufficiently prophylactic for gonorrhea, in that the contents can not or do not get into the urethra far enough to reach all points of infection. Gonorrheal infection of the urethra occurs in a purely mechanical way. The infected secretions being aspirated exactly as a pipette draws up liquid, the compressible elastic urethra functioning as the bulb, and the primary infection may be distributed along the entire length of the bulbous urethra though usually it is not more than 2 or 3 inches from the meatus. Therefore, I believe that the principal defect in the present tube is the short tip which does not permit the germicide to reach all infected parts. As a constructive criticism it is suggested that the contents of the tube be less viscid or the tip be capped with a small rubber tube 3 inches in length.

EXTRACT FROM THE ANNUAL SANITARY REPORT, SUBMARINE BASE, PEARL HARBOR, HAWAII—VENEREAL DISEASE HAZARDS

The venereal question at this station is hard to handle and peculiar to the islands. The amount of recreation ashore for the enlisted men is rather meager. All sports and athletic activities are available in the most favorable way for any man who cares to participate. Interboat and interunit competition are given the largest support. Baseball, football, basketball, tennis, swimming, and boxing are all indulged in, and some sort of athletic activity is demanded of each man, under careful and trained supervision.

Yet, with all this, the association with clean white women ashore, so much desired by men of the age of the average enlisted man, is not easily available. They fall back to cheap dance halls and parks for amusement, where Filipino, Portuguese, and the darker-race girls of low morals congregate. This leads to much venereal disease. As an example—

The Liberty Dance Hall proved by statistics to be a source of much gonorrheal and chancroidal infection, but more especially syphilis. The medical officer personally visited the place; also obtained the opinion of officers who did patrol duty ashore and were requested to watch it. It is a large, open, barn-like structure, used for a dancing pavilion, harboring the lowest type of dark races, where liquor is sold below and cocaine and morphine and other drugs are either sold or given in small quantities to the uniformed men to start the drug habit. This condition was reported to the commanding officer of this station by letter and the place visited by local police; was closed for two days, but was soon reopened and is now flourishing.

Lectures and talks concerning venereal diseases and precautions are given periodically to the crew. The increase in venereal diseases incident to the arrival of the ninth division of submarines at this station has somewhat subsided and the conditions are improving.

Motion-picture shows are given each night in an open-air theater, and boxing bouts at least once a month. Tennis courts are being constructed and a baseball field is available. A swimming pool of fresh water is available in the navy yard near by, and at the end of the U. S. S. *Seagull* pier a diving platform has been erected, and in this way clean amusements are kept always and attractively open to the personnel. A dance is given about once a month for the crew in the base mess hall.

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO JUNE, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and June 30, 1924, notified injuries and poisonings as follows:

	Within command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work or prescribed duty		
Injuries	1,642	809	431	2,882
Poisonings	11	90	15	116
Total admissions	1,653	899	446	2,998

Of these admissions, 85.12 per cent were for injuries or poisonings occurring within the command, and 14.88 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 64.78 per cent were connected with actual performance of prescribed work or duty, and 35.22 per cent were not so connected. Of the total admissions for injuries and poisonings only 55.14 per cent were connected with the actual performance of work or prescribed duties; i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases are worthy of notice from the standpoint of accident prevention:

Ship.—Injury to an eye, resulting in unilaterial blindness, caused by bursting of a gauge glass not protected by a safety device.

Station.—Burn of hand and forearm due to carelessness in lighting a match while the hands were covered with gasoline. In spite of the universal knowledge that gasoline is inflammable and explosive, injuries resulting from lighting matches in the presence of gasoline continue to be reported.

Ship.—Wound of finger incurred by finger being caught in machinery while closing valve on engine.

Battleship.—Fracture of the leg near the knee joint. Trolley transporting a 16-inch shell ran off track, the shell crushing knee against bulkhead.

Battleship.—Wound, left forearm. While attempting to catch a hoisting hook used to fasten to and permit the hoisting of seaplane aboard, patient accidentally put his arm close enough to the *unprotected*, radiogenerator propeller to be struck. Twenty-seven sick days resulted.

Two other radio-propeller accidents, both involving the fingers of the right hand, were reported during the month. In each report the lack of a safety device was recorded.

Destroyer.—Foreign body in eye caused by bursting of a gauge glass made of clinker glass which is supposed to be a safety glass.

Ship.—Man slipped and fell into hold while scrubbing mess hall. It was reported that there were no means provided to prevent falls of this character. Eight sick days resulted.

Air station.—A marine incurred a wound of left hand while handling an automatic pistol. He had removed clip from pistol and then pulled the trigger before emptying the chamber.

It is difficult to understand why accidents of this nature should continue to occur in a military service, yet few months pass without one or more cases being reported.

Battleship.—Accident due to the absence of light. A man was descending a ladder into a compartment where no light was burning. He slipped and fell on the ladder, incurring an abrasion of the side of the body.

Torpedo station.—Burn of chest and abdomen caused by the ignition of kerosene placed too near the galley range. Negligence of others was reported, the gravity of which is greatly enhanced by the fact that the careless act occurred on an ammunition lighter.

The Form F card in the case of one of the aircraft radio generator propeller accidents was accompanied by a letter from the senior medical officer of the U. S. S. *Wright*, containing the following remarks:

As this injury has occurred a great many times during the last year and in this squadron we have had within the last two weeks three of them, I deem it necessary to bring the matter to the attention of the Bureau of Medicine and Surgery.

A number of these accidents occurred in the squadron during our trip to Panama and during the summer maneuvers of 1923. The medical officer of this squadron made a recommendation that some sort of safety device be constructed which would not only serve as a warning, but actually prevent these injuries. Accidents are caused by the radiogenerator which is now located between the after engine bearer struts behind the propeller. Formerly these generators were located near the entering edge of the top wing but in order to enable a plane to use the radio on the water, they were removed to the after struts to be able to set them in motion with the propeller. It was suggested by the medical officer that they be moved to the forward struts. This was considered inadvisable by the radio experts, who stated that the blast of the propeller was too strong and would shake the generator, thereby causing damage to its delicate machinery. As the radio experts considered it inadvisable and impracticable to move the generators to any other location, a piece of wire mesh was put close to one side of the propeller. This safety device at the time of installation seemed to the medical office entirely inadequate, as it has since proved to be, for, with this device in place, the squadron has had three radio-propeller accidents during the last two weeks.

When a number of men are being constantly injured in the same manner, it becomes the duty of the medical officer to bring the matter to the attention of the bureau in the department under whose jurisdiction such matters belong, especially when the medical officer believes that such accidents can be avoided. It is furthermore his duty to make such suggestions as he believes will be useful to the bureau in formulating plans to prevent such accident in all aviation units. It is therefore suggested—

(1) That the Bureau of Medicine and Surgery consult the Bureau of Engineering to determine if these generators can not be installed at some other part of the plane.

(2) If this can not be done, that the radio propeller be inclosed in a wire cage, the cage being so constructed as to make it impossible for anyone to touch the blade while in motion. If this device does interfere slightly with the efficiency of the plane, then the efficiency of the plane must suffer at the expense of human lives and injuries; the vice versa is only justified in extreme emergencies.

(3) If this cage is not satisfactory, perhaps some one in one of the departments of the Navy can construct some device which will not interfere with the efficiency of the plane and at the same time prevent these mutilating injuries.

(4) It is recommended that the Bureau of Medicine and Surgery bring this matter to the attention of the respective bureaus concerned.

This medical officer has taken up this subject with the commander, aircraft squadrons, Scouting Fleet, who is taking steps to construct some sort of installation for the prevention of these accidents. If this device, after being tried, proves successful, the bureau will be informed.

NOTE RELATING TO MOSQUITO CONTROL AND USE OF NITRE CAKE AS A LARVICIDE AT THE NAVAL OPERATING BASE, HAMPTON ROADS, VA.

The following remarks are taken from the report of the Sanitation Division, Medical Department, United States naval training station, Hampton Roads, Va., for May, 1924:

Mosquito control has been very difficult this month, owing to the almost constant rain, which converted all small pools into lakes. Larvæ were discovered in several of these where the niter cake content was diluted below the larvicidal point. These places were immediately brought up to the lethal point. Crude oil was used on all small temporary puddles, and all traps, drains, concrete boxes, and other small containers were treated with a film of crude oil each week, particular attention being given to all street drains after each rainy spell. Fire buckets were inspected regularly, and persons in charge were notified to change the water once a week. No larvæe have been found in fire buckets so far, but some of them contain much trash, indicating that they have not been changed.

During August, 1923, niter cake in solutions varying in strength from saturation to 0.3 per cent were tried out by this division against Culex larvæ and pupæ to determine its value as a larvicide.

It was found that a 0.7 per cent solution killed all larvæ in 24 hours, but that pupæ were much more resistant and a 10 per cent solution was necessary to prevent them from maturing into mosquitoes.

In practical field work strong solutions are necessary; approximately 1 pound of niter cake to the gallon of water. There is a constant loss of niter cake by seepage in the sandy soil of this region, and frequent rains quickly dilute the larvicide below the minimum lethal percentage. In semipermanent pools where fish can not be maintained and where vegetation or wind prevents the maintenance of the proper coating of oil, niter cake has its greatest usefulness.

HEALTH OF THE NAVY

This report is for the month of August. The general admission rate, based on admissions to the sick list for all causes, was 621 per 1,000 per annum, an increase of 23 per cent over the rate of the previous month. The median August rate for the preceding five years is 545. However, only a small part of the increase is accounted for by communicable diseases and common respiratory diseases. The rate for class VIII–(A) diseases increased from 14 to 18 admissions per 1,000 (annual basis) for the month, and for class VIII–(B) diseases the admission rate increased from 53 to 62 per 1,000 per annum.

Admission rates in general were favorable as is to be expected during the summer season.

The following table shows admission rates per 1,000 per annum for the principal communicable diseases, August, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive:

	August, 1919–1923	August, 1924
Cerebrospinal fever	0	0.20
Diphtheria	.73	.10
German measles	.61	.40
Influenza	11.74	9.18
Malaria	25.72	10.40
Measles	1.52	2.83
Mumps	11.71	3.03
Pneumonia	3.50	2.02
Scarlet fever	.70	.50
Smallpox	0	0
Tuberculosis (all forms)	3.94	2.22
Typhoid fever	.14	.10

VITAL STATISTICS

The Monthly Health Index, which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the Monthly Health Index.

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$, or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

TABLE No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of August, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	77,815	41,075	118,890	21,170
All causes:				
Number of admissions	2,936	2,126	5,062	1,030
Annual rate per 1,000	452.76	621.11	510.91	632.50
Disease only:				
Number of admissions	2,574	1,917	4,491	941
Annual rate per 1,000	396.94	560.05	453.28	577.24
Communicable diseases, exclusive of venereal disease:				
Number of admissions	596	480	1,076	252
Annual rate per 1,000	92.91	140.23	108.60	154.74
Venereal diseases:				
Number of admissions	1,124	357	1,481	227
Annual rate per 1,000	173.33	104.30	149.48	139.40
Injuries:				
Number of admissions	358	208	566	89
Annual rate per 1,000	55.21	60.77	56.12	55.26
Poisons:				
Number of admissions	4	1	5	1
Annual rate per 1,000	.62	.29	.50	.61

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of August, 1924*

	Forces afloat, Navy and marines (strength, 77,815)		Forces ashore, Navy and marines (strength, 41,075)		Total (strength, 118,890)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases	2,574	396.94	1,917	560.05	4,491	453.28
Injuries	358	55.21	208	60.77	566	56.12
Poisons	4	.62	1	.29	5	.50
Total admissions	2,936	452.77	2,126	621.11	5,062	510.91
Class II:						
Varicocele	7	1.08	13	3.80	20	2.02
Class III:						
Appendicitis, acute	36	5.55	50	14.61	86	8.68
Autointoxication, intestinal	6	.93	8	2.34	14	1.41
Cholangitis, acute	22	3.39	15	4.38	37	3.73
Cholecytitis, acute	1	.15	4	1.17	5	.50
Cholelithasis	0	0	1	.29	1	.10
Colitis, acute	7	1.08	2	.58	9	.91
Constipation	6	.93	13	3.80	19	1.92
Enteritis, acute	65	10.02	35	10.23	100	10.09
Gastritis, a cute catarrhal	13	2.00	15	4.38	28	2.83
Gastroenteritis	29	4.47	34	9.93	63	6.36
Hemorrhoids	22	3.39	27	7,89	49	4.95
Ulcer, duodenum	1	.15	3	.88	4	.40
Ulcer, stomach	2	.31	1	.29	3	.30
Total	210	32.38	208	60.77	418	42.19
Class V:						
Pharyngitis, acute	4	.62	9	2.63	13	1.31
Rhinitis, acute	4	.62	0	0	4	.40
Total	8	1.23	9	2.63	17	1.71
Class VIII (A):						
Cerebrospinal fever	2	.31	0	0	2	.20
Chicken pox	7	1.08	5	1.46	12	1.21
Diphtheria	0	0	1	.29	1	.10
German measles	3	.46	1	.29	4	.40
Influenza	58	8.94	33	9.64	91	9.18
Measles	24	3.70	4	1.17	28	2.83
Mumps	13	2.00	17	4.97	30	3.03
Pneumonia, broncho	2	.31	0	0	2	.20
Pneumonia, lobar	12	1.85	6	1.75	18	1.82
Scarlet fever	1	.15	4	1.17	5	.50
Whooping cough	0	0	1	.29	1	.10
Total	122	18.81	74	21.64	196	19.78
Class VIII (B):						
Angina, Vincent's	30	4.63	32	9.35	62	6.23
Bronchitis, acute	86	13.26	56	16.36	142	14.33
Catarrhal fever	103	15.88	39	11.39	142	14.33
Tonsillitis, acute	188	28.99	92	26.88	280	29.26
Total	407	62.76	219	63.98	626	63.18
Class IX:						
Dysentery, bacillary	0	0	2	.58	2	.20
Dysentery, entamebic	2	.31	4	1.17	6	.61
Pappataci faver	2	.31	0	0	2	.20
Typhoid fever	0	0	1	.29	1	.10
Total	4	.62	7	2.05	11	1.11
Class X:						
Dengue	38	6.86	79	23.08	117	11.81
Filariasis	0	0	1	.29	1	.10
Malaria	19	3.93	84	24.54	103	10.40
Total	57	9.79	164	47.91	221	22.31
Class XI:						
Tuberculosis (all forms)	6	.93	16	4.67	22	2.22

TABLE No 2.—*Number of admissions reported by Form F cards for certain diseases for the month of August, 1924*—Continued

	Forces afloat, Navy and marines (strength, 77,815)		Forces ashore, Navy and marines (strength, 41,075)		Total (strength, 118,890)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class XII:						
Chancroid	303	46.73	73	21.33	376	37.95
Gonococcus infections	735	113.34	214	62.52	949	95.78
Syphilis	86	13.26	70	20.45	156	15.75
Total	1,124	173.33	357	104.30	1,481	149.48
Class XVIII:						
Pleurisy, acute fibrinous	2	.31	3	.88	5	.50
Class XX:						
Herniæ	37	5.71	18	5.26	55	5.05

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for July, 1924, and from various shore stations for the four-week period, August 3–30, 1924*

	Annual rate per 1,000, July, 1924			Average rate since Jan. 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	223.81	1,647.05	0	189.64	862.28
Battleship divisions:						
Battle Fleet	46.55	149.79	259.14	76.96	134.50	245.83
Scouting Fleet	82.76	344.20	556.41	98.74	191.81	264.61
Asiatic Fleet [1]	180.00	421.56	1000.00	189.47	417.85	616.14
Light cruiser division:						
Scouting Fleet	27.59	170.84	445.41	107.00	192.13	410.93
Destroyer squadrons:						
Battle Fleet	0	136.07	555.56	16.62	148.40	277.28
Scouting Fleet	0	107.82	558.14	17.65	173.83	444.44
Asiatic Fleet [1]	0	697.67	1,647.05	185.33	465.97	862.28
Miscellaneous: [2]						
Battle Fleet	0	143.79	1,000.00	54.22	170.42	265.49
Scouting Fleet	0	172.16	895.52	0	182.98	406.25
Asiatic Fleet [1]	0	257.59	1,080.00	21.02	329.61	523.49
Naval forces, Europe	98.36	369.23	818.18	42.40	244.50	280.06
Special service squadron	76.92	301 58	553.85	69.22	238.93	293.68
Naval transportation service	0	178.02	436.36	53.17	167.07	273.86
Special duty	0	304.58	612.57	0	183.73	420.23

	Annual rate per 1,000, Aug. 3 to Aug. 30, 1924			Average rate since July 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	86.64	429.75	0	64.45	247.93
First naval district	0	32.85	82.11	0	29.67	102.67
Third naval district	0	43.16	77.06	0	52.34	88.37
Fourth naval district	0	49.11	67.32	8.47	47.72	63.11
Fifth naval district	0	93.87	161.29	0	79.46	122.53
Sixth naval district	62.83	85.99	327.73	47.99	73.58	170.78
Seventh naval district	0	0	0	0	0	0
Eighth naval district	106.18	146.22	429.75	98.25	116.80	247.93
Ninth naval district	89.73	89.73	89.73	71.79	71.79	71.79
Eleventh naval district	13.01	64.55	99.43	6.42	49.72	72.87
Twelfth naval district	0	63.28	83.80	16.11	51.54	63.10
Thirteenth naval district	0	141.03	213.99	64.86	99.80	142.86

[1] Month of June, 1924. [2] Vessels of train, base force, etc.

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for July, 1924, and from various shore stations for the four-week period, August 3–30, 1924*—Continued

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASES

	Per cent, July, 1924		Per cent since Jan. 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	69.28	5.85	61.85	8.06
Battleship divisions:				
Battle Fleet	81.11	8.33	70.83	10.96
Scouting Fleet	74.89	1.83	72.00	4.50
Asiatic Fleet [1]	47.95	24.66	45.98	16.08
Light cruiser division:				
Scouting Fleet	78.79	0	53.11	7.34
Destroyer squadrons:				
Battle Fleet	93.65	1.59	68.03	6.56
Scouting Fleet	68.29	14.63	62.31	4.28
Asiatic Fleet [1]	40.00	2.76	51.21	6.75
Miscellaneous:[2]				
Battle Fleet	71.43	15.71	60.49	9.88
Scouting Fleet	70.37	1.85	58.10	5.26
Asiatic Fleet [1]	27.59	20.69	37.55	8.81
Naval forces, Europe	70.83	6.25	55.84	7.89
Special service squadrons	67.44	0	68.84	3.72
Naval transportation service	66.10	5.08	60.41	7.62
Special duty	86.41	3.88	72.08	8.24

	Per cent, Aug. 3 to Aug. 30, 1924		Per cent since July 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All naval districts in the United States	72.57	9.71	71.25	14.06
First naval district	100.00	0	88.89	11.11
Third naval district	100.00	0	83.33	12.50
Fourth naval district	70.00	10.00	80.00	5.00
Fifth naval district	62.34	15.58	62.59	18.71
Sixth naval district	55.56	0	65.38	0
Seventh naval district	0	0	0	0
Eighth naval district	100.00	0	89.47	0
Ninth naval district	100.00	0	92.56	7.44
Eleventh naval district	100.00	0	91.30	8.70
Twelfth naval district	42.86	42.86	38.46	46.15
Thirteenth naval district	63.64	9.09	64.71	17.65

[1] Month of June, 1924. [2] Vessels of train, base force, etc.

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rate per 1,000 entire Navy, for the four-week period, August 3–30, 1924, inclusive*

	Navy (strength, 97,720)		Marine Corps, (strength, 21,170)		Total (strength, 118,890)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of blood	2	0.27	0	0	2	0.22
Diseases of circulatory system	37	4.92	16	9.83	53	5.80
Diseases of digestive system	340	45.33	108	66.32	448	48.99
Diseases of ductless glands and spleen	5	.67	4	2.46	9	.98
Diseases of ear	231	30.73	59	36.23	290	31.71
Diseases of eye and adnexa	30	3.99	23	14.12	53	5.80
Diseases of genito-urinary system (non-venereal)	80	10.64	27	16.58	107	11.70

Table No. 4.—*Number of admissions reported by Form F cards and annual rate per 1,000 entire Navy, etc.*—Continued

	Navy (strength, 97,720)		Marine Corps, (strength, 21,170)		Total (strength, 118,890)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Communicable diseases transmissible by—						
Oral and nasal discharges (A)	152	21. 22	32	19. 65	184	20. 12
Oral and nasal discharges (B)	484	64. 39	101	62. 02	585	63. 97
Intestinal discharges	4	. 53	5	3. 07	9	. 98
Insects and other arthropods	102	13. 57	113	69. 39	215	23. 51
Tuberculosis (all forms)	20	2. 66	1	. 61	21	2. 30
Venereal diseases	1, 166	155. 11	227	139. 40	1, 393	152. 32
Other diseases of infective type	174	23. 15	79	48. 51	253	27. 67
Diseases of lymphatic system	50	6. 65	11	6. 75	61	6. 67
Diseases of mind	33	4. 39	10	6. 14	43	4. 70
Diseases of motor system	67	8. 91	24	14. 74	91	9. 95
Diseases of nervous system	13	1. 73	7	4. 30	20	2. 19
Diseases of respiratory system	33	4. 39	11	6. 75	44	4. 81
Diseases of skin, hair, and nails	59	7. 85	27	16. 58	86	9. 40
Herniæ	48	6. 39	4	2. 46	52	5. 69
Miscellaneous diseases and conditions	50	6. 65	25	15. 35	75	8. 20
Parasites (fungi and certain animal parasites)	37	4. 92	20	12. 28	57	6. 23
Tumors	13	1. 73	5	3. 07	18	1. 97
Injuries	387	51. 48	88	54. 65	475	51. 94
Poisoning	4	. 53	1	. 61	5	. 55
Dental diseases and conditions	17	2. 26	2	1. 23	19	2. 08
Total	3, 638	483. 96	1, 030	632. 50	4, 668	505. 40

Table No. 5.—*Deaths reported, entire Navy, for the four-week period, August 3–30, 1924, inclusive*

	Navy (strength, 97,720)	Marine Corps (strength, 21,170)	Total (strength, 118,890)
Appendicitis, chronic	1	0	1
Caisson disease	1	0	1
Malaria	0	1	1
Tuberculosis, chronic pulmonary	3	0	3
Malignant growths	1	0	1
Other diseases	5	2	7
Drowning	8	0	8
Injuries	9	3	12
Poisoning	2	0	2
Total	30	6	36
Annual death rate per 1,000, all causes	3. 99	3. 68	3. 94
Annual death rate per 1,000, disease only	1. 46	1. 84	1. 53

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CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY
IN CHARGE

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

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NAVY DEPARTMENT,
Washington, March 20, 1907.

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
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PREFACE

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

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

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

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit the Surgeon General of the Navy will send a letter of commendation to authors of papers of conspicuous merit and will recommend that copies of such letters be made a part of the official record of the officers concerned.

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

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

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

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

U. S. NAVAL MEDICAL BULLETIN

VOL. XXI NOVEMBER, 1924 No. 5

SPECIAL ARTICLES

MYCOSIS OF THE HANDS AND FEET

By C. S. BUTLER, Commander, J. E. HOUGHTON, Lieutenant, and G. F. COOPER, Lieutenant (j. g.), Marine Corps, United States Navy

The title of this paper, "Mycosis of the hands and feet," expresses our belief that several molds are implicated and not *Epidermophyton* alone. There were 12 genera involved in Greenwood's study in Boston (1), Sequeira, in his work on diseases of the skin, recognizes three species as being rather common in these lesions. They are *Epidermophyton cruris*, *E. perneti*, and *E. rubrum* (*Trichophyton purpureum*). These produce the condition which is known as "dhobie itch."

Kaufmann-Wolf (2), in addition to *Epidermophyton cruris*, quotes Sabouraud as having found *Microsporon lanosum*, *Achorion quinckeanum*, and *Trichophyton gypseum* also in these lesions. This author implies that *E. cruris* is common in the lesions as found in Berlin, Vienna, and Paris. White and Greenwood (3) make the statement that species of Epidermophyton and Trichophyton are usually found in Boston. In the observations made at the Naval Medical School, the fungi causing this dermatomycosis were found to belong to three genera: *Microsporon*, *Trichophyton*, and *Epidermophyton*. The term epidermophytosis is therefore not strictly speaking correct, as the name would imply that all forms of this disease are due to epidermophytons. We think it may be put down as correct that by long odds, the organisms chiefly involved in the production of lesions of the types under consideration are the same as those responsible for the so-called dhobie itch, crutch itch, intertrigo of the axillary space, and elsewhere. *Epidermophyton*, as distinguished from *Trichophyton*, does not grow on the hair nor in the shaft of the hair. These are the two genera chiefly involved.

The rôle played by the higher fungi in human pathology at the present time is given very little thought. Attention is devoted to the bacteria. Medical mycology (4) came into existence long before bacteriology. It may be said to have begun in 1839 when Langenbeck discovered the fungus of thrush, which was later named *Oidium albicans* by Charles Robin. Following Langenbeck's discovery, the fungus of ringworm was found by Gruby and Malassez in 1844. The discoveries of Pasteur and Koch brought bacteriology to the forefront and medical mycology was unfortunately overslaughed. Castellani estimates that 20 per cent more tropical infections are caused by fungi higher than bacteria. Medical mycology has not advanced very far. The classifications and methods of identification are hazy and the differences among the various genera are slight.

The types of lesions recognized by most dermatologists as produced by these organisms are: (*a*) The acute vesicular or bullous; (*b*) the intertriginous, and (*c*) the hyperkeratotic. Some others recognize a squamous type. A lardaceous type is also recognized by some authorities. These names are sufficiently descriptive, and one of the pictures will show examples of each of the several types. (See figs. 2 to 10.)

Geographical distribution.—The geographical distribution of eczematoid dermatitis of the hands and feet may be said to be worldwide. The experience of dermatologists in the United States shows its extreme prevalence in such widely separated places as New Orleans, San Francisco, Chicago, Washington, and Boston. As for Europe, the works of Kaufmann-Wolf, Sabouraud, Tilbury Fox, Hebra, and others show this complaint to be prevalent in England, France, Germany, Austria, and elsewhere. The studies of Castellani and those of medical officers in the armies and navies of different governments show the extreme prevalence of the complaint throughout all the tropical belt. It is probable that the World War served to supply to every nation participating such mycotic strains as they may not have formerly possessed.

EPIDEMIOLOGY

The name "dhobie itch" seems to attach etiological importance to the washerman, for that is what the name means. The idea has been prevalent that the spores of these organisms are transferred in the process of laundering, from infected clothes to those which are not so infected. In view of the extreme prevalence of this complaint in every country, and in view of the much more plausible method of transfer than by clean clothing, it is thought that the stigma which attaches to the washerman as a purveyor of epidermophytosis should be removed. There are no figures, so far as we know, showing the relative incidence of epidermophytosis as between men and women. Our observations have been made almost entirely upon men, but from talking with many dermatologists it is our belief that the condition is far more prevalent among men than among women; four to one in the Boston figures. This fact has its lesson in the matter of prophylaxis. Lesions are frequently seen on other parts of the body than the hands and feet, so that there is great chance of infection being conveyed by means of common wash basins, common towels, the ordinary bathtub, the seat of the toilet. It is potentially venereal. It requires no stretch of the imagination to conceive of the infection being transferred by shaking hands. When one considers the prevalence of lesions on the hands, it is remarkable that more people do not suffer from it than actually seems to be the case. Epidermophytosis should operate to discourage promiscuous handshaking. This disease often spreads in families and institutions, and it is very difficult to eradicate when it thus gains a foothold. It is of great importance to soldiers and sailors not only on account of the intimate contacts which are made in barracks and on board ship, thus enhancing the chance of transfer, but in many cases by reason of superadded infections (pus infections) of the soles of the feet, it is a very real menace to landing expeditions and to Infantry soldiers in general. Except through these superadded infections there is very little danger to life, but when we consider the chronicity of the infection and the fact that it may carry over in the intact skin from season to season, may last for a lifetime in this way, and upon occasion give rise to much irritation of the areas affected, its importance deserves widespread recognition. Gradually since about 1869 the importance of epidermophytosis has come to be recognized. Dermatologists at the present time are well aware of the damage it may cause and its great annoyance to those infected, but the general practitioner goes along and treats lesions of this character as if they were eczema, pompholyx, etc., with the result that the disease is not cured because it is never recognized for what it really is.

For the purpose of determining the incidence of hand and foot mycosis in the United States naval service, a survey of 500 individuals was made and the results tabulated as shown in the accompanying charts.

A questionnaire was devised and completed, not by the individual himself filling in the spaces, but by personally interviewing each person in regard to past history of ringworm infections, special stress being placed on present and previous crural infection. The following questions were asked: (1) Name, rate, corps; (2) place of birth; (3) tropical service; (4) how long; (5) where; (6) ringworm infections on the body; (7) location; (8) duration; (9) treatment, if any, and by whom; (10) lesions at present; (11) ringworm on hands and feet; (12) location; (13) duration; (14) treatment, if any, and by whom; (15) lesions at present.

If no history of hand or foot infection was claimed, each person was questioned as to previous "dhobie itch" and "Spick itch" infection. The vesicular and scaly lesions occurring on the hands and feet were described, as many of the men interviewed were not clear as to the meaning of the term "ringworm," when applied to lesions of the hands and feet. If a history of existing mycosis were elicited, the lesions were examined and, if they resembled any of the different types recognized, the man was asked to come to the laboratory for further study.

The survey was made among four groups of men—officers, marines, patients in the naval hospital, and enlisted men of the Hospital Corps. As several of the patients in the hospital were marines, and a few were Veterans' Bureau patients, Chart II shows them grouped in this manner.

In view of the chronicity of the lesions in a true mycosis, attention was given to duration in cases of doubtful history before classifying them as positive. If the individual stated that the condition had lasted only a few days and was cured by some simple remedy, his lesions were not considered to be of fungus origin. On the other hand, if they followed a crural or other ringworm infection, much more weight was given to their probable mycotic nature.

CHART I.—*Incidence of ringworm*

	Marines (293)	Patients in hospital (176)	Officers (11)	Hospital Corps men (20)	Total (500)
Tropical duty	69	79	9	9	166
Per cent	23. 5	44. 8	81. 8	45	33. 2
Ringworm other than hands and feet	65	31	2	6	104
Per cent	22. 2	17. 6	18. 1	30	20. 8
Ringworm on hands and feet	8	47	10	11	76
Per cent	2. 7	26. 7	90. 9	55	13. 2
Average duration of lesions (years)	1. 4	1. 68	1. 6	1. 1	1. 42
Active lesions at present	5	6	3	2	16
Per cent	1. 7	3. 4	27. 2	10	3. 2
Mold demonstrated	5	3	2	1	11
Per cent	100	50	66. 6	50	68. 7
NUMBER OF TYPES OF LESION SEEN					
Vesicular	5	3	3	2	13
Squamous	1				1
Hyperkeratotic	1	1			2
Intertriginous	1	2			3

CHART II.—*Relation of tropical duty to ringworm infections of hands and feet and other parts of body*

	Service	Marines (355)	Sailors (91)	Officers (11)	Veterans' Bureau (43)	Total (500)
Ringworm of hands and feet.	Tropical	15	21	9	4	49
	None	10	10	1	6	27
Ringworm of body other than hands and feet.	Tropical	34	16	2	1	53
	None	42	6		3	51

CHART III

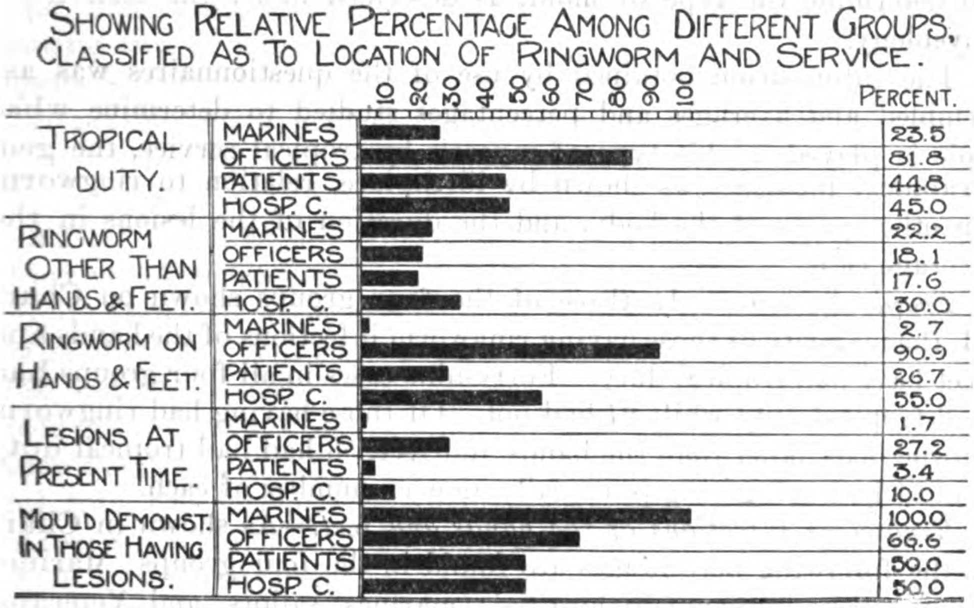

CHART IV.—*Result of complement fixation in hand and foot mycosis*

No.	Name	Type of lesion	Location	Duration	Trop. duty	Fungus demonstrated	Culture	Comp. fixation
1	R. C.	Ves. and Hyper	Feet	5 mos	None	+	−	−
2	H. W	Intertrig	Toes	6 mos	None	+	−	−
3	J. B	Intertrig	Toes	7 yrs	None	+	−	−
4	T. F	Intertrig	Toes	6 yrs	None	+	−	−
5	M. C	Hyperkerat	H. & F.	5 yrs	Yes	+	−	−
6	W. C	Vesicular	Arch	18 mos	Yes	+	+	−
7	M. M	Intertrig	Toes	18 mos	Yes	+	+	−
8	Dr. B	Ves. and Squam	Hands	10 yrs	Yes	+	○	−
9	Dr. C	Vesicular	Feet	24 yrs	Yes	+	+	−
10		T. versicol	Body	2 yrs	Yes	+	−	−
11		Neg. Noguchi	Controls		None			−
12		Pos. Noguchi	Controls		None			−
13		Neg. Noguchi	Controls		None			−

When the man reported to the laboratory, the ringworm fungi were searched for microscopically, as follows: The vesicles, if present, were cleansed with alcohol and pierced at their base with a narrow, sharp scalpel, the point passing through the vesicle and cutting out one side. This free edge was then grasped with a thumb forceps and the remaining attachment severed with the knife. The roof of the vesicle, thus obtained, was inverted on a clean slide, covered by a drop of 15 per cent sodium hydrate solution, and the specimen covered and pressed out with a vaseline-ringed cover glass,

Usually the mold could be demonstrated, when present, within from 5 to 30 minutes, depending upon the thickness of the vesicle. The more keratotic the lesion, the longer the time required by the NaOH for clearing, and vice versa. The fungi were demonstrated in practically every case in which the vesicle was typical and unbroken. If demonstrated, the case was studied by cultural methods to determine the type of mold, as described under the section on mycology.

The information obtained by use of the questionnaires was assembled and averages and percentages studied to determine what rôle is played in this type of mycosis by tropical service, the geographical incidence as shown by birthplace, relation to ringworm on other parts of the body, and the duration of the lesions in the average case.

Tropical service.—In three of the four groups shown on Chart II, the majority of those having ringworm infections of the hands and feet have had tropical duty. Forty-nine cases in all four groups had had tropical duty while 27 had not. Of those having had ringworm on the body other than the hands and feet, 53 had had tropical duty and 51 had not, giving practically an even number of each.

Ringworm infections of the hands and feet.—As shown in Chart I, the following percentages are found in the four groups: Marines 2.7 per cent, patients in hospital (marines, sailors, and Veterans' Bureau patients) 26.7 per cent, officers 90.9 per cent, and hospital corpsmen 55 per cent, with an average for all four groups of 13.2 per cent. The enlisted men of the Hospital Corps and the officers being the smallest group and also showing the highest per cent of infection, causes speculation as to whether or not this is to some extent due to constant handling of patients, or in the case of officers to their permanent status, while the other groups are constantly changing by enlistment and discharge.

Ringworm of the body other than the hands and feet.—As the figures in Chart II indicate that there is about an even number of individuals in this group irrespective of tropical duty, it likewise shows a fairly constant figure of incidence among the four groups, viz, marines 22.2 per cent, patients in hospital 17.6 per cent, officers 18.1 per cent, and hospital corpsmen 30 per cent, with an average for all four groups of 20.8 per cent.

Average duration of lesions.—The figures under this heading are the most constant of all, the variations being very slight in all groups, although the men gave histories of duration, in individual cases, ranging from 6 months to 24 years. The average of the total number was 1.42 years.

Active lesions at present.—Sixteen cases having active lesions were found among the 500 persons included in the survey, or 3.2 per cent.

Demonstration of fungi in the lesions.—Of the 16 cases found, the mold was demonstrated in the vesicles or scales in 11 cases, the highest per cent being among the marines, of whom 5 had vesicles present, and the fungus was found microscopically in the dome of the vesicle in all 5 cases. Of the total of 16 cases, the percentage of positives by microscopical examination was 68.

Types of lesion seen.—Among the 16 cases described above, all the types described elsewhere in this paper were noted, some cases presenting two or more types. As shown by Chart I, the following numbers of the four types were seen: Acute vesicular 13, squamous 1, hyperkeratotic 2, and intertriginous 3.

PATHOLOGY

Figure 1 shows the histology of the skin and the relation of the blood vessels, nerves, sebaceous and sweat glands, hair follicles, etc. Figure II, which is a composite made from the illustrations of Kaufmann-Wolf (2), will show sections of skin through a series of vesicles and also several types of lesion. It will be noted that the mold grows entirely in the epidermis and apparently does not involve the derma at all. There are leukocytes in the vesicle contents and from this fact one would think that perhaps antibodies might be formed in response to *Epidermophyton* infections. The vesicle, which may be considered as the primary lesion of this infection, has no connection with the sweat glands, and its contents are not sweat, though hyperhydrosis may result from the lesions, probably due to congestion. According to Kaufmann-Wolf (2) the contents consist of fibrin, leukocytes, nuclei, and poorly defined fragments of cells. Fungus elements are not to be seen as such but the glycerinlike material which comes from puncture of one of these vesicles is infectious, and the mold is cultivable from it. The layer of epidermis overlying this vesicle is the best tissue in which to find the organism. It is not often possible, in our experience, to find the organism in preparations made from hyperkeratotic and serpiginous lesions. In the sodden epidermis of soft corns it may be occasionally found, but the best lesion from which to make an exact diagnosis is the vesicle.

MYCOLOGY

A considerable amount of work has been done upon the culture of these molds. Sabouraud has not only described the culture characteristics of species of *Epidermophyton*, but has studied and given the culture characters of many other parasitic molds. Greenwood and White (3), Hopkins and Iwamoto (5), Castellani (4), Ormsby and Mitchell (6), and others have studied the culture characters and fermentative reactions of these strains of mold, so that the several species are pretty well defined as to changes which they produce in sugar media and on different culture media. For the purpose of diagnosis and treatment it would seem to us a waste of time to try to culture them.

If the proper type of lesion is studied and the proper technique is carried out in clearing up the portion of the vesicle which is taken, it is practically always possible to demonstrate the causative organism. It often requires perseverance, however. Cultures of these molds are very often contaminated with bacteria, even though the gross appearance of the culture will not disclose the fact. Efforts to separate them on the basis of carbohydrate fermentations are very worthy, but it would seem to us that it is a lot of work with very little dependable information to be expected in the end, so that for diagnosis it seems that culture is useless.

The vegetative mycelial forms found in the tissues (scales and vesicles) (fig. 11) are practically all alike, with very slight morphological differences, so that the recognition of species and genera lies in the manner of growth and reproduction by cultivation on artificial media. Cultural differentiations are, however, most difficult, due to the pleomorphic forms which most of the fungi assume on artificial media containing sugar. The characteristics of the original cultures are often so altered by varying periods of growth on the various media that colony identification is impossible. The distinguishing features must lie in the use of a universally standard culture medium, and that devised by Sabouraud is known as the international proof medium, so that the results in different countries might agree. The difficulty has been in obtaining the materials recommended by Sabouraud, namely, the French peptone (Peptone Chassaing) and the French maltose (Chanut's maltose brute).

For fermentation reactions Hopkins and Iwamoto (5) found it practicable to use a synthetic inorganic medium devised by Currie for the study of citric acid production by *Aspergillus*. Various fermentable substances were added and an indicator to denote the production of acidity. On this medium[1] they found that fungi which grew well on any particular carbohydrate usually produced sufficient acid to change the indicator (Andrade) to red.

This change appeared after a variable interval which was somewhat dependent on the rapidity of growth. Transitory or prolonged periods of acidity were found to be respectively fairly characteristic of certain strains. With the addition of peptone no reddening of the indicator was observed, although control tubes without peptone reacted positively. They assume that the acid production was masked by alkali production from peptone. Observations were made on 19 of Sabouraud's original dermatophytes and over a hundred strains of ringworm fungi isolated in the United States.

Hopkins experiments show that certain strains of the parasitic ringworm fungi utilize mannite, mannese, glucose, and fructose by

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[1] Currie's medium:

Ammonium nitrate	2.5
Diacid potassium phosphate	1.0
Magnesium sulphate (crystal)	.25
Water	1,000.0

Add 1.5 per cent agar, 1 per cent of carbohydrates to be tested, and 0.5 per cent of Andrade's indicator.

a process of acid fermentation, while none of these strains ferment lactose, saccharose, xylose, or arabinose. The common skin saprophytes and air contaminants grow easily and produce acid reactions on carbohydrate containing media, which are not utilizable by the ringworm fungi. By the use of these media on the basis of definite reactions they divide the ringworm fungi into three groups, Group A being the slow fermenting varieties; Group B the intermediates; Group C the rapidly fermenting varieties. Using a double sugar tube containing lactose and saccharose and a tube of media containing mannite it is possible to differentiate the parasitic from the saprophytic fungi and this is undoubtedly a most valuable supplement to morphological study in the identification of these fungi.

In order to avoid confusion of terms which do not mean the same thing to each reader we wish to quote those of White and Greenwood (3), which more clearly describe the morphological characteristics of the fungi, than has been found elsewhere.

(1) Hypha: The vegetative part of a fungus; a fungus filament; long cylindric, branched filamentous cells which have a continued apical growth.

(2) Mycelium: A mass of hyphæ.

(3) Spore: The primary reproductive body of the fungi; primarily a single cell separated from the lower plants for purpose of reproduction. Spores perform a function in the fungi analogous to that of seeds in the higher plants. The majority of fungi produce more than one kind of spore. In the genera *Trichophyton* and *Epidermophyton* three types are produced: Conidia of the sporotrichum type (microconidia), macroconidia, (fuseaux, spindles) and chlamydospores.

(4) Conidium: A sexual spore arising from the hypha by budding or septation. They may develop terminally or laterally or both; at first unicellular they may become pluricellular.

(5) Chlamydospore: A spore formed in the continuity of a hypha and encysted.

(6) Among the conidia in this group of fungi is a type called by the French "fuseaux" (spindles), which is a larger and a particularly differentiated type. It is more or less spindle shaped, thick walled, and sometimes septate transversely in these genera. It is a macroconidium. The shape of these spindles is characteristic in *Epidermophyton* and *Microsporon*, but less so in *Trichophyton.*

(7) Ascus: A saclike cell within which is formed a definite number of spores by a highly complicated process. Generally it contains 2, 4, 8, or a multiple of 8 spores.

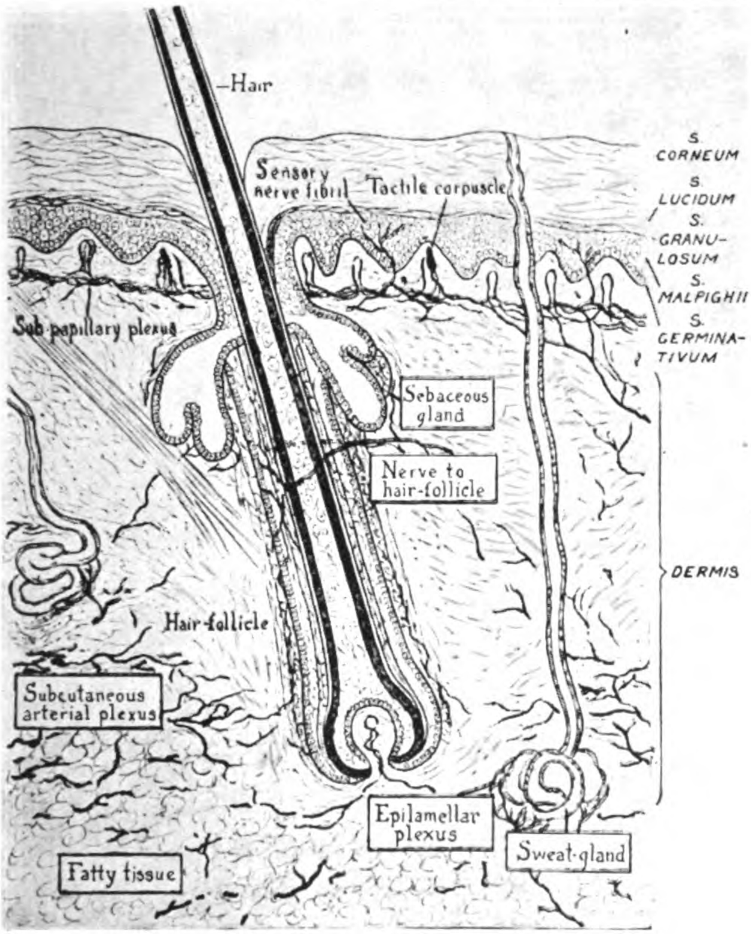
It is usually considered that these genera—*Trychophyton* and *Epidermophyton*—when parasitic on man show only the vegetative forms, i. e., the production of hyphæ and mycelium. The decision as to whether the "sporoid bodies" found in the scales and scrapings from the hose are spores or not depends upon whether these apparent fragments of hypæ are definitely differentiated or whether the process is a simple fragmentation of the hypa. Sabouraud considers them to be fragments of hypæ incorrectly called spores. Castellani considers that sporoid mycelium is a more correct expression than spores.

The principal characteristics of *Epidermophyton cruris* are that the fungus does not affect the hair and that it does not produce supuration. Cultures on the Sabouraud medium are very faintly yellow at first, this color later becoming more pronounced. Sabouraud describes it as that of a half ripe lemon. In cultures protected from light this is more marked than in those grown in full light. All are rather powdery with delicate rays at the circumference, and comparatively early they show (three or four weeks) the pleomorphic transformation evidenced by tufts of white duvet.

In slide preparations from cultures and in hanging drop cultures, *E. cruris* is characterized by its fuseaux and chalmydospore formation (Fig. 4) and the absence or microconidia, such as are found in the *Trichophyton.* The chlamydospores are not characteristic taken alone, as they are found in other genera; but their presence in abundance in association with the characteristic fuseaux gives them confirmatory value. The fuseaux are small club-shaped or pear-shaped structures about 9 microns in diameter, with varying lengths, septate at times, perhaps according to their age, and having no definite number of divisions. Their walls are not dense as compared to the fuseaux found in *Microsporon.* There may be found several arising from the same stem, a condition which is unusual in other genera except *Microsporon* (*M. fulvum*). We have also observed in *E. cruris* spearhead-shaped terminal conidium with dense walls averaging 15 microns in diameter which we have not seen in other genera. Sabouraud says that microconidia are not found in *Epidermophyton* and Castellani mentions their rarity. We have never seen them in our cultures.

It is therefore comparatively easy to distinguish *Epidermophyton cruris* from the *trichophytons:* (1) By culture, which does not closely resemble any Trichophyton, and (2) by morphology. In *Epidermophyton cruris* the chlamydospores are usually many; in *Trichophyton* they are not so common. In *Epidermophyton cruris* the fuseaux are many and characteristic, and in *Trichophyton* they are not numerous. In *Epidermophyton cruris* the macroconidia are absent; in *Trichophyton* they are present.

Laboratory diagnosis.—Demonstration of the fungi in the skin scales and vesicles is of primary importance in the investigation of



Black **—Outlines of glands, follicle and general cell structure**
Yellow**—Arterioles and capillaries**
Red **—Nerves, nerve febrils and tactile corpuscles**

Fig. 1.—Histology of the skin

Fig. 2.—Dysidrosialike mycosis of the feet (Epidermophyton inguinale) in the stage of scaling following a severe inflammation

Fig. 3.—Scaling mold lesion of the palmar surface

Fig. 4.—Appearance of a section through a group of vesicles on the plantar surface (general appearance)

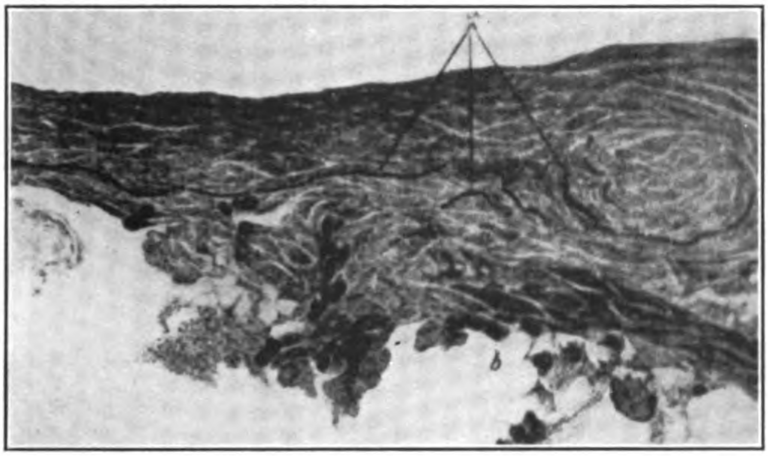


Fig. 5.—View of the horny iayer of the plantar surface (whole vesicles)

(*a*) Mycelium (*b*) Vesicle contents

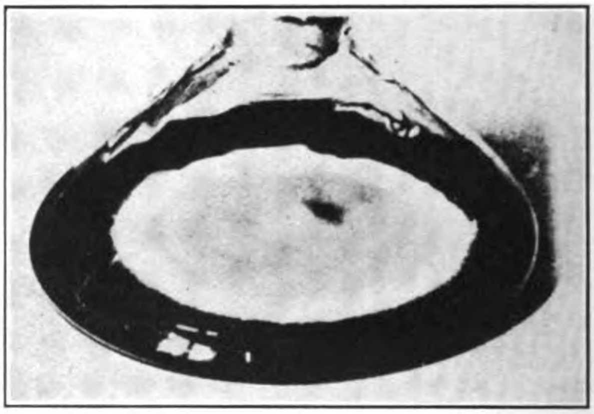


Fig. 6.—Concentric arrangement of culture spoken of in text

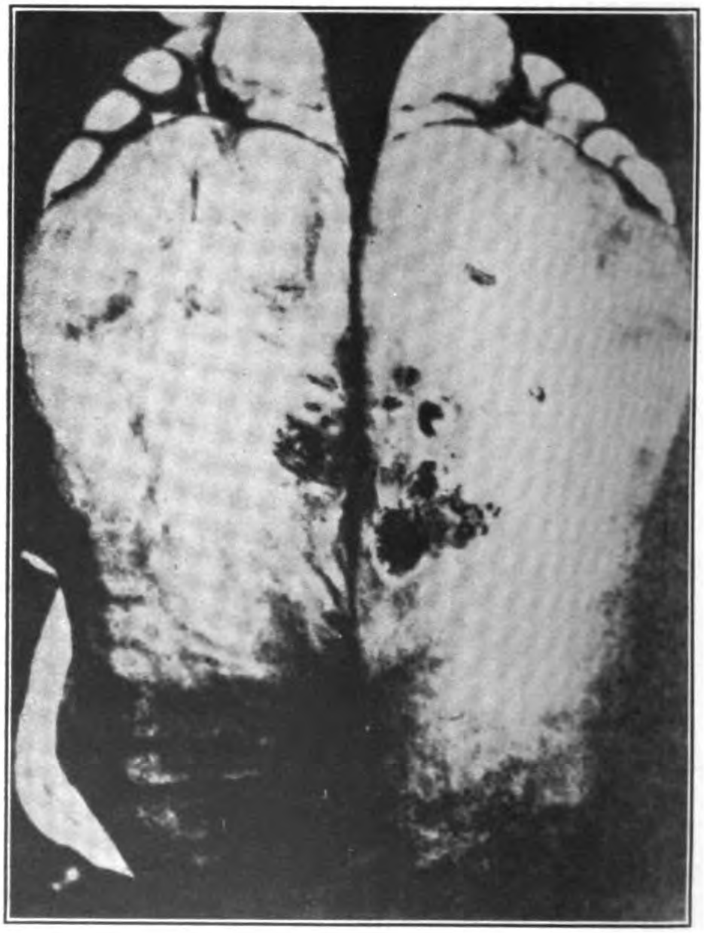


Fig. 7.—Spreading mold focus with considerable pus formation

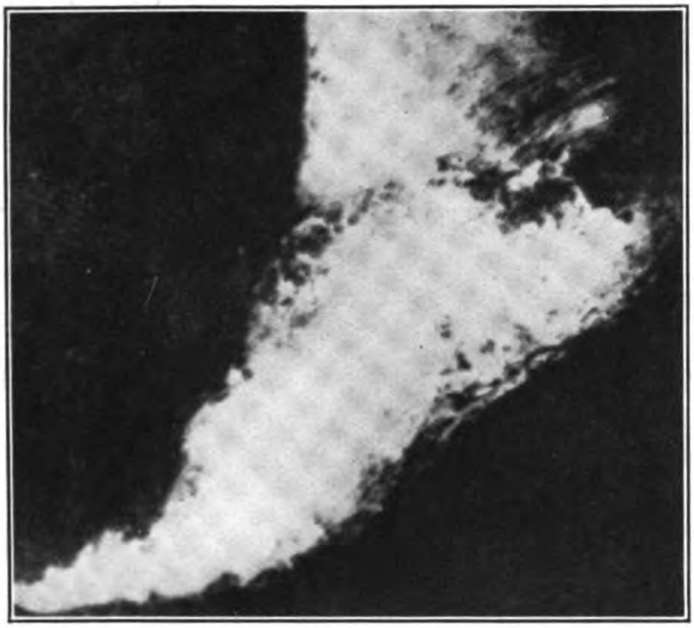


Fig. 8.—Serpiginous, scaly mycotic lesion extending upon the dorsum of the foot

Fig. 9.—Culture particle in potash solution

Fig. 10.—Early mold lesion on the external border of the foot. The younger lesions on the plantar surface show the scaling border

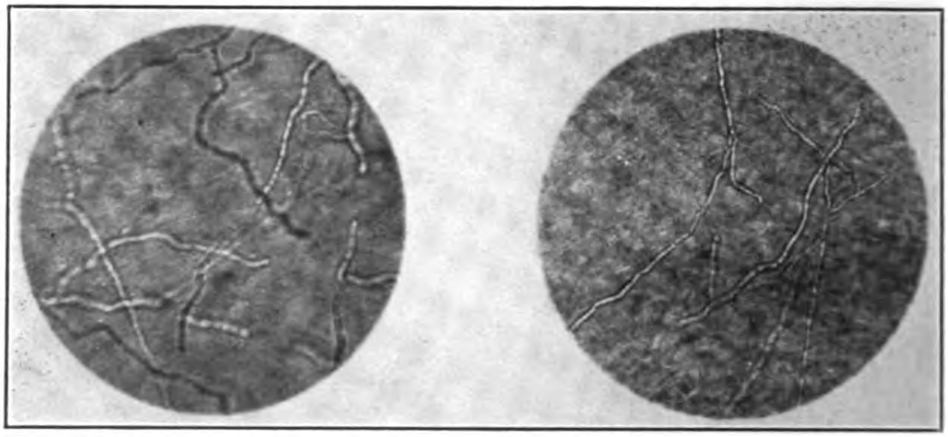


Fig. 11.—Sodium hydroxide preparations from vesicular skin lesions showing mycelia. Photomicrograph×420

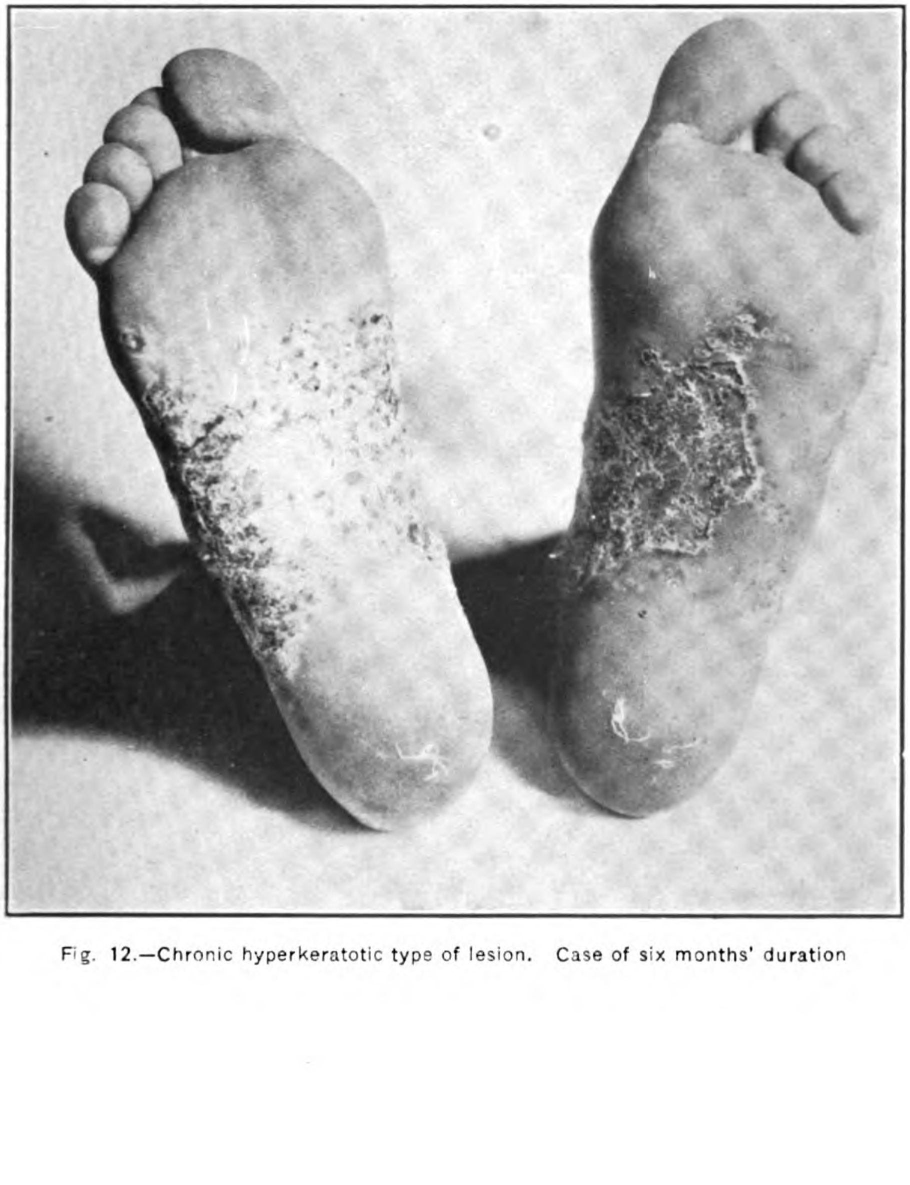
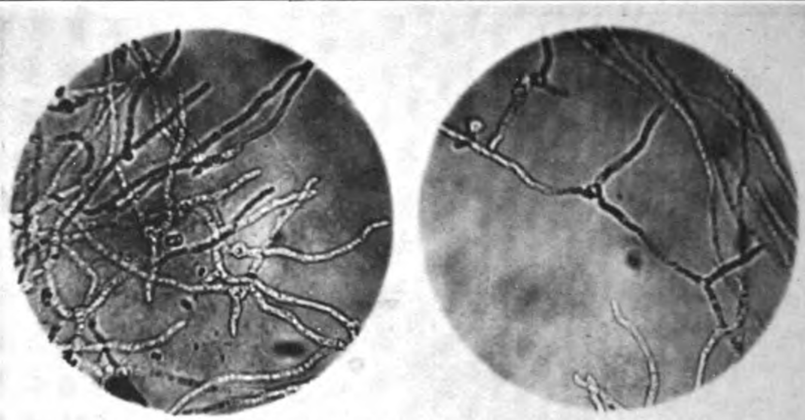
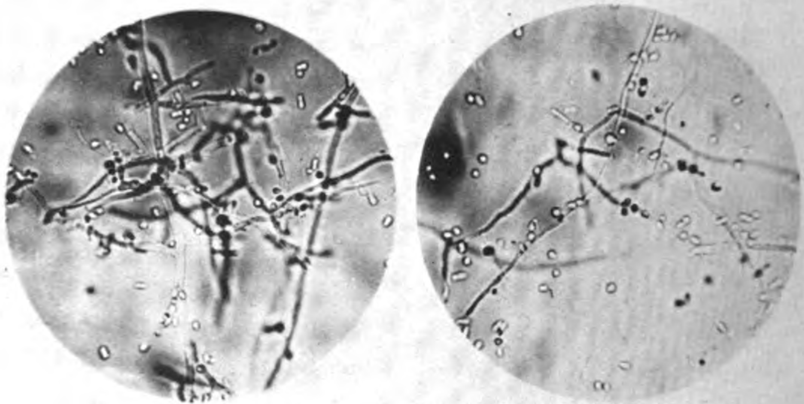


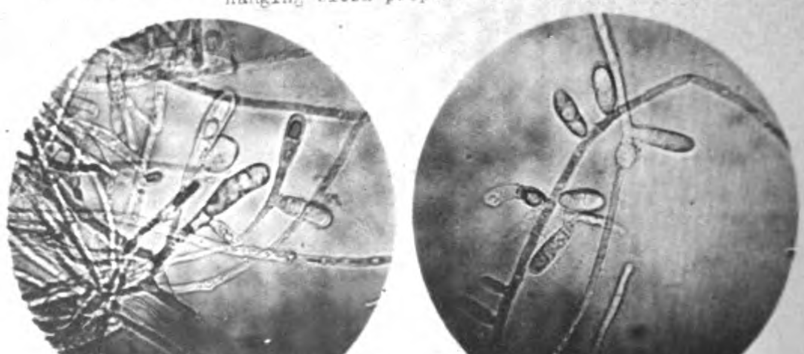
Fig. 12.—Chronic hyperkeratotic type of lesion. Case of six months' duration



Case #58. Photomicrograph (x430) From four day old hanging block preparation. (M. audouini)



Case #198. Photomicrograph (x430) From four day old hanging block preparation. (T. asteroides)



Case #199. Photomicrograph (x430) From four day old hanging block preparation. (E. cruris)

Fig. 13.—Photomicrographs of four-day-old cultures

a dermatomycotic infection. Regardless of the species of fungi present, the treatment is about the same, so that the cultivation and identification of type is perhaps only of scientific interest or importance. It is, of course, not unimportant that cultural identification be made, for on it, more or less, depends an accurate diagnosis. However, the morphological appearance, mode of growth, and clinical effects of each group of trichophytons show many similar characteristics. There are certain minor specific differences which point to the fact that there are a number of species.

Study of fresh material.—We have found that the most expeditious way to examine for fungi in a skin lesion is to remove the scales found at the advancing borders of the lesion by gently peeling toward the normal skin or cutting off the roofs of some of the vesicles. Then clearing with a solution (15 to 40 per cent) of sodium or potassium hydrate. Crush between two glass slides or press down with a vaselined cover-glass. Not all the scales or vesicles examined will show the parasite, and the number of hyphæ or mycelia seen does not seem to bear any relationship to the severity of the infection. One of our foot cases of 20 years duration (*Microsporon audouini*) shows the fungus almost constantly present when new crops of vesicles appear. Exudative material and eczematoid crusts are of no value in diagnosis, as the organism is seldom found in this type. Tribondeau's method (7) of treating the material with ether, then with alcohol, and finally with water to remove the fat, and mounting in NaOH solution, gives a satisfactory preparation and eliminates the error that may creep in of confusing the fat globules with mycelial fragments. The microscopic examination is made first with the low-power lens when the mold can frequently be picked up and further examined by switching to the high dry lens for more detailed study. It requires up to 30 minutes for the specimen to clear in the 15 per cent NaOH solution, and if more rapid clearing is desired 40 per cent solution may be used. The light should be regulated by closing down the diaphragm and an examination made of all levels of the preparation as the scales vary considerably in thickness. Positive preparations will show the mycelial filaments which branch irregularly and are broken up by septa at intervals of varying length, often resembling chains (Fig. 5). Short rounded mycelial fragments resembling spores may be seen, but diagnosis should not be made on these alone.

For permanent mounts lacto-phenol is satisfactory, as it clears rapidly and may be ringed with cement to prevent evaporation. These preparations will keep for six months or longer.

Cultivation of the fungi.—The best media for isolation is that of Sabouraud. Before inoculation the material is placed in 60 per cent alcohol for one to two hours to kill bacteria. Molds withstand this treatment. The material is then washed with 0.9 per cent saline and cut up into very small fragments. Agar slants and small Erlenmeyer flasks containing about 1 cm. of agar on the bottom are inoculated with a platinum loop. The loop is moistened on the surface of the agar slant, touch the material with the loop, and transfer to the medium. Four or five inoculations are made on each slant or flask and incubated at room and incubator temperature. Recently, in addition to Sabouraud media, we have obtained primary cultures on Currie's medium and find it useful in the early elimination of the saprophytic molds. A double sugar tube containing lactose and saccharose and another containing mannite is used.

Hanging block cultures are useful in identification of the various fungi. The hollow ground slide is sterilized by flaming and the concavity filled with melted agar (Sabouraud's). The surface is then inoculated from the colony to be studied and covered with a sterile (flamed) cover glass. Another method is to spread a drop of the melted agar over a sterile cover glass, inoculate the film, and adjust over a concave slide. These methods are excellent in bringing out the mode of fructation of molds which can be studied satisfactorily under the high-power microscope.

Staining methods are of little use in demonstrating the fungi. They are time consuming and uncertain in their results. The fresh preparation is much more satisfactory.

COMPLEMENT FIXATION

The close connection of the capillary loops in the papillæ of the skin with the vesicular lesions of epidermophytosis and the fact that the vesicular contents consist in part of leukocytes, led us to believe that there might be amboceptors formed in response to this infection and we have attempted to demonstrate these bodies by means of the Noguchi technique of the complement fixation test, using antigen prepared from molds isolated from individual cases. We do not think that even though antibodies were found in these infections their demonstration would be of much assistance in diagnosis. Owing to the fact that in allied infections, those by *Sporotrichum* for example, antibodies are formed, we thought it would be of interest to see whether they were probably formed in infections of this nature.

Patients with mold infections for variable periods up to 24 years were used. The results in all cases were consistently negative, using both homologous and polyvalent antigens. These findings agree with Widal and Abrami (8), who were unable to demonstrate the presence of antibodies in mycotic infections.

The antigens were prepared by rubbing up the heavy fungus growth from an agar slant in a mortar with about 15 c. c. of absolute alcohol. This was placed in a water bath at 56° C. for 30 minutes, shaking frequently. This was then centrifuged until clear and alcohol decanted and discarded. To the residue was added 10 volumes of ether and shaken for one hour, placed in dark for 24 hours at room temperature. Decanted ether extracted and dried thoroughly. The dried mold was then pulverized in a mortar and taken up in 0.9 per cent saline in the proportion of 1:200. Heated to 80° C. for one hour. The resulting antigen had the turbidity of about 1,000 parts per million (silica) and smears showed a uniform granular appearance under the high dry lens.

One of the charts shows the results of some of these tests upon infected individuals. (See Chart IV.) The patients whose parasites furnished the antigen used in these tests showed no evidence of amboceptors in their own sera for their particular strain. It is needless to say that all the other sera gave negative results. There was no way of testing the antigenic power of the mold extracts used as antigen. The controls were syphilitic antigen controls, and all were negative. These results square with the symptomatic recurrence and chronicity of epidermophytosis.

Agglutination tests gave consistently negative results.

Experimental animals have not been used in this study.

The cultures so far identified in this group of cases are the *Epidermophyton cruris*, *Microsporon audouini*, and *Trichophyton asteroides*.

TREATMENT

One drawback to adequate treatment of this annoying and chronically recurring condition is a failure on the part of physicians and dermatologists to appreciate a few simple points in its pathologic anatomy, and in the probable life cycle of the organisms causing it. As stated above, the organisms are best found in the dome of what we have chosen to speak of as the initial lesion, namely, the vesicle. The little colony spreading perhaps from one of the resistant forms grows out in the epidermis from this point, and when the vesicle is ruptured the remains of the colony are still there, and the hyphæ will have grown to a considerable extent out into the area surrounding the vesicle. Some of these molds produce sporelike bodies or seeding bodies in culture, and it is reasonable to suppose that a resting stage after the active vegetative condition also grows in the epidermis, so that the area infected may be compared to a plot of ground in which a crop has been grown and seeds of the crop have been in some cases retained in the earth. The resting forms are held splinted, so to speak, in the epidermis. Until the epidermis which holds them is desquamated this resting stage will remain in the soil, and when conditions are favorable for its vegetation it will again sprout into life with the production of new lesions. In the older lesions—that is to say, the hyperkeratotic and intertriginous ones—the sporelike bodies of the resting stage are very difficult to demonstrate. They are nevertheless there, at least bodies which we take to be these are present in the lesions of the type described, when one carefully examines for them in sodium or potassium hydrate solution. Another thing which makes it more evident that the mold is the cause of these lesions is the fact that persistence in local treatment of the lesions by medicines which will destroy the mold will generally cure the lesions. In the hard lesions the organisms are protected, as intimated by overlying epidermis; in many cases greatly thickened, and it is useless to try and destroy them until this hyperkeratosis has been gotten rid of by agencies which will soften the epidermis and enable the antiseptics to get at the mold and destroy it.

In our experience the resistance of the resting stage of the organisms causing epidermophytosis is not very great. This is only an opinion and is not backed up by experimental work on the subject. We think so because cultures of these molds die out rather readily. The resisting stage is not comparable to the spore of the bacterial cell which is heat resistant. By reason of the tendency of the lesions to recur and because of their eczematoid appearance the opinion is prevalent among certain dermatologists that soap is a bad thing in treatment. Perhaps in forms of ordinary eczema soap is *not* good, but for these mycoses it has been our experience that this teaching is unsound. It would seem that the matter of treatment resolves itself into the question of persistence in the use of agencies which will destroy the organisms until all the seeds, the resting forms, are desquamated and killed. The fact that women are less affected by epidermophytosis of the hands and feet than men are is explained on the basis that they are usually more careful in attention to their skin. They are certainly open to infection to the same extent as men are.

In speaking of the treatment and etiology of mycosis of the hands and feet we are speaking, not from the standpoint of the dermatologist nor the mycologist, because we have no special knowledge along either of these lines. We are speaking from the standpoint of physicians who have had personal experience with epidermophytosis, and with this understanding we have found the following preparations to be best in the treatment. For the vesicular lesions the procedure is to clip off the top of the vesicle and release its contents. This open vesicle should be painted thoroughly with a good tincture of iodine, which destroys the organisms released in the fluid and sterilizes the base of the opening and the surrounding area. This applies to vesicles on the hands and feet and to other lesions on the surface of the body. Tincture of iodine as mitigated according to the character of the skin is one of the best treatments that we have for epidermophytosis of the crutch and axilla. Its disadvantage on the hands is that it stains. For the lesions which are pus infected the best treatment we have found is that first used, I think, by Greenwood (9) and later by Feldman and Ochs (10), varying strengths of permanganate of potash. This drug not only destroys pus infection but seems to have a specific effect upon the mycotic organisms themselves. It is an excellent form of treatment for lesions on the hands and the stain produced by it may be very quickly obliterated and the action of the drug stopped by means of another mild parasiticide. This latter is peroxide of hydrogen to which has been added 1 part in 5 of U. S. P. strength of acetic acid. Washing with this solution of peroxide destroys entirely the stains of the permanganate of potassium. As soon as the permanganate stain has been removed by the acid peroxide of hydrogen this latter should be washed off with plain water. Both of these agencies are oxidizers and after a treatment of this sort a local application of lanolin well rubbed in tends to prevent any hardening of the epidermis which comes from the stronger permanganate solutions. A preparation which we have found of very great use in the treatment of this disease, particularly the lesions on the hands and feet, is the U. S. P. preparation, Linimentum Saponis (soap liniment). This is a solution of soap, camphor, and oil of rosemary in a mixture of alcohol and water. This is ordinarily employed for massage and for joint affections and we have not previously heard of its being used as a treatment for mycotic infections. It may be applied to the hands and feet at night on going to bed, taking care to massage it into the interspaces between the fingers and toes until it is dry. Left on over night it seems to change favorably the reaction of the perspiration. It leaves a small amount of camphor which is an antiseptic on the skin and is easily washed off when the morning bath is taken. The soft lesions; that is, soft corns and open vesicles which have been treated with tincture of iodine, are quickly healed under this treatment. As this preparation is easy of application and easy of removal it is one of the best preparations with which to treat the soft lesions caused by molds. It tends to keep the skin soft, which is one essential of a permanent cure. Those drugs which produce necrosis of the epidermis, such as salicylic and benzoic acid (Whitfield's ointment), in our experience are rather disappointing. The tendency to recurrence of the lesions of epidermophytosis above spoken of and which we think is explainable on the basis of imprisonment in the skin of the resting forms of the organism, may be compared again to an agricultural field and the treatment to the burning of that field. One burning may destroy many of the seeds but it does not destroy all. Some of them are imprisoned in the earth and will ultimately spring into life. The continued treatment may be likened to repeated burnings of the same area—enough application of fire to the field will render it sterile. So with the treatment of this condition by mild antiseptics such as those indicated; the long-continued application will result in sterilizing the skin of the seeds. We would then classify the agencies of greatest use in treatment: (1) Soap liniment and careful attention to manicuring; (2) the judicious use of permanganate of potassium and its adjutant, an acid solution of hydrogen peroxide; (3) the use of a bland ointment, and the best one in our experience is plain lanolin; (4) as a helpmate to all three, tincture of iodine. The careful and prolonged use of these preparations will, in most cases, accomplish a cure.

The use of light and X ray to treat epidermophytosis is unnecessary, except perhaps for ringworm of the hair and nails. It takes the services of three or four people to do what the understanding patient may intelligently and effectively accomplish at home. It is like using a 16-inch rifle to shoot a squirrel out of a tree.

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SCHISTOSOMIASIS JAPONICA IN THE UNITED STATES NAVY[1]

By Henry Edmund Meleney, M. D., Peking, China

Since Laning's interesting report in 1914 (1) on cases of schistosomiasis japonica in a group of sailors in the United States Navy, two other papers on the subject by naval medical officers have ap-

[1] From the department of medicine, Peking Union Medical College, Peking, China.

peared (2), (3), and a further comment on the necessity of caution among the United States naval personnel in Asiatic waters has been made in the United States Naval Medical Bulletin (4). The medical officers of the American Yangtze patrol have learned the precautions which are necessary to prevent the crews of their ships from contracting schistosomiasis and a recent fleet order has prohibited members of the United States Navy from hunting in the Yangtze Valley without wearing rubber boots. Although this will probably prevent the occurrence of cases of this disease among the naval personnel, medical officers should still be on the lookout for schistosomiasis and should be familiar with the best-known methods of diagnosing the disease as well as with its specific treatment.

For the purpose of emphasizing these points I wish to report the following case which occurred recently in a member of the United States Navy.

CASE REPORT

History.—The patient went snipe shooting on Oliphant Island in the Yangtze River near Kiukiang on May 16, 1923, and again near Tung-t'ing Lake, Hunan Province, on May 23 and 24. He wore shoes, socks, canvas puttees, and woolen trousers, and waded about in ponds and canals. He had been warned to "bathe himself in a disinfectant" *after returning* from his hunting, which he did. He experienced no itching of the skin, fever, or urticaria during the next few days, and thought nothing further about the possibility of having contracted schistosomiasis. Twenty-six days after his last day of hunting, however, he began to feel feverish at night and had severe pains in the back and calf muscles. His feces were examined by the brine-flotation method on June 21 and 22, but no ova or parasites were found. On the latter day, however, he had 17 per cent of eosinophiles in a white blood count of 8,100. Two days later the eosinophiles had increased to 23 per cent. On June 25 he began to have a feeling of fullness in the epigastrium, he was constipated, and his temperature was 101° F. After this his weight decreased from 130 to 115 pounds, the abdominal discomfort increased, constipation continued, and there was a daily rise of temperature. He was admitted to the Peking Union Medical College Hospital on July 14.

Physical examination.—General appearance well developed but poorly nourished. Expression depressed, skin sallow, with subicteroid tinge. Heart showed functional systolic murmur. Liver dullness in epigastrium increased, but edge not felt. Slight epigastric distention with distinct tenderness and constant distress. Spleen edge, hard and sharp, just palpable below costal margin. R. B. C. 4,864,000, Hgb. 83 per cent, W. B. C. 17,680, neutrophiles 39 per cent, eosinophiles 38.7 per cent, lymphocytes 18 per cent, large mononuclears 4.3 per cent. Blood serum globulin precipitation test positive (2 plus). Urine normal. X-ray of lungs negative. Feces showed eggs of *Schistosoma japonicum* in fresh smear. Temperature, 37° C. at noon; 39.2° C. at 8 p. m.

Course and Treatment.—Treatment with sodium antimony tartrate intravenously was started on the fifty-fourth day after the probable date of infection (May 23). This treatment was made as intensive as possible, on the theory that a high concentration of the drug in the blood was necessary to kill the worms, and that a short course of large doses would be more likely to effect a cure than a longer course of doses which might be sublethal for the worms. In this manner 1.8 gm. of antimony tartrate was given in 12 doses over a period of 17 days. Sodium antimony tartrate (British Pharmacopea standard of purity) was used for the first 8 doses; but for the last 4, Merck's chemically pure potassium antimony tartrate was employed. The first three doses were 0.1 gm. each, after which the dosage was increased by 0.025 gm. per dose until 0.2 gm. was reached on the seventh treatment. This produced a rather severe reaction, so that at subsequent treatments 0.15 or 0.175 gm. was given. The general rule followed was to give three consecutive daily treatments followed by a day of rest. One treatment which produced considerable reaction was followed by three days of rest. The dose for each treatment was dissolved in freshly distilled water and was sterilized by heating the container in boiling water for 15 minutes. The total amount of solution given each time was 10 c. c., no matter how large or small the dose. After the seventh treatment (a total of 0.95 gm. of the drug) no more eggs of *Schistosoma japonicum* appeared in the feces. By this time the white blood count had decreased to 7,400 and the eosinophiles to 31 per cent. The globulin precipitation test was 1-plus positive on the same day. The rectal temperature gradually diminished, rising only to 38.2° C. on the ninth day of treatment and 37.4° C. on the last (seventeenth) day. On this day the globulin precipitation test was only doubtfully positive, and nine days later was negative. Meanwhile the patient's lassitude and epigastric distress had disappeared entirely, his appetite had improved, and he had begun to regain his lost weight. Nine days after the cessation of treatment there were still 29 per cent of eosinophile leucocytes in the blood, but the patient had gained 5 pounds in weight and was in excellent general condition. One month after the completion of treatment he reported to his medical officer that he was experiencing a sensation of numbness in his legs and finger tips, especially after exertion. This gradually decreased in intensity and one month later had entirely disappeared. He resumed full duty seven weeks after completion of his treatment, rapidly regained his normal weight, and has been in perfect health for the past 10 months. On June 19, 1924, the blood globulin precipitation test was negative, white blood cells were 8,600, with eosinophiles 1 per cent, and the feces contained no ova.

COMMENT

1. *Prophylaxis.*—The only safe method of avoiding infection by *Schistosoma japonicum* is to prevent the cercarial form of the worm from coming in contact with the skin. Two hours after the initial contact of cercariæ with the skin, Nakamoto[a] found them in microscopic sections in the corium beneath the epidermis. A bath in a disinfectant after a hunter has returned from his day's sport is, therefore, a poor method of prophylaxis. Experiments in Japan determined the fact that two layers of cloth, whose mesh was less than 0.1 mm., prevented the cercariæ from reaching the skin of animals immersed in infected water. Such a covering would, of course, have to be carefully made to prevent leaks at the seams. The logical conclusion is that the only safe way for a person to avoid infection from entering infected water is to wear water-tight leg covering. Hip boots of rubber are the coverings now usually worn by experienced hunters in the Yangtze Valley.

With regard to the prevention of infection by the crews of naval vessels in the Yangtze River, it may be stated that there is no danger of infection while a vessel is in the swift-flowing water of a large river, but there is danger in lakes such as the Tung-t'ing Lake, particularly if the vessel is anchored near the shore. The lake water in such a locality should not be used for washing the decks or for other purposes without being first boiled or stored for at least 48 hours. Sailors should not be allowed to come into contact with the lake water in cleaning the sides of the ship or the ship's boats. The cleaning of the ship's boats on the shore of the lake is especially to be avoided. More dangerous than the main portion of the lakes are the coves which are dry in winter but flooded in summer. The intermediate host of the parasite is very plentiful on the shores of these coves (5). Irrigating ponds, canals, and ditches, which are everywhere present throughout the rice country, are also very dangerous. Landing parties from ships, or sailors on shore leave, should be cautioned particularly against such infected water. Laning (1) brought out several of these points, but it is not amiss to emphasize again such important preventive measures.

2. *Diagnosis.*—A history of exposure to infected water, followed after about four weeks by a temperature curve simulating typhoid

[a] Personal communication.

fever, with epigastric distress and a high eosinophilia are often enough to lead one to a provisional diagnosis of schistosomiasis. Nevertheless, the finding of the eggs in the feces is the only absolute method of diagnosis. In many of the supposed cases reported in foreigners eggs have never been found in the feces. It seems advisable, therefore, to emphasize the following method of fecal examination in suspected cases of schistosomiasis, since by it the presence of a very few eggs can be detected in a large specimen of feces.

A. Method of fecal examination: The egg of *S. japonicum*, being permeable to water, will shrink out of recognizable shape in concentrated salt solutions. The brine-flotation method of examination is therefore to be avoided. It is also impossible to secure normal hatching of miracidia from the eggs in distilled water. Hence spring, well, canal, or lake water is the most suitable for the method about to be described. If the feces contain blood and mucus, the eggs are usually numerous in that portion of the specimen, but if the stool is formed or fluid a slide smear may not reveal them readily. In this case the following technique is recommended:

Work the whole specimen of feces through a piece of wire mesh screen or several layers of gauze to remove the larger particles. Collect it in a glass beaker of about 1,000 c. c. capacity and fill the container with water. After stirring to separate the soft particles let the mixture stand undisturbed for about 30 minutes. Then pour off the fluid down to the lighter portion of the sediment. Fill the container again with clear water and repeat the decanting until the supernatent fluid is clear. The periods between decantations may gradually be shortened to about 10 minutes, and the specimen may be transferred to a smaller container as the sediment becomes less bulky. Portions of the washed sediment may be examined for eggs in a petri dish or on a glass slide. If this fails to reveal eggs the washed sediment with clear supernatent fluid should stand for a few hours or, in cool weather, overnight at room temperature. The supernatent fluid is then searched with a hand lens for miracidia, which appear, against a dark background, as minute white boatlike bodies swimming rapidly in a straight line. They are most numerous just below the pellicle of the water, but may be found also in the deeper layers. The only precaution is to avoid confusing them with paramecialike forms which may be present in the water used for washing the feces. Paramecia swim with a spiral motion, while the miracidia swim straight with the dorsal side always up. If there is any doubt, the two forms can easily be distinguished under the low power of a microscope. If an Erlenmeyer flask is used the surface area is reduced so that the presence of even a few miracidia can be detected. No case of suspected schistosomiasis should be declared negative until such a method of search is used. In persons who are exposed to infection only once very few eggs may be passed at a time and diarrhea or blood in the feces may never occur. In such cases this method is very valuable for an early diagnosis. A cathartic may bring down eggs if they fail to appear otherwise.

B. The globulin precipitation test: The use of the blood serum globulin precipitation test in the diagnosis of schistosomiasis japonica and in following the course of the disease is especially useful in the type of case reported here. It is performed according to the technique of Sia (6) which consists briefly of the mixing of 20 c. mm. of blood from a finger prick with 0.6 c. c. of distilled water in a test-tube of about 0.7 cm. diameter. After mixing, the tube stands undisturbed for one hour. It is examined periodically for flocculation and precipitation of the serum globulin. Sedimentation of the precipitate in 15 minutes is read as a 4-plus reaction, in 30 minutes as 3-plus, in 60 minutes as 2-plus. Flocculation without sedimentation at the end of one hour is a 1-plus reaction. In normal blood there is no coagulation of the globulin, the mixture remaining perfectly clear. Although this reaction was first noted in cases of kala-azar, it has been found positive in many cases of schistosomiasis japonica also [Faust and Meleney (7)]. It may prove to be a valuable presumptive diagnostic reaction in early cases with a definite history of exposure to infected water, when eggs can not be found in the feces. Furthermore the gradual disappearance of the reaction in cases under specific treatment may be a valuable indication of the success of the treatment, as it appeared to be in the present case.

3. *Treatment.*—The fact that antimony is a specific against the schistosomes has been established in Africa by Christopherson (8) and by many other workers. The course of treatment in the case here reported was somewhat more intensive than that used by the workers in Africa. They rarely give more than 0.16 gm. of tartar emetic at a time, and the interval between treatments is usually two or three days. In this way a course of treatment with 1.5 to 2 gms. of the drug covers between three and five weeks. Our patient received 1.8 gm. (27 grains) in 17 days. It is possible that only the most favorable cases will tolerate such intensive treatment and that in more debilitated patients a more conservative program is necessary. Our method emphasizes the possibility, however, of curing an early case in a comparatively short period of time.

One of the most important considerations in the use of tartar emetic (sodium or potassium antimony tartrate) is the purity of the preparation. Christiansen and Norton (9) have recently reported that most specimens of tartar emetic now on the market for medicinal use contain lead, arsenic, or iron as impurities, as well as antimony oxide, which is insoluble and toxic. Some specimens contain all four of these impurities. This emphasizes the importance of using only chemically pure preparations of the drug. If tartar emetic of a poorer grade is used reactions are more likely to occur and smaller doses at somewhat longer intervals must be employed.

SUMMARY AND CONCLUSIONS

1. A case of schistosomiasis japonica in a member of the United States Navy who went hunting in the Yangtze Valley is reported.

2. The only effective method of preventing infection by *Schistosoma japonicum* is to avoid contact of the skin with water containing the cercarial form of the worm. Bathing in a disinfectant after returning from a day's hunting will not prevent infection.

3. In lightly infected cases eggs may be difficult to find in the feces. The most accurate method of diagnosis is to wash the feces and hatch out the miracidia from the eggs. A method for this procedure is described.

4. The use of the blood serum globulin precipitation test in the diagnosis of this disease is described and its value in following the course of treatment is emphasized.

5. Comment is made upon the intensive treatment of schistosomiasis with tartar emetic, especially with reference to the necessity of using a pure preparation of the drug.

6. It is hoped that the present fleet order requiring the use of rubber boots by all members of the United States Navy who go hunting in the Yangtze Valley may be continued as a permanent prophylactic measure against this disease.

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ARTERIAL HYPERTENSION

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

During the past two years a number of patients with hypertension have been admitted to the naval hospital at San Diego, Calif., or referred from the out-patient department. Two cases have been under observation for two years, six cases for at least one year, and more recently 20 hypertension patients have been subjected to clinical, teleroentgenographic, and electrocardiographic investigation.

The majority of cases of this series having a high blood pressure, even with little or no evidence of kidney change, were diagnosed as chronic interstitial nephritis. Not so long ago this diagnosis was common with physicians everywhere. Gradually there is developing the belief that in these patients the vascular lesion with the associated myocardial change is the primary and important disturbance and that most people with high blood pressure fail to exhibit definite signs of kidney damage.

The terms arterial hypertension, essential hypertension, and benign hypertension are now commonly employed to designate permanent high blood pressure with little or no signs of kidney involvement in contradistinction to high blood pressure associated with definite manifestations of renal pathology, the so-called nephritic type of hypertension or chronic nephritis. E. T. Bell, in a paper read before the New York Academy of Medicine, October 22, 1923, analyzed the autopsy findings in 218 cases of essential hypertension from 4,000 post-mortem records. One-sixth of these cases showed absolutely no renal atrophy and no renal arteriolar sclerosis, indicating that arterial hypertension may, and frequently does, precede the slight or moderate kidney change that is frequently found in this condition. In the analysis of these 4,000 post-mortem records he found that arterial or essential hypertension occurs four times as often as chronic interstitial nephritis.

It would seem that in the past we have unduly emphasized the kidney lesion by employing the diagnosis of chronic interstitial nephritis in our hypertension patients with little or no abnormal kidney findings, and that the introduction of the term "arterial hypertension" in the new 1924 nomenclature will broaden our understanding of the clinical manifestations of this very interesting affection. Arterial or essential hypertension is a disease in which the blood pressure is permanently increased without known cause. All pathological anatomic changes characteristic of the condition are secondary, being the effect of the hypertension upon the individual. As the result of the observations conducted in our series of cases it is hoped to show that the cardio-vascular lesion is the primary and most important finding in arterial hypertension and that the kidney disturbance is of secondary consideration.

The early signs of arterial hypertension are oftentimes obscure. Headache is a common symptom which may be no more than a sensation of fullness in the head, or a feeling of pressure upon the vertex, the so-called lead cap headache. The patient frequently complains of being easily fatigued while performing duties which formerly caused no physical or mental exhaustion. Nervous depression or irritability is frequently present. There may be vague neuralgic and muscular pains. In conjunction with, or independent of, these signs of nervous instability, one is impressed with the frequency of gastrointestinal disturbances. The abdomen is often distended and there is marked evidence of indigestion. This symptom complex far too frequently condemns the patient to the diagnosis of neurasthenia.

Palpitation, tachycardia, and dizziness associated with or without signs of relative cardiac insufficiency may occur. There may be shortness of breath on exertion and precordial pain. Premature ventricular contraction may be observed, and Figure 5A indicates a bigeminal pulse occurring in a patient with a systolic blood pressure of 230. The premature contractions in this instance are identified by the tall "R" spikes which follow closely on the preceding "T" wave, during which should be the diastolic period of the heart. Rarely one may encounter auricular fibrillation. One of the patients of this series with a blood pressure of 180 systolic and 105 diastolic suddenly developed auricular fibrillation, as shown in Figure 5B. In this tracing the "P" wave, the representative of auricular contraction, is absent and fibrillary ("F") waves fill diastole.

It is now generally conceded that the presence of albumin and even casts in the urine does not necessarily determine the diagnosis of nephritis. This is particularly emphasized in cases of orthostatic albuminuria, in which large amounts of albumin and even occasional casts are present and the kidney remains normal. In our work in the hospital we have frequently encountered albumin and casts in cases definitely the result of chronic foci of infection, involving either the teeth, the nose, the tonsils, the sinuses, or a combination of these structures, and the removal of the source of infection has resulted in the disappearance of the abnormal urinary findings. It has not infrequently been observed that the first examination of the urine of the hypertension patient shows more casts and a larger quantity of albumin than at any subsequent period, and these findings have occurred in patients who have received no treatment whatsoever. The decrease in the albumin and casts has in practically every instance been associated with a lowering of the systolic blood pressure. My impression is that the amount of albumin, the frequency of nycturia, and the total amount of night urine excreted is fairly proportional to the rise and fall of systolic blood pressure. It has been my experience that whenever the patient, both objectively and subjectively, is in the stage of satisfactory compensation, the albumin and casts remain quantitatively the same or are even diminished, and that the amount of night urine voided continues in the neighborhood of the normal limitation.

One of the most outstanding observations in our series of cases has been that regardless of whether or not albumin and casts occur, the kidney function test remains within normal limits, even during the terminal stages of hypertension. This is particularly so while the heart remains compensated. The case in this series manifesting signs which closely approach the nephritic type of hypertension and showing the greatest degree of cardiac hypertrophy, with right and left sided dilatation and a systolic blood pressure of 250 and a diastolic pressure of 180, showed a phenolsulphonphthalien excretion of 35 per cent at the end of the first hour and 20 per cent at the end of the second hour. The blood urea nitrogen was 19 mgr. per 100 c. c. of blood, and the quantity of urine voided from 8 p. m. to 8 a. m. during the two hourly renal tests following a high protein diet was 575 c. c. The maximum specific gravity of the two hourly tests was 1,025, and the greatest variation of the specific gravity was 12°, which may be accepted as within the standard requirements of the normal limits. Frequently 400 c. c. is stated to be the normal standard amount of night urine (8 p. m. to 8 a. m.). More recently Mosenthal's investigations places the normal standard of night volume as high as 750 c. c.

The eye-ground changes of arterial hypertension are those of arteriosclerosis, never those of chronic nephritis. In two of our cases the signs of retinal hemorrhage disappeared almost completely and the improvement manifested itself in conjunction with a subsidence of other subjective and objective symptoms.

Gradually the blood pressure increases from 160 to the neighborhood of 250 systolic and 110 diastolic, or even higher, and the one, two, three ratio of the pulse pressure is lost.

The highest recorded blood pressure of this series was in the case of a retired officer. The systolic pressure was 253 and the diastolic 135. The patient was put to bed and all food absolutely prohibited for four days. Two thousand cubic centimeters of water were permitted in 24 hours. The chart shown in Figure 3 indicates the response of the systolic blood pressure to this rather heroic procedure. As the result of this experiment it was felt that a daily fast at infrequent intervals would better meet the clinical requirements. Therefore, once every 10 days the patient abstains from food and during the past two months his blood pressure has remained below 200 systolic.

One of the most constant observations, and also a very interesting one, is that the blood pressure presents transitory rises, which far too frequently disturb the mental equilibrium of the patient and, moreover, the subsequent decline in blood pressure not uncommonly confuses one's judgment in regard to the beneficial effects of some particular therapy which recently may have been employed. Variations of 40 to 50 points in the reading of the systolic pressure have been encountered in the case of an officer during hourly observations conducted from 9 a. m. until 3 p. m. Still another officer manifested an elevation of 20 points following nine holes of golf, and this same officer, during a similar experiment, showed a rise of 40 points systolic as the result of driving his automobile through the congestion of the city traffic. Observations conducted on several officers following an afternoon nap indicated a fall of blood pressure ranging from 20 to 30 points.

Whenever the blood pressure remains high for a considerable period of time an actual increase in the volume of the heart muscle results. Cardiac hypertrophy is the typical hypertension effect upon the heart. Physical examination of the hypertension heart may determine a forceful apex impulse beyond the mid-clavicular line which oftentimes extends to the sixth intercostal space. Epigastric pulsation is common. The aortic second sound is accentuated and cardiac dullness to the left is the characteristic finding upon percussion. In the later stages of hypertrophy and in hypertension in the pulmonary circulation the heart is enlarged to the right. One may not infrequently elicit a functional apical systolic murmur.

The employment of the electrocardiograph in the study of high blood pressure will help to clarify our knowledge of the early cardiac disturbance. It will assist us in a greater refinement in prognosis and make clearer our understanding of the final disposition to be recommended in these cases. The electrocardiographic findings are not, however, indisputable evidence of cardiac pathology, but in conjunction with the history, the physical examination, and the laboratory reports may be considered as a valuable diagnostic adjunct. It not infrequently happens that the electrocardiographic impressions are not confirmed by post-mortem findings, nevertheless as the result of the study of this series of cases, and even though my experience is admittedly limited, it would seem that the electrocardiogram is our most helpful asset in detecting abnormal myocardial changes in the hypertension heart.

The electrocardiographic findings, which I have observed to be fairly characteristic, are notching of the "R" spikes in at least two leads, and inversion of the "T" wave in one or more leads and left ventricular preponderance. The drawing shown in Figure 6 is taken from an electrocardiogram of a hypertension case, and illustrates

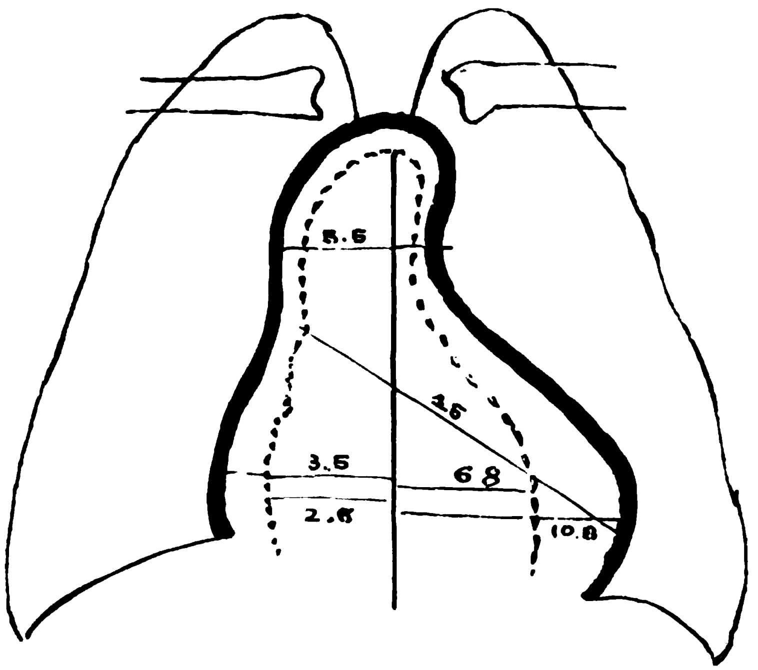

Fig. 1.—Frontal projection of the hypertension heart (solid line) compared with the heart of the asthenic habitus (broken line)

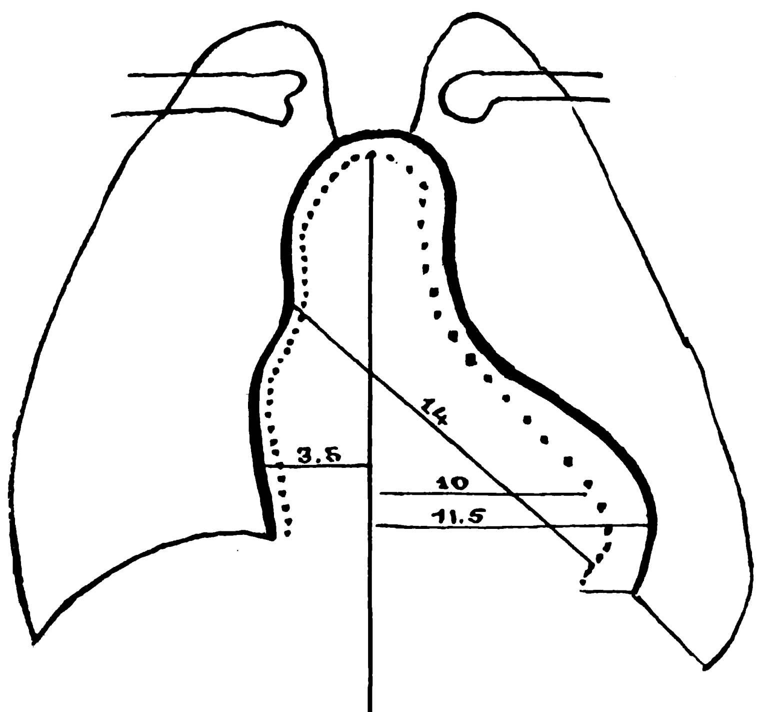

Fig. 2.—Frontal projection of the hypertension heart (solid line) compared with the heart of the asthenic habitus (broken line)

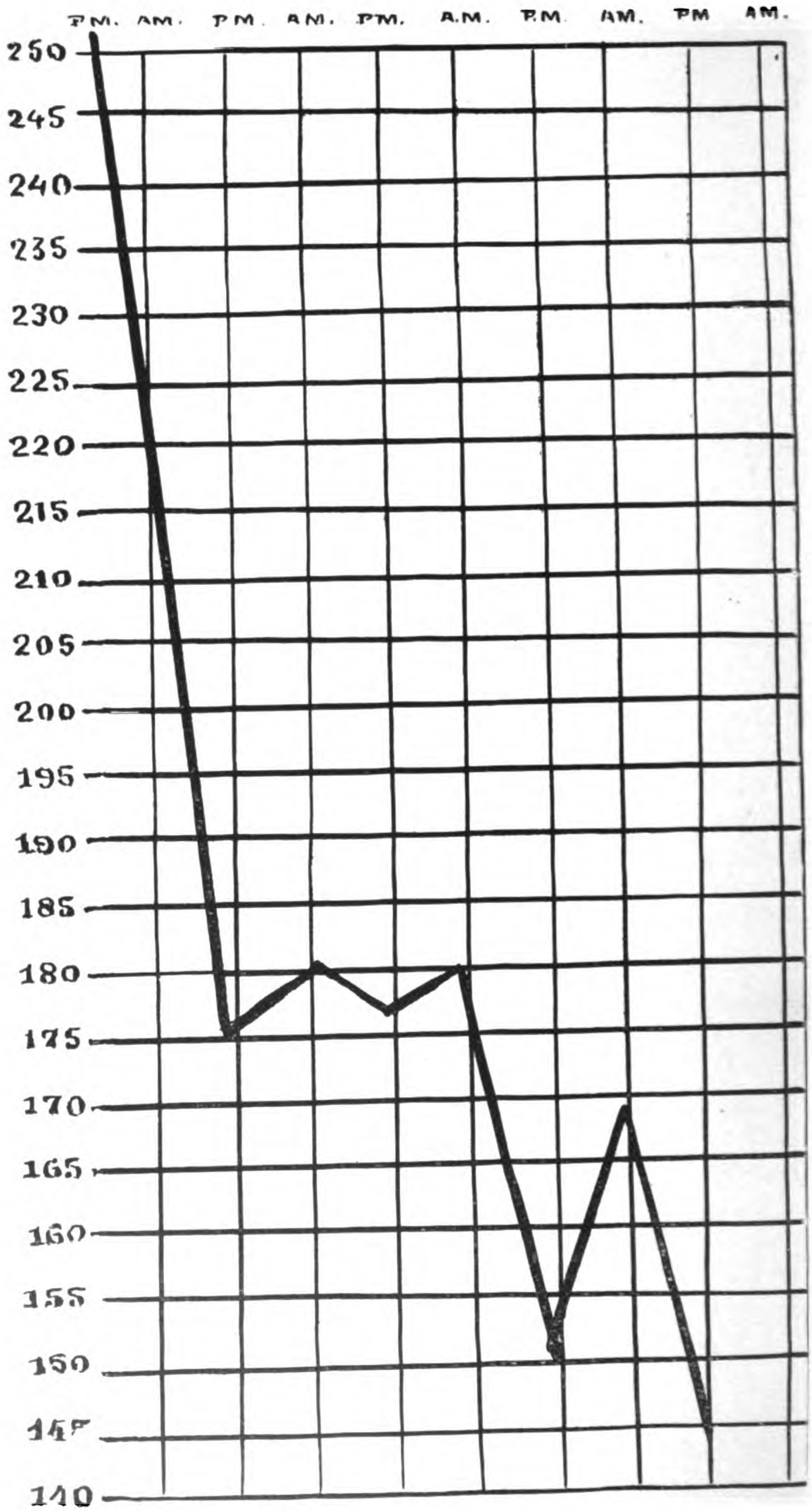

Fig. 3.—Systolic blood pressure during a four-day fast

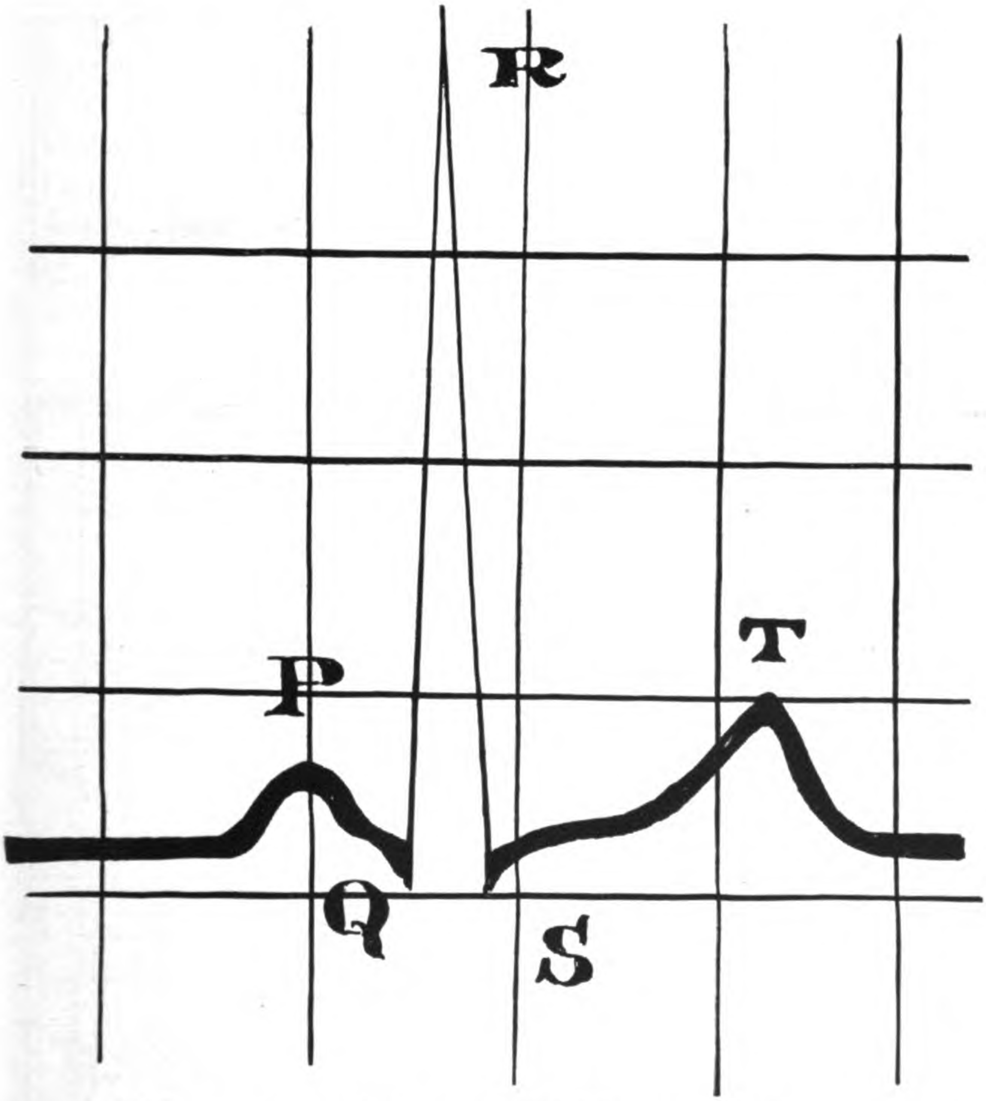

Fig. 4.—P represents the auricular wave and Q R S T represent the ventricular group

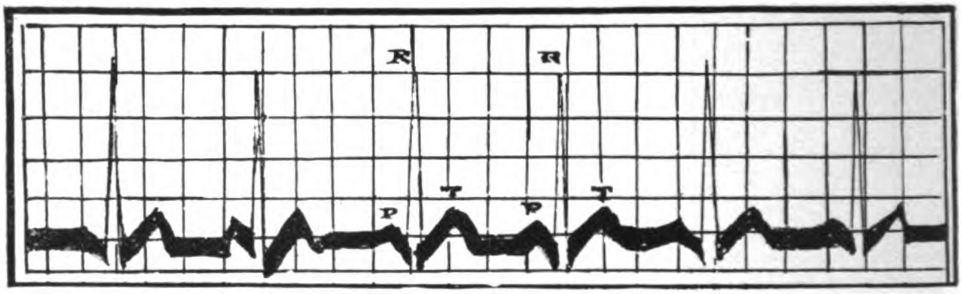

Fig. 5.—Normal electrocardiogram, for comparison with record below

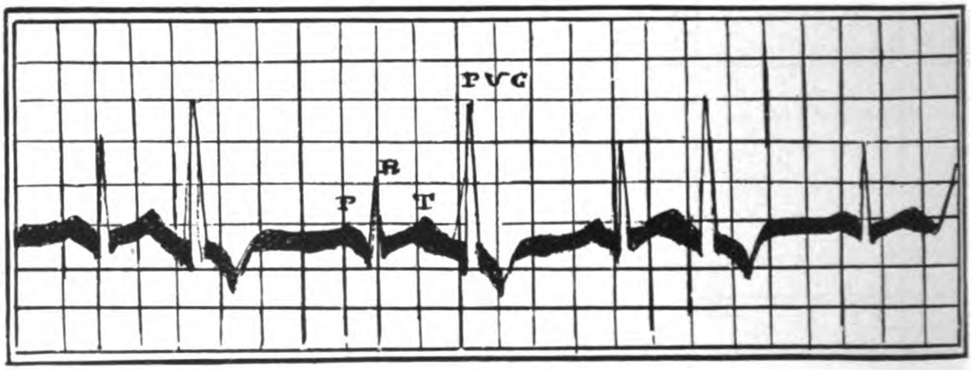

Fig. 5a.—Coupled beats (bigeminal pulse)

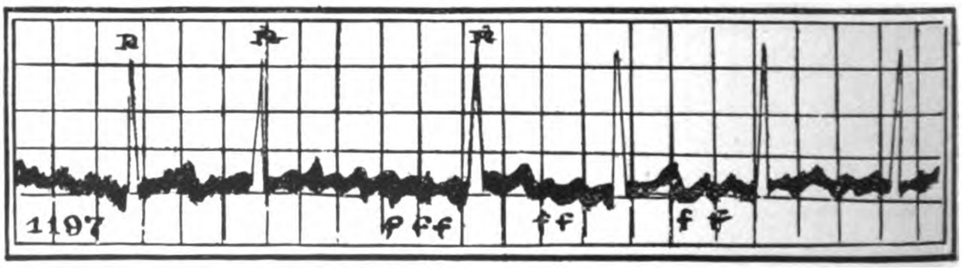

Fig. 5b.—Auricular fibrillation

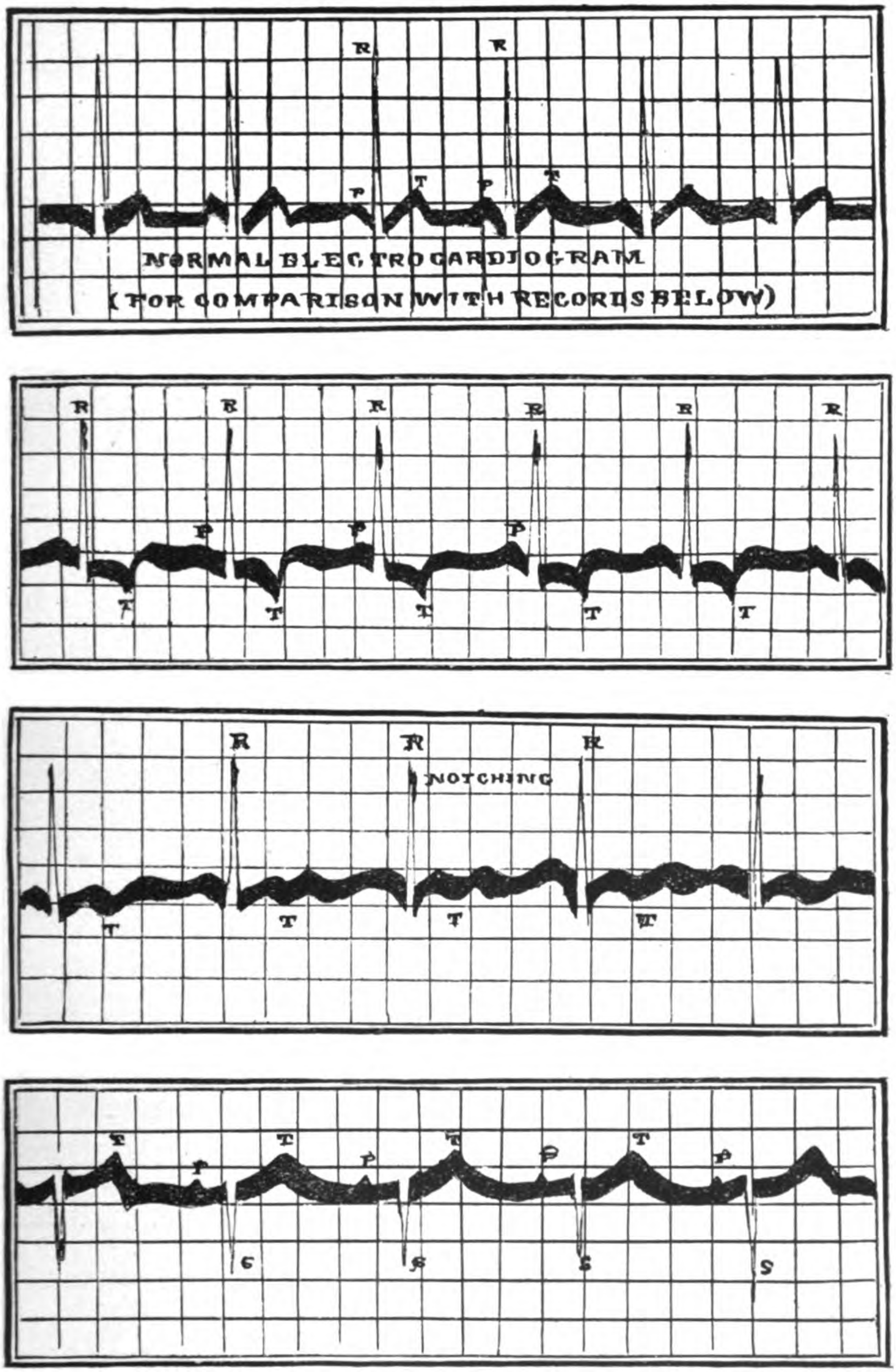

Fig. 6.—The electrocardiogram presents the three characteristic findings which have been observed in the hypertension heart—i. e., notching of R's, inverted T waves (Lead I and II), and abnormal left axis deviation

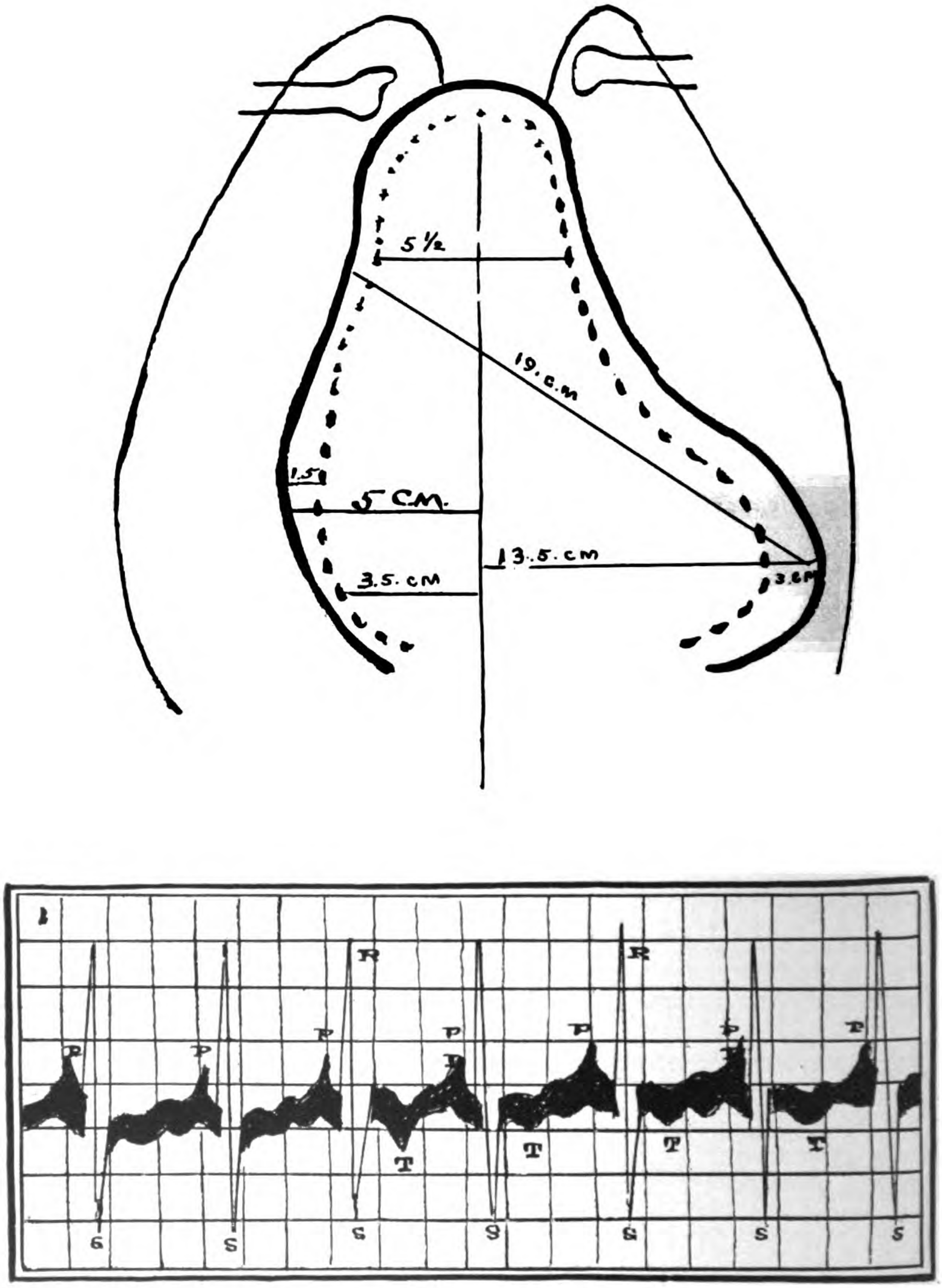

Fig. 7.—Frontal projection of the terminal stage of the hypertension heart with hypertrophy of the right and left ventricles (solid line) compared with the heart of the hypersthenic habitus (broken line). The electrocardiogram shows that the P wave (the auricular representative) is almost twice its normal height and that the T wave is inverted. This case is considered a borderline nephritic type of hypertension

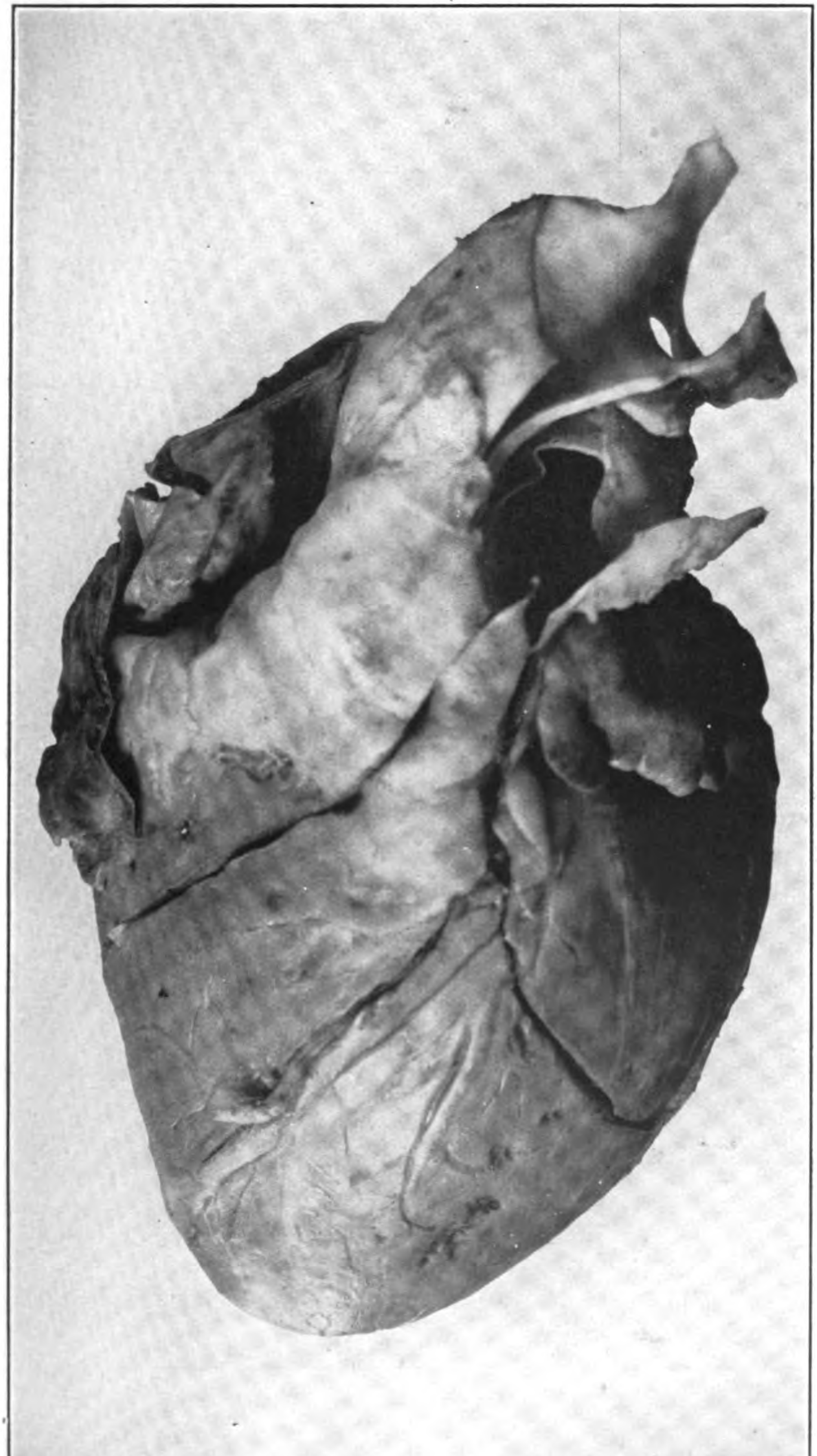

Fig. 8.—Hypertension heart showing marked hypertrophy of the left ventricle and sclerosis of the coronary artery. The electrocardiogram predicted the serious prognosis and the cardiac pathology found post-mortem

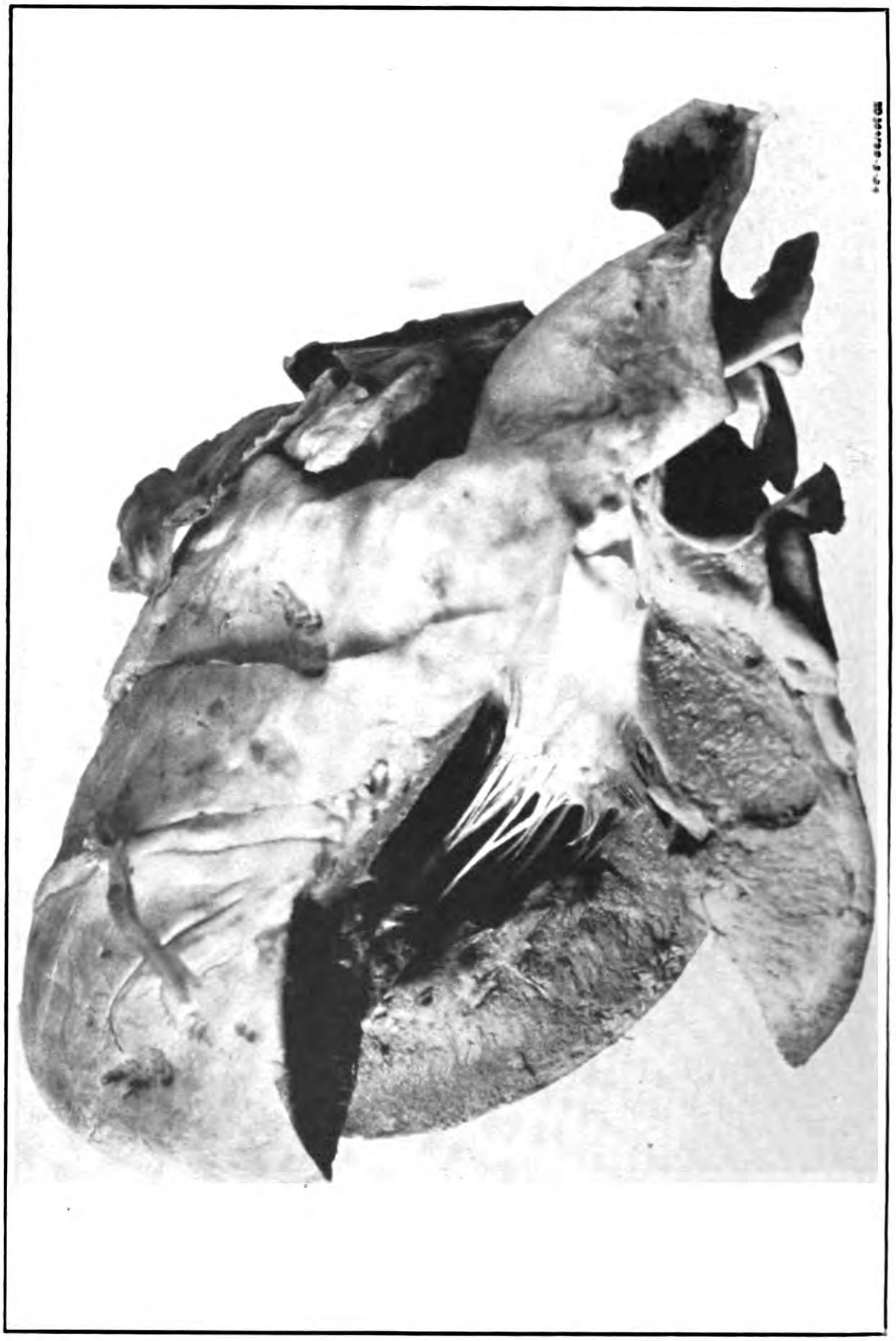

Fig. 9.—Hypertension heart showing the wall of the left ventricle almost four times its average size

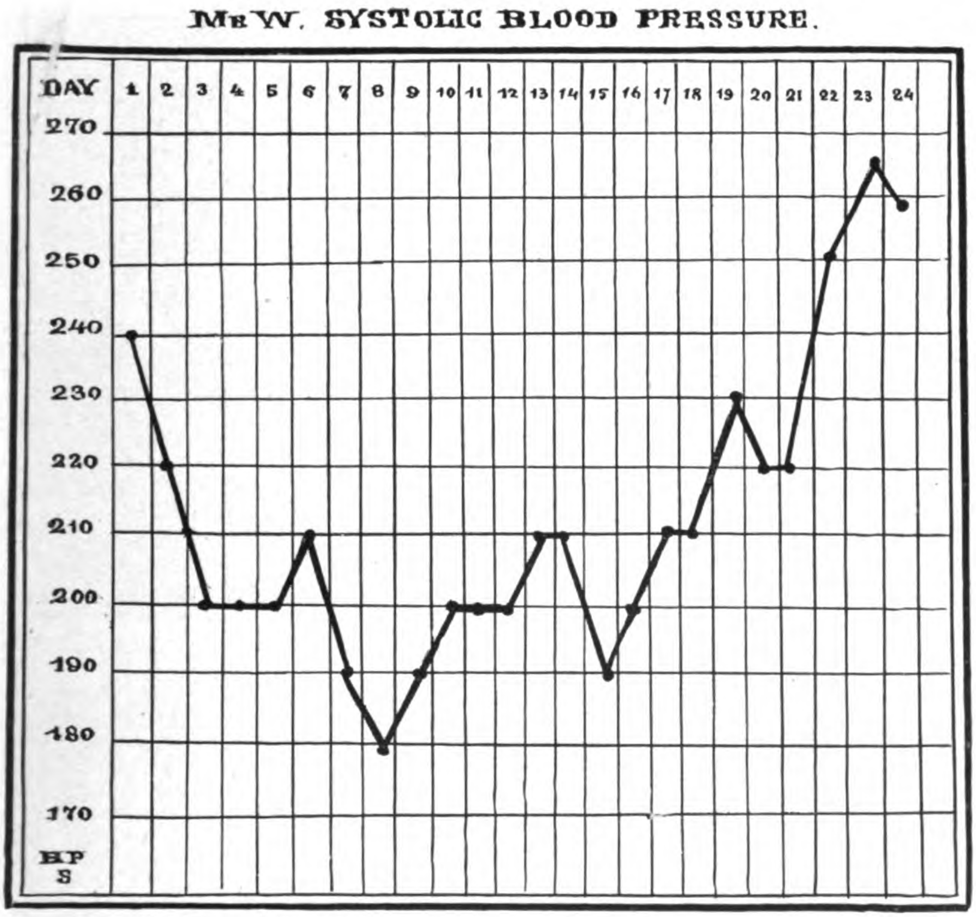

Fig. 10.—On admission patient presented the usual signs of decompensation of the heart with passive congestion of the lungs and kidneys (Elliott's Complex). Patient digitalized on the third day, which resulted in a fall of blood pressure and a prompt disappearance of the hemoptysis and hematuria. Eighth day digitalis was stopped. Nineteenth day digitalis again started, but heart failed to respond and the blood pressure continued to advance, and death occurred on the twenty-fourth day. Large doses of tincture of digitalis as high as 24 c. c. in 24 hours have been administered to our hypertension patients with a systolic blood pressure of more than 200 m. m.

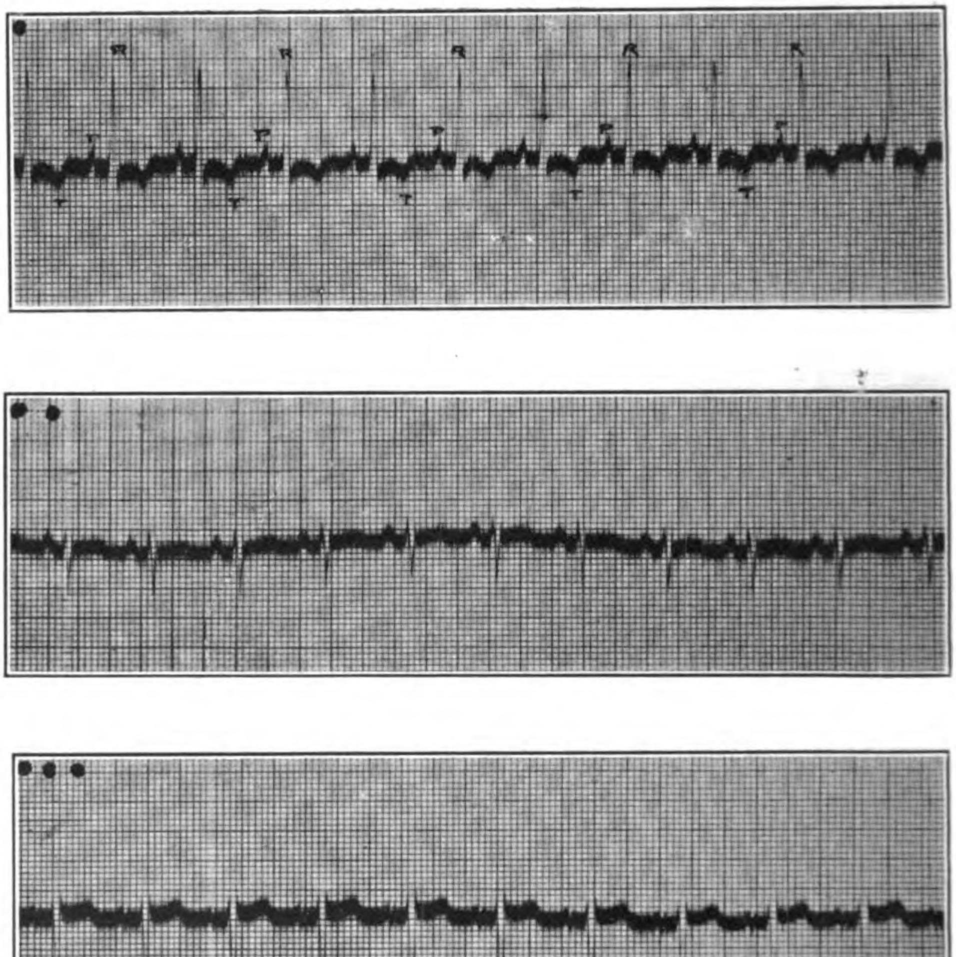

Fig. 11.—Post-mortem findings (figs. 8 and 9) confirmed the electrocardiograph tracing in this case. The electrocardiogram shows a classical picture of left ventricular prepon- derance with T wave Negativity in lead I. Note the tall R's in lead I and the absence of S. In lead III there are no R's but marked downward deflections (S). Paul White's formula applied to this cardiogram gives the following Index: (R'+S''')−(S'+R''')= index or (17+15)−(0+0)=+32

the three characteristic findings indicated. During the later stages of hypertension with right ventricular preponderance, one not infrequently determines an increase in amplitude of the "P" wave beyond the normal standard of 3.10[4] m. m. Some of the early hypertension cases show none of theses abnormal tracings, while others show one or more. Notching of the "R's" and left ventricular preponderance are the usual findings. An inverted "T" wave in the first or second, or in all three leads, has been observed in four instances and when found indicates a very serious prognosis. It may be remarked that a negative "T" wave appearing in leads one or two is always considered pathological while a negative "T" wave in lead three has little or no clinical significance.

Although the abnormal electrocardiographic tracings are fairly characteristic, one should not consider that these findings are found only in the hypertension heart, they may also occur in other conditions but their appearance in hypertension undoubtedly signifies myocardial disturbance.

Ventricular preponderance or, as not infrequently designated, abnormal right and left axis deviation, is one of the most interesting subjects in electrocardiography. In order to obtain a comprehensive understanding of the abnormal value of right and left axis deviation one must keep in mind the habitus of the individual, whether tall or short, the position of the patient when the electrocardiogram is taken, the depth of respiration, whether or not unduly influenced by fright or exercise. The individual with an abnormal axis deviation—the man of short, fat stature—will show a left axis deviation while those having a tall, lean stature will present a right axis deviation.

During an electrocardiographic study of 50 recruits presenting an asthenic habitus, I found border line right axis deviation to be the characteristic finding and in those individuals with well-defined "drop hearts" and the narrow hearts of pulmonary tuberculosis the index of right axis deviation was even greater. The variations noted ranged from −2 to −22. These observations may explain the usual clinical finding of increased right cardiac dullness in the hearts of pulmonary tuberculosis as most of these recruits represented the "prephthisical" habitus.

In estimating the abnormal value of right and left axis deviation it has been my procedure to follow the index of Paul D. White of the Massachusetts General Hospital. A value of +20 is the border line of normal for left axis deviation and the index of −10 is the border line of normal for right axis deviation. Thus, in determining the abnormal left axis deviation in Figure 6 one first measures the height in millimeters of the chief "R" spike in lead one, plus the length of the chief downward " S " in lead three. Next one measures the downward excursion of the " S " in lead one, plus the upward height of the " R " spike in lead three—

$$(U + D) - (D + U) \text{ equal index.}$$

$$(20 + 10) - (O + O) \text{ equal } +30.$$

which being beyond the border line of +20 for abnormal left axis deviation indicates preponderance of the left ventricle.

In conjunction with the electrocardiogram, the teleroentgenogram affords additional evidence of the degree of hypertrophy in the study of the hypertension heart. The most common finding is the so-called " sabot-shaped heart." This shape of heart is also found in aortic regurgitation. It represents a left ventricular hypertrophy without right ventricular hypertrophy. When the hypertension heart fails, it frequently happens that in addition to left ventricular hypertrophy the right ventricle also dilates. In order to properly estimate the degree of hypertrophy of the hypertension heart from the teleroentgenogram one must keep in mind the average standard of heart measurement when considered in relation to the habitus of the individual.

Average standard measurements in relation to habitus:

	Transverse diameter	Long	Broad	A-arch
Asthenic	8. 8	11. 4	9. 9	3. 9
Hyposthenic	11. 1	13. 1	10. 6	4. 8
Sthenic	12. 4	14. 1	10. 6	5. 1
Hypersthenic	13. 8	14. 7	10. 7	5. 7

Thus Figure 1 represents the hypertension heart of an individual of the asthenic habitus. This patient, Mr. W., is one of the two examples of the asthenic habitus with high blood pressure which has occurred in this series. The systolic blood pressure is 230 and the diastolic 120. Although the actual measurements of the hypertension heart in this patient are less than the hypertension heart shown in Figure 2 the degree of hypertrophy is greater when compared with the normal heart of the asthenic habitus. The teleroentgenogram in this instance indicates that in addition to left ventricular hypertrophy there is also right ventricular hypertrophy. The first electrocardiogram taken showed an abnormal left axis deviation and an electrocardiogram taken six weeks later indicated an abnormal right axis deviation, signifying that the right ventricle had become preponderant over the already hypertrophied left ventricle. The second and third leads showed an inverted " T " wave.

The sabot-shaped heart shown in Figure 2 is from a hypertension patient who represents the asthenic habitus, and although there is considerable left ventricular hypertrophy the right ventricle gives no teleroentgenographic or electrocardiographic evidence of enlargement. These two cases have been presented in order to indicate the advantages of employing both the electrocardiogram and teleroentenogram in the study of the hypertension heart.

In the naval service the greatest number of hypertension cases occur among officers who have reached the age of 40 and beyond, and one of our most important duties is to determine the future usefulness of the hypertension officer to the service.

Hypertension alone or associated with slight abnormal urinary findings should not condemn an officer to the diagnosis of "chronic nephritis," with its accompanying hazards in regard to retirement, life insurance, and promotion by selection. It is the effect of high blood pressure upon the heart and kidneys which most concerns us, and as in the majority of cases the cardiovascular damage is paramount and the renal disturbance of secondary importance it would seem that one's attention should primarily be directed to the heart in order to properly estimate an individual's fitness to remain in the service. The annual physical examination of all officers, which requires a blood-pressure determination, affords an excellent opportunity to study our hypertension patients before serious damage to the heart occurs, and it would seem advisable that an officer presenting a persistent high systolic blood pressure, in the neighborhood of 160 or above, should be subjected to a thorough clinical and laboratory investigation, including teleroentgenographic and electrocardiographic study.

In considering the effects of high blood pressure, it is well to keep in mind that there are many reasons incident to the complex phenomena of life which may be responsible for rises in blood pressure. Thus, worry, the wear and tear of one's work ashore and afloat without sufficient exercise in the open air, endocrine imbalances, intestinal stasis, and chronic foci of infection are some of the factors which have been encountered during these observations.

In this connection, the following case seems particularly interesting. Mrs. X, age 53 years, wife of an officer, came under my observation in October, 1923, complaining of shortness of breath and precordial distress on slight exertion. After a particularly strenuous day of social activity she noticed swelling of the ankles, and occasionally she complained of a pounding in her head associated with vertigo. Upon examination she was found to have a systolic blood pressure of 210 and a diastolic blood pressure of 110. The eye grounds were normal, and the electrocardiogram showed borderline left axis deviation. The "T" wave was positive and persisted so. The urinary examination showed a trace of albumen and an occasional hyaline or granular cast. A thorough search for some focus of chronic infection, e. g., infected teeth or sinuses, was negative. She was advised to subject herself to a complete rest, to reduce her weight, and to eat a sensible diet with certain protein and salt restrictions. Her systolic blood pressure remained in the neighborhood of 200 mm., but the signs of cardiac distress and other subjective symptoms were greatly relieved.

In March of this year she developed severe uterine hemorrhages and an examination elicited a uterine fibroid about the size of an orange. A consulting civilian physician strongly recommended a radical operation for the removal of the tumor but in view of her condition it was deemed advisable to resort to radium treatment as she appeared to be a typical case for this particular form of therapy. Radium was inserted into the uterus for a period of 24 hours and during this time the patient experienced no discomfort whatsoever. All hemorrhage from the uterus stopped and the patient almost immediately began to show clinical signs of improvement.

Within two weeks the systolic blood pressure had fallen to 170 mm. and within one month to 150 mm., and has since remained within normal limits (less than 160 mm.). The abnormal urinary findings have disappeared.

According to Prof. F. Muller (Munish), hypertension and uterine fibroid so frequently occur together that some casual relationship must be assumed. He further states that Röntgen rays may reduce the fibroid but that they do not influence the hypertension, whereas the blood pressure may become normal after the operative removal of the fibroid. Evidently one may expect similar happy results following the use of radium. Professor Muller also remarks that "Climacteric hypertension, which is by no means rare, is also probably due to the internal secretory influence of the female genital organs." American authorities call attention to the prevalence of adenoma of the thyroid gland in conjunction with hypertension.

It would appear, therefore, that the diagnosis of arterial hypertension should be employed during the study of high blood pressure cases and that the diagnosis of chronic nephritis be made only after careful observations over a considerable period of time, and then only when the urinary findings and kidney function tests show definite signs of renal damage.

DIAGNOSIS OF DISEASES OF THE COLON

By H. L. BROCKMANN, Lieutenant, Medical Corps, United States Naval Reserve Force

This paper is an attempt to review the chief measures employed to diagnose diseases of the colon, including briefly the clinical pictures of a few of the important affections of this structure. Conditions of serious and often fatal nature involving the colon occur with sufficient frequency to warrant this attention.

Simple complaints of diarrhea, constipation, passage of blood, mucus, or pus, whether or not accompanied by pain, call for a rigid investigation. A carefully taken history is the starting point. The onset and continuance of constipation or diarrhea in an individual hitherto not so afflicted strongly indicates partial obstruction in the colon. In persons above 45 this is a common indication of cancer of the large bowel, frequently long before a mass can be palpated. It is not necessary that blood or other abnormal material occur in the feces, nor even that pain or much discomfort be complained of.

Passage of red blood or pus other than from local hemorrhoids, fistula, or other lesion about the anus always means ulceration or abscess of the large bowel. If this ulceration is low enough to be seen by the proctoscope or sigmoidoscope, its character can often be determined by direct examination. If it is too high to be accessible, it is likely cancerous or tuberculous, because if other types of ulcers are present some of them are almost always present in the accessible portion.

Physical examination should always include rectal examination with a finger cot or glove. Information is thus gained as to the extent of hemorrhoids, the tonicity of the anal sphincter, the presence of rectal growths or ulcerations, and the extent of pressure from an enlarged prostate, or a posteriorly displaced uterus. The tonicity of the sphincter is frequently relaxed in obstruction of the sigmoid or pelvirectal colon. Inspection of the feces gives us directly facts which we must gain in no other way. If mucus alone is present, it is not likely that the lining of the intestine is ulcerated. Often gross examination will reveal the presence of blood or pus. Often necessary and always desirable is the use of the microscope, by means of which positive identification may correct an otherwise deceiving picture. The microscope may likewise reveal the causative agent of an ulceration; for example, the *Entameba histolytica*. Simple chemical tests for blood are also available.

In the presence of blood or pus or much mucus, or where there is evidence of malignancy, the sigmoidoscope and X ray are employed more closely to identify the lesion. By Röntgen ray study we learn much in particular of cancers, ulcerations—tuberculosis as well as others—and diverticuli. Barium is given by mouth or by enema to carry out this investigation. The enema is the more valuable. It is necessary beforehand to empty the colon thoroughly with a purgative and a cleansing enema. Direct examination is obtained with the fluoroscope, and films are made for further study and permanent record.

The most important roentgenologic sign of cancer is a filling defect of the barium in the colon, a local irregularity due to jutting of the growth into the intestinal lumen, by contracture, and to some extent by spasm of the infiltrated wall. Next in importance is the finding of obstruction, since nonmalignant stricture of the colon is exceedingly rare. Tuberculous ulcerations do cause filling defects and occasionally obstruction, therefore the above signs are not altogether characteristic of cancer. But considering that tuberculous ulcerations usually involve the cecum and ascending colon, cause characteristic spastic phenomena and rapid emptying of the cecum and ascending colon of barium, and are frequently accompanied by a history or the presence of tuberculosis elsewhere, a differentiation between cancer and tuberculosis of the bowel can usually be made. In chronic ulcerative colitis, nontuberculous, and of obscure etiology, the most striking Röntgen characteristic is rapid filling of the colon by a barium enema, the contour of which is narrow, ribbonlike, and smooth. Diverticuli and diverticilitis are characterized in radiographs by the constant presence of small round spots in the vicinity of the colon even after the enema is evacuated, oval or rounded shadows projecting from or lying outside the intestinal lumen, representing barium filled diverticuli. They are usually accompanied by narrowing and defective filling of the bowel.

To summarize, I have found the important lines of investigation of colonic disease to be the following: History, physical examination, examination of the feces, and I might also add examination of the blood, sigmoidoscopic, fluroscopic, and radiographic study.

Cancer of the colon.—In consideration, more specifically, of certain diseases of the colon, I have selected cancer, amebic dysentery, and chronic ulcerative colitis as conditions offering diagnostic problems. "Cancer of the bowel" usually means cancer of the colon, for cancer of the small intestine is rare. In the colon it occurs with equal frequency in men and women, most commonly between the ages of 40 and 65, although cases have been recorded in much younger and in older people. About half of intestinal cancers are located in the rectum and pelvirectal flexure, and 20 per cent in the sigmoid. Other common sites are the cecum and splenic flexures. They may occur at any point.

There should be less terror regarding cancer of the colon. Extension and secondary deposits occur later and less frequently than with cancer in most other locations. Obstruction occurs more often before glands are involved, and the prospect of radical cure by operation in reasonably early diagnosis is comparatively good, even when resection of large portions of the bowel is necessary. When found at operation, enlarged lymphatic glands near such cancers may be inflammatory only and not malignant. Rectal cases give results better than the worse gastric cases, but not as good as in cases where the growth is higher in the colon.

The symptomatology indicating the presence of cancer are as follows: (1) Onset of constipation or diarrhea with no other apparent cause in a person of the cancer age whose bowels have previously been regular. (2) The presence in the feces of mucus, from catarrhal colitis induced by obstruction; of pus, which may require the microscope for identification; or of blood, which may vary in amount from that only to be detected by chemical means to that sufficient to identify grossly as bright red blood. Or there may be no blood at all even in advanced cases. (3) Vague discomfort in the abdomen, which rarely amounts to real pain until the obstruction is almost complete. (4) Cachexia which varies greatly. It may be absent or extreme. Progressive loss of weight and increasing anemia are the chief general symptoms. These are greatest when the lesion is proximal to the splenic flexure, whereas obstructive symptoms are greater when it is located in the more distal colon. (5) A palpable mass is present in only about 40 per cent of cases, on rectal or abdominal examination. This is sometimes formed by the accumulation of feces back of the obstruction, therefore its disappearance and even partial relief of the obstruction after purgation does not mean that a cancer is absent. Only complete and lasting relief of all symptoms justifies exclusion of a diagnosis of cancer. Its suspected presence demands thorough and prolonged inquiry.

Case: J. F. M., a retired white farmer, aged 56, entered the High Point Hospital November 13, 1923, complaining of diarrhea and of much discomfort across the lower part of the abdomen. He had suffered indigestion nearly all his life and after being constipated for years rather suddenly developed diarrhea about two years ago. The stools had been soft or liquid and of sausage color, with a considerable amount of fresh blood. His best weight had been about 150, and his weight on admission was 140, but he had become pale and suffered from nervousness and insomnia. He had also suffered for a time from nervousness and tingling in the legs. He had been treated for pellagra and gastric indigestion. During the physical examination a mass was palpated in the right side of the abdomen, tender, and to which the patient was immediately inclined to attribute his trouble. He had first noticed it about two weeks before admission.

His father had died at 57 of pulmonary tuberculosis and his mother of typhoid. He had used alcohol in very small amounts for years and chewing tobacco excessively until a year ago.

Physical examination: The patient was a slender man, aged apparently about 50, with slight duskiness of skin. The abdomen was soft and slightly full. There was a mass apparently half as large as a man's fist near the hepatic flexure of the colon, freely movable and tender.

Radiographs after barium enema and again after barium meal both show a marked filling defect in the ascending colon, near the hepatic flexure.

A blood Wassermann test was negative; red blood cells, 3,280,000; hemoglobin, 48 per cent; leukocytes, 7,120; neutrophiles, 65 per cent; lymphocytes, 19 per cent; large mononuclears, 15 per cent; basophiles, 1 per cent. The gastric contents were normal. The urine contained a trace of albumin and a few casts.

Preoperative diagnosis: Cancer, ascending colon, near hepatic flexure.

Operation: Approximately 5 inches of the ascending colon, including a hard nodular mass, were resected and an end-to-end anastamosis made. No evidence of metastasis was found.

On the inner surface of the piece of gut removed was a carcinomatous ulcer surrounding the lumen for a distance of about 2 inches, causing almost complete obstruction. Microscopic findings, adenocarcinoma.

Postoperative history: Uneventful recovery. Discharged December 17, 1923, a month and four days after admission. On March 15, 1924, he felt entirely well, the only finding relative to his illness being slight numbness in his legs. His weight was greater than ever in his life, and his red blood cells numbered slightly more than 5,000,000, with a hemoglobin reading of 80 per cent.

Amebic dysentery.—A disease the incidence of which in this section of the country has not been determined with any degree of accuracy is amebic dysentery. The *Entameba histolytica* frequently invades the colon of man in most tropical and subtropical countries, and dysentery from this cause certainly exists in this region.

The condition usually begins insiduously with lassitude, weakness, slight abdominable pain and diarrhea. As a rule blood and mucus later appear in the stools, in which, when fresh and warm, the amebæ can be demonstrated microscopically. There is great pain, tenesmus, griping, and purging, 15 or 20 stools a day not being uncommon. The amebæ are sometimes carried elsewhere by the portal circulation, and abscess of the liver is a fairly frequent complication.

Amebic dysentery has a tendency to improve and become chronic with relapses. But it may have an acute onset and run an acute course to an early termination fatally. This varying severity explains certain variation in symptoms.

The temperature is seldom high, even in acute cases. When death occurs it is usually from exhaustion. Perforation of the intestine, and intestinal hemorrhage are occasional causes.

Accurate clinical diagnosis is based chiefly on finding the entameba histolytica in the stools. Most cases recover under modern treatment. This consists chiefly in the administration of emetine, preferalby by mouth as emetine bismuth iodide 3 grains in a hard gelatine capsule every night for 12 nights. Or emetine hydrochloride is given by hypodermic 1 grain each night for 12 nights. Relapse calls for repetition of the emetine, with an increased number of doses, up to 18 or 24.

Case: W. L. B., an unmarried white farmer, aged 45, was admitted to the High Point Hospital January 17, 1924, complaining of abdominal pain. He stated that for 17 days his bowels had been loose, but that previous to this there had been no trouble other than occasional constipation. At the first, one night his sleep was disturbed by a soft stool, followed by 8 or 10 watery stools the next day. In a few days free blood appeared, ceased for about a week, then reappeared, about a tablespoonful at a time, with considerable mucus. Onset of pain was gradual, of a griping character, worse on the left side of the abdomen. He had kept himself on a milk diet from the onset.

Twenty years ago he had lived for a time in South Carolina, where he contracted tertian malaria.

Physical examination: The patient was a pale, fairly well nourished man, with the appearance of weakness and with a weak voice. The teeth and gums presented a condition of moderate pyorrhea. The abdomen was soft and moderately tender generally. There was a distinct mass in the cecal region, the size of a man's fist, which felt like thickened cecum.

The urine contained a trace of albumin. The stools were watery and contained much fresh blood with particles of clear mucus. At times they were of a dark color, greenish, and contained solid particles of feces. A microscopic examination was not made. Röntgenray study with barium enema and barium meal gave no definite findings. The column of barium moved very slowly in the ascending colon.

Course: On giving the purgative and enema in preparation for Röntgen study, the mass referred to entirely disappeared. The temperature varied from 97° to 100.4°, and the pulse from 100° to 130°. There was a constant desire to move the bowels. Progressive weakness and rapid emaciation ensued for a term of six days, with great pain, and terminating with hiccough, delirium, and rather sudden death while straining to move his bowels on the night of January 25, 1924.

At autopsy the cecum and ascending colon were found greatly distended with fecal accumulations of semisolid character. The sigmoid in the left iliac fossa had ruptured for a distance of 3 inches or more and the pelvis was filled with foul bloody fecal matter. The whole decending and sigmoid colon was covered on the inner surface with ulcerations, almost circular, and deeply undermined, some going through to the serous coat. This was easily torn on removing the colon, causing new perforations. The ulcers were typical of those caused by the *entameba hystolytica.*

Chronic ulcerative colitis.—Chronic ulcerative colitis of unknown etiology presenting a characteristic pathology and clinical picture. It is infective in origin, but apparently is not transmitted readily to other individuals. From its close similarity to bacillary dysentery, it seems probable that the unknown organism is closely related to the *Bacillus dysenteriæ.*

Sometimes the onset is acute, with severe diarrhea and fever, but more commonly it is insidious, the first indication being perhaps a slight intestinal irregularity with the occasional passage of a little mucus or blood, many months before the onset of severe symptoms. Later there is always diarrhea, the number of stools reaching 10 or 15 a day. They are generally fluid and small in bulk, with bright-red blood, pus, and mucus. Occasionally there are quiescent periods in which the microscope may be required to recognize these substances. The mucus is unformed, and not like that of mucus colitis.

There is generally abdominal discomfort, but seldom pain or tenesmus, and very little tenderness excepting in a few cases in which the peritoneum becomes inflamed. There may or may not be distension or slight muscular rigidity.

Digital and sigmoidoscopic examination should always be made. The mucus membrane is bright red, thick, and sometimes granular, bleeding easily when touched.

The ulceration may become so extensive that only small islets of mucus membrane are left. The edges are very irregular, and the thick mucus membrane is not undermined. In spite of the severity of the ulceration, it is superficial and stricture never develops. It is sharply limited to the large bowel, as the ileo-cecal valve prevents the spread of the infection to the ileum.

Generally there is not a great deal of discomfort. Irregular fever is present during acute exacerbations. The appetite is usually good. Progressive emaciation, weakness, and anemia follow the constant diarrhea, and death usually results from cachexia. Efficient and prolonged treatment is necessary to save the lives of these individuals, who seldom realize the serious character of their disability.

Case: Mrs. P. H. G., white, aged 50, a rural resident of Virginia, was admitted to the High Point Hospital January 29, 1924, complaining of bloody diarrhea for 6 months, following a long existing constipation. There had also been symptoms of indigestion such as belching and "sour stomach," and she had been treated for gall bladder infection, carrying out transduodenal lavage at home, and taking autogenous vaccines. She had become much weakened, easily exhausted, and nervous, especially when in crowds. There was a complaint also of itching and dryness of the skin.

Her mother had died of tuberculosis at 44, and her father at 60 from gall bladder disease. She had had no children or miscarriages. After the usual childhood diseases, there was difficulty in establishing her menstruation, after which her health was normal. Her teeth were readily replaced by plates. She had had an operation supposedly for hemorrhoids and fistula in ano several years before, and for removal of the tonsils a month before admission. Following the former there was slight loss of control over the bowel movements. There had been no menstruation for four years.

On physical examination she was found to be in a fair state of nutrition, the only significant findings being general slight abdominal tenderness, and considerable distention, with no rigidity.

Radiographs after a barium enema showed a ribbonlike barium column in the transverse and descending colon. Proctoscopy and sigmoidoscopy showed an ulcerated and bleeding mucous membrane. Following the barium enema, between 1 and 2 pints of thick cream colored pus passed from the bowel. Repeated examinations of the stools revealed pus, fresh blood, and dark liquid feces—no evidence of animal parasites. Cultures were not made. Blood examination revealed a surprisingly slight degree of anemia, and a negative Wassermann test. There was slight albuminuria.

Course: A diagnosis of chronic ulcers of the colon was made and for two weeks and a half the patient improved moderately, chiefly under rest and diet. On February 16 an exploratory laparotomy was performed with the hope of locating and removing the cause The uterus was found to be moderately enlarged with multiple fibroids, and densely adherent to the sigmoid colon, as was also the left broad ligament. There were also adhesions between the colon and anterior parietal peritoneum, as well as about the splenic flexure and cecum. The cecum was hard and thickened, and the appendix chronically inflamed. The appendix and uterus were removed and the adhesions cut and tied. Convalescence from the operation was fairly satisfactory, but the original symptoms persisted in spite of careful medical and dietary supervision. There appeared much abdominal tenderness and very free bloody stools showing pus also. The temperature, which before the operation had never been above 100°, rose to 102° eight days after this, and many small aphthous ulcers appeared in the mouth at the same time. The latter healed but the patient gradually lost strength and died, apparently from exhaustion, on February 10, 1924.

Post-mortem examination of the abdomen revealed plastic and slightly fibrinous adhesions in four or five places between various loops of the small intestines, the parietal peritoneum and the colon. The colon was rather friable, and on being removed was torn fairly easily.

The whole mucosal surface from cecum to rectum was covered with an irregular ulceration extending to the muscular coat, with only small islands of mucosa remaining. The edges of these islands were thickened, and even in them there was more or less necrosis. The lesions were sharply limited to the colon, the terminal ileum being entirely healthy.

Pathological diagnosis: Chronic ulcerative colitis.

THE INFLUENCE OF CLIMATE IN THE TREATMENT OF TUBERCULOSIS

By J. D. Blackwood, Jr., Lieutenant, Medical Corps, United States Navy

From the earliest times in the history of medicine, climate has played a leading part in the treatment of tuberculosis. The search for the most favorable climate has extended from the Tropics to the Arctic regions; from the sea level to high altitudes; from the open country to the forests.

For the past 2,000 years living in pine forests has been advocated as beneficial in the treatment of "ulcerated lungs" as mentioned by Pliny. E. Ebermayer demonstrated that forest air like sea and mountain air is freer from injurious gases, dust particles and bacteria; that the forest soil contained less nutritive matter (albuminoid, potash, phosphates, and nitrates) for bacterial growth; that the temperature and moisture conditions were less favorable and that the sour humus of forest soil was antagonistic to pathogenic bacteria.

Likewise, from the time of the ancients until comparatively recent times, a sea voyage was frequently recommended for those suffering with tuberculosis. While we know, since the advent of bacteriology, that sea air about 100 miles from shore is practically germ free yet we also know that many are not good sailors and that conditions aboard ship are not always conducive to the proper amount of rest, fresh air, and nutrition so necessary in the treatment of tuberculosis.

While voyaging on the sea is no longer advocated, residing by the sea is still considered of value in certain forms of tuberculosis.

The Tropics, unless one resides in the mountainous, cooler regions, have proven too enervating, especially in summer, for tuberculous patients.

The inaccessiblity at present of the Arctic regions precludes them as a climatic accessory in the treatment of this disease, although they have been recommended by some.

In our own country, for many years, patients suffering from this disease were given the advice of Horace Greely—"Young man, go west." It was felt that the higher, dryer climate of our Middle West was the one thing which stood between the sufferer and death. Unfortunately, the general practitioner, when he diagnosed his case did not take into account the amount of involvement of the lungs, the circulatory, pulmonary, nervous, or kidney complications, the financial condition, and the earning capacity of his patient, with the result that the West became confronted with the economic problem of caring for many destitute invalids. Finding that many cases which had left their homes and gone to different climates failed to be improved, or if improved were unable to adapt themselves to conditions upon their necessary return to their homes, the attention of tuberculosis workers then turned to home treatment.

Thus, two schools of thought have arisen, one feeling that climate has a definite place in the treatment of tuberculosis, and the other stating definitely that it has no place.

While there is no doubt that tuberculosis can be cured at home if the patient will conscientiously take the treatment, yet as Dr. F. I. Knight said at the meeting of the National Association in 1905: "It is strange that the factors of climate should have no effect upon the individual with tuberculosis, when they certainly do have an effect upon him when he does not have tuberculosis."

Again, the advocates of climatic treatment claim as stated by E. S. Bullock: "Comparison of the results of treatment in institutions in favorable climates with those obtained by like methods in unfavorable climates must convince the most skeptical that the advantage is all on the side of proper treatment in a favorable climate."

By a favorable climate for pulmonary cases is meant that with a low relative humidity, pure air, a maximum of days with sunshine, and an altitude ranging from 1,000 to 6,000 or even 8,000 feet, depending upon the type of case.

In an endeavor to ascertain the opinions of prominent tuberculosis workers to-day upon the importance of climate and altitude in the treatment of tuberculosis, letters were written to prominent specialists in various parts of the country, some practicing in cities and some at sanatoria, asking their opinions upon the following questions:

(*a*) I. What type of pulmonary tuberculosis is benefited by altitude?

II. What type of case is benefited most at sea level?

III. Do you consider a ward in a general hospital situated near sea level in a city, a proper place for the treatment of pulmonary tuberculosis with the most benefit to the patient? If so, what type of case?

IV. Would, in your opinion, a patient derive more benefit in a hospital devoted exclusively to the treatment of tuberculosis situated away from the city?

Upon analyzing the answers the majority opinion appeared to be as follows:

(*b*) I. Altitude: Early to moderately advanced chronic cases in which there is no tendency to hemoptysis, no cavitation, no weakening of the circulation nor cardiac embarrassment, no marked emphysema, nor nervous irritability.

II. Sea level: Advanced cases with or without extensive fibrosis, emphysema, chronic bronchitis, tendency to ulceration, cavitation, hemorrhage, weak circulation, renal complications, high temperature and acute miliary tuberculosis; also bone and glandular tuberculosis.

III. Ward in general hospital: Only cases for study and observation, emergency cases or far advanced, hopeless cases which it is desired to have near their families.

IV. Sanatorium: Of more value on account of the moral effect and the benefit derived from the attendance of doctors and nurses, who are trained and are devoting their time to the treatment of tuberculosis alone.

There are two of the answering letters which the writer would like to quote in extenso; one because it conforms with his opinion and the other because it states logically the opinion of one who holds climate as a negligible factor in the treatment of tuberculosis:

MY DEAR BLACKWOOD: These would be my answers:

1. I believe practically all cases of pulmonary tuberculosis are benefited by a moderate elevation of altitude, say, about 1,000 feet. Care must be exercised in recommending altitude for cases with considerable involvement or those who have a tendency to hemoptysis.

2. I would consider sea level best adapted to those cases with a pulmonary lesion so extensive as seriously to interfere with respiration and those cases with a history of frequent hemoptysis.

The seashore itself I would only consider suitable for bone and gland tuberculosis, or those cases without any open pulmonary lesion.

3. I would consider that a ward in a city hospital at sea level should only be used for emergency cases or those cases so near death that it is deemed best to keep within reach of their family.

4. I believe that the large majority of patients derive more benefit from a stay in a hospital devoted exclusively to tuberculosis, situated far enough away from the city to avoid all smoke and dust, especially when combined with a moderate elevation of altitude. The most essential point in regard to a sanatorium or hospital for the tuberculous is to see that the medical and nursing staffs are thoroughly acquainted with the treatment of this disease and its complications as well as their recognition.

I have tried to answer the questions in full to the best of my ability, but I am sure you must appreciate the fact that medicine is not an exact science and that any opinion as to the best method of treatment for any special case must be based upon a consideration of all the factors involved after a thorough study of the individual patient.

Cordially yours,

(Signed) FRANK A. CRAIG, M. D.

DEAR BLACKWOOD: Answering your questions categorically:

(1) What type of case is benefited by altitude? In 20 years' experience in treating every sort of case of pulmonary tuberculosis at White Haven (an altitude of 1,500 feet), with and without cardiac and other complications, and of treatng the same variety of cases in the city of Philadelphia, at a practical sea level, I have never found the slightest difference. If altitude has any effect on tuberculous cases, I have never found it.

Certain cases not doing what they should do in Philadelphia and conforming better to the treatment at White Haven have done better at White Haven, as one would expect, but when these or similar cases fail to conform to the treatment at White Haven they do no better than when they fail to conform in Philadelphia.

(2) What type of case is benefited most at sea level? A certain number of my pulmonary tuberculosis cases in Philadelphia have gone to the seashort (Atlantic City, Wildwood, and Cape May). On the whole it appears to me their success was not so great as in the case of patients who remained at home, or went to a sanatorium at White Haven, but I was inclined to think that it was because of the inducements at the seashore so that they were either in the sun too much, exercising too much, or remaining up too late. I have always found that patients, as a rule, do badly in hotels, apparently because they do not rest or take the diet properly. Patients in hotels are always afraid that someone will recognize the fact that they have tuberculosis, and they will be asked to leave. Rarely, therefore, can they be made to conform to rigid rules. In general, I would say that there are only two places to treat patients, either in a sanatorium or in their own homes. A small number of patients have gone to boarding houses in the town of White Haven. They practically never do well, because with the best of intentions in the world, the managers of the boarding houses have them doing things which are improper. These boarding-house keepers think that one of the necessities is contentment, and so they urge the patients into little amusements, like playing cards at night, a lot of talking, etc., all of which I have found detrimental. I have attributed, therefore, the failure to do well at seashore resorts to the same causes as in boarding houses at White Haven.

I have a certain number of patients coming to me from Atlantic City and other seashore resorts whose homes are there. They do well while living actually in their homes and conforming to the rules. This is what one would expect when one recalls that the death rate from tuberculosis in New York City, a seashore city, has been reduced so that it is the lowest of any of the large cities of the world. The death rate in New York City at the present time is about 99 per hundred thousand and in Philadelphia about 110, both reduced in 40 years from about 300. Vienna is an inland city at an altitude of 436 feet, New York is on the seacoast; there is no comparison between their death rates; in other words, it is what patients do which both prevents tuberculosis and makes them well of tuberculosis; elevation, in my mind, has no influence.

(3) Do you consider a ward in a general hospital in a city at sea level the proper place to treat pulmonary tuberculosis with the most benefit to the patient? If so, what type of case? At the White Haven Sanatorium we have wards. These wards are taken care of by nurses especially trained in

the nursing of tuberculosis, and all of whom are arrested cases themselves. In addition, the patients are attended by eight or nine experts from Philadelphia who have been doing nothing but tuberculosis work for a number of years. These patients do well, but I feel perfectly confident that if we transferred the White Haven Sanatorium to the heart of the city of Philadelphia they would do just as well. Naturally, every deviation you have from this more or less perfect nursing care, namely, from extremely well-trained nurses and high-class experts, the less well your patients will do. You are handicapped in military service work by, first, nurses trained in the care of acute diseases and not tuberculosis; second, by physicians who have not had a great deal of experience with tuberculosis; third, by a class of patients more than ordinarily hard to manage.

(4) Would, in your opinion, a patient derive more benefit in a hospital devoted exclusively to the treatment of tuberculosis situated away from the city? Unqualifiedly, yes; because I think there would be less inducement for the patients to overdo it, and they would be less bothered by frequent calls of relatives and friends.

In the treatment of tuberculosis the prime necessity is to do what is right. The contentment of the patient is decidedly secondary. My personal experience in that regard is not different from my experience in the treatment of any other disease. If a child 18 months old breaks its leg we put the child to bed and the leg in a splint. Two days later the child is going to feel just as well as he will ever feel again in his life, and he can not be made to understand why he should remain in bed. If he is kept in bed, even if it is necessary to strap him there, the leg will get well; if he is allowed up, no matter how much more contented he is up, the leg will never get well. The same applies to typhoid fever, pneumonia, scarlet fever, or any other disease you care to mention. We find the same thing true of tuberculosis. When it is proper for the patient to be in bed, it makes no difference how discontented he is in bed he does better there than if he were up. I am not anxious, therefore, for a patient to be participating in a lot of pleasures in the immediate neighborhood, or seeing a lot of friends who excite and worry him.

The one advantage of a hospital near a large ctiy in comparison with one far away is that you are more likely to get expert medical attention in the neighborhood of the city than at a distance.

Sincerely yours,

(Signed) JOSEPH WALSH, *M. D.*

There is no doubt that pulmonary tuberculosis can be cured under the most unfavorable conditions. Some years ago the writer abstracted and reported to the staff of the Phipps Institute, Philadelphia, a paper by Schmorl, who was pathologist at a general hospital abroad. He autopsied 1,440 cases, ranging in age from infancy to 100 years, who had died of various diseases, including tuberculosis. He demonstrated tuberculosis in 90 per cent of these cases. Many of these cases had died at an advanced age of diseases other than tuberculosis without any history of their ever having been treated for tuberculosis, and yet showed healed tuberculosis lesions in their lungs. While this is so, it does not take into account the number of cases of pulmonary tuberculosis living in the same surroundings who died of tuberculosis. It simply proves that if pulmonary tuberculosis can become cured under unfavorable conditions, then surely there is a greater chance for cure under favorable conditions.

It is the writer's belief that early to moderately advanced cases, such as those conforming to paragraph (*b*) I, would be most benefited by treatment at a tuberculosis sanatorium situated at a moderate altitude away from the city, so that the patient may realize more fully why he is in the hospital, will be more amenable to discipline, will be less liable to the secondary infections of acute colds, pneumonia, etc., to which his tuberculous state renders him less resistant. and will be away from the distractions and attractions of city life; but we must not lose sight of the fact that some patients in their search for health will be like the man who sought a four-leafed clover the world over, only to find it in his own back yard upon his return home.

CLINICAL NOTES

PYLOROSPASM ON DIVISION OF THE PYLORIC RING

By L. H. Williams, Lieutenant, Medical Corps, United States Navy

W. J. Mayo, in a recent article appearing in Surgery, Gynecology, and Obstetrics, March, 1924, called attention to the eight nodes of the intestinal tract. These neuro-muscular nodes, worked out by Keith, are situated along the intestinal tract at strategic points and initiate the impulses to the smooth muscle, the resulting contraction of which eventuate in aid to digestion and the expulsion of refuse. He states the intestines have two beats, "one called peristalsis, which occurs once or twice a minute, and the second beat, which Mall called the heart of the portal system, occurring 18 to 20 times to the minute."

The node, situated "at the termination of the primitive foregut near the common duct," was brought forcibly to our attention recently while excising a duodenal ulcer under local anesthesia. When this node is disturbed the reflex known as pylorospasm occurs.

The patient, a veteran, had submitted to operation because of a pain in the epigastrium after meals. The history and clinical findings were those of a duodenal ulcer. A large, sclerosed ulcer was found on the anterior surface of the duodenum when the abdomen was opened under local anesthesia. The induration appeared to involve the pyloric ring. While the ulcer was being excised from the duodenum the patient was quiet and was apparently feeling no more discomfort than is usual in such operations. It was necessary to cut through the pyloric ring to completely excise the indurated area. No pain was complained of as the pylorus was divided, but in a few seconds the patient groaned and complained of pain. He described the pain as cramplike. It appeared to come in about one minute intervals with cresendo effect and lessening after several seconds duration. No reason for this untoward and unexpected pain could be found at the time. It was not attributable to retraction on parietal peritoneum or pressure, as the pain was not present when the protective packs were placed in position and the duodenum caught in Allis's clamps at the outer limits of the ulcer. The pain continued to come at about the same intervals when the retractors were removed and all activities stopped in order to observe the effect. It was found impracticable to continue the operation with local anesthesia alone and a light ether anesthesia was given, under which the operation, a modified Horsely, was completed.

The behavior of this patient was in such marked contrast to others recently operated upon here under local anesthesia for duodenal and gastric ulcer, in which excision of ulcer was done, that the cause became of paramount interest.

The neuro-muscular node controlling the pyloric region, because of the long-continued irrigation of the ulcer, was in all probability greatly stimulated by cutting through the pylorus with the resulting peristaltic pain.

CLASSIFICATION OF THE ARTHRITIDES WITH REPORT OF A CASE OF HYPERTROPHIC ARTHRITIS

By C. J. Stuart, Lieutenant (j. g.), Medical Corps, United States Navy

Much confusion exists in medical texts concerning the classification of joint disease. Many different classifications exist, and it is but natural that such a state of affairs should lead to misunderstanding and differences in diagnosis.

Especially in the case of arthritis deformans is this lack of clarity in terminology evident. Royal Whitman, in his "Orthopedic Surgery," discusses arthritis deformans as presenting varying manifestations of the *same* type of pathological process. Osler in "Principles and Practice of Medicine" and Stevens in "Practice of Medicine" refer to arthritis deformans as an entity. Jones and Lovett in their "Orthopedic Surgery" give as synonyms of arthritis deformans: "Chronic nontuberculous arthritis, rheumatic gout, osteoarthritis, rheumatoid arthritis, chronic rheumatic arthritis, chronic rheumatism, hypertrophic and atrophic arthritis, and infectious or toxic arthritis."

Such a multiplicity of designations is confusing if not actually ridiculous. The nomenclature of arthritis, adopted by the Bureau of Medicine and Surgery of the Navy, recognizes only acute arthritis, chronic arthritis, and arthritis deformans. Since *all* cases of acute or chronic arthritis are not the same as regards etiology or prognosis, an attempt has been made to designate more fully the various types before classifying them according to the Navy nomenclature. I am indebted to Dr. H. C. Bean, of the orthopedic department, United States Naval Hospital, Chelsea, Mass., for the following classification:

Arthritis

Classification	Acute	Chronic	Deformans
A. Infectious:			
Infectious proper—			
1. Etiology (known, e. g., teeth, tonsils, etc.).			
2. Types (mono and polyarticular).			
3. Symptoms	Heat, redness, pain, tenderness, temperature, effusion, and capsular infiltration.	Pain on motion; tender spots, capsular thickening.	By adhesions and swe l ing.
4. Prognosis	Tends to subside fairly rapidly.	Tends to improve although slowly.	Tendency to get well
5. Treatment	Immobilization, while very painful; early physiotherapy and passive motion; get rid of focus.	Diathermy, baking, massage, and manipulation.	Manipulation; diathermy.
6. Remarks: Tuberculosis, gonococcus infection, syphilis, suppurative and rheumatic fever might be included but are definite diseases and are usually classified as such.			
B. Toxic:			
1. Etiology unknown (perhaps intestinal).			
2. Types (usually polyarticular).			
3. Symptoms	Heat, redness, pain, tenderness, capsular infiltration, but rarely ever acute.	Pain on motion; capsular thickening.	By flexion deformity and swelling.
4. Prognosis		A slow tendency to improve.	Deformities hard to correct.
5. Treatment	Rest, elimination	Physiotherapy passive and active motion.	Operation and physiotherapy.
6. Remarks: Very common class. When case is found to improve under intestinal treatment it automatically becomes infectious proper.			
C. Atrophic:			
1. Etiology (unknown, although the similarity to joint disturbances in syringomyelia, tabes, etc. point to a neurological cause).			
2. Symptoms	Never acute	Insidious onset; weakness, stiffness, atrophy.	Subluxations and dislocations.
3. Prognosis		Progressively worse.	Hopeless cripples.
4. Treatment		Prevent deformity.	Arthroplasties.
5. Remarks: More common in some localities than in this region (Massachusetts). Some similarity to an endemic infection. Sometimes epidemic in character.			
D. Hyperthrophic or osteoarthritis:			
1. Etiology (metabolic), age, injury.			
2. Symptoms	Only acute when strained; is in reality a strain when acute.	Pain, tenderness, limitation of motion by pain.	Rarely deforming; fingers show most proliferation.
3. Prognosis		Recover with only moderate stiffness.	Permanent.
4. Treatment		Elimination. Rest; immobilization.	None.
5. Remarks: A disease of middle and old age associated with arteriosclerosis.			

Thus it is seen that any of the different recognized types of arthritis may lead to deformities and may then properly be spoken of as "arthritis deformans." For instance, in any one case of acute infectious arthritis, e. g., one due to a focus of infection at the root of a tooth, the case may be referred to at different times as "acute arthritis," "chronic arthritis," or "arthritis deformans." A more exact designation, conveying much more information, would be "acute infectious arthritis," "chronic infectious arthritis," or "deforming infectious arthritis."

In the above scheme of classification it is seen that hypertrophic arthritis is a metabolic disturbance chiefly. Willis in The Journal of Bone and Joint Surgery April, 1924, discusses the relationship of age and this metabolic disturbance. He states that similar hypertrophic findings are practically universal after age of 45, some individuals showing more tendency in this direction than others. There is seen a wearing away of the articular cartilages at points of greatest pressure, and upon X ray there is seen a "squaring" of the normally rounded bony ends, very characteristic in this condition. This is due to an outgrowth or deposit of bone, the bone replacing cartilage at the edge of the joint surfaces. The motions of the affected joint are consequently limited and painful. The process is insidious in onset and it is not unusual to get a history of some sudden injury or overstrain of the part causing attention to be directed to the condition; X rays will usually show the same hypertrophic changes in joints other than the one complained of.

Treatment in these cases of hypertrophic arthritis is more successful than in some of the other types of chronic arthritis; under rest and eliminative treatment they usually show rapid improvement, but subsequent overstrain may, of course, bring on a recurrence of the acute symptoms.

Report of a case of hypertrophic arthritis.— J. F. S., a Veterans' Bureau patient, age 63, was admitted to this hospital March 28, 1924. complaining of pain and swelling of right knee and right foot.

Family history: Negative; no history of tuberculosis, heart, or kidney disease; no gouty diathesis; no history of tonsillitis or rheumatic fever.

Past history: Usual diseases of childhood; pneumonia at age 38. good recovery; health generally has been good all his life; led a rather sedentary life; hotel steward, until entering the Navy in April, 1917, as ship's cook. Shortly after his entrance into the Navy patient was taken with acute pain in the feet and knees. He attributed this to the unusual strain he was subjected to in standing for long periods on hard decks; he had been a man of very sedentary habits until this time and he had gotten very much overweight.

Patient was practically an invalid on account of his joint condition for several months, and he was finally surveyed from the service September, 1917. After leaving the Navy, patient was unable to get about for nearly a year, being in bed much of the time. Later he was given two years' vocational training by the Veterans' Bureau (as hotel manager), but he was under treatment by the out-patient department of the Veterans' Bureau much of the time, and during the year preceding his admission to this hospital all teeth were extracted.

Present illness: Patient states this is simply a continuation of his "old trouble," but that recently it has been much worse. He has been in bed for two weeks with acute pain in the right foot and knee prior to coming to the hospital.

Physical examination: Temperature, 98°; pulse, 82; respiration, 20. Patient is well developed and quite obese; he comes in walking with a cane protecting the right leg.

Head and neck: Pupils equal, regular, and react normally to light and distance. There is a moderate degree of arcus senilis present. Tonsils not enlarged or cryptic. All the teeth have been removed. No enlargement of the lymphatic glands.

Thorax: Expansion rather shallow; no areas of dullness; no alterations in the voice or breath sounds; no râles heard.

Heart: No evidence of enlargement; no murmurs heard; blood pressure—systolic 120; diastolic 80.

Abdomen: Very obese and somewhat pendulous. No scars or areas of tenderness. No hernia or varicocele; has small external hemorrhoids.

Extremities: The heads of the tibiæ are enlarged on both sides and the right is tender on pressure. The head of the first metatarsal on the right is painful on manipulation.

Reflexes: Normal.

Laboratory findings: Blood Wassermann negative; urinalysis negative. Phenolsulphonephthalein output (2 hours), 55 per cent.

X-ray plates: Show distinct hypertrophic changes in the bones of both feet and in both knees. There is a most characteristic "squaring off" of the edges of the bone at the heads of the tibiæ.

This patient was put to bed to insure rest of the affected parts and given cabinet baths, purgation, and diathermy. His symptoms have subsided rapidly under the above treatment, combined with a diet consisting largely of vegetables.

At present, five weeks after his admission to the hospital, he is up and about and is free of symptoms.

Under the Navy nomenclature this case could be diagnosed as "Chronic arthritis" (hypertrophic type).

CARCINOMA OF THE PANCREAS

WITH REPORT OF A CASE

By H. L. Pugh, Lieutenant (j. g.), Medical Corps, United States Navy

Our present knowledge of the physiology, pathology, and surgery of the pancreas has been rendered possible by the vast amount of work which has been done upon this organ in recent years, stimulated particularly by the impetus afforded by reason of its relation to diabetes. Long clinical observation checked by the experience of the post-mortem room and an occasional accidental experiment on the living subject, coupled with animal experiments, have thrown a flood of light on the physiology of the organ and elevated it from the position of a mere accessory digestive gland to the rank of a structure indispensable for the metabolic needs of the organism.

Tumors of the pancreas, as pointed out by Mayo Robson and others, are far from common and are usually of a malignant nature. Carcinoma is no doubt the most common of the neoplasms found in the pancreas, but is perhaps in the majority of cases not recognized until the case comes to autopsy, the reason probably being, as Dr. Sidney Phillips has pointed out, that the secondary nodules which form in the liver during the course of most cases of cancer of the pancreas are so much more readily recognized both during life and at post-mortem examination than a nodule of cancer in the pancreas, which requires to be searched for. On this account many cases of cancer of the pancreas have been considered as examples of cancer of the liver. This is borne out by the fact that since more attention has been directed to diseases of the pancreas the deaths certified from cancer of the organ have risen, while the deaths certified as from cancer of the liver have fallen in number. The type of growth may be any of the following, which are given in order of their frequency according to most textbooks: Scirrhous or encephaloid cancer, columnar celled carcinoma or colloid cancer.

The time of occurrence is usually after 40 years of age with the following symptom complex: First there usually is loss of weight, indigestion and general malaise, pain being absent or unimportant in most instances. Secondly there is jaundice particularly if the head of the pancreas is involved. The skin assumes a dark, almost black color, unlike the yellow color of the jaundice from gall stones. The liver swells and the gall bladder dilates. The patient seems then almost to dissolve, the loss of flesh being so rapid. The stools become pale and contain fat and muscle fiber if meat be taken. Chemical analysis of the stools shows that there is not only a large excess of unabsorbed fat, but that the neutral fat is much increased relative to the combined fatty acid, owing to the absence of the fat splitting ferment of the pancreatic juice from the intestine. Bleeding from the stomach and intestines is not uncommon and hemorrhages may occur under the skin. When the tumor attains any size it may be palpated through the abdominal wall, but this is the exception rather than the rule.' Enlargement of both gall bladder and liver can be generally made out. Ascites or dropsy of the lower extremities may follow from pressure on the portal vein or inferior vena cava or from secondary involvement of the liver. Death occurs from exhaustion, as a rule, within a few months, and is never very long delayed. According to Mayo Robson and Cammidge cancer affecting the head of the pancreas is more rapidly fatal than when occurring in any other organ.

A résumé of the clinical findings in a typical case of malignant disease of the pancreas as outlined by the two above-mentioned authors may be given as follows: A patient suffers for a time from indefinite symptoms of digestive disturbance, then jaundice appears, coming gradually but persistently increasing; the gall bladder is usually distended and the liver is normal or slightly enlarged at first and greatly enlarged later. A tumor may be found in the neighborhood of the pancreas. Cachexia rapidly develops and in some cases, however rare, pain disturbs the patient's rest. There is soon a feeling of prostration and weakness. The feces are massive and contain fat. The normal relation between the neutral fat and combined fatty acids is disturbed and an undue proportion of undigested muscle fiber is present in the stools. The urine contains albumin frequently and sugar and fat rarely. The whole clinical course is run, as a rule, within 12 months and after the appearance of jaundice within from 6 to 8 months.

The variation of symptoms according to the position of the tumor is spoken of by most writers on the subject. The cases are divided in the majority of instances into three chief types: (1) When the tumor extends to the right and compresses or occludes the common bile duct and pancreatic ducts; (2) where it takes an upward and forward course and besides compressing the bile duct, leads to pyloric stenosis and subsequent symptoms of dilatation of the stomach; (3) where the extension is backwards, causing compression of the vena cava, and of the portal veins, thus leading to an early onset of ascites and edema of the lower extremities.

In the differential diagnosis of carcinoma of the head of the pancreas we must consider common duct cholelithiasis, interstitial pancreatitis, cancer of the common bile duct, cancer of the liver, cancer of the pylorus, and catarrah of the bile ducts. Jaundice coming on painlessly and becoming absolute in a patient at or beyond middle age associated with a rapid loss of weight and strength and the formation of a perceptible tumor in the gall bladder region may very probably be correctly diagnosed carcinoma of the head of the pancreas. In common duct cholelithiasis there is always a preliminary history of gall stones.

Treatment: Medical treatment must be purely symptomatic; morphia for the relief of the pain, calcium chloride for the prevention of hemorrhages. Surgical treatment is not very hopeful and has usually been undertaken under the idea that the cause of the jaundice might be a removable one, or that the drainage of the bile duct might afford relief to the jaundice, but if the disease has involved the head of the pancreas, it is hopeless, however treated. Cholecystotomy and cholecystenterostomy may be done for the relief of the jaundice but are only palliative measures.

REPORT OF A CASE

The patient, a hotel porter, 47 years of age, Polish by birth, married two years, with no children, but wife alive and well, entered the hospital February 2, 1924.

Complaint: Pain in abdomen, jaundice, and general weakness, associated with loss of weight amounting to 20 pounds in past 7 months.

Family history.—Obscure, father and mother died of old age. No definite knowledge concerning sisters and brothers. No history of tuberculosis, malignancy, cardiac or renal disease.

Past history.—Patient had usual diseases of childhood with good recovery in each case. No history of any serious illness, accident, or operation prior to onset of present illness. There is a vague history of symptoms referable to his liver coming on as early as the summer of 1918 while he was in the trenches; this trouble was in the nature of pain through liver and gall bladder region associated with a general stomach upset and rheumatism. All of this he attributed to exposure in trenches and the general strain incident to warfare. In any event relief was afforded by symptomatic treatment and he spent several years of comparatively good health from the time of his discharge, July, 1919, till June, 1923.

In June, 1923, while taking vocational training patient was seized rather suddenly with a severe attack of pain in epigastrium accompanied by nausea and vomiting and the appearance of a generalized icterus. Upon closer questioning patient admits that his general health had been gradually failing for some weeks prior to the onset of the attack of pain which caused him to be taken to a hospital.

Present illness.—Upon admission to the Chelsea naval hospital patient complained chiefly of pain in abdomen, jaundice, and general weakness associated with loss of weight amounting to 20 pounds in past seven months. The onset of this trouble he dated to June, 1923. According to his account of his case the entire symptom complex had become progressively more marked with no periods of abatement since the onset. The jaundice had become progressively deeper. His appetite had remained fairly good, his bowels had been constipated, and his stools clay colored for some time. He had experienced no vomiting for several months.

Physical examination.—A deeply jaundiced cachectic individual skin clear of any significant scars or eruption. No generalized adenopathy. It was interesting to note that the jaundice instead of being of the bright yellowish variety commonly seen in acute catarrhal jaundice or common duct cholelithiasis was of an extremely dark or leaden hue.

Head and neck.—Face emaciated and deeply jaundiced. No thyroid enlargement. Eyes: Conjunctiva deeply jaundiced. Pupils equal, regular, and react normally. Ears, nose, and throat: Negative to inspection. Teeth: Good.

Chest: Emaciated, however, expansion good and equal on the two sides. Lungs: Clear and resonant throughout. No adventitious breath or voice sounds. No rales. Heart: No apparent enlargement. Action regular in force and rhythm. Pulse of good quality, normal in rate, and synchronous with apex beat. Blood pressure 125–85. No cardiac murmurs.

Abdomen: Symmetrical and flat, lower border of liver definitely palpable 1 inch below costal margin. Slight generalized tenderness over entire abdomen but no masses felt upon admission.

Genitals: Negative. Extremities: Negative upon admission. Both feet and legs became slightly edematous during patient's illness. General nervous system apparently normal.

Urine: Color, dark greenish amber, sp. gr. 1.035; reaction, acid; sugar, slight reduction of Fehlings; bile, strongly positive; micro, no pus blood or casts.

Blood: R. B. C.'s, 4,790,000; W. B. C.'s, 8, 700; polys, 48; lymph, 31; eosino, 1; hemoglobin, 80 per cent; coagulation time, 3 minutes 45 seconds; blood sugar, 77 mg. per 100 c. c.; whole blood Wassermann, negative.

Feces: Stools clay colored; chemical examination reveals presence of much fat.

Upon admission patient was running a slightly irregular temperature of from 98 to 100°. His pulse ranged between 50 and 90 and respiration was 20.

In view of the rather insidious onset, the absence of a typical history of gallstone attacks, the extreme icterus, however atypical of that commonly found in common duct lithiasis in that it presented the dark or leaden appearance, and the history of marked loss of weight leading to an existing profound degree of cachexia, a diagnosis of tumor, head of pancreas, was made, with common duct lithiasis and carcinoma of liver as second possibilities.

Operation.—February 7, 1924, ether anesthesia. Laparotomy, right midrectus incision. Gall bladder and liver exposed. Gall bladder found markedly distended and firm to palpating hand. Liver found to contain numerous hard nodules varying in size from that of a pea to a large marble. Further examination of abdominal viscera revealed a hard nodular mass at the head of the pancreas, undoubtedly carcinoma. Stomach was apparently normal.

Cholecystostomy was done, 250 c. c. of a lightly bile tinged mucoserous fluid was withdrawn, rubber tube made fast in cholecystostomy opening and wound closed, ether recovery good.

The wound healed promptly, and sutures were removed on the sixth day. Drainage was profuse during the first 10 days after operation, at the expiration of which time the drainage tube was removed, a total of 3,285 c. c. of dark-colored bile was discharged. After removal of the tube drainage continued to a marked degree for three weeks, making it necessary to change the dressing several times per day.

Immediately following the operation the patient continued to run a temperature similar to that which existed before, i. e., from 98° to 100° F. However, after about 10 days his temperature assumed a hectic course ranging between 98° and 104° F. during each 24 hours, there being a corresponding variation in his pulse rate, i. e., between 80 and 120. Examination of chest at this time revealed nothing significant.

Following the profuse drainage of bile there appeared to be a slight decrease in the degree of icterus, however his general condition became progressively worse. The weakness and emaciation increased and one month after the operation a mass about the size of an orange could be palpated in the epigastrium. At about this time edema of the feet and legs was first noticed.

The patient suffered no intense pain at any time during hospitalization, either before or after operation. Weakness, anorexia, and gastric discomfort constituted his chief complaints.

One month after operation, i. e., about the time of the appearance of edema in his feet and legs his condition began to grow rapidly worse, the weakness increasing to coma, and on March 15, 1924, 42 days after admission and 37 days after operation he quietly died.

Permission for autopsy could not be obtained.

NOTES AND COMMENTS

DIABETES, NEPHRITIS, JAUNDICE

In a lecture on "The Changing Standpoints in Metabolic Disease" recently delivered by Dr. W. Langdon Brown, of London, introductory to a postgraduate course at the Prince of Wales Hospital, Tottenham, and printed in the British Medical Journal of June 28, 1924, attention was called to the recent shifting of the main interest in the study of diabetes, nephritis, and jaundice from the urine to the blood.

As is well known, the main function of the kidney is to keep the composition of the blood constant, but in the past it was not realized that in part this was effected by changes in the so-called renal threshold, which term may be best explained as follows: "For any substance in the blood which can be of use to the tissues the kidney interposes a barrier in the way of its excretion; and if the amount of this substance in the circulation does not exceed a certain level the kidney does not excrete it. This rule applies, at any rate, to sugar, salt, hemoglobin, biliary constituents, and water. On the other hand, there is no such barrier to purely waste products such as urea or uric acid. Their percentage in the urine is chiefly determined by the concentrating power of the kidney. The threshold of the kidney may be affected by disease of that organ or may be altered to compensate for disease elsewhere, while disease of the kidney may also affect its power of concentration. The composition of the urine does not vary, therefore, with the composition of the blood, and the problem presents infinite complications unless the blood is directly examined."

In the lecture Doctor Brown illustrated the foregoing thesis by reference to the change in our views on diabetes, nephritis, and jaundice that has followed biochemical examination of the blood. His remarks follow:

DIABETES

"The presence of sugar in the blood is essential to life, and a threshold to retain some is therefore necessary. As soon as it falls too low there is profuse sweating, faintness, and mental confusion; and if the fall is extreme there will be convulsions, coma, and death. It is really a condition of internal asphyiation, since some sugar is necessary for the oxidative processes of the cell. An excess of sugar in the blood is not so dramatic in its consequences. It tends to impair the translucency of the crystalline lens, to excite neuritis, and to increase the liability to septic infections, but its most constant effect is to exhaust the cell islets of the pancreas. This sets up a vicious circle, since the failure of the cell islets results in still further hyperglycemia, which in its turn exhausts the cell islets still more. In the attempt to prevent the loss of a valuable foodstuff the kidney raises its threshold for sugar, so that one can never assume from the fact that a diabetic becomes free from glycosuria as the result of treatment that his blood sugar is becoming more normal. On the contrary, it usually continues to rise, even despite the dietetic restrictions.

"Where the renal threshold for sugar is low, as in so-called renal glycosuria, there are no serious consequences. Some two years before the discovery of insulin I posed the question in a discussion at the medical society, 'Is not hyperglycemia the enemy?' But no answer was forthcoming.

"Since then I think a general agreement has been reached that hyperglycemia *is* the enemy—particularly because of its disastrous effects on the cell islets. The resting blood sugar should normally be 0.1 per cent, rising in about 20 minutes after a meal to 0.15 per cent, and returning to normal in about one and a half hours. Within certain limits the body can function with a blood sugar that departs in either direction from these figures, but too great a fall is immediately dangerous, and too great a rise is ultimately serious. Anyone with a resting hyperglycemia is a potential diabetic.

"Now the level of normal blood sugar depends on two main factors—the endocrine balance and the threshold of the kidney. The endocrine balance is the resultant of the action of the sympathetic group of ductless glands—that is, the thyroid, pituitary, and adrenals—which mobilize sugar in the blood, and the reaction of the pancreas which stores it in the liver and muscles. Overaction of the former or underaction of the latter alike result in hyperglycemia. It is clearly of no use to treat a case of glycosuria by insulin if there is no hyperglycemia, and it may be positively dangerous. Fortunately we may lay it down as a general rule that when both sugar and diacetic acid are present in the urine of an undieted patient hyperglycemia is practically certain to be found. But when as a result of treatment glycosuria vanishes while acetonuria persists, there are two possible explanations—one that the patient is being dieted too strictly, the other that the kidney has raised its threshold for the excretion of sugar; the acetone bodies continuing to pass out by simple diffusion. In the first instance a slight relaxation in the diet by allowing more carbohydrate will diminish or even abolish the acetonuria, in the latter it will not, since the extra carbohydrate can not be utilized.

"It is in this matter of hyperglycemia that insulin helps so much; it promotes the utilization of sugar by the liver and other tissues, and thus renders the rise of the kidney threshold unnecessary, for the blood sugar automatically falls for six hours after its injection. But, further, insulin promotes the completer combustion of fat so that acetonuria is controlled. It might be thought that this was the direct consequence of better utilization of the sugar which burns up the fat; no doubt this is generally the case, but there are instances on record (Widal and others) where the acetonuria was abolished by insulin without the glycosuria being controlled at all.

"In general it may be said that the more severe the diabetes the higher the blood sugar is likely to be. But this is not invariably the case. I have at present a typically severe instance in a young woman whose blood sugar has never been found above 0.153 per cent, and in whom 20 units of insulin a day are required to bring it down to 0.125 per cent, at which level she can still only tolerate very little carbohydrate. She does better, however, when her fats are reduced.

"I should like here again to enter my protest against the statement that once insulin treatment is started it can never be discontinued. Many patients take this to mean that if they cease having it their last state will be worse than their first. There is no justification for this, but it has led, in my experience, to a number of patients declining the aid that insulin could undoubtedly bring. I would, on the contrary, positively assert that the sooner insulin is used after the onset of symptoms the more likely is permanent benefit to be derived. The most disappointing cases have been those of long standing who have become more or less adapted to a raised blood sugar, though even these have received some benefit. The most successful cases have been in young people who had early treatment. I have at the present time under my observation three girls, aged 5, 8, and 24, respectively, who have now had no insulin for several months, yet who have been persistently free from glycosuria with a normal blood sugar. They all had very high blood sugars at the beginning of treatment; in two of them it exceeded 0.4 per cent. I no longer regard diabetes as a *necessarily* progressive disease; but before the days of insulin the conditions were such that it almost inevitably progressively damaged the cell islets by hyperglycemia. In young and growing persons it is possible that if this is prevented by insulin the new cell islets, as they form, can escape damage. By combining alimentary rest, which quiets down the general metabolism, with insulin to combat hyperglycemia, the outlook in diabetes has been enormously improved. And I would add that slowing metabolism by rest in bed for a month at least at the beginning of treatment, and careful eradication of septic foci, which in themselves tend to produce hyperglycemia, should be regarded as essential parts of the treatment. Moreover, I believe that the question of the blood sugar in diseases other than diabetes will amply repay the study it is beginning to receive.

NEPHRITIS

" From the point of view of function rather than structure nephritis may be hydremic or azotemic, though mixed types occur. In the hydremic type the renal threshold is raised for salt and water, both these substances being unduly retained in the blood and tissues. Nitrogen retention, however, does not occur, so that the blood urea is normal. The great drain of proteins into the urine leads to their diminution in the blood, while lipoids tend to increase there. These are the facts we have learned from a study of the blood. Ordinary parenchymatous nephritis is usually of this type. In the azotemic type the concentrating power of the kidney is damaged. Therefore there is a failure to eliminate solids, both those for which the kidney interposes a threshold and those for which it does not. Nitrogen retention therefore occurs, and instead of the normal 20 to 40 mg. of urea in the blood we may find 80, 90, or even more. As it is the power of concentration which is impaired, the output of water is not involved, and, indeed, since the blood pressure rises, it is actually increased. Possibly this increased output of water is compensatory so as to enable the solids to escape in more dilute solution. Chronic interstitial nephritis illustrates this type.

"Now it is clear that the treatment will materially differ according to whether there is hydremia or azotemia. Since the blood proteins are low in the former we should not severely restrict the intake of protein in the food. Meat extracts should of course be prohibited, since they have hardly any nutritive value and have to be excreted by the kidney. The intake of salt should also be greatly reduced. Since it has been shown that the lipoids increase the tendency to edema, the fat in the diet should be cut down as much as possible. On the other hand, as the kidney can eliminate urea quite well, we can take advantage of its diuretic effect by giving it in doses of 45 to 60 grains three times a day. Its influence in getting rid of edema is sometimes remarkable.

"When nitrogen is being retained, however, the restriction of protein is a wise procedure. Let me say at once that even then it is not the urea which is toxic, but other nonprotein amine bodies. If the hypobromite method is used these are estimated as well as the urea, but if the urease method is employed only the urea is estimated. By employing both and comparing the results I have been able to find that in uremic conditions the amount of these unknown amine bodies is increased both relatively and absolutely in the blood and cerebrospinal fluid. The vomiting and diarrhea are attempts to eliminate these toxic nitrogenous substances by other channels. Von Noorden has shown that as much as 8 grams of nitrogen can be eliminated by the bowel, while not more than 3 grams can be got rid of by the skin. In the vomit of a uremic patient under my care Doctor Canti found a higher percentage of urea than in the blood. This points strongly to vicarious excretion and suggests the inadvisability of hastily checking such methods of elimination. But in such cases drastic nitrogen restriction is clearly called for, and I am accustomed to follow von Noorden's plan of giving nothing but fruit juice and sugar for a few days. The same method is also applicable to acute nephritis where nitrogen is apt to be severe. Here the benefit of fruit juice and sugar is often very striking, and in my opinion it is a far better treatment than milk diet. Recently I saw a doctor's son who developed acute nephritis with hematuria after tonsilitis. After 48 hours of stewed fruits, sugar, and lemon squash the blood disappeared altogether and the albumin fell to a trace; in a few days the urine was normal.

"The occurrence of mixed types, particularly in parenchymatous nephritis, undergoing secondary contraction of the kidney, raises difficulties. Where facilities for repeated blood examinations exist we can adapt our treatment accordingly, but where they do not we may take the blood pressure and the excretion of water as a guide. When the edema has subsided there is no point in continuing the administration of urea, and when the blood pressure shows a tendency to rise we may infer a failure in the concentrating power of the kidney and prescribe a more restricted intake of proteins.

JAUNDICE

"The new work on jaundice centers round van der Bergh's test for bile pigment in the blood serum. This depends on Ehrlich's diazoreaction. A freshly prepared mixture of diazotized sulphanilic acid and sodium nitrite is added to the serum, and if a pink color appears at once it is called a direct reaction; if only after the addition of alcohol, an indirect reaction. If there is a pink color at once which deepens further on the addition of alcohol, it is called a biphasic reaction.

"In considering the formation of bile pigment it is convenient to modify slightly McNee's description of the structure of the liver. A liver lobule may be compared to a number of test tubes packed up in damp sawdust. Each test tube represents an hepatic alveolus lined by secreting cells, blind at its central end, while its lumen represents the bile capillary. The sawdust represents Kupffer cells which are bathed in the blood from the capillaries of the portal vein.

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They form part of the reticuloendothelial system, which is also largely represented in the spleen pulp. They take up red corpuscles and any free hemoglobin from the blood stream and turn the blood pigment into bile pigment. But the final stage of this process, which apparently involves the breaking off of a protein fraction, is carried out in the cells lining the test tube. Bile pigment in this final form gives a direct reaction, but if it is still combined with protein it only gives an indirect reaction.

1. Obstructive Jaundice

"Now it will readily be understood that if there is an obstruction to the bile ducts some of the completely formed bile pigment will be reabsorbed into the blood stream. This will give the direct reaction, and is the condition found in the jaundice of gall stones and new growth of the head of the pancreas, for instance. In gall stones without jaundice the bile content of the serum is normal.

2. Toxic and Infective Jaundice

"Here, the polygonal cells being diseased, some of the bilirubin from the Kupffer cells is unable to enter them, and therefore passes direct into the blood stream, still in the combined form. The blood serum will therefore yield at first an *indirect reaction*, but as disintegration of the cells proceeds the bile capillaries become obstructed also and the reaction becomes biphasic, the direct portion of the reaction becoming intenser as obstruction becomes more marked. Such jaundice occurs in many general conditions of infection and toxemia. Here the jaundice does not appear to be merely due to catarrh of the smaller bile ducts as was formerly thought, for a series of changes in the liver cells can be demonstrated, ranging from simple cloudy swelling (as in pneumonia) through fatty degeneration (as in chloroform poisoning), partial necrosis and dislocation of the liver cells (as in spirochetal jaundice), to almost complete necrosis (acute yellow atrophy). In salvarsan poisoning any one of these stages may be met with.

3. Hemolytic Jaundice

"When blood destruction is excessive more bile pigment is found than the polygonal cells can deal with; some will be excreted normally, while the rest goes into the blood in the combined form. The serum will therefore only yield the *indirect reaction*, and bile pigment will usually be absent from the urine, while constantly present in the feces.

"That blood pigment can be turned into bile pigment without the aid of the liver was shown by Virchow. The hematoidin of old blood clots is chemically identical with bilirubin in its combined form, yielding the indirect reaction, as we now know. The experiments on geese which were formerly held to prove the contrary were done in ignorance of the fact that what corresponds to the spleen in higher animals is largely inclosed within the liver of birds. McNee suggests that hemolytic jaundice depends on blood destruction in excess of normal, whereby the cells of the reticulo-endothelial system, especially in the spleen, are thrown into increased activity which may result in or be actually dependent on an increase in the size of the spleen. The blood serum comes to contain a greatly increased amount of bilirubin of the same type as that arising from the normal physiological destruction of effete red corpuscles in health.

"This conception would explain much which has been hitherto obscure. It has been recognized that 'splenic anemia' is a consequence of several different conditions producing splenic enlargement, and that it is often relieved by splenectomy. On removal the spleen may be found to be the seat of tuberculosis, or endothelioma, among other conditions. Apparently we may now conclude that any disease of the spleen stimulating the formation or activity of the reticulo-endothelial cells sufficiently may produce splenic anemia. It would also explain why splenic anemia may go on to Banti's disease, in which cirrhosis of the liver and jaundice supervene, since the Kupffer cells of the liver are structurally and functionally an extension of the reticule-endothelial system of the spleen. It explains why the spleen may enlarge in the crises of pernicious anemia, and throws light on the occasional jaundice (without necessarily biliuria) in that disease.

"Van den Bergh has also shown that in some apparently healthy sallow individuals the bilirubin in the serum may reach nearly 3 units. Since the threshold for its excretion in the urine is 4 units, such individuals show no bile in the urine; the unit = 1 part of bilirubin in 200,000 parts of serum. The condition has been called 'simple familial cholaemia'; usually the spleen is not enlarged nor the fragility of the red corpuscles increased. There would appear, however, to be all stages between this and the condition known as acholuric family jaundice. In this form the patient may be born jaundiced or become so soon after birth. The jaundice persists with little or no variation for many years, but bile pigment is present in the stools as in health, while it is absent from the urine, in which any darkening present is due to excess of urobilin. Nevertheless bile pigment, giving the indirect reaction, is present in the serum. The spleen is always enlarged. There is considerable anemia with a low color index, poikilocytosis, nucleated red cells, and reduction in the number of leucocytes. Yet the patient has good or fair health, and shows a normal resistance to intercurrent diseases. This condition tends to appear in more than one member of the family and in successive generations. Some of the patients are liable to attacks during which the color deepens, when pain may be experienced over the spleen or liver, or both, and there may be slight pyrexia. Neither alcohol nor syphilis appears to play any part in the etiology. Enlarged abdominal veins, ascites, edema of the legs, and hematemesis have never been recorded, and the liver does not appear to be cirrhotic, although it is sometimes fatty.

"Attacks of hemoglobinuria have been noted in this condition, which could be produced by exposure to cold, and in this connection it is interesting to note that in one family a cold bath would intensify the jaundice. All this points to hemolysis as a cause of the jaundice. The serum from a patient agglutinates normal red corpuscles, but not his own red corpuscles or those from another individual suffering from the same disease. The most striking pathological feature of the condition is the undue fragility of the red corpuscles, for they are hemolysed by a dilute salt solution which has no effect on ordinary corpuscles. We may conclude that in acholuric family jaundice there is a chronic hemolysis of unduly fragile corpuscles as a primary event, but that the threshold for the excretion of bile is not reached, while the enlargement of the spleen and liver is secondary, to deal with the increased hemolysis. What the cause of this undue fragility may be is still unknown.

Latent jaundice is a term applied to conditions where the bilirubin content of the serum does not reach four units, so that the usual symptoms are missing. The hemolytic type of this is seen in pernicious anemia, anemias due to worms, and in all the newly born. Its occurrence is of prognostic value when salvarsan is being given, as it is evidence of the approach of poisoning by the drug. An obstructive type of latent jaundice occurs in cirrhosis. In this connection it is interesting to note that in the ordinary jaundice so common in the new born (icterus neonatorum) the blood serum gives an indirect van der Bergh's reaction, so that it is hemolytic in origin. Before birth the fetus has a polycythemia of about 6½ millions per cubic millimeter. On the second day after birth this excess has disappeared and probably there will not be more than 4½ millions. In a sense this polycythemia may be regarded as a protection against the risk of loss of blood at birth. Once this has passed, hemolysis occurs and hemolytic jaundice follows. The fact that latent jaundice is always present for a time after birth supports this view. Severe jaundice in the new born is generally due to suppurative pylephlebitis from septic infection through the umbilical cord or to congenital syphilis. Rarely it results from congenital atresia of the bile ducts.

"*Dissociated jaundice* has been described by French observers—the bile pigments going one way, the bile salts another. But as they did not take the condition of the blood into account, judgment must be reserved on this. There may, indeed, be renal dissociation in obstructive jaundice, both pigments and salts being found in the blood while only bile salts are filtered out by the kidney. I saw a case of catarrhal jaundice in which bile salts appeared in the urine before the pigment, and it is stated that this is common in the later stages of this condition. In my experience of jaundice as a whole the converse condition is commoner—that is, for bile pigments to be present in and the bile salts to be absent from the urine.

GENERAL CONCLUSIONS

"The biochemical examination of the blood has therefore cleared up many doubtful points as to different forms of glycosuria, has explained the progressive damage produced by hyperglycemia, and has provided the best guide for regulating treatment by insulin. In nephritis it has brought out clearly the distinction between hydremic and azotemic forms of the disease which materially affects their rational treatment. It has reestablished after many years the existence of hematogenous jaundice, and has enabled us to classify our cases on a rational basis. In the time that remains I should like to say something about the fresh light this method has thrown on the subject of so-called acid intoxications. For a time there was a tendency to apply wholesale to clinical conditions the results obtained by the experimental injection of acids into animals. Carnivorous animals can protect themselves against a certain amount of acid by the formation of ammonia from the tissues, while herbivorous animals use their excess of alkaline salts for the same purpose. Where these measures are inadequate there is dyspnea, acetonuria, and ultimately coma. It is not surprising that it was thought that herein lay the explanation of diabetic coma, associated as it is with the formation of diacetic acid, which is largely excreted in combination with ammonium salts. Then is was found that in diabetic coma the reaction of the blood, or, to speak more exactly, its hydrogen-ion concentration, was not necessarily altered in the direction of acidity. It should be remembered that an acid may be toxic in its effects simply because it is an acid, like hydrochloric acid, or because it contains a molecule which is poisonous to protoplasm, like prussic acid. In the first instance the lethal dose is large, in the second it may be so small that the reaction of the blood is not appreciably affected. Now diacetic acid contains a toxic enolic group which is equally deleterious in the form of a neutral diacetate. This stimulates the respiratory center, causing dyspnea, washing out CO_2 by overventilation of the lungs, and exhausting the alkaline reserve of the blood. The only benefit of intravenous infusion of sodium bicarbonate is to restore some of the alkaline reserve for a time. But it fails to check the production of this poisonous enolic group, which ultimately overwhelms the body. Insulin, on the other hand, strikes at the root of the mischief.

"But it remains true that any increase in the hydrogen-ion concentration of the blood produces dyspnea. It is the lactic acid which is formed from the breaking down of glycogen which causes us to be 'out of breath' after strenuous exertion. Ventilation of the lungs is thereby increased and more oxygen is taken in, which rebuilds the lactic acid into glycogen, oxidizing one quarter of it in the process. Thus the blood is restored to normal and we are no longer breathless. Similarly the dyspnea or uremic asthma is due to the failure to excrete acid sodium phosphate, and the resulting acidemia may be temporarily relieved by alkalis. But a man may also be breathless at a high altitude without any exertion, and his blood will be found to be more alkaline than usual. Here the mere lack of oxygen due to its low tension in the atmosphere directly stimulates the respiratory center, nervous tissues being the most sensitive to this lack. The resulting dyspnea washes out CO_2 from the lungs so that the blood actually becomes more alkaline, a condition which the kidney tries to rectify by excreting more alkali. This type is seen clinically in the dyspnea of heart disease, which is due to oxygen lack, largely the result of capillary stasis, which allows of more complete reduction of hemoglobin. It is therefore usually associated with cyanosis, but there need be no increased production of acid. Indeed, the increased pulmonary ventilation may actually produce alkalemia. Clearly it is no use to give alkalis, therefore, in cardiac dyspnea. If digitalis is not contraindicated on other grounds it should be tried because a cardiac tonic will help to relieve capillary stasis and the consequent anoxemia. With the same purpose in view oxygen should be given, and it should be given through a rubber catheter introduced through the nose into the nasopharynx. The catheter is attached to a Wolff bottle containing warm water through which oxygen is bubbled. Given in this way it can definitely increase the oxygen saturation of the blood, as has been proved by direct examination of the blood removed by puncture of an artery; given in the ordinary way it has no such effect.

"The conclusion of the whole matter may be briefly stated thus: When acidemia is associated with dyspnea, the acidemia is the *cause* of the breathlessness; when alkalemia and dyspnea are associated the alkalemia is the *result* of the dyspnea. Recognition of these facts is of great importance in selecting the appropriate measures of treatment."

REPORTS

REPORT OF MEDICAL ACTIVITIES ASHORE IN HONDURAS DURING CIVIL STRIFE OF FEBRUARY AND MARCH, 1924

By W. T. MINNICK, Lieutenant, Medical Corps, United States Navy

In this report reference to the de facto government forces will be spoken of as the "Reds" and those of the opposing forces as the "Blues," since these were the colors adopted by the respective forces.

The U. S. S. *Denver's* landing force, consisting of 4 officers and 52 men, landed at Ceiba, Honduras, at 11.15 a. m. on February 28, 1924, and established themselves in the Standard Fruit Co.'s compound to protect the lives and property of such Americans and noncombatants as sought refuge in the established neutral ground. This force was reinforced on February 29 by 1 officer and 35 men. The landing force took quarters in an office building of the company. The building had one large floor and several small offices. The large floor was used as quarters for the men, while the officers were quartered in the smaller offices. Toilet facilities were excellent, but slightly crowded. The sleeping quarters were adequate and good. Mosquitoes gave very little trouble, but every man was provided with a mosquito net. Shower baths were provided for the men in one of the buildings near by. Provisions were made in the rear of the building for washing clothes. The landing force was messed in the company's restaurant. The food was fair and as well prepared as could be expected under existing conditions. The water supply from the fruit company's water system was excellent.

The fruit company's property, which was declared a neutral zone, is about one-half by one-fourth mile in extent. There are a number of houses, barracks, storehouses, shops, and train sheds on the property. There were from three to four thousand noncombatants on the property. Sleeping quarters, messing, and toilet facilities were not adequate for this large number of people. Due to the ignorance of the people it was impossible to make the most of the facilities present. The buildings and grounds were policed daily and the ground about the buildings and floors were sprayed with cresol solution.

An irregular body of "Blues" entered the city about 1 p. m., on February 28, 1924, and attacked the "Reds" who were in the cuartel and customhouse. Many stray shots were fired over the neutral zone. One British and one American subject were wounded while in the neutral zone. A dressing station was established at the headquarters of the landing force and first-aid treatment was rendered to any wounded of either force who came into the neutral zone. Two men of the "Red," three noncombatants, and nine of the "Blue" forces applied for treatment. Eleven of these were dressed and transferred to the charity hospital. One with a machete wound of the hand was dressed and directed to report to the hospital daily for dressing.

Due to the danger from rifle fire the dead were left about the city for two days, then they were gathered up and left at the cemetery. Their condition was such that burial was not practical and it was recommended that they be burned. This recommendation was acted on, but not completed when the U. S. S. *Denver* left Ceiba. There were 48 known dead, 47 were burned and 1 buried. There were also 4 others reported dead.

The landing force embarked on board the U. S. S. *Billingsley* for Puerto Cortez, Honduras, at 9.40 a. m., March 4, the U. S. S. *Denver* having sailed for Puerto Cortez March 3.

The landing force again landed at Puerto Cortez at 4.40 p. m., March 4, and established headquarters in a sugar shed on the cement pier. The western end of the city which embraced the American colony was established as a neutral zone; all combatants were cleared from the zone and noncombatants disarmed. A first-aid dressing station was established in the center of the sugar shed and protected from any danger with a barricade of filled sugar bags. Sanitary conditions were not good because of the unclean sugar shed, bad water, lack of bathing and toilet facilities, and numerous mosquitoes. The sugar shed was thoroughly cleaned, the one latrine, which accommodated about eight men at a time, was thoroughly scrubbed with lye and washed with a strong cresol solution. Water was conveyed from the ship in water breakers. Arrangements were made for bathing and washing clothes back of the sugar shed on the cement pier. Each man was supplied with a mosquito net, and quinine prophylaxis was given during our stay in Puerto Cortez.

There was no engagement at Puerto Cortez, the "Reds" leaving the city on the morning of March 6. The "Blues" took possession of the city and the *Denver's* landing force returned to the ship.

The U. S. S. *Denver* sailed for Tela, Honduras, at 10 a. m., March 7, and the landing force went ashore at 4 p. m., of the same date. Headquarters were established at the railroad station, and a box car was placed on a sidetrack for a first-aid station. The water was excellent, mosquitoes were numerous, messing facilities were good, the landing force being messed in the United Fruit Co.'s restaurant.

The men were supplied with mosquito nets, but were badly bitten while on watch, and were given quinine prophylaxis. Bathing and toilet facilities were had at one of the company's barracks.

An engagement between the "Reds" and "Blues" occurred at 6 a. m., March 8. During the battle the "Blue" Red Cross organization made every effort to care for the wounded, not only of the "Blues" but of the "Reds" as well. During the engagement there were 16 of the "Red" forces and 25 of the "Blue" forces dressed at our dressing station. Twenty-two of these were transferred to the fruit company's hospital for further treatment and the others directed to report to their own organizations, for further treatment. During this engagement there were 41 known wounded and 6 killed. The "Reds" surrendered and the "Blues" took possession of the city during the afternoon of March 8, and the *Denver's* landing force returned to the ship at 8.30 a. m., March 9, and at 11 a. m., sailed for Ceiba, Honduras.

The U. S. S. *Denver* anchored off Ceiba at 3 p. m., and the landing force immediately went ashore to reinforce the United States marines of the U. S. S. *Florida*, who landed the day previous from the U. S. S. *Lardner*. On landing the forces established themselves in the same office building as on their first landing of February 28. The fruit company's property had been occupied for several days by a large number of civilian refugees. The buildings and grounds mentioned in paragraph 3 were dirty. Fecal deposits were found about the grounds and buildings and even the train sheds contained such refuse. The medical officer was at once given full authority to take any sanitary measure he thought advisable and to issue orders pertaining to sanitation. A house committee under the supervision of the medical officer was formed in each building, which sheltered refugees, who were authorized to enforce cleanliness and were responsible to the medical officer for the enforcement of all orders. Two latrines were built, each to accommodate 24, and 12 additional toilet seats in the building were opened for use. The buildings were evacuated each morning and the floors and grounds thoroughly cleaned and sprayed with cresol solution. The fecal deposits about the buildings were removed and further deposits prohibited. Inspections were made twice daily.

An engagement occurred on March 10, between the "Red" and "Blue" forces. During the engagement the "Blue" Red Cross organization made every effort to care for the wounded and bury the dead of both forces. At our dressing station 20 wounded, 13 of the "Blue" and 5 of the "Red" forces, and 2 noncombatants were given first aid treatment, 14 of which were transferred to the charity hospital. During this engagement there were 78 known wounded and 31 killed.

During the three engagements there were 219 wounded and 89 dead. Seventy-five of the wounded were attended at our dressing station.

The character of wounds cared for at our station were as follows:

Location	Number	Character of wound
Limb	41	25 with wound of entrance and exit; 16 with wound of entrance and exit with fracture.
Head	11	All flesh wounds.
Trunk	20	10 with wound of entrance and exit; 10 with wound of entrance only.
Neck	2	All flesh wounds.
Hand	1	Machete wound.

During the engagement at Tela and the first one at Ceiba, there were numerous wounds by soft-nosed bullets, which shattered bones and left frightful wounds of exit. During the second engagement at Ceiba there were fewer soft-nosed bullets used. The use of the machete in close fighting, is a general custom in this country and several men died of such wounds. Of the number dressed at our station not one case required the use of a tourniquet, although several patients had arteries of considerable size destroyed. Hemorrhages from wounds received during the second engagement was much greater than in the previous cases due to the clean wounds from the high power rifles and steel jacket bullets used. So far as could be learned no tetanus developed among the wounded and antitetanus serum was used in only one case.

There were no casualties among our forces. The health of the men with the landing force was excellent. At present (March 25) seven cases of malaria have developed due to exposure in Honduras.

NAVY NURSE CORPS

At the biennial convention of the American Nurses' Association held in June, 1924, at Detroit, Mich., the Navy Nurse Corps was represented by the superintendent, three chief nurses, and three nurses. Following is a history of the Government nursing section of the American Nurses' Association by the superintendnt of nurses of the United States Public Health Service, and a report of the convention by the superintendent of the Navy Nurse Corps:

SECTION OF GOVERNMENT NURSING SERVICE OF THE AMERICAN NURSES' ASSOCIATION

By LUCY MINNIGERODE, Superintendent of Nurses, United States Public Health Service

Although the Nurse Corps of both Army and Navy have been in existence for a number of years, there was little or no connection between these nurses in the military services of the Government and the national nursing organizations, notwithstanding the fact that the American Red Cross department of nursing constituted by law the reserve of these services and that the national committee on Red Cross nursing service forms the connecting link between the American Red Cross and the nursing organizations of the country.

When the United States of America entered the World War the nursing service of the Government immediately came into the limelight. It is interesting to note that through the vision and foresight of the then chairman of the Red Cross national committee on nursing service, Jane A. Delano, there were ready for immediate service with the Army and Navy about 8,000 nurses. Many of these 8,000 nurses were enrolled in special base hospitals and units, and it was my privilege to organize around Columbia Hospital, Washington, D. C., a unit of 20 nurses for service in the Navy Nurse Corps. This unit had the distinction of being the first group called into service and many of them are still members of the Navy Nurse Corps.

Following the World War with the need for immediate hospital facilities for disabled soldiers and sailors and with the placing of the responsibility for the development of these facilities upon the United States Public Health Service there came into existence another corps of nurses which increased in numbers as the disabled men were discharged from the military forces and as the nursing services of the Army and Navy decreased.

A fourth governmental nursing service was created as such with the transfer of hospitals for disabled veterans from the Public Health Service to the Veterans' Bureau May 1, 1922, so there are at the present time four organized nursing services in the United States Government, and by "organized" I mean those where the authority is centralized and where the highest standards of qualifications are maintained. These four services number approximately 3,000 registered nurses, the standard of qualifications being that required by the American Red Cross. During this period, however, there has not been the close connection with the national nursing organizations which would seem to be essential if the service were to develop along the proper lines and if the American Nurses' Association was to be representative of all phases of nursing work.

Following the convention of the American Nurses' Association at Atlanta, Ga., in 1920, a suggestion was made that the Government services be given definite representation on the councils of the association, with the result that the superintendents of the Government services are now members by virtue of their office of the advisory council of the national organization.

After the Seattle convention in 1922, when it was only through the courtesy of the director of the department of nursing of the American Red Cross that the Government services were represented on the program of the convention, it became evident that a still closer tie must be found than this representation on the advisory board.

Accordingly request was made for the establishment of a section on Government service in the American Nurses' Association, and this section held its first meeting in Detroit, June, 1924, when the association held its biennial convention. The program committee was most generous in allowing this new section a full joint meeting so that the accomplishment, the ambition for progress, and the needs of the Government, the largest employer of nurses in this country, was presented to all delegates and visitors. We feel that the establishment of this section has been a great step forward for the nurses in Government service.

We hope that the nurses in the various stations of the Army, Navy, Public Health Service, and Veterans' Bureau will take an interest and an active part in all nursing affairs so that we may make ourselves a part of this great organization and may take advantage of this opportunity to promote interest in and knowledge of the type of service rendered, the wide range of activities, the inevitable growth, and the opportunity for patriotic service in these Government nursing services.

REPORT OF THE CONVENTION OF THE AMERICAN NURSES' ASSOCIATION HELD AT DETROIT, MICH., JUNE 16 TO 21, 1924

By J. Beatrice Bowman, Superintendent, Navy Nurse Corps

The advisory council of the American Nurses' Association met Saturday, June 14. This council is composed of officers of the American Nurses' Association, presidents of the State associations, chairman of sections, the editor of the American Journal of Nursing, and the superintendents of the Army, Navy, Public Health and Veterans' Bureau nursing services. An interesting new member was added from the Porto Rican Nurses' Association.

On Monday, June 16, the Navy exhibit was placed in the booth assigned to it, and too much can not be said of the splendid cooperation given by the different hospitals as expressed through these group pictures. To Lieut. Commander M. A. Stuart and Chief Pharmacist's Mate A. B. Brown of the recruiting station in Detroit, recognition is due for their interest, hard work and enthusiasm in assembling and placing the exhibit, also packing and shipping it to the bureau.

The exhibits of the Governmet services were said, by all with whom we came in contact, to be by far the most interesting of any at the convention, and I feel that the Navy exhibit was exceptionally good in its subject matter, also from an artistic point of view. Members of our own corps were on duty in the booth throughout the day, ready to give all information asked, and the nurses found much pleasure as well as interest in meeting the nurses and superintendents of the civilian hospitals.

The Government nursing section, which held its first meeting on Wednesday, June 18, was greeted with a surprising amount of interest and enthusiasm. Approximately 2,000 nurses attended the session and we learned afterward from all sides that it was one of the most interesting meetings of the convention and bids fair to be the strongest section of the American Nurses' Association. Thursday morning, a "Round Table" for this section was held and attended by an overflow of the space assigned. The outstanding comment made of this section was the pleasure expressed because of the cooperation and friendship exhibited by the four superintendents. This came as a surprise to us, but naturally was pleasing and gratifying. Election of officers was held; Miss Lucy Minnigerode, superintendent of Public Health nursing service, was made chairman; superintendent, Navy Nurse Corps, vice chairman; and Miss Sayre Milliken, captain, assistant superintendent, Army Nurse Corps, secretary. We realize already that a large and powerful organization has come into existence, but the most interesting and delightful part is that the nurses are expressing so much pleasure *because* of its existence. We are given to understand that we may look for splendid cooperation from all. Members of the Government services and ex-members, who have received honorable discharge, are eligible to this section. At the "Round Table" I made a plea that we unite as an organization in educating the nurses of the country to the work and standards of the Government organizations.

On Friday morning, June 20, the Navy nurses met with me for breakfast where we compared notes as to the interesting things at the convention and the success of the exhibit. All were most enthusiastic and stated that they felt the trip well worth while because of the new interest it created and the inspiration obtained through contact with the splendid women met and the subjects heard discussed.

The attendance of over 5,000 nurses—I understand 5,400 registered—was most impressive and the determination for better things. the activities, and the enthusiasm shown for the nursing profession could not do less than inspire one.

The handling of this convention by Michigan nurses called forth the greatest expressions of admiration from all. Nothing was overlooked nor was there confusion of any sort. The position Michigan nurses have made for themselves is an example which should be followed by all in our profession. They are not only alive to the activities of the profession but are active in all civic and social interests, and what is also a delightful condition, they are accepted and relied upon in every instance. It has shown us that we have much ground to cover, and we know there are many difficulties to overcome before we can reach the position already achieved by them.

I feel that my trip to Detroit was successful in the interests of the Navy and that the purpose in mind, to create a friendly feeling for the Government services throughout the United States, has already brought results. Many superintendents admitted they had held antagonistic feeling for our services, though they had great respect for the Navy, but now seem glad to have the knowledge, and their attitude is greatly changed. Miss Adda Eldridge was elected president of the association, and the next convention will be held at Atlantic City in 1926.

THE NAVY NURSE CORPS AND ITS RELATION TO THE ADVANCEMENT OF NURSING EDUCATION [1]

By J. Beatrice Bowman, Superintendent, Navy Nurse Corps

In order that I may impress upon you the necessity in the Navy for graduate nurses of high caliber who are keenly alive to the activities of the present and future development of the nursing pro-

[1] Paper read at the biennial convention of the American Nurses' Association, Detroit, Mich., June, 1924.

fession, I must briefly outline the actual teaching work done by members of the Navy Nurse Corps aside from the general duties as nurses, specialists, or executives in the 44 stations to which nurses are assigned, 20 of these being naval hospitals with an approximate bed capacity of from 50 to 1,000. Sixteen of these naval hospitals are located in the United States and the remainder at the tropical naval stations in the Virgin Islands, Haiti, Guantanamo Bay, Cuba, Pearl Harbor, Hawaii, Samoa, Guam, and the Philippine Islands. The remainder of the 44 include our dispensaries, the two hospital ships and the United States naval transports.

Primarily, the Nurse Corps was established to care for the Navy sick, but you, of course, can understand it is impossible for women to live aboard our various ships of the Navy, aside from the hospital ships and even this duty was denied us until 1921. Who, then, cares for the sick on board our battle ships, supply ships and colliers? Not the orderlies as you in civilian life know them, but the Navy hospital corps men who stand uniquely in a class by themselves, and who number throughout the Navy approximately 4,000.

Because of the importance of the work for which these men are responsible, the naval service realized long ago it was necessary to get the men together under instructors where ample facilities for teaching and demonstration were available. It also realized that a well-formed foundation of theoretical knowledge is a prime requisite in the later development of a hospital corps man. Therefore, in May, 1902, the first centralized school of nursing for the Navy was established in the Norfolk Naval Hospital.

At the present time there are two schools of this kind, one at the naval hospital, Mare Island, Calif., and one at the hospital station, Portsmouth, Va., each of which is now placed on the accredited list of training schools in California and Virginia, and to each of these schools are detailed three Navy nurse instructors. The Navy is dependent upon these schools for the intensive training of its men, as it is realized that by giving theory first we more rapidly develop the practical or clinical side so necessary in preparing men for duty aboard ship.

This intensive training occupies a period of from four to six months. The men are then transferred to our naval hospitals where their instruction is taken over by officers and members of the Nurse Corps. Classes are held each day excluding holidays and Sundays, and practical bedside nursing is the responsibility of the nurse in charge of the ward.

Instructors for these men are a matter of great moment at this time, as the Navy desires to develop the man to the fullest extent of his ability. A course is being developed that will inspire and give the hospital corps men an incentive to go to the highest rank obtainable. If the man is ambitious he may, after having passed his examinations in all branches, be given what is equal to a post-graduate course in the pharmacists mates' school at the aforesaid training center. A man may then specialize in any given subject. It may interest you to know in what subjects he is examined before receiving higher ratings. His education is, of course, first considered and he must pass a satisfactory examination in ward and sick bay duties, clerical work, dressing room, operating room, laboratory, X-ray, commissary department, and dispensary duties. He is marked in the special duties to which he may have been assigned. Anatomy and physiology, minor surgery and first aid, materia medica, nursing, hygiene and sanitation, diets and messing for the sick, pharmacy and chemistry, typewriting, anesthesia, administration, and all practical subjects constitute his educational requirements in the Navy. You can readily see that a man who has the ambition to advance from a hospital corps man to a pharmacist or chief pharmacist deserves respect and recognition.

While the education of the corps man extends over numerous departments to which a nurse is not attached, she is as a general rule the first to receive him from the school, also in the school, and as you know it is the start that generally counts in a man's life. We are establishing the nurse instructors throughout the naval hospitals, whose duties are to follow up the nursing education of the corps man, yet the ward nurse is daily a bedside instructor and it is the example she sets as she goes about her duties in directing and caring for the sick and managing the ward that the man takes with him when he is placed on his own responsibility on a battleship; therefore, we impress upon our nurses how great is their responsibility and how much the lives of the men at sea depend upon their ability as qualified Navy nurses.

Not only does the teaching of the hospital corps men fall to the lot of our nurses, but in the island possessions of the United States, training schools for the native women are successfully conducted and, therefore, higher standards of living and health are being established.

In the Virgin Islands we have a hospital at St. Thomas, and on the island of St. Croix we have two hospitals, 14 miles apart, in the towns of Fredericksted and Christiansted. The total number of nurses in training here is 32. Prior to the advent of the Navy nurses in the Virgin Islands there had been no professional nursing as we know it. A little band of nine Navy nurses organized three training schools for native (colored) girls, giving them a very thorough course, of three years' duration, with the idea of fitting them for work in their own islands.

The problems necessarily have been difficult, owing to the unwillingness of the better-class families to allow their girls to "perform manual labor" and the lack of, in some cases, even a primary education. These difficulties have been surmounted, first of all, by conducting classes in the three R's, as well as in nursing; and, secondly, by general public education.

Two classes have been graduated, and to-day we find the graduates employed in the hospitals as charge nurses, as welfare nurses in the country districts and in the schools, practicing midwifery under a physician's direction, and in private nursing.

Much has been done in the treatment of trachoma, general sanitation, and, most especially, in the care of mothers and babies. The interest and enthusiasm in the continuous "Better Babies Campaign" never flags.

We are very proud of the progress made in our Virgin Islands training schools, and the American nurses might be recalled and the positions of responsibility and trust filled by the native graduates, were it not for the fact that it is impossible for them to maintain discipline without the moral support of the white women.

On our lovely little island of Samoa is situated a naval station where we have a small naval hospital or dispensary of about 35 beds; also under the administration of the medical department is the Samoan hospital for natives and all races except white. The buildings in the Samoan hospital, with the exception of the dispensary and operating rooms, are built like the native houses, which are all open, with thatched roofs.

The training school for native nurses was established in 1914 and the Navy nurses were given this charge. The pupil nurses, 12 in number, are full-blooded Samoan girls, of the Polynesian race, 16 years of age or over. To be admitted into the training school, they shall have had some preliminary training in home hygiene and right living. This they have received from a missionary school which is a boarding school conducted by the London Missionary Society, and to which the daughters of many of the native chiefs and best native families go at as early an age as 6 years. The best of the senior pupils are selected to join the training school and it is considered a great honor, as the native nurses are held as the highest type on the island.

The Navy nurse is in charge, under the direction of the commanding officer of the naval hospital, and the native nurses are given a course of training from two and one-half to three years, with classwork five days a week, from the time they enter until they graduate.

In 1919 one native Samoan nurse was sent by the Navy Department to the United States naval hospital, Mare Island, where she received a six months' post-graduate course. She is now a valuable assistant, especially in teaching English to the nurses who are expected to learn it rapidly, as they do. Their education, however, is limited; therefore, ordinary textbooks are of no use. Textbooks have been prepared (but never printed) for their use, and they learn all the simple essentials; being good imitators, they do their practical work well, though not always understanding why, except that it is right.

The object of the school is to train the native girls to go among their own people, to do work as district nurses after graduation. Just as long as they are doing nursing work, which is until they marry, or are discharged for misconduct, they are under the supervision of the chief nurse. District nurses report in to the hospital at the end of each month to give a report, get new supplies, etc. They treat simple cases and send others to the hospital. There are no medical officers in the villages, so nurses are of the greatest value. One month out of every five or six is spent in the hospital to bring them up to standard and to learn new methods.

The pay of the graduate native nurse is $15 a month for the first year with an increase of $1 a month for each succeeding year. The native pastor is responsible for the district nurses while they are in his village and gives them food, shelter, and protection. It is his duty to report any misbehavior of the nurses which is brought to his attention. The married graduate nurses always do what they can to carry on the work, but without pay. They usually marry native pastors or school-teachers. No pay is given to the pupil nurses, but they are quartered, subsisted, and furnished uniforms.

Guam has a condition similar to that of Samoa, with the exception of the source from which the native nurses are selected. The Chamorro race, found on this island, has to a degree mingled with the Spanish, Filipinos, and Japanese, and, since 1898, with Americans. The pure Chamorro girl is of a sweet nature, works hard with her hands, imitates to a great degree her teachers, but is a difficult pupil to make see the light of reason. She is faithful to her duties, and is cheerfully willing and helpful. American civilization has taught her much, and from the coming generations who are attending schools established by the United States we look for better things. From different parts of the island the most intelligent girls are selected in order that, upon completion of their training, they will willingly return to their own people and teach right and healthful living. Due to their faith in those who have taught them and also because they must pass a rigid examination yearly, the graduates have become successful midwives and are doing a vast amount of good in all parts of the island.

In giving you a résumé of teaching done by Navy nurses, I have left until the last mention of the encouragement given by the bureau to our nurses in affording educational facilities. Since 1921, Admiral E. R. Stitt, Surgeon General of the Navy, has made it possible for the bureau to offer courses at schools in which such specialties as will be of value to the Navy are given, and since October 1921, 61 nurses have taken advantage of the bureau's generosity. In anesthesia, a total of 7 nurses have completed courses at the Lakeside Hospital, Cleveland, and at the Graduate School of Medicine of the University of Pennsylvania; 16 have completed courses in dietetics; 5, in courses for instructors of nursing; 11 have completed the advanced course in laboratory work at the United States Naval Medical School, Washington, D. C.; 15, the course in physiotheraphy, and 4 a course in nursing of tuberculous patients.

The teaching program of the Medical Department of the Navy is as interesting as it is progressive, but we must have a greater number in our corps to fulfill it. I can not begin to tell you in the time allotted of the possibilities of personal education in travel or in the short hours of duty which allow study and self-improvement in time off duty, nor of the delightful home life, the *esprit de corps*, and the care and the number of good things the Navy makes possible for us, but I shall take time in closing to tell you that above all, and beyond all that the Navy gives it makes it possible for us to serve the country we so dearly love. Even though some feel that they can but remain long enough to familiarize themselves with the work in order that they may be ready for any emergency, to everyone comes the thrill of true, loyal service to our own country, our own people, our own flag.

BOOK NOTICES

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

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

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

INSANITY AND LAW, A TREATISE ON FORENSIC PSYCHIATRY, by *H. Douglas Singer, M. C., M. R. C. P., professor of psychiatry, University of Illinois, College of Medicine; formerly State alienist and director of the State Psychopathic Institute of Illinois, and William O. Krohn, A. M., M. D., Ph. D., formerly resident psychologist to Kankakee State Hospital; head of department of psychology at Western Reserve University, and at the University of Illinois, and senior fellow at Clark University; for six years medical juror in Cook County (Chicago) insanity court. P. Blakiston's* Son & Co., Philadelphia, 1924.

The authors devote the first half of their excellent work to a brief description of the various types of mental reactions and disorders, and their symptomatology. The discussion, though very good, is much too brief to serve as an adequate guide or textbook for one who desires detailed information about the various types of mental disorder. For this purpose he had best seek his information elsewhere, as this volume gives no consideration to the etiology, pathology, prophylaxis or treatment of mental disorders, without which it would be difficult, if not impossible, for anyone to obtain any clear understanding of them. But, of course, in a work of this character such is hardly to be expected. The symptoms of several of the mental disorders are discussed in two or three places in the book, thus making it necessary for the student to search the book, by means of cross references, if he desires to secure all of the available information about any particular psychosis or mental abnormality. This arrangement is believed to be faulty, and not so easily intelligible as the authors had hoped for. Duplication of description, clearness, simplicity, and ease of reference, it would seem, would have been much better served by a complete discussion of each psychosis and its reaction type under one general heading.

The scheme of classification of mental disorders given is that adopted by the American Psychiatric Association. Beside each group is given the statistics of frequency and percentages of 21,742 cases of first admissions to 72 State hospitals, during the year 1920, which were collected by the national committee for mental hygiene, and tabulated by Pollock and Furbush. This table scheme of classification of mental disorders is valuable in its way, as anyone can ascertain at a glance the relative frequency of occurrence of each type of insanity or psychoneurosis.

A brief but interesting and important chapter is devoted to the simulation of mental disorders, or malingering, and the detection of same. The authors state that "in the ordinary practice of medicine questions of simulation rarely arise, for the reason that motives are lacking. In medicolegal work, however, the situation is very different. Strong motives often exist, such as the desire to extort damages or to escape responsibility for a crime."

Unlike most treatises on mental disorders, the authors of this volume have concerned themselves less with the welfare of the insane individual than they have with his relations with society. Most textbooks on psychiatry are chiefly concerned with the welfare of the lunatic himself. All sorts of legal complications may and frequently do arise when an individual becomes insane, such as the satisfactory determination to all parties concerned that the individual really is insane, the necessary legal steps to insure his commitment to an appropriate institution, his rights while there, the ascertainment of his restoration to sanity and his discharge from the institution, his guardianship, his restoration to the rights of sanity, the degree of mental capacity necessary for the making of legal contracts; the rights of individuals who make legal contracts with him, such as loans, sureties, promissory notes, deeds, conveyances, marriages, breaches of promise, divorces; the insane individual's liability or responsibility for torts against property or persons, for libel and slander, and for crimes committed; the degree of mental integrity necessary for testamentary power and testamentary capacity as defined by the laws of various States. The greatest value of the book is to be found in the consideration of the legal aspects of these questions in their relation to insanity, as well as certain miscellaneous legal aspects of insanity, such as rape committed by or upon the insane, the admissibility of the testimony of lunatics as witnesses, the depositions of witnesses who have become insane, drug addiction and mental capacity, bail exonerated by insanity, rights of the holder of a note of an insane person, the effect of insanity on the drawer of a check, insanity terminating employment, insanity of a voter, eminent domain as affected by insanity, the responsibility and care of carriers of insane passengers, the liability of employers for mental incompetency of employees, the wrongful certification of insanity, privileged communications between physicians and insane patients, the issuance of the writ of habeas corpus to determine the legality of the confinement of a person in a State asylum for the insane.

Consideration is given to the legal definition of insanity as opposed to the medical view of same. The distinction is made in law as in medicine that insanity does not include mental deficiencies such as idiocy, imbecility, and moronism. The following definition of insanity is constructed by the authors:

> An insane person or lunatic (not being an idiot or imbecile) is one in whom there exists, due to disease, a more or less prolonged deviation from his normal method of behavior and who is therefore incapable of managing his own affairs or transacting ordinary business, who is dangerous to himself, to others, or to property, or who interferes with the peace of society.

"Partial insanity," delusions, hallucinations, illusions, "moral insanity," "mania," psychoses with epilepsy, Dämmerzustände or "twilight states," psychopathic personalities, morbid impulses, sexual perversions, mental deficiency, the merits and demerits of "intelligence tests," the psychoneuroses—psychasthenia, neurasthenia, and hysteria—alcoholism, and the age-old question of the ability of an alleged lunatic to distinguish between abstract right and wrong are also well discussed, with their legal significance.

An excellent chapter is devoted to "The physician in court," what constitutes a medical expert and medical expert testimony, the difference between expert and nonexpert witnesses, hypothetical questions, cross-examination of medical experts, catch questions, and other questions of interest to the physician called upon to testify in a lunacy case.

The authors have made a well-taken attempt to correlate the often divergent aims and views of the practitioners of law and medicine, "with the hope of bringing about a better understanding of the actual basis from which must start any practical effort to improve the relations between insanity and law. The requirements for this improvement are twofold—the physician needs a better knowledge of legal practice and ideals, and the lawyer needs fuller information about mental diseases."

The work assists very materially in supplying these needs.

ANESTHESIA, by *James Tayloe Gwathmey, M. D., first president of American Association of Anesthetists; anesthetist to the New York Skin and Cancer, Columbia and Peoples Hospitals; fellow American Medical Association and the New York Academy of Medicine.* Second edition. (The Macmillan Co., New York and London, 1924.)

This new edition of Gwathmey's masterpiece serves to remind us that we are indebted to him for a very great deal of our present knowledge of the science and art of anesthesia. Besides his books, he has, for years, contributed a great number of papers describing his scientific and clinical investigations into new and old ideas and developments in this field. One finds the essence of all his work and that of others as well in the present volume.

History of anesthesia is described in a most interesting manner in the opening chapter. General physiology of inhalation anesthesia, with a discussion of various theories of the action of general anesthetics and of factors which modify the physiology of anesthesia, such as warming the agent and the use of oil of orange, occupy the second chapter. W. B. Gatch contributes a chapter on the use of rebreathing in the administration of anesthetics. Nitrous oxid is fully covered, with a description of the combinations with other agents and many of the machines used. Ether, its administration, physiology, indications and contraindications is discussed at length, as are ethyl chlorid and chloroform. Ether by colonic absorption receives the careful consideration to which it is entitled. The chapter on local anesthesia by Dr. J. E. Mitchell touches only the high spots of this important field. Local anesthesia in dentistry is described by Dr. Herrmann Prinz. Other chapters treat of spinal and intravenous anesthesia; synergistic analgesia with magnesium sulphate; the medico-legal status of the anesthetist; ethylene anesthesia and painless childbirth by synergistic methods.

There is evidence of a great deal of careful work in the preparation of the book, both on the part of the author and the publisher. It will be found of great value to hospitals and to those who are engaged in administering anesthetics.

DIABETES AND ITS TREATMENT BY INSULIN AND DIET, by *Orlando H. Petty, M. D., professor of diseases of metabolism in the Graduate School of Medicine, University of Pennsylvania.* F. A. Davis Co., Philadelphia, Pa., 1924.

This is a small book written for the diabetic patient. In it the author defines diabetes, gives the causes of the disease, methods of prevention and control and outlines in detail the calculation of food entering into the patient's diet. The reader is told how to test the urine for glucose and is instructed concerning insulin and its administration. The volume closes with some sample menus and a number of recipes of use to the diabetic. The book contains a number of tables giving the standard weight for age, foods of high, medium, low and very low food value, the excess of acid-forming or base-forming elements in foods, the natural salt content of foods and the protein, fat and carbohydrate content of the commonly used foods.

Success in the treatment of diabetes depends to a great extent on how thoroughly the patient masters his diet problems and how faithfully he follows his particular diet. Each patient requires more or less instruction in these matters and this book contains all that he needs to know of the matter.

LIFE INSURANCE EXAMINATION, edited by *Frank W. Foxworthy, Ph. B., M. D., formerly president of the American Association of Medical Examiners; associate editor "Medical Insurance"*. The C. V. Mosby Co., St. Louis, 1924.

Life insurance has become one of the great business interests of the world in which the medical examiner is a vital factor. To this volume 49 collaborators, all leaders in life insurance work, have contributed short papers which cover the entire field of the medical examinations for life insurance.

The editor has arranged these papers in the following sequence: A history of life insurance examinations; Industrial insurance; Group insurance; Fraternal insurance; The relation of the agent to the medical examiner; Organization of the medical department; The medical director; Medical referees; The medical examiner; General instruction to examiners; The etiquette of medical examinations: The examination of women; The mouth, nose, throat, eye, and ear; The respiratory system; Tuberculosis cardiac conditions from the life insurance standpoint; Examination of the heart and lungs; The abdomen; The nervous system; The endocrines and visceral nerves in relation to life insurance; Blood pressure; The diagnostic value of the syhygmomanometer; Syphilis from the life insurance standpoint; Focal infection; Goiter and life insurance; Postoperative risks; Maligant epithelial neoplasms; Urinalysis; The examination for albumin and casts; Albuminuria and cylindruria; Glycosuria; Laboratory procedures; Life insurance examinations in the South; Hazards of tropical risks; Army service as an insurance problem; Numerical method of valuing lives for insurance; Insurance on substandard lives; The relation of build to mortality; Examinations for health and accident insurance; The selection of risks for disability and double indemnity benefits; Health conservation; Insurance welfare work; Inspection reports; Fraud; Legal aspects of life insurance examinations; The influence of occupation on life underwriting; Postponement in disease.

The book is exceptionally readable, informative, amply illustrated, and of great practical value to those following this special line of medical work.

DISEASES OF THE EYE, A HANDBOOK OF OPHTHALMIC PRACTICE FOR STUDENTS AND PRACTITIONERS, by *George E. de Schweinitz, M. D., LL. D., Sc. D., professor of ophthalmology in the University of Pennsylvania; ophthalmic surgeon to the University Hospital; consulting ophthalmic surgeon to the Philadelphia General Hospital, the Orthopedic Hospital, and the Infirmary for Nervous Diseases.* Tenth Edition. W. B. Saunders Co., Philadelphia, 1924.

When a new edition of a work that has been a standard followed by students and practitioners for nearly 35 years and that has passed through nine editions appears it needs little attention on the part of the reviewer. In the tenth edition of this well-known work the author has incorporated the advances made in ophthalmic practice during the past three years. Reference to the following subjects is made either for the first time or, having been previously included, has been elaborated in accordance with the author's personal experience: The Diaphragm Lamp (Gullstrand) with which the observer is able to project a narrow beam of intense light upon the part of the eye to be examined; contact illumination, a method of examination of the anterior segment of the eye, especially the cornea, developed by Basil Graves; binocular visual acuteness and the importance of illumination of the test cards when determining acuteness of vision; the use of sunlight in ophthalmoscopy as recommended by Edward Jackson; simple centric ophthalmoscopy by which the details in the macular region may be studied by the direct method if a diaphragm lamp is used as the source of light; ophthalmoscopy with red-free light by means of which certain pathological changes are readily detected; agricultural conjunctivitis, a condition studied by Patton and Gifford, characterized by enormous swelling of the lids and adjoining lymph nodes, some superficial necrosis of the skin of the lids, and pseudomembranous deposit on the conjunctiva and striate clearing of corneal opacities; uveoparotitis; hernia of the vitreous; senile changes in the optic nerve, temporary amaurosis in infants; Barraquer's method of extraction of cataract by suction; subconjunctival excision of pterygium; tendon transplantation; muscle recession with scleral suturing; O'Connor's "cinch shortening" operation.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS, by *G. W. Norris, A. B., M. D., professor of clinical medicine in the University of Pennsylvania; visiting physician to the Pennsylvania Hospital,* and *H. R. M. Landis, A. B., M. D., director of the clinical and sociological departments of the Henry Phipps Institute of the University of Pennsylvania; visiting physician to the White Haven Sanatorium,* with a chapter on the ELECTROCARDIOGRAPH IN HEART DISEASE, by *E. B. Krumbhaar, Ph. D., M. D., director of laboratories of the Philadelphia General Hospital; associate professor of pathology, University of Pennsylvania Graduate School of Medicine.* Third edition. W. B. Saunders Co., Philadelphia, 1924.

This work has become an authority among the internists of America. Its popularity rests in the intensely practical manner in which the authors have presented the physical diagnosis of the heart and lungs in health and disease. The first edition appeared in 1917, the second in 1920. The present edition is much larger than the former two. As the authors tell us in the preface, they have taken advantage of the revision to incorporate descriptions of a number of rare conditions which were omitted in former editions, and they have endeavored to present a well-rounded description of the various diseases affecting the organs of the thoracic cavity and to state clearly the methods by which a correct conclusion may be reached.

It is needless to state that they have been especially successful in their endeavor.

As in former editions the material is presented in four parts. In Part I the examination of the lungs is considered. Part II deals with the examination of the circulatory system. In Part III the diseases of the bronchi, lungs, pleura, and diaphragm are discussed. In Part IV the diseases of the pericardium, heart, and aorta are presented. The profusion of illustrations is noteworthy, especially the photographic reproductions of frozen anatomic sections, most of which were prepared under the supervision of Dr. George Fetterolf.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

REMARKS ON VENTILATION, WITH SPECIAL REFERENCE TO SANITARY REPORTS

A few weeks ago a medical officer sought information that might assist him to interpret some carbon dioxide readings obtained by analyzing a number of samples of air from certain badly ventilated compartments of the ship to which he was attached. He was informed of course that the carbon dioxide content as found in samples of air taken at random in rooms or living compartments has little or no meaning. Most medical officers who come to the United States Naval Medical School for instruction are found during the course in hygiene and epidemiology not to have brought with them any very definite knowledge of how to proceed to determine what the conditions are in a given compartment with respect to ventilation or what data to collect and put on paper to show just how bad the conditions are. Statements of fact are necessary for one who is not familiar with the local conditions to enable him to appreciate the situation.

Few annual sanitary reports from ships contain information of positive and direct value. As a rule, only general statements are made. Although these may be expressed with so much feeling that the reader can have but little doubt that the ventilation is bad, action looking toward correction can seldom be taken on such reports. While there may be no exaggeration in such statements it is not possible to know there is not without a knowledge of certain facts which prove just what the conditions actually are.

Annual sanitary reports, reports of routine inspections, etc., do not initiate action leading to alterations or repairs. The initiative must ordinarily be taken by the commanding officer by means of appropriate correspondence. Nevertheless if a sanitary report contains definite information relating to such questions as defective ventilation, and the medical officer's conclusions are supported by temperature and relative humidity records and other data comprising all essential facts, the Bureau of Medicine and Surgery is in a position to act upon the report. Facts can be used to good advantage; general statements and opinions not supported by the necessary data usually can not be transmitted to other bureaus even as information, and much less is it possible to make suitable recommendations. The purpose of annual sanitary reports in general is to inform the Bureau of Medicine and Surgery accurately of medical, epidemiological, hygienic, and sanitary conditions as they exist, but information to the point which seems to cover the situation is frequently extracted for transmission to other bureaus concerned, and not infrequently remedial action is hastened thereby.

It is equally important that medical officers in seeking the correction of unsatisfactory hygienic conditions should be explicit in letters or reports to the commanding officer, taking care to describe the conditions as they exist, without exaggeration, and backing up their conclusions with accurately recorded data when possible. The commanding officer is thereby assisted in presenting the case as strongly as circumstances indicate and action upon his recommendations will be facilitated.

To furnish the necessary data relating to ventilation, it is necessary that observations be made in the affected compartment regularly and systematically under the varying conditions of occupation and work that exists, and in different kinds of weather.

Now, ventilation is not a difficult subject. It has not been difficult for years; certainly not for those guided by common sense. But for all, and especially for those who developed with instruction in hygiene that left them with a rather poorly defined idea that the analysis of a number of samples of air and determination of carbon dioxide percentages would tell them about the quality of the air and just how good or bad the ventilation was, if they had brains to understand, or if they could ever find time to learn what it was all about, the work of the New York ventilation commission has been a great blessing. Those who have not the time to wade through the long report of the commission will find the chapter on ventilation—air and health—in Park's Public Health and Hygiene, written by Prof. C. E. A. Winslow, of the Yale School of Public Health, who took an active part in the investigations of the commission, to be a summary of the subject that is sufficiently complete as to detail to serve as a most useful guide in practical work.

Various aspects of ventilation problems in the Navy were discussed in considerable detail in an article entitled "The Pneumonia, Bronchitis, and Tonsilitis Season—Housing, Ventilation, and Contact," which appeared in the January, 1924, number of this BULLETIN. Although it is not intended here to enter into a complete discussion of the subject it may be worth while to define good ventilation and point out briefly the data that are necessary to indicate just how good or how bad the ventilation is in a given room or compartment.

In the first place, what is good air? We may dismiss carbon dioxide from consideration because it is not a poisonous gas in virtue of any qualities of its own, and because it has now been conclusively shown by investigations that the organic effluvia and supposedly poisonous organic substances given off from the the bodies of occupants, the concentration of which more recently the carbon-dioxide content has been taken to indicate, are really harmless and in fact play no direct part in causing any of the symptoms and effects of bad ventilation, ranging as they do from such trivial and temporary conditions as languor, headache, etc., to complete disability and even death. Bad odors are offensive, of course, and may affect the appetite or excite reflexes that influence feelings and give rise to various reactions, and the discharge of disease-producing microorganisms into the air under conditions where they immediately enter the mouth or nose of some other person, is a still more important consideration. Carbon dioxide may gradually accumulate in a sealed compartment, as in a submarine, until there is enough to reduce the percentage of oxygen by displacement below the percentage necessary to support life or combustion. However, such a contingency can not arise in a space that has any ordinary connection with the outside air. Barring such special conditions, good air can be defined essentially, as Winslow has defined it for purposes of ventilation, as:

1. Fresh outside air when possible, and in any event air that is cool but not uncomfortably so.

2. Air in which the relative humidity is not excessively high in relation to the temperature.

3. Air that is in motion, but without sufficient motion to create a disagreeable draft, and preferably motion that varies from moment to moment accompanied by slight fluctuations in temperature.

These are essential properties of good air. Of course, air can not be regarded as good if it contains offensive odors, poisonous fumes or gases, or excessive amounts of dust.

Ventilation is bad regardless of other conditions if the air is not in motion. It is bad regardless of other conditions if the temperature is too high. But these physical properties of the air really can not be separated either with regard to their effects or for purposes of discussion. It is the combination of temperature, relative humidity and air movement that determines at any given moment in any confined space whether ventilation is good or bad. The only other question that has to be considered as a rule is the removal of odors. That of course depends in part upon the sources of odors and in part upon a sufficient movement of air to remove them from the space.

Occupants require a sufficient quantity of good air as defined above, regularly supplied and properly circulated to accomplish the following:

1. To remove the heat that is eliminated from the body.
2. To remove the moisture excreted by the lungs and sweat glands.
3. To remove body odors.

If these three purposes are being accomplished so well that the occupants engaged in work or other activities demanded by the occasion, are as comfortable as they should be with due regard for the nature of the physical exertion required of them, it may be said that the ventilation is good at the time.

Thus, the question of ventilation hinges largely on the temperature, and especially when sources of heat must be dealt with in addition to the bodies of occupants. Ventilation problems can be divided into cold weather problems and hot weather problems, but in either case overheating is the principal defect to be overcome. In cold weather it is merely a question of regulating artificial heat, difficult though it may be in practice to secure regulation that is fully satisfactory. Any space that is sufficiently well supplied with air by natural or mechanical means to maintain conditions that can be tolerated at all in hot weather is bound to be well ventilated, or at least much better ventilated in cold weather, provided artificial heat is furnished in adequate amount so that heat from the bodies of occupants need not be relied upon to maintain the room temperature at 70° F. Of course, if body heat must be depended upon to any great extent the almost inevitable result will be the cutting down of the air supply to a point where body odors are not removed. Under such conditions, due to the lack of air movement, the air will feel dead and smell stale to one entering the compartment. Removal of body heat and body moisture which at other times are matters of paramount importance are easily dealt with in cold weather, as a rule. Still more heat is required in the form of artificial heat to maintain a comfortable room temperature, and the low temperature of the outside air, even when the air is nearly saturated, results in such a low percentage relative humidity after the air is heated to room temperature that its capacity to evaporate water from the clothing and bodies of occupants will not be called into question. If the space is not well ventilated at such a time it is because there is not enough artificial heat being supplied or fresh air is not being admitted as freely as it could be or the space is overcrowded to the degree that a sufficient amount of air can not be admitted without creating disagreeable drafts.

Under warm weather conditions ventilation becomes almost purely a matter of removing heat and moisture from the bodies of occupants as well as heat and moisture entering the space from any and all other sources, with sufficient rapidity to enable the occupants to perform their required tasks and remain in a state of comparative comfort. Any quantity and movement of air that is sufficient to remove heat and moisture in warm weather will suffice to take care of body odors.

This is the crux of the situation; it makes no difference whether the air supply is 1,000 cubic feet of air per capita per hour, 2,000 cubic feet, 3,000 cubic feet, or even more; if the temperature and relative humidity of the air within the space are such that the occupants can not be reasonably comfortable the space is badly ventilated.

How can conditions be improved? Obviously, in one or more of three ways: By increasing still more the quantity of fresh outside air entering and circulating through the space; by insulating against heat arising from sources other than the bodies of occupants; and by installing cooling apparatus, coils or other devices, to absorb heat and condense moisture from the air. Under some conditions 1,000 to 1,200 cubic feet of fresh air per capita per hour may be ample to keep the contained air at proper temperature and in proper motion so that it feels comfortable and smells fresh. If so, well and good. If 3,000 cubic feet fails to do that the space is badly ventilated at the time, although obviously it may not be a few minutes later, if the temperature of the outside air drops, if the sun no longer shines with full force upon that side of the ship, or if the rate at which wild heat enters the compartment is reduced.

What data are required to furnish a convincing word picture of inadequate ventilation? Nothing complicated. In the first place, regularly and systematically recorded temperature readings properly correlated with records of the outside temperature and weather conditions, from time to time, over a sufficient period to represent fairly the conditions encountered at different hours of the day and night, under the various circumstances of occupation and work that obtain. Temperature records alone, coupled with matter of fact statements as to how the air feels and smells, and as to whether the occupants perspire freely and remain wet with perspiration while at rest or while engaging in work that does not require much physical effort, go a long way toward furnishing an accurate description of existing conditions. In living compartments, when the air is laden with odors from garments hung or stowed therein, the ventilation is bad. The rapidity with which tobacco smoke is removed is a good indication of air movement.

It is always desirable to record the percentage of relative humidity along with the temperature readings. This may be done by means of the ordinary wet and dry bulb thermometer if a sling psychrometer is not procurable.

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If these data and statements are furnished the situation will be sufficiently well covered in most instances to accomplish the intended purpose of the report so far as the description of existing conditions is concerned. There is little more to be said, although, of course, recommendations with discussion of possible means of improving the ventilation based on study and knowledge of local conditions constitute another phase of the question not to be neglected.

It is because of failure to furnish such readily obtainable data as are mentioned above that many sanitary reports are entirely useless from the standpoint of enabling the bureau to act upon them and make suitable recommendations.

In recent years the kata-thermometer, invented by Dr. Leonard Hill in England, has come into more or less general use as an instrument to indicate the condition of the air with respect to comfort, by registering the combined cooling effect, at the moment, of the temperature, relative humidity, and movement of the air. This is a special thermometer about 8½ inches long, with a bulb at one end approximately three-quarters of an inch in diameter containing colored alcohol. Only two temperature levels are marked on the shaft of the thermometer, 95° F. and 100° F. At the upper end of the shaft there is a small chamber into which the colored fluid may rise after filling the shaft when the thermometer is placed as a preliminary step in moderately hot water. To take a reading the thermometer may be used with the bulb dry, or, covered with a porous fabric cot, it may be used with the bulb wet. In either case the thermometer is placed in moderately hot water until the colored fluid fills the shaft and overflows into the chamber at the top. The thermometer is then removed from the water and the bulb is quickly wiped dry if it is to be used dry, or the excess of water is quickly squeezed from the fabric cot if it is to be used wet, after which the thermometer is suspended at rest in the vertical position, well away from the observer's body. As it cools, the fluid falls, and by means of a stop watch the observer carefully notes the time in seconds required for it to drop from the 100° F. to the 95° F. mark. A factor determined for each instrument separately is stamped on the shaft. This factor when divided by the number of seconds required for this drop in temperature is intended to give the figure representing the cooling power of the air on an object at approximately body temperature, expressed in millicalories per square centimeter per second. Used with the bulb dry the rate of cooling is affected only by the temperature and movement of the air. Heat is given up to the air by radiation and convection. With the bulb wet, the relative humidity of the air becomes an additional influence and cooling takes place by evaporation as well as by radiation and convection.

Kata-thermometer readings give useful information, if not taken too literally, when recorded in conjunction with ordinary thermometer reading, relative humidity findings, and a statement of comfort conditions as actually experienced. They express in a figure the information which can be obtained by noting the effect of the atmospheric conditions upon the occupants of the space, and therefore they may serve to reinforce statements regarding habitability and comfort. Certainly they tend to allay suspicion of exaggeration.

Comments in public health literature during the past year indicate varying degrees of esteem for this instrument. The question has been raised as to the accuracy of standardization. However, even if the rate of cooling indicated by the factor is 10 per cent or more above or below the actual rate, it does not make much difference, as the error is a constant, and different kata-thermometers give readings that agree closely enough for practical purposes.

In Public Health Engineering Abstracts published by the United States Public Health Service, June 14, 1924, an article entitled, "The Determination of the Factor of the Kata-Thermometer," by T. C. Angus in the Journal of Industrial Hygiene, volume 6, No. 1, May, 1924, is reviewed by Leonard Greenburg. The reviewer concludes that the essential point to bear in mind as a result of that and previous studies is that kata-thermometer observations are not to be interpreted too closely. The error in the factor of the instrument must be clearly borne in mind.

As generally interpreted, the kata-thermometer indicates comfortable conditions when the dry reading gives a cooling power of not less than 6 millicalories per second per square centimeter of surface, and when the wet reading indicates a cooling power of not less than 11. The manufacturer states that the wet cooling power should not be below 11 in rooms for sedentary workers, and for physical work the rate of cooling should be greater. The figures are based on Doctor Hill's observations.

The kata-thermometer is undoubtedly a useful instrument, for, irrespective of its error, which is at least constant in the case of any given thermometer, it gives data that are outside the range of conflicting opinion. However, as indicated above, all essential information relating to a badly ventilated space can be obtained without it.

The impression must not be conveyed that carbon dioxide determinations no longer have a place in ventilation work. They have, but they are useful in checking up on the quantity of air flowing through a room or space; not to indicate quality of the air. As a part of a ventilation survey, with conditions fixed for study, the number of occupants counted, the character of muscular efforts noted, and other sources of carbon dioxide, such as combustion, under control it is possible from the percentages of carbon dioxide in fair samples of the contained air to calculate with a fair degree of accuracy the number of cubic feet of fresh air entering the room per minute or per hour. The findings are useful for checking against anemometer readings taken in the main duct and at various outlets where there is a mechanical ventilation system. The calculations are based, of course, on the fact that each adult occupant not engaged in muscular work adds to the air from 0.6 to 0.7 cubic feet of carbon dioxide in one hour.

THE UNITED FRUIT CO.'S EXPERIENCE WITH MALARIA

The experience of the United Fruit Co. with malaria in the American Tropics is discussed in considerable detail in the 1923 or twelfth annual report of the medical department of the company, submitted by Dr. William E. Deeks, general manager. In view of our experience with malaria in Haiti, Santo Domingo, and other places in the West Indies, the facts and opinions recorded in the report will doubtless be of interest to medical officers of the Navy, and the paragraphs dealing with this disease are therefore reprinted.

MALARIA

The morbidity caused by malaria, together with the consequent economic loss, is so great that it easily outranks in importance that of any other disease in the American Tropics. All reasonable efforts, therefore, should be made to prevent its recurrence, and to ascertain the best possible methods of treatment to effect cures of the infected individuals, in order that they may not act as carriers. The problems involved in the attempt to eradicate malaria from the districts where the company operates are too gigantic to allow of entertaining even the possibility of their solution in the immediate future. All that we can hope for at present is reasonable control of irremediable conditions. To bring about eradication of malaria, certain conditions are absolutely necessary, and it takes time to obtain them. We know the cause of malaria, its methods of transmission, and, to a limited extent, the means of cure. Some of the difficulties which confront us in the control of the disease will herewith be briefly referred to.

As is generally known, malaria is caused by a minute animal parasite which is transmitted to man by the Anopheles mosquito, in which the parasite itself goes through one stage of its development. The mosquito obtains the infection from a malaria-infected human being. To prevent malaria the cycle of transmission must be broken either by the destruction of the Anopheles mosquitoes, preferably in the larval stage, or by the sterilization of the malarial infections in the carriers. As to the first of these propositions: The Anopheles mosquitoes are very widely distributed, and multiply in the Tropics at any time of year, wherever even a film of water exists for a few days. Lakes, ponds, rivers, ditches, borrow pits, water containers of every variety, and seepage areas are all suitable for their breeding and multiplication. We must also consider that a female lays at one time about 250 eggs, all potential adults, and that only from 7 to 10 days are necessary to bring them to maturity. In a few days each female adult that survives is prepared to duplicate this number of eggs, so that uncontrolled multiplication of the Anopheles soon results in the production of uncounted millions. On the United Fruit Co. cultivations, comprising an area of approximately 685 square miles of territory, it would be a bold sanitarian indeed who would attempt the impossible task of destroying all mosquitoes, particularly when adjoining unsanitated areas are continually replenishing the supply. All that can really be expected, therefore, is the institution of control measures to keep the index as low as possible by reasonable sanitary means.

Regarding the other aspect of the problem—that is, the sterilization of malarial infection in acute cases and in chronic carriers—the only known methods that offer any hope of destroying malarial infection call for the administration of quinine in some form, supplemented by the use of arsenical preparations during indefinite periods. To render this procedure effective the whole community would necessarily have to be treated, not only employees and their families, but all those nonemployees who commingle daily with our people. We have no definite knowledge of the amounts of quinine necessary to bring about the desired result, nor do we know the best method of administration, the interval of dosage, or the length of time necessary to carry on treatment. A great many dogmatic assertions have been made as to the above points at issue, but so far these questions are mere matters of opinion which are based for the most part on limited experience, and which lack the stamp of scientific accuracy. We are still groping in the dark to a considerable extent and merely following methods which we believe have given us the best results. In this connection it will be worth while to consider a few abstracts from a recent article, "Studies in the Treatment of Malaria" (Annals of Tropical Medicine and Parasitology, October 13, 1923) by the eminent authority, J. W. W. Stephens:

THE TIME AT WHICH RELAPSES OCCUR AFTER CESSATION OF TREATMENT IN SIMPLE TERTIAN MALARIA

"The time incidence of relapses can be considered in three ways:

"1. In reference to the relapses themselves, i. e., the percentages of the total relapses which occur during each period of time: From an analysis of the time of occurrence of 582 relapses, we found that about four-fifths occur in the first 20 days after treatment, that the majority of the remaining one-fifth occurs in the second 20-day period, i. e., the ratio of the number of relapses in the two periods is about 4:1.

"2. In reference to the total cases treated, i. e., the percentage of cases treated which relapse during each 20-day period of time: Of the cases treated (800), about three-fifths relapse in the first 20-day period, about one-tenth in the second 20-day period, and still fewer at later periods; i. e., the ratio of the percentages for the two periods is 6:1.

"3. In reference to remainders, i. e., the incidence among the cases treated, less those who have previously relapsed. Of the cases treated (800), about three-fifths relapse in the first 20 days, and about one-fourth of 'the remainder' cases in the second 20-day period. The ratios are here 12:5, or 2.4:1.

"From an analysis of 1,000 'rigors' or paroxysms, we found that—

"(*a*) Over 90 per cent of the paroxysms occur during the hours of bodily activity—in our series of cases, from 7 a. m. to 6.59 p. m.

"(*b*) The maximum number of paroxysms, about 20 per cent, occurs at 2 p. m. Quinine sulphate, orally in doses of grains 120 on each of two consecutive days, represents the maximum amount of the drug which can be tolerated by the average case, as the treatment had to be abandoned owing to severe symptoms in 5 of 15 cases.

TREATMENT OF AN ATTACK

"*Quinine.*—(*a*) Orally: Ten grains of quinine sulphate in solution on each of two consecutive days suffice to cut short an attack of simple tertian malaria and to cause the temporary disappearance of parasites from the cutaneous blood.

"(*b*) Intramuscularly. 1. Quinine bihydrochloride: Fifteen grains of quinine byhydrochloride in 2 c. c. of water on each of two consecutive days likewise cause the cessation of febrile paroxysms and effect the temporary disappearance of all stages of the parasites from the cutaneous blood. This holds good for *P. vivax* and *P. falciparum.* Where the patient can take quinine by the mouth there is usually no necessity for intramuscular injections, but where oral quinine is ineffective, intramuscular quinine remains as a most effective treatment.

"(*c*) Intravenously: Quinine bihydrochloride in doses of 10 to 15 grains in a 10 per cent solution in normal saline, in one or a series of six injections, causes the cessation of febrile paroxysms and a disappearance of parasites from the cutaneous blood in simple tertian malaria. In malignant tertian malaria these doses do not cause the disappearance of parasites—trophozoites or gametes—from the cutaneous blood.

"*Arsenic.*—(*a*) Organic, *Arsenobillon* (chemically related to arsphenamine): A single intravenous injection of 0.9 gram controls the fever and causes the disappearance of *P. vivax* from the cutaneous blood within 24 hours. The same dose has no appreciable effect on the temperature or the parasites in the case of *P. falciparum* or *P. malariæ.*

"(*b*) Inorganic, *Liquor arsenicalis:* In doses of minims 15 daily, failed to control the fever or to cause the disappearance of parasites. In doses of minims 30 daily, the temperature fell to normal within 10 days, and in 13 of 14 cases parasites disappeared in 2 to 6 days.

"*Luargol* (a silver arsenical preparation).—A single intravenous injection of 0.2 gram controls the symptoms and causes the disappearance of the parasites in simple tertian malaria.

"Treatment by preparations of antimony, manganese, quitenine and quinotoxin, amylopsin and trypsin gave no results.

SUBSEQUENT TREATMENT.

"We have seen that the immediate effect of quinine and other drugs is to allay the febrile symptoms and to cause the disappearance of parasites, but this condition of apparent cure was, sooner or later, followed by a relapse in the majority of cases. Two questions consequently arose:

"1. The first was, Could the condition of apparent cure be maintained by continuing the quinine treatment, and, if so, how should it be given?

"2. The second was, Were these cases in which the administration of quinine was continued for more or less long periods, and which showed no symptions while taking quinine, really cured. Would they relapse or not, when treatment was stopped, just as they had done when the treatment had lasted only a few days, or would the number of relapses be now smaller?

"Question 1: The aspect of the problem that mainly occupied us was whether if a certain total dose of quinine were given weekly, e. g., grains 30, 60, 90, it were better to administer the quantity on six days, giving 5, 10, or 15 grains daily, or on two consecutive days, only, each week, giving 15, 30, or 45 grains daily.

"This question was put to the test for a period of eight weeks in a series of cases for each total weekly dose of 30, 60, and 90 grains of quinine sulphate.

"An accurate record was kept of the febrile relapses (non-parasitic) and of the parasitic relapses (febrile and afebrile), as determined by the temperature chart and daily blood examinations during the whole of the period.

"In each series the record was in favor of the weekly administration of quinine in preference to the daily.

"Thus, 30 grains is better administered in the form of two doses of 15 grains than in the form of six doses of 5 grains.

"The best result was obtained by the administration of grains 45 (three doses of grains 15) on each of two consecutive days weekly, this, as above stated, giving a better result than grains 15 daily for six days.

"In other words, in order to maintain a patient in a condition of freedom from relapses, an interrupted course of quinine is preferable to a continuous one.

"So far as the actual result was concerned, an equally good one, or nearly so, was obtained in a different way, viz, by giving 15 grains of bihydrochloride intramuscularly on each of the first two days of treatment, and then liquor arsenicalis, minims 30 daily, with two periods of intermission for 8 weeks (2 weeks on, 1 week off, 2 weeks on, 1 week off, 2 weeks on).

"Question 2: This question resolves itself into an inquiry as to whether by any course of treatment, short or long, a curative effect would be obtained, i. e., freedom from relapses after cessation of treatment over an observation period of 60 days (or longer).

"Many methods were tried, but in nearly all, when treatment was stopped, the number of relapses was large, and there is at present no method known which will cure all cases, even if the treatment lasts eight weeks.

"Many methods of cure continue, however, to be advocated, but they are not supported by trustworthy evidence, more especially in regard to an adequate observation period.

"The following two treatments gave us the best results:

"Liquor arsenicalis, minims 30 daily, with one or two periods of intermission with an injection of quinine bihydrochloride on each of the first two days only.

"Novarsenobillon 0.9 gram intravenously on the first, eighth, and fifteenth days with quinine bihydrochloride grains 15 intramuscularly on the first and second, eighth and ninth, and sixteenth days.

"It is worthy of note that a treatment which is 'good' while it lasts is not necessarily followed by a 'good' result when it has ceased. Thus the treatment noted above, viz, grains 45 × 2 weekly for eight weeks, while 'excellent' while it lasted, was followed by 80 per cent of relapses when the treatment had been finished.

"Whereas the arsenic treatment, also a good one while it lasted, was followed by a 'good' result also when it had ceased."

QUESTIONNAIRE SENT TO OUR PHYSICIANS

With the object of obtaining the expert opinions of our physicians who have had extensive experience in the treatment of malaria in tropical countries, we sent them the following questionnaire requesting information on certain important points:

First. Is the administration of quinine in liquid form preferable to its administration in capsules, disintegrating tablets, or friable pills?

We know that quinine is insoluble except in an acid medium, and that in cases of fever the acid secretions of the stomach are lessened. It has always been my impression that during the febrile stage we obtain better absorption from quinine in liquid form than we do when utilizing it in a solid form, but that during the afebrile stage there are sufficient acid secretions in the stomach to dissolve it in solid form. However, Grosser has stated that even the insoluble preparations are completely absorbed. If this be true during the febrile stage, there is no need of our giving quinine in solution, and we shall thus do away with one of its objectionable features.

Second. What dosage is desirable?

Some authorities claim that in all the benign forms of fever 30 grains daily are sufficient during the febrile period; and that 10 grains daily thereafter, if the dose is continued over a period of two months, will absolutely cure the patient. From my experience in the Canal Zone I gained the impression that the administration of 45 grains during the febrile stage, and for three days subsequent thereto, and 30 grains daily for a period of two to three weeks thereafter, gave us quicker results and prevented relapses, and this method was adopted. However, we believe this is another point warranting investigation, as we do not wish to give more quinine than is required to bring about the desired results.

Third. Should the quinine be administered two, or three, times daily? If twice daily is sufficient to give the required dose, it will mean economy in work for our hospital staff.

If you are not in a position, from your experience, to give us positive answers to the above questions, it is requested that you take a series of cases of positive malaria, keep a careful record of their names, ages, complications, history of previous attacks, and the present attack, etc., and that you satisfy yourself thoroughly as to—

1. Whether or not the administration of quinine in liquid form is preferable to its administration in capsules, disintegrating tablets, or friable pills.

2. What dosage is desirable? (With a follow-up history over a couple of months as to whether or not the patients have a relapse.)

3. Whether the quinine should be administered two, or three, times daily.

A great many dogmatic statements have been made in answer to the above questions, and positive evidence is desired as to the best method of procedure. You have on your staff trained and experienced men who possess scientific instincts and are sufficiently observant to give us these data.

There are two ways in which malaria can be eradicated: One is through the destruction of the mosquito—the transmitting agent; and the other, by means of community prophylaxis by quinine.

In regard to the first method (mosquito destruction), we believe the United Fruit Co. is doing all that can be expected of any commercial organization in the way of maintenance of sanitary measures, and the results have shown consistent improvement. The question arises, therefore, whether or not some effort should be made to sterilize the malarial carriers that are responsible for the transmission of the disease.

Undoubtedly, a great many of the men employed by the United Fruit Co., and their dependents are carriers. To determine which are, and which are not, would necessitate a careful blood examination of the whole population, preferably by the "thick-film" method. This would be a gigantic task, and one which we could not recommend, with our present organization. The only way, therefore, to cure the carriers would be by prophylactic treatment of the entire community, extending over a period of eight weeks or more. Naturally there might be some members of our organization who would not care to submit to this treatment. Salaried employees who might protest (a small minority) could have their blood examined, and if it were free from organisms they would naturally be exempt from treatment. But if good results are to be obtained, every carrier should be obliged to submit to treatment or be expelled from the community.

There are different methods of giving quinine for prophylactic and sterilization purposes. One is to give 10 grains daily over a period of eight weeks; another to give 30 grains daily every Saturday and Sunday over a period of eight weeks; and a third method is to give 15 grains twice a week over a period of eight weeks. Some believe 15 grains once a week sufficient for prophylactic purposes. We have had experience in some of the divisions in giving quinine by some of these methods, and apparently with excellent results.

Community prophylaxis has been attempted on a large scale by the Rockefeller Foundation in this country, by the Italians, and also by the English in Ismailia. They have all reported a reduction in the amount of malaria, from 80 to 85 per cent. If we could carry on a similar prophylactic campaign among our employees and have similar results in the reduction of the number of cases of malaria, the financial advantage to the United Fruit Co. would amount to a very large sum. An attempt of this kind would therefore seem justifiable.

To be successful we should necessarily require the cooperation of all departments, from the manager down to the ultimate division, and a special corps of responsible, trained male nurses to assist. All communities over which the medical department at present exercises supervision in your division would have to be simultaneously treated over a period of two months, and for this purpose it would probably be better to select the dry season.

The replies to this questionnaire may be briefly summarized:

The consensus of opinion regarding the first question is that liquid quinine is preferable in the febrile stage of the disease, is more readily absorbed and more effective; but that in the case of a febrile conditions friable pills or tablets are equally satisfactory. Two qualifications of this statement, however, are necessary. First, a small percentage of persons are nauseated by the liquid preparation; and, second, a small percentage can not swallow pills or tablets. Under these conditions a certain degree of latitude must be allowed for the idiosyncrasies of the patients. Furthermore, a great many tablets and pills that are on the market are insoluble and therefore unabsorbed; hence they entirely lack therapeutic power.

In reply to the second and third questions, in regard to the dosage, opinion is equally divided. Some believe that 15 grains three times daily should be given for the first five or six days; that the dose should then be reduced to 10 grains three times daily for four or five days; and that there should be a follow-up treatment of two 15-grain doses every Saturday and Sunday for eight weeks. Others believe that they get equally good results by the administration of 20 grains in the morning, and the same number at noon; the stomach is more irritable in the evening. This treatment should be continued for five or six days, and then the dosage can be reduced to 15 grains twice daily for four or five days, with the same follow-up system as that referred to above. All believe the follow-up treatment is very valuable, but not always practical. Again, the consensus of opinion is that in our plantation work a dose of 10 grains daily for eight weeks is neither practicable nor effective. The writer believes that equally good or even better curative results can be obtained through a follow-up treatment with Aiken's tonic tablets, which have the following formula (two of these should be given after each meal):

	Grain
Quinine sulphate	1
Acid arsenous	1/50
Strychnine sulphate	1/50
Reduced iron	2/3
Ext. gentian	1/4

In regard to community prophylaxis, this is not to be recommended at present for various reasons:

First. It is impossible to obtain the cooperation of the whole population; obviously, it would be useless to protect only a part of the population, and to allow untreated active carriers to circulate freely throughout the community.

Second. An attempt of this kind should be preceded by a campaign of education, and to carry out such a plan among an illiterate population is a difficult proposition.

Third. It would be necessary to obtain governmental support and compulsory measures for the carrying out of any program for general cinchonization.

Fourth. Probably the greatest difficulty encountered in our work among employees is attributable to the fact that a large percentage of the labor, particularly in new land cultivations, is migratory. The superintendent of agriculture in one of the divisions estimates that a laborer's length of stay in that division averages less than two months. In other words, the average period a worker remains in our employ is no longer than the time required to sterilize his blood of malarial infection, and his place is then taken by another infected laborer. A preventive campaign under such conditions would be interminable.

IMPORTANCE OF BODY'S CURATIVE AGENTS—MALARIA

In this connection, another point should be considered. The writer believes that it is impossible by any known means to cure malaria absolutely in an individual who is suffering from some other complicating or debilitating condition, such as syphilis, hookworm disease, or malnutrition. In other words, in any attempt to eradicate the malarial infection in an individual, the administration of quinine is ineffectual without the assistance of the natural curative agents of the body. If a cure is to be effected, complicating conditions must be concurrently treated, vital resistance increased, and nature assisted in every way. Statements repeatedly appear in various publications to the effect that the arsenical preparations are curative for malaria. The writer believes that the favorable results reported are due not to any direct destructive action on the malarial parasites, but either to the specific results of these preparations in complicating syphilis, or to the general tonic effects of arsenic in increasing the natural resistance and thus assisting the curative and protective agencies of the body. We venture to hope that some preparation of quinine or other plasmodial parasiticide will be devised, similar to those arsenical preparations which have been developed for the treatment of syphilis, in order that prompt destruction of the parasites may be effected without injury to the human organism.

Our medical superintendent in Costa Rica observes that in most cases of malaria there is a tendency for patients to suffer from acidosis. He states that he has been administering some alkaline drug, such as bicarbonate of soda, before meals and giving the quinine solution after meals. He has been employing with excellent results the method described in the following abstract from the Indian Gazette, of Calcutta:

QUININE MAGNESIUM SULPHATE TREATMENT OF MALARIA

On the basis that the malaria paroxysm is of the nature of an "anaphylactoid" phenomenon, Sinton developed what might be termed a combined quinin-alkali treatment, thus assisting the natural defenses of the body to combat any tendency to "acidosis" or diminished alkali reserve; making the reaction of the body fluid more favorable to the optimum parasiticidal action of the quinin; and at the same time helping to alleviate the symptoms of cinchonism. The alkaline mixture, per dose, consists of sodium bicarbonate, 60 grains, and sodium citrate, 40 grains, in 1 ounce of water. The quinin mixture consists of quinin sulphate, 10 grains; citric acid, 30 grains; magnesium sulphate, 60 grains, in 1 ounce of water. One dose of each mixture, from 15 to 30 minutes apart, is given three times daily for four or five days, and twice on each of two successive days; 180 grains of quinin are given in the course of seven days. Very favorable reports are made regarding the use of this treatment.

MALARIA AND SANITATION

Doctor Barber's recent malaria survey on the plantations of Honduras and Guatemala plainly indicates that the Anopheles index is comparatively low there. This fact is clear evidence of satisfactory sanitary work. On the other hand, the malarial index is high—probably over 30 per cent of the people are infected—and this condition is confirmed by Doctor Clark's survey. The conclusion, then, undoubtedly is that if the incidence of malaria is to be reduced, measures must be initiated to limit the number of carriers through some method of quinine administration over a long period. While under the influence of quinine, few parasites appear in the peripheral blood, and Darling has shown that no mosquito infection can take place unless there are at least 12 gametes, or sexual parasites, to the cubic millimeter of blood. The routine administration of quinine should materially lower the incidence of malaria, particularly during the wet seasons, which are favorable for the multiplication of Anopheles and hence for the transmission of malaria. It is our belief that periodical administration of quinine, over a period of two months, to all individuals in all stable communities, and to all members of our labor camps—particularly when there is an influx of new labor—would result in a great diminution of the incidence of malaria, especially if the present sanitary conditions be maintained.

DEVELOPMENT ACTIVITIES OF THE COMPANY IN RELATION TO MALARIA

In view of these facts, a review of the work of the medical department for the year 1923 necessitates a consideration of the development activities of the United Fruit Co., as these have a definite bearing on the morbidity and mortality statistics of the malarial incidence:

During the past year the company planted 40,878 acres of virgin land, or approximately 64 square miles. It is particularly this class of frontier work that is responsible for a large increase in morbidity. The primitive jungles must be cut down, extensive drainage work undertaken, camp sites located and built upon. Such a program requires a great many laborers working under conditions where necessarily no preventive measures can be undertaken except by quinine prophylaxis. That, moreover, frequently constitutes a difficult problem, owing to the natural antipathy of the uneducated laborers in regard to taking quinine, and their inability to comprehend regulations essential to their own protection. Owing to the labor turnover incidental to the new-land cultivations, it is necessary to import new labor. This must be recruited from outside sources, usually from districts where sanitary measures are merely primitive and the rate of malaria and of hookworm disease is high. Moreover, many of the laborers are afflicted with tropical leg ulcer and, in addition, not a few of them suffer from malnutrition and other debilitating conditions on entering the company's employ. There is naturally, therefore, a lowered resistance to disease, and with these conditions unavoidably existing in connection with the preparation of new land for cultivations, the morbidity and mortality rates are high. Approximately 90 to 95 per cent of our employees in the tropical divisions are laborers whose numbers include negroes, native Indians and mixtures of different races absolutely unfamiliar with even the rudiments of sanitary regulations. In the older cultivations, where labor is more stable, conditions are much better and our morbidity is less, as the laborers have been gradually taught and trained to take care of themselves. If it were possible to obtain that cooperation which can rightly be expected in an educated community, and if each householder could be held responsible for the sanitary conditions in the immediate vicinity of his dwelling, the problem of disease prevention would be greatly simplified.

When a ditch is allowed to fill up with rubbish, and drainage is thus interfered with, large numbers of mosquitoes will be bred within a few days. Cans, bottles, and other containers carelessly thrown about become filled with water in rainy seasons, and immediately they are potential breeding places.

It is useless to screen the houses of any but the better educated. The screens will not be kept in condition, and a house with defective screening is worse than one without screens, for mosquitoes not only gain entrance but remain in. Constant vigilance is necessary, therefore, for the maintenance of even a semblance of sanitary efficiency. In fact, a regular system of constant sanitary supervision is essential to success. The general supervision and direction of the company's development work is in charge of intelligent natives or whites, mainly from temperate zones. The importance of education and enlightenment of the population in sanitary problems, with a view to the prevention of disease, is clearly comprehensible when the malarial rate among the illiterate is contrasted with that which obtains among the educated population. Granted an intelligent population with a knowledge of the manner in which malaria is communicated and the ability and willingness to apply this knowledge—if the sanitary conditions are reasonably good, there is no reason why malaria should be a serious menace to the health of a community.

CAISSON DISEASE RESULTING FROM COMPLETE DISREGARD FOR THE MANDATORY INSTRUCTIONS OF THE DIVING MANUAL RELATING TO MANAGEMENT OF THE DIVER'S ASCENT IN CONFORMITY WITH THE DECOMPRESSION TABLES PUBLISHED THEREIN

A case in which symptoms of caisson disease promptly followed the rapid ascent of a diver after he had been working for about 35 minutes at a depth of 140 feet is described and pertinently commented upon by Capt. Ralph Earl, United States Navy, inspector of ordnance in charge of the naval torpedo station, Newport, R. I., in the following letter to the Bureau of Ordnance:

On July the 28th, 1924, in Narragansett Bay, a diver at work recovering a sunken torpedo in the vicinity of the U. S. S. *Florida* was ordered to the surface peremptorily by officers of that vessel. This resulted in injury to the diver.

This incident took place at 9 a. m. on July 28, 1924, off Jamestown, R. I. ———, a gunner's mate, first class, was diving in 140 feet of water in order to recover a Mark X–2 torpedo, sunk during some experiments in connection with the *Florida*. ——— had been down about 35 minutes when ———, a gunner's mate, first class, who was attending him, was ordered peremptorily by an officer of the *Florida* to haul him up immediately. He obeyed the order, and ——— was brought to the surface in 3 minutes instead of the 53 which experience has shown is necessary. Although a young man, he was seized with an acute attack of vomiting, headache, dizziness, and shortage of breath, an attack which caused some concern, but from which he has now recovered.

Therefore, it is considered advisable to call to the attention of the service the proper procedure when bringing divers to the surface.

When deep diving, such as in from 90 to 100 feet of water, is carried out, serious danger attends the diver when brought to the surface, due to the formation of bubbles of nitrogen gas in the fluids and tissues of the body, a condition known as "caisson disease" or "compressed-air illness." The proper procedure requires that when a diver has been submerged for even half an hour below 120 feet, the time taken in his decompression and ascent should be as follows: Five minutes at 40 feet, 10 minutes at 30 feet, 15 minutes at 20 feet, 20 minutes at 10 feet, and 3 minutes should be allowed for the remainder of the ascent.

The Bureau of Ordnance indorsed this letter to the Bureau of Navigation via the Bureau of Construction and Repair, and the Bureau of Medicine and Surgery as follows:

Forwarded. From the attached report it appears that ——— gunner's mate, first class, while diving in 140 feet of water was brought to the surface in violation with existing orders on the subject, and that, as a result thereof, he was injured.

This correspondence is forwarded to the Bureau of Navigation with recommendation that appropriate disciplinary action be taken, and to the Bureau of Construction and Repair, and Medicine and Surgery, with the view that this accident be called to the attention of the service in order to prevent recurrence.

The Bureau of Construction and Repair added the following comment:

Forwarded. The instructions with regard to diving are contained in the Diving Manual, 1916, the department publication under the cognizance jointly of this bureau and the Bureau of Medicine and Surgery. All vessels provided with diving outfits are provided with this manual.

Chapter 10 of this manual contains instructions for the management of the ascent of a diver and states that "in all diving operations, *decompression*, i. e., ascent, in accordance with these tables, *shall be strictly followed*, and, except in special exigency, *no diver shall be brought to the surface faster than the time specified*."

In the case recorded, these instructions were not carried out. Failure to carry out these instructions in case of a deep dive is almost certain to cause illness to diver and may cause his death.

The Diving Manual requires that when diving operations are undertaken the commanding officer shall be informed and a specially qualified officer shall be placed in charge of the diving launch and divers (p. 59).

A revision of the Bureau of Construction and Repair Manual is now in the hands of the printer, which includes a chapter on diving, including instructions on decompression. A copy of this revised Construction and Repair Manual will, as soon as available, be supplied to every officer in the service. This may suffice to familiarize the service with the necessity for carrying out the proper procedure for bringing divers to the surface.

In accordance with the suggestion made by the Bureau of Ordnance, the Bureau of Medicine and Surgery takes this means of publishing the facts as recorded in Captain Earle's letter for the information of medical officers. The bureau assumes that the medical officer of the *Florida* was not consulted as to the advisability of hauling the diver in question rapidly to the surface and was not aware of the fact that instructions contained in the Diving Manual were about to be disregarded.

The Bureau of Medicine and Surgery collaborates with the Bureau of Construction and Repair in the endeavor to furnish precise information relating to the hazards of diving in the Diving Manual, United States Navy, which together with the mandatory instructions contained therein will assure divers of the greatest possible degree of safety at all times. If there are officers who are not aware of the reasons and need for these instructions it is obvious that they should be informed without delay, or at least that steps should be taken to insure that no officer who is not familiar with deep-sea diving will be placed in a position to give directions that may result in serious injury to the diver.

Medical officers are, of course, expected to be familiar with the instructions pertaining to diving hazards in order that they may give proper and adequate treatment in case of accident. They may at times be in a position to point out that the department requires adherence to the instruction in the Diving Manual, but more often the medical officer will not know that the instructions have been disregarded until an accident has occurred.

The bureau notes with interest that the Bureau of Construction and Repair will furnish every officer in the service with a copy of the forthcoming new edition of the Diving Manual. It is desirable that every medical officer have his own copy of the manual. Heretofore the only copy available, as a rule, has been the one provided with each diving outfit. The subject of diving is covered in textbooks on naval hygiene, of course, and more recently medical officers have had for reference in their files the article on deep-sea diving by Lieut. Commander G. R. W. French, Medical Corps, Unitd States Navy, which was printed in the October, 1922, number of this BULLETIN. That article conforms to the manual and includes all essential information which directly concerns the medical officer. However, it is desirable that each medical officer should have a copy of the complete manual. The chapters of the 1916 edition of the manual which deal with the medical aspects of diving were prepared by Doctor French and no noteworthy changes have been made in the new edition.

EPIDEMIOLOGICAL ASPECTS OF A CASE ON GONOCOCCUS INFECTION OF CONJUNCTIVA, RESULTING IN LOSS OF ONE EYE

In following the lead given by the Form F card in this case, inquiry was made of the commanding officer of the naval hospital to which the man had been transferred as to the conditions and circumstances surrounding the case. The commanding officer of the hospital replied as follows:

The following information was obtained from Private ———, United States Marine Corps, relative to the infection of his left eye, which resulted in loss of the eye:

He was one of approximately 350 members of the crew of the U. S. S. *Tacoma*, who were brought by the U. S. S. *Prometheus* from Vera Cruz, Mexico, to Charleston, S. C., arriving here 2 February, 1924. The infection developed in his eye the day before arrival.

The *Tacoma's* men were quartered in various parts of the *Prometheus*. The patient, with about 50 others, were quartered in the blacksmith shop, two decks below the afterwell deck. A bucket was issued to every two men, and fresh water was issued twice a day, for bathing and washing in the washroom, in the forecastle. Patient used same bucket during entire trip, keeping it chained to a stanchion. Had his own towels and did not use a towel belonging to any other party. The man who shared his bucket had had gonorrhoea about three years before, but had not had any sign of recurrence after the disappearance of symptoms of that attack.

Asked if he could in any way account for the infection, he replied that there were swinging doors in the entrance to the head, which was next to the washroom; that every man entering the head pushed these doors open with his hand. That every man using the urinal braced himself with his hand against the bulkhead over it. That, although a part of the head was partitioned off for venereal patients, of which there were a considerable number, he feels certain that the urinal was used by both venereals and nonvenereals. He thinks it possible that infective pus may have been left either on the door or the bulkhead by the hand of some man with an active gonorrhea, and that his infection may have been due to the transfer of this pus by his own hands to his eye.

A CASE OF FOOD POISONING—LOBSTER (CRAWFISH) SUSPECTED

The suspected food in this case was lobster (crawfish) salad eaten in a restaurant at Ponce, P. R. The only other food eaten by the patient, a chief machinist's mate attached to the U. S. S. *Osborne*, during the 48 hours preceding his illness was eaten at regular mess on board ship. Nothing was served in the mess that would be likely to cause a single case of poisoning and no other man attached to the vessel was affected. No one else from the ship partook of the suspected salad.

The onset of symptoms was sudden. The first indication of illness was pain in the epigastric region appearing six hours after eating the salad. When seen by the pharmacist's mate several hours later he was in his bunk, pale and anxious. The skin was clammy and covered with beads of perspiration. At intervals he had spasmodic pain in the abdomen not localized but radiating to all parts. He vomited at intervals for about eight hours. He complained also of frontal headache, of aching in the lumbar region and of general soreness in the abdomen. There was diarrhea with soft stools at first followed by light colored liquid stools after the first few movements. There was but little prostration. His temperature was elevated to 99.6° F. during the first few hours of the attack; pulse rate 84 and regular. There were no ocular signs.

The patient lost 8 pounds in weight but recovered rapidly after 24 hours.

The suspected food was eaten in a public restaurant and nothing is known concerning the length of time the crawfish was kept, or the conditions under which it was kept, prepared, and served.

This apparently was another instance of poisoning caused by contamination of the food in question by some member of the B. enteritidis-paratyphoid group of bacilli.

Readers will note that case records in quite a series of cases of poisoning by lobster or crawfish are beginning to accumulate since the practice was adopted of following up Form F cards where the diagnostic title indicates the probability of obtaining information of epidemiological interest.

A CASE OF FOOD POISONING—FRIED OYSTERS SUSPECTED

The oysters in question were eaten at dinner in the wardroom mess of the U. S. S. *Kanawha.* All other members of the mess partook of the oysters without becoming ill.

Symptoms began 12 hours after eating the oysters and included frontal headache, spasmodic pain in the abdomen, intestinal colic, and abdominal distension. The patient's temperature was elevated to 100° F. during the first few hours. The initial symptom was constipation followed by diarrhea with liquid stools every 15 minutes or half hour for one day.

The medical officer who answered the questionnaire in this case was not medical officer of the vessel when the case occurred, and no information was obtainable as to the source of the oysters, time they were kept on board or conditions under which they were handled and prepared.

OUTBREAK OF FOOD POISONING ON BOARD THE U. S. S. "NEW YORK"

The bureau is informed that an extensive outbreak of food poisoning occurred on board the U. S. S. *New York* with some 400 cases. As in previous outbreaks of food poisoning which have occurred in battleships, and which have been discussed at length in previous numbers of the BULLETIN, the suspected food was hash served for breakfast.

The commander of the Scouting Fleet in a letter to the Scouting Fleet states that poisoning was caused by meat which had been hashed and stowed in the galley overnight. He remarks, it would have appeared evident that such meat should have been recooked before being served, and directs that vessels will take precaution against any such contingency in the future.

The required epidemiological report of this outbreak has not yet been received.

PHYSICAL AND MENTAL DEFECTS IN RECRUITS EXAMINED BY BOARDS OF REVIEW AT NAVAL TRAINING STATIONS

A much-needed improvement in the method of dealing with physically and mentally defective recruits at naval training stations was secured in July when the Bureau of Navigation cooperating with the Bureau of Medicine and Surgery established a board of review at each training station to deal with recruits who appear to be physically or psychologically undesirable for the service.

This promises to be an effective method of expeditiously applying judgment as to the qualifications of recruits in doubtful cases and disposing of recruits who are not likely to be of value to the Navy by discharging them for inaptitude, except in cases where medical survey is indicated.

Medical officers generally will be interested in watching developments along this line, inasmuch as men who are obviously undesirable, at least from the medical officer's standpoint, because of psychological defects, but who do not present enough definite evidence of disease to justify discharge from the Navy on purely medical grounds, constitute a considerable percentage of those attending sick call, and are largely responsible for the exasperating features of the average day's work.

The following summaries of the early actions of boards of review are presented here to give medical officers an idea of their work. From the standpoint of preventing future morbidity in the Navy, without additional knowledge in the premises, in view of the data recorded, several of the decisions at Hampton Roads must strike the reader as disappointing.

Monthly report of examinations by the board of review at the United States Naval Training Station, San Diego, Calif., for July, 1924

Apprentice seaman.—Not considered desirable material for the naval service. Syphilis. Recommended he be surveyed. Surveyed July 7, 1924.

Apprentice seaman.—Not considered desirable material for the naval service. Bed wetting. Recommended he be discharged for in aptitude. Discharged July 10, 1924.

Apprentice seaman.—Not considered desirable material for the naval service. Bed wetting. Recommended he be discharged for inaptitude. Discharged July 14, 1924.

Apprentice seaman.—Not considered desirable material for the naval service. Constitutional psychopathic inferiority without psychosis; chronic appendicitis, refuses operation. Recommended he be discharged for inaptitude. Discharged July 17, 1924.

Apprentice seaman.—Not considered desirable material for the naval service. History of ear trouble two years ago; right ear drum thickened; right external otitis; left ear drum practically destroyed; muco purulent discharge left ear; hearing both ears 15/15. Vision 15/20. Recommended he be surveyed. Surveyed July 19, 1924.

Apprentice seaman.—Considerable desirable material for the naval service providing the following condition is remedied: Gonococcus infection, urethra. Recommended he be transferred to United States naval hospital, San Diego, Calif., for treatment. Transferred July 26, 1924.

Number appearing before the board	6
Number of cases recommended for discharge	3
Number of cases recommended for survey	2
Number of cases recommended for transfer to hospital	1
Number of cases recommended for retention	0

Monthly report of examinations by the board of review at the United States Naval Training Station, Newport, R. I., for July, 1924

Apprentice seaman.—Under observation for the past week and was suffering from psychoneurosis neurasthenia to a marked degree. He complained of continuous occipital headache, insomnia, and there was a moderately large varicocele present. According to his statement he has not felt well for the past three years and has from time to time been under a physician's care. The board found that he is physically undesirable for retention in the naval service because of psychoneurosis neurasthenia. Enlisted at New York City, June 11, 1924.

Apprentice seaman.—Examined by the board and found to have a decided degree of fallen arch of each foot. The pedograph record confirms this finding. Pain in feet and contraction of toes occur as a result of the condition. There is a history in this case of flat feet with symptoms over a period of three years prior to enlistment. During the past, steel arch supporters were worn in his shoes. This man's condition was detected by the use of the pedograph machine when he first reported at this station early in May, 1924. He was transferred to the naval hospital, Newport, R. I., under the diagnosis on "No disease" in accordance with existing orders. He was discharged from the hospital with the recommendation that he be placed in training under observation. During his period of training the condition has interfered with the performance of his duties from time to time and has finally caused him to abandon training and to report at the dispensary for relief. The board found that he is physically undesirable for retention in the naval service because of flat feet. Enlisted in the Navy at Brooklyn, N. Y., 8 May, 1924.

Apprentice seaman.—Under hospital treatment 196 days since his arrival at this station. His instructor reports he is very stupid in his training and seems utterly unable to grasp the most elementary things. Examination shows that he is far below the average mentality and not amenable to training. The board found that he is physically undesirable for retention in the naval service because of constitutional inferiority. Enlisted at New Haven, Conn., on 11 December, 1923.

Monthly report of examinations by the board of review at the United States Naval Training Station, Hampton Roads, Va., for July, 1924

Apprentice seaman.—Enlisted at Raleigh, N. C., June 13, 1924, reported on station June 13, 1924, picked up by receiving surgeon. Appeared before the board June 24, 1924, and found to have flat feet and bed wetting. Patient is of inferior mentality and is unable to adapt himself to service conditions. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Apprentice seaman.—Enlisted at Atlanta, Ga., June 18, 1924; reported on station June 19, 1924; picked up by receiving surgeon. Appeared before the board June 25, 1924, and found to have hernia, inguinal, right. This man does not desire operation. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Apprentice seaman.—Enlisted at Raleigh, N. C., May 15, 1924; reported on station May 15, 1924. Appeared before the board July 1, 1924, and found to have cardiac disease, with pronounced arrhythmia (irregularity). Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Seaman, 2c.—Enlisted at Nashville, Tenn., April 5, 1924, reported on station April 7, 1924, picked up by receiving surgeon. Appeared before the board July 1, 1924, and found to have deformed feet, post-operative, partly webbed toes, second and third, both feet. This case has been under observation in sick quarters, Unit "A" for some time to determine his fitness for duty. It is apparent that he is not physically fit. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Fireman, 3c.—Enlisted at Raleigh, N. C., February 26, 1924, reported on station February 27, 1924. Appeared before the board

July 1, 1924, and found to have chronic rheumatism. This man has previously been recommended for inaptitude discharge, at the naval hospital, Norfolk, Va., June 20, 1924. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Apprentice seaman.—Enlisted at Louisville, Ky., June 26, 1924, reported on station June 28, 1924, picked up by receiving surgeon. Appeared before the board July 3, 1924, and found to have flat feet. Recommendation that he be returned to duty and retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Birmingham, Ala., June 3, 1924, reported on station June 4, 1924. Appeared before the board July 3, 1924, and found to have old fracture, right knee. Recommendation that he be returned to duty and retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Birmingham, Ala., June 25, 1924, reported on station June 27, 1924. Appeared before the board July 1, 1924, and found to have Otitis, media, chronic, with perforation left ear drum. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 1, 1924.

Apprentice seaman.—Enlisted at Indianapolis, Ind., June 7, 1924, reported on station June 9, 1924. Appeared before the board July 7, 1924, and found to have bed wetting (1 plus for albumin). Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Nashville, Tenn., June 21, 1924, reported on station June 23, 1924. Appeared before the board July 7, 1924, and found to have flat feet. No fallen arches; $\frac{3}{4}$ inch depression right foot; $1\frac{1}{8}$ inches left foot. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Fireman, 3c.—Enlisted at Birmingham, Ala., April 3, 1924, reported on station April 5, 1924. Appeared before the board July 7, 1924, and found to have valvular heart disease, pulmonic lesions. This case has been under constant observation since April 15, 1924. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 7, 1924.

Seaman, 2c.—Enlisted at Baltimore, Md., February 18, 1924, reported on station February 19, 1924. Appeared before the board July 7, 1924, and found to have no disease (observation). After close and careful observation for 17 days of this case the board of review finds no disease or disability to exist and feels compelled to report to the commanding officer that Vancheri is a malingerer and recommends disciplinary action. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Washington, D. C., May 29, 1924, reported on station June 3, 1924, picked up by receiving surgeon. This man first appeared before the board June 16, 1924, and found to have deformity of righ arm, ankylosis right wrist. At that time he was recommended for retention in the service. He was reexamined by the board July 9, 1924, and in the opinion of the board he is unable to perform his duties due to above disability. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 10, 1924.

Apprentice seaman.—Enlisted at Raleigh, N. C., June 4, 1924, reported on station June 4, 1924, picked up by receiving surgeon. Appeared before the board July 10, 1924, and found to have hydrocele, right testicle. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer. This man was reexamined by the board July 16, 1924, for same disability. This man refuses operation. Recommendation that he be retained in the naval service, and transferred to the United States Naval Hospital, Norfolk, Va., for treatment as may be required. Recommendation approved by commanding officer.

Seaman, 2c.—Enlisted at Raleigh, N. C., April 30, 1924, reported on station May 1, 1924. Appeared before the board July 10, 1924, and found to have valvular heart disease. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer. This man was reexamined by the board July 23, 1924, and found to have valvular heart disease, also an extremely irritable heart. This man has been under observation in sick quarters since July 9, 1924, and the following disability found: Valvular heart disease; mitral murmur which is transmitted. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 24, 1924.

Apprentice seaman.—Enlisted at Washington, D. C., June 3, 1924, reported on station June 4, 1924, picked up by receiving surgeon. Appeared before the board July 14, 1924, and found to have overriding fourth toe right foot. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Fireman, 3c.—Enlisted at Baltimore, Md., January 10, 1924, reported on station January 11, 1924. Appeared before the board July 14, 1924, and found to have epilepsy. This man was seen in two typical epileptic fits by a medical officer. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 15, 1924.

Apprentice seaman.—Enlisted at Birmingham, Ala., June 10, 1924, reported on station June 11, 1924. Appeared before the board July 16, 1924, and found to have syphilis. Recommendation that he be retained in the naval service, and transferred this date (July 16, 1924) to the United States Naval Hospital, Norfolk, Va., for treatment as may be required. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Cincinnati, Ohio, June 4, 1924, reported on station June 5, 1924. Appeared before the board July 16, 1924, and found to have otitis, media, chronic. No perforation. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Indianapolis, Ind., June 2, 1924, reported on station June 3, 1924. Appeared before the board July 16, 1924, and found to have union of fracture, faulty, right clavicle. Recommendation that he be retained in the naval service, and transferred this date (July 16, 1924) to the United States Naval Hospital, Norfolk, Va., for treatment as may be required. Recommendation approved by commanding officer.

Musician, 2c.—Enlisted at Detroit, Mich., November 13, 1923, reported on station December 18, 1923. Appeared before the board July 16, 1924, and found to have arthritis, chronic. In the opinion of the board of review this case does not come under the recruit ruling for discharge. Recommendation that he be retained in naval service, and transferred this date to the United States Naval Hospital. Norfolk, Va., for treatment as may be required. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Louisville, Ky., May 5, 1924, reported on Station May 6, 1924, picked up by receiving surgeon. Appeared before the board July 16, 1924, and found to have otitis, media, chronic with perforation right ear drum. This case was sent to the United States Naval Hospital, Norfolk, Va., for the purpose of attempting a cure. After extensive treatment the condition still exists, and will be a constant source for ill health should he be retained in the service. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 17, 1924.

Apprentice seaman.—Enlisted at Louisville, Ky., July 8, 1924, reported on station July 10, 1924, picked up by receiving surgeon.

Appeared before the board July 14, 1924, and found to have ankylosis, right ankle joint. Incurred prior to enlistment, not in the line of duty. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 15, 1924.

Seaman, 2c.—Enlisted at Raleigh, N. C., April 23, 1924, reported on station April 23, 1924. Appeared before the board July 16, 1924, and found to have mental inferiority. This man has been a patient in sick quarters since July 11, 1924. During this time he has had numerous convulsions; three of these were seen by medical officers and diagnosed as hysterical. It is not believed that this case will ever be able to meet service requirements. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 17, 1924.

Seaman, 2c.—Enlisted at Portland, Oreg., November 13, 1923, reported on station May 28, 1924. This man has had trouble ever since he came in the service. Has tried to do his duty, both on shore stations and at sea, but unsuccessfully. Has an extreme case of flat feet and in the opinion of the board he will never be able to perform any duty satisfactorily. Recommendation that he be discharged from the naval service in accordance with Bu. M.&S., 1st indorsement, WEE-SS-P.Q.&M.R. 997764 of 4 June, 1924. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 17, 1924.

Apprentice seaman.—Enlisted at Jacksonville, Fla., July 10, 1924, reported on station July 11, 1924. Appeared before the board July 23, 1924, and found to have no disease (observation). Examination as to mental condition. No disability found. Recommendation that he be returned to duty and retained in the naval service. Recommendation approved by commanding officer.

Apprentice seaman.—Enlisted at Louisville, Ky., June 20, 1924, reported on station June 21, 1924. Appeared before the board July 23, 1924, and found to have overriding fifth toe right foot. This case was picked up by receiving surgeon. Recommendation that he be returned to duty and retained in the naval service. Recommendation approved by commanding officer.

Fireman, 3c.—Enlisted at Philadelphia, Pa., March 17, 1924, reported on this station July 22, 1924, from naval hospital, Norfolk, Va. Appeared before the board July 23, 1924, and found to have somnambulism. This man has been on the sick list with diagnosis of somnambulism at the following ships and stations: U. S. S. *Rappahannock*, June 22, 1924; United States naval hospital, Norfolk, Va., June 23, 1924; U. S. S. *Jason*, July 16, 1924; United States naval hospital, Norfolk, Va., July 16, 1924. Recommended to appear before a board of review while at the naval hospital, Norfolk, Va. In the opinion of the board it is thought that he is unfit for the naval service. Recommendation that he be discharged from the naval service, in accordance with Bu. M.&S. 1st indorsement WEE:SS-P.Q.&M.R. 997764 of 4 June, 1924. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 24, 1924.

Apprentice seaman.—Enlisted at Birmingham, Ala., May 16, 1924, reported on station June 17, 1924. Appeared before the board July 24, 1924, and found to have flat feet; 1½ inch depression right foot; 1¼ inch depression left foot. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 25, 1924.

Fireman, 2c.—Enlisted at Minneapolis, Minn., June 12, 1924, reported on station June 20, 1924. Appeared before the board July 24, 1924, and found to have epilepsy. In the opinion of the board this man is able to perform his duties. Recommendation that he be retained in the naval service. Recommendation approved by commanding officer.

Fireman, 3c.—Enlisted at Springfield, Mass., September 20, 1923, reported on station July 24, 1924, from receiving barracks, Hampton Roads, Va. Appeared before the board July 28, 1924, and found to have somnambulism. This man has been on the sick list with diagnosis of somnambulism at the following ships and stations: U. S. S. *Kittery*, June 30, 1924; United States naval hospital, Norfolk, Va., June 30, 1924. Was recommended to appear before a board of review at time of discharge from the naval hospital, Norfolk, Va., July 11, 1924. In the opinion of the board it is thought that he is unfit for the naval service. Recommendation that he be discharged from the naval service, in accordance with Bu. M.&S. 1st indorsement WEE:SS-P. Q. & M. R. 997764 of 4 June, 1924. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 29, 1924.

Fireman, 3c.—Enlisted at Raleigh, N. C., April 28, 1924, reported on station April 28, 1924. Appeared before the board July 29, 1924, and found to have rhinitis, atrophic. Condition existed prior to enlistment. Purulent discharge both sides, all turbinal tissues and mucous membranes are showing evidence of atrophy. In the opinion of the board it is believed that his condition will be a constant source for ill health should he be retained in the naval service. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. NOTE.—Discharge not carried into effect due to injury incurred in line of duty July 29, 1924, for which he is being treated at the present time.

Apprentice seaman.—Enlisted at Atlanta, Ga., May 19, 1924, reported on station May 20, 1924, picked up by receiving surgeon. Appeared before the board July 31, 1924, and found to have arrhythmia (irregular heart) very marked case, which has been under observation during training, and the board is of opinion that there is no improvement nor will there ever be, and considers him unfit for the naval service. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 31, 1924.

Apprentice seaman.—Enlisted at Raleigh, N. C., June 16, 1924, reported on station June 16, 1924. Appeared before the board July 23, 1924, and found to have epilepsy. Recommendation that he be returned to duty and retained in the naval service. Recommendation approved by commanding officer. This man was reexamined July 29, 1924, and found to have epilepsy. This man has been seen in epileptic fits while under observation in sick quarters, and was verified by communication with his mother, who stated that he had had fits about one and one half years prior to entering the naval service. Recommendation that he be discharged from the naval service. Recommendation approved by commanding officer. Discharged with inaptitude discharge July 30, 1924.

Recapitulation

Total number appearing before board	34
Total number recommended for retention in service	14
Total number recommended for and discharged with inaptitude discharge	19
Somnambulism	2
Epilepsy	2
Flat feet	2
Flat feet and bed wetting	1
Hernia, inguinal, right	1
Arrhythmia (irregular heart)	2
Deformed feet, postoperative, partly webbed toes second and third, both feet	1
Chronic rheumatism	1
Otitis, media, chronic	2
Valvular heart disease	2
Deformity of right arm, ankylosis right wrist	1
Mental inferiority	1
Ankylosis right ankle joint	1
Rhinitis, atrophic, recommended for discharge, but retained in service for treatment of injury received in line of duty on day discharge was to be effected	1

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO JULY, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and July 31, 1924, notified injuries and poisonings as follows:

	Within command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work or prescribed duty		
Injuries	1, 917	958	554	3, 429
Poisonings	13	95	19	127
Total admissions	1, 930	1, 053	573	3, 556

Of these admissions, 83.88 per cent were for injuries or poisonings occurring within the command, and 16.11 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 64.69 per cent were connected with the actual performance of prescribed work or duty, and 35.30 per cent were not so connected. Of the total admissions for injuries and poisonings 54.27 per cent were connected with the actual performance of work or prescribed duties, i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases among those reported during the past month are worthy of notice from the standpoint of accident prevention:

Battleship.—Line of staging, which was defective from use, parted. The patient fell from the staging and suffered a fracture of the fibula.

Battleship.—A similar accident occurred on another ship while a man was over the side. He fell about 16 feet and was injured.

Battleship.—While coaling ship, a topping lift which was defective from use, carried away, allowing the boom and rigging to sweep the deck. Fortunately only one person was injured.

Ship.—While lowering a motor sailer over the side. the chain bridle of the after sling carried away, injuring and throwing the occupant of the boat into the water.

Ship.—While lowering a boat, a shackle on the boom parted, allowing the boom to fall; the patient's thumb was caught and torn off.

All of these cases were reported within a period of one month, and thus the frequency with which preventable accidents of this character occur is emphasized.

Destroyer.—Fracture of fingers and injury to foot by air lock door. Because of noise made by the blowers, it was impossible to hear the warning bell on the top side. Both doors of the air lock opened at the same time, causing the lower door to close on the victim's hand and foot. Practicability of an adequate safety device was reported.

Receiving ship.—Fracture near shoulder joint with dislocation. The injury was caused by falling in a bathroom. It was considered that this accident would not have occurred if a wooden grating had been installed on the bathroom floor.

Marine detachment.—An explosion of kerosene used in the operation of a Forbes water sterilizer was reported. It was due to a broken feed pipe, conveying kerosene, which had become defective from use. Two deaths resulted from multiple burns incurred in the explosion.

Ship's detachment on duty ashore.—Member of a ship's detachment encamped ashore, while wading, walked off a ledge into deep water and drowned. Death was reported as due to the man's own misconduct in disobeying orders. This man, a seaman first class, enlisted September 19, 1923. He had not learned to swim.

Ship.—While pouring hot cocoa, the handle of the container broke: the hot liquid spilled, and a burn of the abdomen resulted.

Training station.—Fracture of finger caused by placing the hand in a potato peeler while the same was in motion.

Ship.—Two injuries were reported as caused by the breaking of emery wheels. One caused an injury to the hand. In the other case a new emery had been placed on an unguarded, portable emery wheel. When grinding started, the emery broke and a piece of it struck the patient in the face.

Burns caused by the ignition and explosion of gasoline continue to be reported. In one of the cases recently reported a bystander struck a match while the injured man was filling a gasoline tank. In another instance some one had left gasoline standing in a cup; another man not knowing the contents, was emptying the cup when some ashes dropped from a cigarette he was smoking. From the card reports it would appear that gasoline is being used extensively for various purposes, including cleaning, and that it is being handled with gross carelessness. Nearly all burns caused by gasoline are reported as due to carelessness.

HEALTH OF THE NAVY

This report is for the month of September. The general admission rate based on admissions to the sick list for all causes was 530 per 1,000 per annum. The median September rate, experience of the preceding five years, is 578. The rate for August, 1924, was 511. The increase in the September rate over that of August was largely due to increased prevalence of the common respiratory disease (Class VIII–B).

There was a considerable reduction in admission rates for the communicable diseases of the respiratory type grouped in Class VIII–A. Only four cases of measles were reported during the month; three afloat and one ashore.

The following table shows admission rates per 1,000 per annum for the principal communicable diseases, September, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive.

	September, 1919–1923	September, 1924
Cerebrospinal fever	0. 01	0
Diphtheria	. 19	. 10
German measles	. 40	. 20
Influenza	14. 24	9. 36
Malaria	19. 86	12. 48
Measles	2. 17	. 40
Mumps	9. 78	1. 51
Pneumonia	2. 89	1. 20
Scarlet fever	. 38	. 50
Smallpox	0	0
Tuberculosis (all forms)	2. 38	2. 01
Typhoid fever	. 09	0

VITAL STATISTICS

The Monthly Health Index, which is published on the 15th of each month, contains the statistical data for individual ships and shore stations. The statistics appearing in this BULLETIN are summaries compiled from those published in the Monthly Health Index.

Annual rates, shown in the succeeding statistical table, are obtained as follows:

The total number of admissions to the sick list or the number of deaths reported during the period indicated is multiplied by $\frac{365}{28}$ or $\frac{365}{35}$, or 12, depending upon whether the period includes four or five weeks or a calendar month. The product is then multiplied by 1,000 and divided by the average complement.

E. R. STITT.

TABLE No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of September, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	77, 691	41, 574	119, 265	21, 250
All causes:				
Number of admissions	2, 957	2, 306	5, 263	1, 153
Annual rate per 1,000	456. 73	665. 61	529. 54	564. 29
Diseases only:				
Number of admissions	2, 618	2, 041	4, 659	1, 023
Annual rate per 1,000	404. 37	589. 12	468. 77	500. 66
Communicable diseases, exclusive of venereal diseases:				
Number of admissions	592	534	1, 126	301
Annual rate per 1,000	91. 44	154. 13	113. 29	147. 34
Venereal diseases:				
Number of admissions	1, 113	389	1, 502	223
Annual rate per 1,000	171. 91	112. 28	151. 13	109. 14
Injuries:				
Number of admissions	335	256	591	124
Annual rate per 1,000	51. 74	73. 89	59. 46	60. 69
Poisons:				
Number of admissions	4	9	13	6
Annual rate per 1,000	. 62	2. 60	1. 31	2. 94

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of October, 1924*

	Forces afloat (strength, 77,691)		Forces ashore (strength, 41,574)		Total (strength, 119,265)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases	2, 618	404. 37	2, 041	589. 12	4, 659	468. 77
Injuries	335	51. 74	256	73. 89	591	59. 46
Poisons	4	. 62	9	2. 60	13	1. 31
Total admissions	2, 957	456. 73	2, 306	665. 61	5, 263	529. 54
Class II:						
Varicocele	6	. 93	6	1. 73	12	1. 21
Class III:						
Appendicitis, acute	41	6. 33	27	7. 79	68	6. 84
Autointoxication, intestinal	9	1. 39	18	5. 20	27	2. 72
Cholangitis, acute	34	5. 25	9	2. 60	43	4. 33
Cholecytitis, acute	0	0	2	. 58	2	. 20
Cholelithasis	0	0	1	. 29	1	. 10
Colitis, acute	3	. 46	1	. 29	4	. 40
Constipation	13	2. 01	25	7. 23	38	3. 82
Enteritis, acute	18	2. 78	25	7. 23	43	4. 33
Gastritis, acute catarrhal	10	1. 54	14	4. 04	24	2. 41
Gastroenteritis	10	2. 01	54	15. 59	67	6. 74
Hemorrhoids	21	3. 24	24	6. 93	45	4. 53
Ulcer, duodenum	3	0. 46	3	. 87	6	. 60
Ulcer, stomach	0		2	. 58	2	. 20
Total	160	24. 71	205	59. 17	370	37. 23
Class V:						
Laryngitis, acute	1	. 15	4	1. 15	5	. 50
Pharyngitis, acute	7	1. 08	12	3. 46	19	1. 91
Rhinitis, acute	4	. 62	1	. 29	5	. 50
Total	12	1. 85	17	4. 91	29	2. 92
Class VIII (A):						
Chicken pox	4	. 62	1	. 29	5	. 50
Diphtheria	1	. 15	0	0	1	. 10
German measles	0	0	2	. 58	2	. 20
Influenza	54	8. 34	39	11. 26	93	9. 36
Measles	3	. 46	1	. 29	4	. 40
Mumps	10	1. 54	5	1. 44	15	1. 51
Pneumonia, broncho	3	. 46	1	. 29	4	. 40
Pneumonia, lobar	5	. 77	3	. 87	8	. 80
Scarlet fever	2	. 31	3	. 87	5	. 50
Total	82	12. 67	55	15. 88	137	13. 78

TABLE No. 2.—*Number of admissions reported by Form F cards, etc.*—Con.

	Forces afloat (strength, 77,691)		Forces ashore (strength, 41,574)		Total (strength, 119,265)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class VIII (B):						
Angina, Vincent's	38	5.87	30	8.66	68	6.84
Bronchitis, acute	101	15.60	70	20.20	171	17.21
Catarrhal fever	79	12.20	66	19.05	145	14.59
Tonsillitis, acute	227	35.06	81	23.38	308	30.99
Total	445	68.73	247	71.29	692	69.63
Class IX:						
Dysentery, bacillary	0	0	3	.87	3	.30
Dysentery, entamebic	0	0	2	.58	2	.20
Total	0	0	5	1.44	5	.50
Class X:						
Dengue	28	4.32	109	31.46	137	13.78
Fillariasis	0	0	1	.29	1	.10
Malaria	31	4.79	93	26.85	124	12.48
Pappataci fever	0	0	10	2.89	10	1.01
Total	59	9.11	213	61.48	272	27.37
Class XI:						
Tuberculosis (all forms)	6	.93	14	4.04	20	2.01
Class XII:						
Chancroid	240	37.07	63	18.18	303	30.49
Gonococcus infections	767	118.47	265	76.49	1,032	103.84
Syphilis	106	16.37	61	17.61	167	16.80
Total	1,113	171.91	389	112.28	1,502	151.13
Class XIII:						
Pleurisy, acute fibrinous	3	.46	7	2.02	10	1.01
Class XX:						
Hernia	16	2.47	23	6.64	39	3.92

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for August, 1924, and from various shore stations for the five-week period, September 1, 1924, to October 4, 1924*

	Annual rate per 1,000, August, 1924			Average rate since July 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	204.16	3,163.64	0	214.06	1,187.66
Battleship Divisions:						
Battle Fleet	84.33	152.29	310.74	105.45	151.04	221.39
Scouting Fleet	64.11	171.77	303.80	73.59	261.82	413.95
Asiatic Fleet [1]	0	546.49	1,169.23	171.43	437.88	573.80
Light Cruiser Division:						
Scouting Fleet	27.15	177.65	532.26	40.26	174.50	399.19
Destroyer Squadrons:						
Battle Fleet	0	141.69	571.43	0	138.72	563.38
Scouting Fleet	0	75.25	489.80	0	91.15	489.80
Asiatic Fleet [1]	0	585.73	3,163.64	174.76	482.83	1,187.66
Miscellaneous: [2]						
Battle Fleet	0	152.88	679.25	0	148.41	734.69
Scouting Fleet	0	106.79	494.85	0	141.55	697.39
Asiatic Fleet [1]	0	455.88	660.00	18.58	348.12	500.72
Naval Forces, Europe	0	315.79	444.44	135.85	343.54	646.15
Special Service Squadron	59.11	250.29	546.53	152.38	275.82	550.24
Naval Transportation Service	75.66	353.47	1,010.53	92.90	266.43	633.17
Special duty	0	209.91	476.82	0	256.91	424.42

[1] Month of July, 1924. Average rate since Jan. 1, 1924.
[2] Vessels of train, base force, etc.

TABLE No. 3.—*Summary of annual admission rates, etc.*—Continued.

	Annual rate per 1,000, Sept. 1, 1924, to Oct. 4, 1924			Average rate since July 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	72.08	365.98	0	70.77	236.32
First naval district	0	46.69	68.36	0	25.62	77.20
Third naval district	0	52.00	75.18	0	54.80	76.68
Fourth naval district	15.18	49.39	79.09	11.42	49.82	68.15
Fifth naval district	0	81.67	365.98	0	83.35	205.60
Sixth naval district	57.82	60.51	89.66	54.48	72.10	147.79
Seventh naval district	0	0	0	0	0	0
Eighth naval district	22.44	39.69	171.90	73.81	92.00	231.40
Ninth naval district	155.50	155.50	155.50	96.83	96.83	96.83
Eleventh naval district	57.78	77.45	120.52	34.39	65.73	87.47
Twelfth naval district	59.72	65.99	87.39	43.56	59.96	65.12
Thirteenth naval district	37.82	150.57	362.79	76.74	123.55	236.32

RATIO OF GONOCOCCUS AND SYPHILIS INFECTION TO TOTAL CASES OF VENEREAL DISEASES

	Per cent, August, 1924		Per cent since July 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	66.15	8.44	67.80	7.34
Battleship Divisions:				
Battle Fleet	85.79	7.65	83.47	7.99
Scouting Fleet	66.00	9.00	72.10	4.08
Asiatic Fleet [1]	50.00	11.46	46.76	15.18
Light Cruiser Division:				
Scouting Fleet	72.50	2.50	75.34	1.37
Destroyer Squadrons:				
Battle Fleet	76.27	13.56	85.25	7.38
Scouting Fleet	80.00	3.33	73.24	9.86
Asiatic Fleet [1]	47.90	7.56	50.65	6.89
Miscellaneous: [2]				
Battle Fleet	77.92	12.99	74.83	14.29
Scouting Fleet	62.71	13.56	67.66	5.99
Asiatic Fleet [1]	40.32	4.84	38.08	8.05
Naval Forces, Europe	65.79	18.92	68.60	11.63
Special Service Squadrons	58.33	5.56	63.29	2.53
Naval Transportation Service	57.14	6.72	60.11	6.18
Special duty	81.94	1.39	84.57	2.46

	Per cent Sept. 1 to Oct. 4, 1924		Per cent since July 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All naval districts in the United States	77.67	14.08	73.80	14.07
First naval district	81.25	6.25	85.29	8.82
Third naval district	92.31	7.69	84.49	10.81
Fourth naval district	71.43	14.29	77.78	7.41
Fifth naval district	79.52	8.43	68.92	14.86
Sixth naval district	81.25	12.50	71.43	4.76
Seventh naval district	0	0	0	0
Eighth naval district	75.00	25.00	86.96	4.35
Ninth naval district	86.67	6.67	89.66	6.89
Eleventh naval district	71.43	25.00	80.39	17.65
Twelfth naval district	20.00	80.00	30.43	60.87
Thirteenth naval district	92.86	0	77.43	9.68

[1] Month of July, 1924. Average rate since Jan. 1, 1924.
[2] Vessels of train, base force, etc.

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rate per 1,000, entire Navy, for the five-week period, September 1 to October 4, 1924, inclusive*

	Navy (strength, 98,015)		Marine Corps (strength, 21,250)		Total (strength, 119,265)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of blood	2	0. 21	0	0	2	0. 17
Diseases of circulatory system	42	4. 46	11	5. 38	53	4. 62
Diseases of digestive system	384	40. 74	128	62. 64	512	44. 65
Diseases of ductless glands and spleen	3	. 32	0	0	3	. 26
Diseases of ear	339	35. 97	64	31. 32	403	35. 14
Diseases of eye and adnexa	68	7. 22	15	7. 34	83	7. 24
Diseases of genito-urinary system (non-venereal)	122	12. 94	23	11. 26	145	12. 64
Communicable diseases transmissible by—						
Oral and nasal discharges (A)	123	13. 05	30	14. 68	153	13. 34
Oral and nasal discharges (B)	673	71. 41	123	60. 20	796	69. 41
Intestinal discharges	2	. 21	3	1. 47	5	. 44
Insects and other arthropods	140	14. 85	143	69. 99	283	24. 68
Tuberculosis (all forms)	21	2. 23	2	. 98	23	2. 01
Venereal diseases	1, 417	150. 35	223	109. 14	1, 640	143. 01
Other diseases of infective type	255	27. 06	79	38. 66	334	29. 56
Diseases of lymphatic system	43	4. 56	20	9. 79	63	5. 49
Diseases of mind	45	4. 77	14	6. 86	59	5. 14
Diseases of motor system	96	10. 19	26	12. 72	122	10. 64
Diseases of nervous system	22	2. 33	5	2. 45	27	2. 35
Diseases of respiratory system	52	5. 52	7	3. 43	59	5. 14
Diseases of skin, hair, and nails	82	8. 70	35	17. 13	117	10. 20
Hernia	33	3. 50	11	5. 38	44	3. 84
Miscellaneous diseases and conditions	82	8. 70	24	11. 75	106	9. 24
Parasites (fungi and certain animal parasites)	62	6. 58	21	10. 28	83	7. 24
Tumors	15	1. 59	7	3. 43	22	1. 92
Injuries	541	57. 40	124	60. 69	665	57. 99
Poisoning	7	. 74	6	2. 94	13	1. 13
Dental diseases and conditions	20	2. 12	9	4. 40	29	2. 53
Total	4, 691	497. 74	1, 153	564. 29	5, 844	509. 60

TABLE No. 5.—*Deaths reported, entire Navy, for the five-week period, September 1 to October 4, 1924, inclusive*

	Navy (strength, 98,015)	Marine Corps (strength, 21,250)	Total (strength, 119,265)
Diabetes, mellitis	1	0	1
Dysentery, bacillary	1	0	1
Malaria	1	0	1
Pneumonia, lobar	1	0	1
Tuberculosis, chronic pulmonary	4	1	5
Scarlet fever	1	0	1
Syphilis	2	0	2
Other diseases	11	2	13
Drowning	2	0	2
Other accidents and injuries	11	2	13
Total	35	5	40
Annual death rate per 1,000, all causes	3. 71	2. 45	3. 49
Annual death rate per 1,000, disease only	2. 33	1. 47	2. 18

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CAPTAIN D. N. CARPENTER, MEDICAL CORPS, U. S. NAVY
IN CHARGE

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

TRUMAN H. NEWBERRY,
Acting Secretary.

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

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
Volume XI, No. 1, January, 1917.
Volume XI, No. 3, July, 1917.
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PREFACE

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

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

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

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

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

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

NOTICE TO SERVICE CONTRIBUTORS

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

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

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

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

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

U. S. NAVAL MEDICAL BULLETIN

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SPECIAL ARTICLES

THE DISTRICT MEDICAL OFFICER

(THE MEDICAL AID TO THE COMMANDANT)

By R. W. PLUMMER, Commander, Medical Corps, United States Navy

It is assumed that the Bureau of Medicine and Surgery created the office of medical aid to the commandant, or district medical officer as that officer is now designated, in order to decentralize the enormous amount of detail incident to rapid expansion of medical activities in war time. A medical officer, selected by the bureau and ordered to duty on the staff of a district commandant, is enabled to assist the Surgeon General in furthering the welfare of the medical department.

In this connection, it is well to observe that an officer chosen for this duty should keep in mind that the *mission of policy* is vested in the Surgeon General. This officer's duty is to further this policy and relieve the bureau of countless duties that can and should be decentralized. Furthermore, the district medical officer must have the full confidence of the commandant if he expects, by his direction, to harmonize the medical activities of the district efficiently. Studious and careful attention to all duties coming within the purview of this office is the price of a successful administration. Medical officers must show that they are capable of organization and efficient administration if they are expected to assume real leadership in their allotted sphere. All medical activities should be supervised, administered, and commanded by medical men in so far as their distinctive medical features are concerned.

The district medical officer is an officer with an abundance of authority by direction of the commandant. If he is a "live wire," an indoctrinated medical officer and a capable military surgeon, he will successfully accomplish his task.

Organization.—The medical organization of a naval district will depend upon many factors. One district will be called upon to meet the requirements of specialized units not included in others. Scattered personnel, transportation, and the nature of land and sea communications will influence such organization.

Navy yards, naval stations, section bases, rendezvous, schools, camps, and all district activities where personnel is stationed must include medical administration. Not only must the land activities be coordinated, but all district vessels and transports supervised.

Medical personnel and dispensaries with such equipment as conditions call for must be placed at points requiring them. Naval hospitals within the district are supervised by the director of hospitals. The harmonious association of the director of hospitals with the district medical officer brings about prompt and added efficiency. It is well to bear in mind that cooperation by the district medical officer will further the administration of the hospital service.

The personnel required to conduct a large district in time of war is numerous. The office of the district medical officer should have enough medical officers, pharmacists, and clerks for the proper administration of district activities ashore and afloat and for supervising the transportation service.

The cards of all the medical personnel in the district should be carried in the office of the district medical officer, and all except specialized hospital and yard assignments should be made by the commandant. Likewise, all transfers within the district should be made by the commandant. The district medical officer should call on the bureau for personnel through the commandant and assign those not specially detailed for the duties mentioned. This method will relieve the bureau of considerable work. When personnel are in excess, it is the duty of the district medical officer to inform the bureau. In war time it will be found necessary in a large measure to work with untrained men, and careful supervision is indicated.

Section bases must be so equipped that they can readily expand to meet casualties from waters contiguous to such base. In addition to the care of the personnel of the base itself, district vessels making such base a port of call may require personnel and supplies; therefore it is necessary for section bases to be equipped for meeting emergencies incident to naval warfare in this vicinity.

Yards, training stations, barracks, camps, schools, offices, isolated radio stations, air stations, and Government industrial plants are under the care of the district medical officer. All paper work from every medical activity should be routed through the commandant. Right here the bureau, by delegating such authority to the district medical officer as good policy indicates, can save time and labor for action on surveys, requisitions, etc. It is not deemed advisable to dwell on too many detailed matters of organization, but transportation, training, hygiene, the Naval Reserve, and civilian hospitals will be mentioned in the following pages.

Transportation.—All shore stations in a district will choose the most expeditious manner of handling the sick and wounded en route to hospitals. The regular hospital ambulance service can take care of all men within a reasonable distance. Ambulances from one point can be used in reaching isolated stations. Ambulance boats may be useful in transportation. Railroad trains, airplanes, and private motor vehicles may be necessary. In war times ambulances are available for most units. The problem is usually a choice of method only. Here again no set rule in one district can govern another. Except under the stress of many casualties at a given point, the problem presents no great difficulties when given careful study.

Training.—In the rapid expansion of the Medical Department from a peace status to a state of actual war, it will be found impracticable to give young medical officers any preliminary instructions in their new duties. After careful selection, we must use them as we get them. With young hospital corpsmen, the reverse holds. They must be trained or they are worse than useless. It is not sufficient that we draft hundreds of men qualified in the art of dispensing drugs; we must obtain men disciplined in first aid and elementary nursing and turn their entire attention to this new field. How are we going to do this? The answer is not simple, but experience has shown the writer that much can be done. Place as many as possible in our naval hospitals and sprinkle them through all the civilian hospitals in the district for intensive training. All civilian hospitals in war time are glad to have such men, especially when they realize that these institutions are performing a patriotic service. Classes of instruction must be held daily at all units. When these men have finished such instruction as conditions permit, their places are taken by other recruits.

Certain men should be trained in embalming, and such as show an aptitude for pharmacy and laboratory work by reason of previous training may be assigned to this work.

Hygiene.—In war time, officers of the Public Health Service are available to assist the district medical officer in all matters pertaining to the hygiene of the district. Eternal vigilance is the price of good health. Newly acquired stations, manned by inexperienced officers and men, require painstaking supervision to avoid the results of poor hygiene. An inspecting officer, therefore, is required for this work, and the district medical officer must see that all recommendations are promptly complied with.

Relations with the medical profession, civilian hospitals, and medical societies.—In peace times, the district medical officer has a great opportunity to associate with his medical colleagues, join their medical societies, and keep in touch with the staffs of the large hospitals. A live medical officer can be of distinct service if he follows up this policy. He can interest the profession in what the naval Medical Corps is actually doing, and conduct a vigorous campaign to enroll as many as possible in the Medical Reserve Corps, especially those who are well qualified physically and professionally. He can talk to young graduates about Navy as a career and suggest that they consider interneship in a naval hospital. The bureau's present policy of training Medical Reserve officers should be conducted, and the training of the medical department personnel of reserve organizations afloat and ashore should be supervised. The district medical officer should keep a chart of all civilian hospitals, their staffs, bed capacity, nature of cases treated, number of nurses employed, number of nurses in training, number of internes, how organized, and any other information of interest. The bureau can then be accurately advised at all times. One can not write and get proper information. Dig it out by the personal touch.

District medical storehouse.—In time of war, it will be found necessary to assemble medical supplies in quantities sufficient to supply the needs of the store stations within the district, overseas ships, and vessels operating from and within the district. Emergency supplies may also be required to meet an unforeseen situation. Requisitions approved by the commandant should be submitted. The district medical officer should obtain all standardized supplies from the regular naval supply depot and avoid, if possible, emergency purchase of articles on the supply table.

The Red Cross.—The district medical officer, during war, should always keep in touch with the district managers of the Red Cross and formulate a cooperative plan of action in so far as their activities relate to the Navy. The organization of the Red Cross, the writer has found, is always ready to be of service.

The district medical officer should approve or disapprove the issue by any organization of medical supplies to the Navy in his district. Many well-meaning organizations function under various names, and much tact is necessary to avoid giving offense and at the same time make them understand that to achieve harmony they must work with and through the Navy's representative.

In conclusion it may be stated that a skeleton organization in peace times capable of expansion to meet the stress of war is good doctrine and common sense. It is foolish for us to believe that we can meet the emergency when it arises. We must not falter in adhering to a principle we know, as naval officers, is right, and keep everlastingly at it to get the best results obtainable.

The bureau, in detailing district medical officers, has a right to expect that they will be zealous and painstaking. The right man in an administrative job is soon noticed. He does not have any trouble. He is too busy.

The writer believes that an efficient medical officer, properly supported by the bureau, will be a potent influence in maintaining the medical department of the district on a war basis.

SANITARY REPORT, FIFTH NAVAL DISTRICT, 1918 [1]

On September 17, 1917, Medical Inspector F. L. Pleadwell, United States Navy, relieved Medical Director L. W. Spratling, United States Navy, as medical aid to the commandant of the fifth naval district. At that time the office of the medical aid comprised a single room, located, with some of the other offices of the district, in the Citizens Bank Building, Norfolk, Va. This room was scarcely large enough to hold the records and the three members of the office force assigned, and the room which was secured later in the Talbot Building was hardly any better. As the work of the office expanded, more ample accommodations were provided in the New Munroe Building, and, finally, when the commandant moved to the naval base, the office of the medical aid followed.

At the height of war activity the office force comprised 4 medical officers, 1 pharmacist, 4 hospital corpsmen, and 10 yeomen. The district personnel in September, 1917, numbered approximately 13,000, distributed over the States of Maryland, Virginia, West Virginia, and North Carolina, but the chief concentrations of personnel were in the Hampton Roads area and at Baltimore. On November 11, 1918, the date of the armistice, the district complement reached 30,000. Since that date to the present, progressive demobilization has reduced the number to about 24,000, and this reduction will be continued for some months, until a peace-time roster is reached.

ORGANIZATION

The medical organization of the district was expanded along the lines indicated in the official pamphlet, "The Regulations for the Government of Naval Districts of the United States," with modifications to suit local conditions.

The hospital organization is provided for under a separate administration of the director of hospitals, with direct responsibility to the commandant. In practice, however, the medical aid has often acted as a medium for the transmission of information between the commandant and the director of hospitals, as a convenience to both, and in order to be in a position to inform the commandant regarding the major dispositions in the hospital service. This plan has

[1] To supplement Commander Plummer's paper on "The district medical officer," the sanitary report of the fifth naval district for the year 1918 is inserted at this point. In this report the duties of the district medical officer as developed in this district by Capt. F. L. Pleadwell, Medical Corps, United States Navy, are expressed in a concise manner. The report shows to what extent the office of district medical officer can be developed and its importance in the general administrative scheme of a naval district.

worked satisfactorily. The chief relation of the medical aid to the commandant has been advisory, as to all medical and sanitary work in the district. The supervision exercised by the office of the medical aid covered a wide range of medical activities, which may be epitomized by stating that all medical, sanitary, and medical supply matters of the following came under his notice: Dispensaries, hospital boats, naval overseas transport vessels, district vessels, dental offices, aviation detachments, ammunition depot and naval mine depot, rifle ranges, armed guard personnel, navy yard marine barracks, section bases, naval port guard, mobilization and recruiting stations, radio stations, and labor barracks. The attached blue print and copy of letter to aid to commandant gives in detail the organization covering these activities.

In addition, this office has cooperated with the force surgeon, cruiser and transport force, Newport News, Va., and with the port surgeon at that port, and coordinated medical administration between the groups in the district represented chiefly by the training station, naval operating base; training station and receiving ship *St. Helena;* the navy yard ammunition depot; and the naval operating base.

The office of medical aid has supervised requisitions, reports, returns, and general medical correspondence governing policy which has passed between the district and the Navy Department and the Bureau of Medicine and Surgery.

Surg. George B. Young, United States Public Health Service, the sanitation officer of the district attached to this office, has rendered valuable service in connection with sanitary inspections of the many stations of the district, as well as in an advisory capacity to the medical aid and to the board of control, War Construction Activities and Housing Commission, and as a member of the district health board.

MEMORANDUM FOR AID TO COMMANDANT, FIFTH NAVAL DISTRICT

From: Medical Aid, Fifth Naval District.
To: Aid to Commandant, Fifth Naval District.
Reference: (*a*) Your memo. of April 1, 1918.
(*b*) General Order, No. 372.
(*c*) Regulations for the Government of Naval Districts of the United States, 1917.
(*d*) Blue print (M. & S.—K. W. H.—Apr. 9, 1917, medical service, naval districts).

1. In accordance with request in reference (*a*) the following organization is submitted as representing the scope of medical activities at present being administered by the medical aid.

(*a*) General medical and sanitary supervision over all naval medical activities in the district, except naval hospitals. (Reference *c*, sec. 16.)

(*b*) With respect to the hospital group, however, the director of hospitals maintains close relations with and cooperates with the medical aid, so that the latter is in a position to properly inform the commandant regarding the major dispositions in the hospital service. (Reference *c*, sec. 23, p. 15.)

The director of hospitals also cooperates with the medical aid in the matter of the transportation service of the sick between the naval hospital units and the hospital base. (Reference *c*, sec. 21, p. 13, and sec. 29, p. 18.)

Transportation of patients from outlying groups to the central group (hospital) is in charge of the medical aid. (Reference *c*, sec. 21, p. 13, and reference *d*.)

Establishment, organization, and equipment of dispensaries at section bases, rifle ranges, aviation detachments, radio stations, and camps.

Provision and equipment of hospital boats charged with water transportation of the sick.

(*c*) Provision of dental services; medical and surgical attendance in Norfolk; medical and sanitary supervision of district vessels, overseas transports, armed guards on merchant ships, recruiting and enrolling stations, and aviation detachments.

(*d*) Sanitary inspection and supervision of the following: Training stations, operating base, navy yard, hospital boats, magazines and depots, marine barracks, rifle ranges, section bases, district vessels, overseas transports, armed guard vessels, aviation detachments, Hospital Corps schools, recruiting and enrolling stations, radio stations, camps, dental offices, sanitary surveys about naval establishments.

The sanitary supervision also attends to plans for quarters, barracks, hospitals, dispensaries, and other structures projected for naval personnel.

(*e*) Enrollment of Hospital Corps personnel and detail to activities listed in paragraphs *b*, *c*, *d*, and *f*, except hospitals. Nomination of medical and Hospital Corps personnel to and from stations in the district.

(*f*) Directs the preparation of requisition for medical supplies and the distribution of these supplies.

(*g*) Arranges transportation of sick and wounded from section bases and other outlying points to the hospital bases, as well as the collection of sick from transports, armed guard vessels, district vessels, etc.

(Signed) F. L. PLEADWELL.

Medical organization of section bases.—In January, 1918, an estimate of the situation respecting the medical organization of section bases in the district was prepared as a memorandum and forwarded to the medical officers in charge, with a suggestion that they make a study of the local situation in the light of the medical aid's estimate, and develop plans for medical relief, utilizing all available facilities in the section base and adjacent communities.

The following is from the memorandum furnished each medical officer of a section base:

"The medical organization of the section base as at present constituted is such as to enable it to act simply as a place of temporary relief for the sick and wounded arising from the patrol force and from the personnel of the section base itself. It is conceivable, however, that section bases may be called upon to act in a large capacity at some future time, either as collecting stations or as clearing stations, or both, for a sudden influx of disabled from a much larger force, as from local actions off the coast, from mining operations, or even from the fleet. It is not impossible that with the progress of the war that the strategic area off this coast may become a theater of naval operations. Assuming such a possibility, it would be necessary to cope with a larger number of rescued, wounded, or disabled. To be ready to meet every possible contingency in this direction, plans should be drawn in advance and schemes projected to provide for the sudden expansion of all available medical, hospital, and transport facilities at or near each section base. It is impossible to anticipate with anything approaching accuracy just what demands may arise in future in this direction. The conditions of sea warfare are such as to make the number of casualties always doubtful, and the proportion of wounded to the killed and drowned can not be forecasted. In the battle of Jutland the proportion of wounded to the killed and drowned was exceedingly small; in the next great engagement it may be very large."

Medical officers at section bases are requested to make a study of the situation in the light of the above-mentioned remarks and along the lines of the memorandum which follows, and seek to develop an organization utilizing the facilities in and about the section base as far as possible.

In submitting these suggestions it is not intended to check individual initiative with regard to the details of the organization, or dictate what they shall be, but only to stimulate interest in a study or estimate from which a general policy may be evolved, in order to insure uniformity of equipment and procedure and develop readiness to cope with any situation that may arise. As a matter of fact the problem is not exactly the same at the different section bases, and it is for the individual officer to make appropriate adjustments as he may see fit. Medical officers are invited to study the scheme projected and submit any suggestions or modifications which they think are advisable.

PROPOSED ARRANGEMENTS FOR DEALING WITH NAVAL SICK AND INJURED LANDED AT SECTION BASES IN THE FIFTH NAVAL DISTRICT

1. It is desired to develop an organization of personnel and provide material for meeting the requirements of sick and injured at all the section bases included within the limits of the Fifth Naval District. These bases are as follows:

Section base No. 1, Baltimore, Md.
Section base No. 2, Washington, D. C.[2]
Section base No. 3, Cherrystone Island, Va.
Section base No. 4, Norfolk, Va.
Section base No. 5, New Bern, N. C.

2. It will be the duty of the medical officer in charge of a base dispensary to project and perfect schemes for the organization of the local first-aid resources in adjacent localities, where these are obtainable and are made voluntarily available for naval purposes, including measures for the selection and fitting out of buildings suitable for temporary accommodation of wounded, in addition to any hospitals which may be utilized. Local resources in the way of medical and nursing force, stretcher bearers, Red Cross personnel, hospitals, transport appliances and ambulances, or vehicles capable of use as ambulances, including bedding and supplies, should be listed preparatory to the adoption of a plan of organization and training. Certain detailed information relative to landing and caring for wounded is called for in an attached memorandum. When all plans are perfected the medical officer should have test mobilizations of both personnel and material from time to time. Voluntary aid from Red Cross organizations, both in the direction of supplies and transport, should be requisitioned whenever possible, and motor ambulance transport by voluntary aid of civil organizations should be developed as far as practicable.

At some of the section bases it may become necessary to supply means of transport for wounded from a vessel to the landing, but as a rule it is expected that most ships will have facilities for handling their disabled as far as the dock, the organization at the section base taking charge from that point. When the relief of a large force is called for, patrol vessels themselves may be used to carry the wounded.

[2] This base was later excluded from the district.

3. The provisions to be made for the care of sick and injured between the time of landing and their removal to the naval hospital base will depend upon their condition. A few may be unable to travel at once and will have to be cared for temporarily at the section base dispensary, or in near-by civil hospitals or in establishments extemporized for the purpose. In any event they will probably have to await appropriate transport, and during this waiting period will require first aid, food, clothing, and shelter. Therefore emergency provisions will, in general, fall into four groups:

1. Dispensary provisions for temporary care of nontransportable cases.
2. Equipment for medical and surgical treatment.
3. Clothing.
4. Messing and rationing arrangements.

With respect to the item of clothing, as many cases of immersion, uncomplicated by other conditions, occur as the result of naval, patrol, and mining activities, an assortment of dry clothing for fitting out such cases before they are transferred elsewhere is essential. A list of clothing thought to be suitable in these circumstances is appended.

The idea intended to be conveyed in this discussion is that the section base dispensary, after it is organized and developed to care for what may be termed normal demands, shall then be considered the nucleus of a larger organization, which the medical officer should endeavor to develop from local resources, with the idea of caring for any overflow from emergencies beyond the normal capacity of the dispensary.

MOBILE MEDICAL RELIEF PARTY

As it would be impracticable to provide and keep constantly available at each section base in number and amount sufficient to meet extreme demands, it is intended to establish at some central position in the district, from personnel available, one or more medical relief parties under charge of an officer, with a chief petty officer and a number of hospital apprentices, drilled in the principles of first-aid and rescue work, which, upon notice, can be placed on a fast patrol or hospital boat and dispatched to reinforce a section base dispensary. Such a party will have the merit of mobility and of being easily moved to points requiring assistance. It will be equipped with first-aid supplies and appliances, as well as with such medical and surgical supplies, bedding, and clothing as are deemed essential. This plan, by utilizing the regular complement of the station selected, will avoid the permanent locking up of personnel and material in waiting at section bases and enable assistance to be sent upon demand to a base in time of stress and pressure of work, due to a sudden influx of cases. The personnel of such a party will, in the intervals of such service, be regularly employed at their ordinary duties, and so a constant and full employment will be insured.

MEMORANDUM

Details relative to landing wounded at______________________________
Section Base No____
Located at____
Telegraphic address____
Senior naval officer____
Senior medical officer____
Chairman, local Red Cross or volunteer aid organization_____________
Nurses registry____
Boy and Girl Scout organizations____________________________________
Hospitals: (Name and location of each)______________________________
  Number of existing beds____
  Can expand to____
  Number of improvised or temporary beds____________________________
  Situation of temporary beds_______________________________________
  Distance of hospital from landing place___________________________
  Distance of hospital from railway station_________________________
Medical assistance:
  Possible number of medicial men available, with names, addresses, and telephone numbers____
  Possible number of Red Cross nurses available, with names, addresses, and telephone numbers_____________________________________
Stretcher parties:
  Possible trained bearers in charge of_____________________________
  Possible emergency bearers in charge of___________________________
Transport at present in locality:
  Numbber of ambulances—
    Motor_______________________ | Carrying _____________________
    Horse_______________________ | Carrying _____________________
  Number of stretchers____
  Additional transport____
  Small craft suitable for water transport__________________________
Railway accommodation:
  Length of platform (ambulance train)______________________________
  Additional sidings____
  Distance of station or siding from hospitals______________________
  Distance of station or siding from landing places_________________
Landing places:
  Accommodation for ambulance train_________________________________
  Maximum draft of water at piers and docks_________________________
    High water__________________ | Low water ____________________
    Spring tide_________________ | Neap tide_____________________
Maximum size of ship which can be berthed at high water_____________
Existing supplies:
  Cots or beds____
  Clothing____
  Medical and surgical supplies_____________________________________
Remarks:____
____
____

Hospital resources:
- General
- Contagious
- Extemporized

Recommendations:
- (*a*) Cots, beds, hammocks, and bedding
- (*b*) Clothing
- (*c*) Medical and surgical supplies
- (*d*) Instruments
- (*e*) Transport

List of clothing for immersion cases

[One unit]

Blankets	50	Shoes, pairs	50
Caps, watch	50	Socks, wool, pairs	50
Drawers, heavy	50	Trousers, pairs, blue	50
Gloves, wool	50	Undershirts, heavy	50
Jerseys	50	Shirts, blue flannel	50
Overcoats	50	Handkerchiefs	50

NOTE.—Each unit outfit to be composed of 40 garments of average size and 10 of larger size.

One section base to which the above memorandum was furnished organized a system of medical relief, complete in all details, in about 10 days. The report from this base included all the data called for, listed the local physicians, with telephone numbers, as well as stretcher bearers, trained nurses, volunteer ambulances, nurses' aids, with full information regarding the disembarkation of wounded at wharfs, instructions to the Red Cross, etc., within the time stated above. Great credit is due Surg. J. F. Patterson, acting assistant surgeon, United States Public Health Service at section base No. 5, for the promptness and efficiency with which he organized the system of relief in this locality and to those who cooperate with him.

A similar system has been organized for section base No. 3, at Cherrystone Island.

The organizations described above served later as models for a system of emergency relief for the city of Norfolk, which was being developed by the Norfolk County Medical Society to meet emergencies, such as epidemics, or great catastrophies.

The medical aid appeared before this society, by invitation, and presented an outline of the scheme of relief developed for the fifth naval district, as described above, and its adoption by the society followed. This organization served most usefully later when an epidemic of cerebrospinal fever appeared in this locality, and also in the influenza epidemic of 1918.

MEDICAL TREATMENT FOR ARMED GUARD PERSONNEL

The steadily increasing demands during the war for medical attention to members of the armed guard on merchant vessels clearing from or calling at this port necessitated the organization of a scheme of medical and sanitary inspection, medical attention to personnel, transportation of patients to hospital, antityphoid inoculations and vaccinations, delivery of medical boat boxes, and the preparation of identification tags. This work was executed chiefly from the United States hospital boat *Itasca*, and from an office established at Newport News, Va., which was placed under the armed guard medical officer. During the period from April 4, 1918, to December 11, 1918, this officer reported the following work:

Inspections of armed guard vessels (including personnel, food, quarters, etc)	231
Antityphoid inoculations	75
Transfers of patients to hospital	140
Deliveries of medical boat boxes	48
Deliveries of medical prophylactic outfits	37
Deliveries of first-aid outfits	27

This officer also made inventories and appraisals of medical supplies on 18 vessels, and prepared identification tags for the armed guard personnel on 12 vessels.

The total number of patients treated from the armed guard medical office at this point between the dates mentioned was 1,150, and the number treated aboard ship, 764. After December 11, 1918, this work was continued on the station ship at Newport News, the U. S. S. *Rosedale*, moored at the Chesapeake & Ohio Pier No. 10. Lieut. W. F. Crouse, M. C., United States Navy, who had charge of this work, is deserving of the highest commendation for the thorough manner in which it was performed.

HOSPITAL BOATS

During the year the number of district vessels reached the maximum of 120, and as few, if any, of them carried medical personnel. it became necessary to establish a hospital boat service for these vessels. From September 4, 1917, the U. S. S. *Caprice* had been assigned as a hospital boat, later replaced by the U. S. S. *Qui Vive*. These two craft operated during 1917 and 1918, treating some 1,151 cases and making 404 transfers of patients from district vessels to hospital.

Early in 1918, it became apparent that a larger boat was required to carry on the increasing work, and the U. S. S. *Itasca* was secured and assigned as a hospital boat on January 18, 1918. From the date mentioned to the end of the year 2,138 patients were transported to hospital, and there is a record of 186 patients treated, but the records for a portion of this period are incomplete. With the demobilization of the Army overseas, and the return of men to the United States, Newport News became an active port of debarkation, and as naval sick and wounded were also being received in considerable numbers, it became an urgent necessity to organize a more adequate system of transport between that port and the naval hospitals at Norfolk and naval operating base.

The numbers to be transported as well as the distance, and the bad weather often encountered on the run, made it important to obtain a larger and more seaworthy hospital boat for this service. It was not until December 3, 1918, however, that the U. S. S. *Adrian* was assigned for the purpose. From that date to the end of the year, only 28 days, 563 patients were carried to hospital by the *Adrian*. Lieut. G. E. Butler, Medical Corps, United States Navy, in charge of this work, is to be commended for the highly efficient manner in which it has been conducted.

NAVAL DISPENSARY, NORFOLK, VA.

The war expansion of naval personnel in the vicinity of the city of Norfolk, and the selection of that city as a place of residence by the majority, soon necessitated the establishment of a dispensary there where treatment could be afforded, and from which calls could be made upon patients too ill to attend at the dispensary. The fifth naval district dispensary first opened on February 5, 1918, at No. 9 Talbot Building, Norfolk, Va., being moved from there to the Dickson Building, thence to the New Munroe Building, and finally to the Flatiron Building. During the period from February 5, 1918, to December 31, 1918, 17,863 patients were cared for by this dispensary. This establishment also served naval personnel belonging to the naval overseas transportation service.

Similar dispensaries were opened at the following points in the district:

Section 1, Baltimore, Md.
Navy rifle range, Glenburnie, Md.
Navy rifle range, Virginia Beach, Va.
Naval overseas transport office, Baltimore, Md.
Section base No. 3, Cherrystone Island, Va.
Naval air station, Morehead City, N. C.
Navy mine depot, Yorktown, Va.
Base dispensary, naval operating base, Hampton Roads, Va.

Points of relief, with hospital corpsmen in charge, were established at Coast Guard stations Nos. 183 and 187; at the radio station, Beaufort, N. C.; at Lamberts Point coal pier; and at the Chesapeake & Ohio Pier No. 10 at Newport News.

Medical and Hospital Corps personnel were detailed for recruiting stations in the district and for the Navy ordnance plant, South Charleston, W. Va.

HOSPITAL CORPS

The furtherance of the policies of the bureau during the war regarding the Hospital Corps, in respect of recruitment, training, and assignment to duty, has, within the district and to vessels fitting out from the district, devolved upon the office of the medical aid.

The publicity campaign directed by the bureau and instituted within the district for the purpose of interesting medical and dental students in the project of enrolling in the Volunteer Naval Reserve as hospital corpsmen in the Naval Reserve Force, resulted in the accession of 113 medical students and 41 dental students, in the rating of hospital apprentice, second class. During the summer a number of these students were ordered to active duty for training in the various stations within the district, and a few were assigned to naval transports for the round trip to France and return.

The publicity campaign by which these accessions were obtained comprised the following measures: A circular of information was prepared and forwarded to the deans of medical and dental schools, of well-recognized and reputable standards, their assistance being enlisted to bring the information before the students with a favorable recommendation. Notices were furnished the principal newspapers in the district, which set forth the advantages of enrolling, with a request for publication. These steps were supplemented by personal correspondence with the teaching staffs of the various schools. The students enrolled came from the following institutions: University of Maryland (medical and dental); Johns Hopkins University; Baltimore College of Dental Surgery; Medical College of Virginia, Richmond, Va.; Wake Forest College, North Carolina; University of Virginia; University of West Virginia; and the University of North Carolina.

Before the establishment of the Hospital Corps training school on the naval operating base, the preliminary training of newly enrolled hospital corpsmen presented considerable difficulty. It was finally decided to utilize the facilities and personnel at the navy yard, Norfolk, at the dispensary there, although this arrangement was far from ideal. It imposed an additional burden upon Medical and Hospital Corps personnel already occupied with duties connected with the navy yard, but was accepted by them in a cheerful spirit, and with the understanding that it was a temporary expedient. A course was arranged to cover six weeks of training, the schedule to include nursing, general hygiene and quarantine, anatomy and physiology, first aid, materia medica, physiological action of drugs, special diseases and their treatment, and transportation methods. The students were quartered in the upper story of building No. 16, and instruction was given by the Medical and Hospital Corps personnel on duty at the dispensary. Four classes of apprentices were graduated, making a total of 175.

With the establishment of the Hospital Corps training school at the naval operating base, there was afforded ample facilities for training, particularly in the higher ratings. This school has been concerned mainly with the preparation of pharmacist's mates for independent duty. Part of the training has consisted in the assignment of pharmacist's mates, first class, and chief pharmacist's mates to the cruiser and transport force for a round trip for training, a similar number being temporarily assigned to the school from the transport force. In this way 233 men have had the benefit of a short period of sea training and a similar number of men from the transport force have benefited from a course of instruction in the school.

During the year 1918, a total of 1,652 hospital corpsmen have been received for training at the Hospital Corps school.

Demands for independent duty men for naval overseas transport vessels have been met during the year to the number of 676.

Attention is invited to the fact that this school, as at present organized, conducted courses for pharmacists, and the upper ratings of the Hospital Corps was more of the nature of a post-graduate school than of a trade school for enlisted men, and as such it would seem to be a rational disposition to remove the school wholly from the jurisdiction of the training station and place it under the commandant of the district. As a matter of practice it has been administered from the office of the medical aid to the commandant.

MEDICAL SUPPLIES

The steadily increasing demands for medical supplies during the year, from naval vessels, naval overseas transports, armed guard ships, section bases, etc., and the necessity which frequently arose for outfitting vessels at short notice, emphasized the desirability of having some depot or distributing point within the district.

The naval operating base, being constituted the logistical area, was the logical place for a medical supply depot, but as this base is still in the stage of development, and immediate service was necessary, the duty of receiving, storing, and issuing medical supplies had, perforce, to be assigned to the naval dispensary at the navy yard. This was not a suitable disposition, since the yard had become purely an industrial center, but it was the best that could be made at the time, and the personnel concerned at the dispensary performed this duty most creditably under adverse conditions of limited storage space and limited facilities for the assembling and packing of stores, which rendered their achievements the more praiseworthy.

In March the medical aid made representations to the bureau regarding the project of building a supply depot on the naval operating base. The idea presented was that about three months' supplies should be held here for issue, and that a building suitable for the reception, storage, packing, and issue of this amount of supplies would be entirely sufficient.

During the course of the war transportation difficulties have been such that stores requisitioned from New York have been so long in transit that supplies on hand would approach the exhaustion point before others became available. Limited storage facilities necessitated frequent renewals, and, in general, the supply of medical stores from this point has not been satisfactory. Many of the difficulties encountered would be overcome by the provision of a suitable supply depot.

This project was approved, plans were drawn, funds allotted, site approved, and it only remains for the building to be erected.

During the year 1918 the following supplies were issued from the naval dispensary, navy yard:

Boat boxes issued	350
Prophylactic outfits	150
Navy standard medicine boxes	38
Requisitions filled	1,132

QUARANTINE, DISINFECTION, AND FUMIGATION FACILITIES IN HAMPTON ROADS

Soon after reporting for duty the medical aid, with the idea of bringing forward these important subjects for elucidation and of getting action looking to their provision, addressed the bureau and urged that appropriate measures be taken to bring the general subject of quarantine in this locality to the attention of the proper authorities in order that the facilities mentioned might be provided before urgent need for them should arise. It developed that the Public Health Service had in hand a project for building a quarantine station on Craney Island, which is to be materially enlarged by dredging operations in the new ship channel to Norfolk. This project, however, has only recently taken form, and the problems of fumigation, disinfection, and delousing, made much more irksome by reason of the war, have had to be met by extemporized arrangements not wholly satisfactory.

By agreement with the public health surgeon at Fortress Monroe, Va., vessels requiring fumigation and disinfection have been taken in hand by him and given appropriate treatment, but the equipment available for this work has been limited, and hence only the smaller vessels calling here could be cared for. Any larger ship requiring thorough disinfection and evacuation of personnel was under the necessity of proceeding to the Delaware Breakwater or to New York. Col. Charles Lynch, Medical Corps, United States Army, surgeon of the port of embarkation, Newport News, upon request of this office, has kindly extended the facilities of the Army delousing plant to the Navy. Upon completion of the disinfection plant at the naval hospital, Norfolk, facilities for delousing a limited number of men will become available.

At the navy yard a portable disinfection house has been built under specifications drawn up by this office in cooperation with the surgeon of the yard, which is capable of being connected up with the steam supply of of being utilized with formalin, and this apparatus has been usefully employed in treating smaller outfits, clothing, blankets, etc., from ships at the yard.

After the adoption of the plan to delouse personnel before embarkation at French ports, the necessity for such extensive treatment on this side largely disappeared, but not entirely so.

DISTRICT BOARD OF HEALTH

On March 12, 1918, the commandant, acting upon representations made to him by the medical aid, authorized the appointment of a district board of health, consisting of the aid for public works, the medical aid, the commanding officer, naval hospital, Norfolk, the sanitation officer of the district, and the senior medical officer, naval operating base. This board has met from time to time to discuss sanitary and medical problems arising in the district and vicinity. The board has served a useful purpose in this direction and in its advisory capacity to the commandant. This board, as constituted by the commandant's order, was authorized to request the presence of any officers before it at its meetings who might be in a position to throw light on the subjects up for consideration. Among the subjects under discussion during the year were the following:

The handling and disposition of meningococcus carriers; water supply in the vicinity of Norfolk and Portsmouth; prevention of poisoning from trinitrotoluol; sanitary aspects of the St. Helena training station; and the cerebrospinal fever epidemic of February, 1918.

In order more effectively to cooperate with the health authorities of Norfolk County, in matters of sanitation in the vicinity of naval stations in the district, the medical aid has received an appointment as special health officer of the State from the State health commissioner.

GENERAL FEATURES OF SANITARY CONTROL IN THE DISTRICT

The general sanitation of the district during the past year has covered a wide field, and a full discussion of the problems involved would exceed the limits of this report.

Two situations developed, however, which are deemed worthy of more than passing mention. One of these was concerned with the question of the sanitary improvement of St. Helena training station and receiving ship. The medical aid and the sanitation officer made a sanitary inspection of this station late in 1917, and the medical aid received the impression that the level of sanitation was not as high as it should be. As a result of representations made to the bureau, a board was appointed to make a sanitary inspection of the station and make any recommendations for improvement considered advisable. This board, consisting of Rear Admiral Albert Ross, United States Navy, Medical Inspector F. L. Pleadwell, United States Navy, and Surg. George B. Young, United States Public Health Service, met on November 10, 1917, and made a thorough study of conditions existing at this station, and, after careful deliberation, made recommendations looking to improvement, among the most vital of which was that St. Helena be no longer utilized as a receiving station for recruits, but that the training station, naval operating base, be provided with proper reception units, to make it self-contained and independent of the St. Helena station, which is now concerned chiefly with receiving ship duties. During the course of 1918 a complete reception group was added to the training station, naval operating base, and St. Helena station ceased to be a reception point for recruits.

Among the other improvements recommended by the board, and subsequently carried out most efficiently by the commanding and medical officers of the St. Helena station, may be mentioned the following: The glassing in of bungalows; the filling and grading of depressed and swampy areas; the provision of additional dispensaries; the provision of a proper laboratory; the provision of additional bungalows for mess attendants; the abandonment of the receiving building as a place of issue for clothing and small stores; and the adjustment of many other minor sanitary defects. As a result of the many improvements on this station the comfort of the men has been considerably enhanced, and there has been a material lessening of the movement of communicable disease.

Another subject of great interest and paramount importance which had to be dealt with during the year was the prevention of poisoning of personnel from the handling of trinitrotoluol at the naval ammunition depot, St. Juliens Creek. This subject was not a new one to the medical aid, since he had had an opportunity while abroad to study it at close range, but it was new to most of the other officers concerned, and in spite of the best efforts of the commanding officer of the depot it required considerable time and insistent demands for proper facilities to minimize poisoning and at the same time get the best results from the workers. It may be stated here that all the mines used abroad in the North Sea mine barrage were filled at this plant, and the urgency for prompt shipment made it extremely important to secure a maximum steady output as soon as possible. To develop here a full account of the measure taken for controlling the poisoning at the plant would take one beyond the limits of a report of this character, but the prevention of poisoning from this substance may be summed up succinctly by the one word, cleanliness.

To furnish adequate facilities for minimizing contact of trinitrotoluol with the cutaneous surface of the workers is sufficient to prevent poisoning in the great majority of cases, and this means the provision of appropriate clothing, adequate bathing facilities, careful technic in the handling of trinitrotoluol, minimizing contact, and the provision of full changes of clothing after leaving work, and subsequent to the bath. In this connection it is of interest to note that the negro detail assigned to this work later proved much less susceptible to poisoning than the white detail. The young enlisted men at first employed here were very prone to become poisoned, especially in the warmer season, when free perspiration enhanced the chances of absorption.

REPRESSIVE MEASURES AGAINST VENEREAL DISEASES

This office has cooperated with the various agencies concerned with the prevention and control of venereal disease. Chief among these was the naval section of the social hygiene division of the Commission on Training Camp Activities, from which emanated a comprehensive program consisting of lectures, exhibits, pamphlets, stereomotorgraphs, etc., dealing with the varied aspects of this subject.

The legal control of venereal disease was in the hands of the law-enforcement officer, Mr. W. H. Mann, who was assigned to duty in the district in December, 1917. This officer became the medium by which a proper enforcement of the laws was secured in respect of venereal disease by coöperation with the police authorities of Norfolk and Portsmouth. The medical officers of the various stations in the district were required to submit weekly to the office of the medical aid certain data and information regarding the origin or source of infection of cases of venereal disease admitted to the list. This information was conveyed to the law-enforcement officer, who made appropriate investigation and secured convictions in the civil court where infringement of the law seemed evident.

A number of lectures, educational in nature, were delivered at various points in the district by representatives from the Commission on Training Camp Activities; medical officers in turn carried on supplementary instruction along similar lines.

The medical aid, by direction of the bureau, on April 21, 1918, attended a conference of representatives of the Army, Navy, Public Health Service, and Virginia State Board of Health, which was held at Newport News, Va., to discuss measures of more effective cooperation of the antivenereal agencies working in the naval and military areas of this region. The various aspects of the venereal problem were fully discussed, as well as the measures which were deemed advisable for adoption in order to ameliorate local conditions. As a result of this conference more thorough cooperation of the different groups concerned has followed, and repressive measures have become more effective.

On May 9, 1918, the medical aid accompanied the commandant to the law-enforcement conference which was held in the hall of the house of delegates, Richmond, Va., and presided over by the governor. A number of papers dealing with the diverse aspects of the problem of venereal disease were read. The commandant spoke on the problem from the standpoint of the Navy.

During the year 1918 the movement of venereal disease in this district has been surprisingly low, and the curve of incidence has only indicated an abnormal rate at those seasons of the year when holiday leaves are granted. It develops, therefore, that a large proportion of the cases appearing in statistics do not originate within the district, but are imported.

BOARD OF CONTROL, WAR CONSTRUCTION ACTIVITIES

The office of the medical aid, through the sanitation officer, has cooperated with the board of control, by extending advice in matters of sanitation connected with housing plans and selection of sites, mosquito surveys of proposed sites, drainage, etc., particularly for the towns projected for housing civilian workmen engaged in work on the various governmental activities centered in this area. This cooperation extended also to the barracks for laborers. One of these has been erected just outside the navy yard, capable of accommodating 750 workmen. Two towns, one for colored and one for white workmen, have been constructed on the tract of land located in the area between the navy yard and the ammunition depot.

THE NATIONAL RED CROSS

The local chapters of the Red Cross and the director of the Red Cross supply service of the fifth naval district have been of very material assistance in supplying certain articles of clothing to the patrol, mine sweeping, and overseas forces, in arranging amusements for the enlisted men, supplying funds in needy cases after discharge, furnishing ambulances, and in many other directions supplementing the efforts of the medical establishments in the district. In addition to the foregoing, the Red Cross has built and furnished a convalescent house at the naval hospital, Norfolk, Va., and plans contemplate a similar house at the naval operating base.

In February, 1918, Mrs. William Sloane offered a house and grounds located on Tanners Creek as a convalescent camp for enlisted men. The Red Cross undertook the furnishing, equipment, and general management of this camp, under the direction of the commanding officer of the naval hospital, naval operating base. This camp has served a useful and beneficial purpose in providing a place of convalescence and recuperation for men at the naval hospital who were not quite fit for discharge to full duty.

The Red Cross has erected a nurses' home near the naval hospital at the operating base, and a recreation and rest house for enlisted men at the naval ammunition depot.

In addition to the above, the Red Cross maintains offices and subsidiary supply stations at the naval operating base, and at the receiving ship and training station, St. Helena, representatives of the Red Cross have frequently visited the outlying stations of the district for the purpose of supplying sweaters, helmets, mufflers, socks, gloves, etc., and, where necessary, medical supplies and surgical dressings to supplement regular stocks.

The Red Cross has also a home service section, which endeavors to meet situations of personal stress and trial where the regular service could afford little assistance. A newspaper service has been maintained at the naval hospital, naval operating base, and in the sick bays of other stations, daily papers from 58 cities being on file for use by enlisted men.

The Red Cross has also supplied victrolas, flowers, and fresh fruit to this hospital.

DENTAL SERVICE

A number of dental offices were opened in the district during the year at points where they could best serve personnel not provided for in this respect requiring dental treatment, such as those from naval overseas transport vessels, armed guard personnel, and the crews of the patrol force. Offices were established on a more or less permanent basis at Norfolk, Va.; at section No. 1, Baltimore, Md.; base dispensary, naval operating base; and at the air station, naval operating base. At certain other stations, namely, section 3, Cherrystone Island; Navy rifle range, Virginia Beach, Va.; and Navy rifle range, Glenburnie, Md., dental officers were temporarily assigned, with portable dental outfits to carry out the more urgent treatment required. It is intended to provide a similar arrangement at the navy mine depot, Yorktown, Va.

MEDICAL ORGANIZATION

FIFTH NAVAL DISTRICT

- MEDICAL AID—(Ref. A)
  - Information and Cooperation (Ref. C)
    - Hospital Administration—Director of Hospital Service
  - Sanitary Supervision—Sanitation Officer. (Ref. B)
    1. N avy yard
    2. Naval ammunition depot
    3. Naval mine depots
    4. Marine barracks
    5. Training stations
    6. Naval operating base
    7. Hospitals
    8. Rifle ranges
    9. Section bases
    10. District vessels
    11. Armed guard vessels
    12. N. O. T. S. vessels
    13. Naval port guard
    14. District officers
    15. Sanitary surveys
    16. Aviation detachments
    17. Hospital Corps school
    18. Mobilization stations
    19. Radio stations
    20. Naval Camps and barracks
    21. Labor barracks
  - Personnel, Medical and Hospital Corps
    1. Hospital boats
    2. N. O. T. S. vessels
    3. Naval port guard
    4. District vessels
    5. Rifle ranges
    6. Section ranges
    7. Dispensaries
    8. Aviation detachments
    9. Dental offices
    10. Navy yard
    11. Marine barracks
    12. Ammunition depot and naval magazine
    13. Medical attendant, Norfolk
    14. Law enforcement officer
  - Material
    1. Supply and dispensary depot
    2. Dispensaries
    3. Hospital boats
    4. Overseas transports
    5. District vessels
    6. Armed guard
    7. Dental offices
    8. Naval rifle ranges
    9. Marine barracks
    10. Navy yard
    11. Naval ammunition depot
    12. Naval mine depots

Ref. A: (1) Orders from Navy Department, No. 3362–104, September 7, 1917. See section of Ref. C. (2) Orders from Navy Department No. 3362–111, January 23, 1918.

Ref. B: (1) Orders from Navy Department, No. N–31–MEF–17649–1, June 30, 1917. (2) Orders from Navy Department, No. N–31–HN–17649–3, September 25, 1917. (3) Surgeon General's letter SP No. 127847, September 29, 1917.

Ref. C: (1) Regulations for the Government of Naval Districts of the United States, 1917. (Med. Dept.). Sections 21 and 29. (2) Orders from Navy Department No. N–31/IV–2833, March 22, 1918.

RÉSUMÉ OF THE ACTIVITIES IN THE UNITED STATES NAVAL HOSPITAL, GREAT LAKES, ILL., UNDER THE DIRECTION AND SUPERVISION OF THE CONTACT OFFICER

By G. D. Sutton, Lieutenant Commander; H. L. Fougarousse, Lieutenant, Medical Corps, United States Navy; and E. Rosenthal, Field Director, American Red Cross

A few years ago, when the United States Naval Hospital, Great Lakes, Ill., was reorganized to include the care and treatment of patients from the Veterans' Bureau, it was realized that it would be necessary to undertake some phases of hospital work which had not in the past been the custom in the average naval hospital. In order for the hospital authorities to gain the necessary information relative to the patients' social status and other factors having a bearing on the illness under investigation, it was found advisable to ask the Red Cross to take up certain activities which could not be handled by the naval staff of the hospital. The activities of the Red Cross and allied organizations have been very valuable from every standpoint; and with this realization in mind, it has been thought that a definite exposition of these activities might be of value, both in reviewing the work done in the past and in planning expansion in the future.

In order to facilitate handling patients and their relatives outside of the professional phase, it was found necessary to organize a contact service, which had cognizance of all admissions and control of all activities operated in the interest of ex-service men. This service was placed under the supervision and direction of a naval medical officer, who also acts as contact officer with the Veterans' Bureau of this district and as morale officer of the hospital reservation. The Red Cross, under the guidance of the commanding officer of the naval hospital, assigned to duty at the hospital a staff of trained case workers, recreational, and occupational therapy aids under an assistant field director. This staff was amalgamated with the contact service. The Navy, to complete the organization, added specially trained stenographers, several occupational therapy aids, and a clerk well versed in the regulations and practices involved in the presentation of veterans' compensation claims. As it operates to-day, the contact service consists of:

- Contact officer
  - Red Cross
    - Assistant field director.
    - Hospital social workers.
    - Stenographers.
    - Hostess.
    - Recreational worker.
    - Occupational therapy aids.
    - Occupational therapy pupil aid.
  - Contact office
    - Clerk.
    - Stenographers.
    - Chief pharmacist's mate.
    - Pharmacist's mate, first class.
    - Pharmacist's mate, third class.
  - Morale
    - Library.
    - Recreational activities.
    - Publicity and bulletin.
    - Religious services.
  - School
    - Head aid.
    - Teacher—basketry.
    - Teacher—weaving and leather.
    - Teacher—clay modeling.
    - Teacher—woodwork.
    - Teacher—calisthenics, etc.

RED CROSS

- Assistant field director: Executive; Official correspondence; Charities; Emergencies
  - 2 social workers
    1. Loans, clothing, general relief, affidavits for compensation claims, encourage reinstatement of insurance, prosecution of State bonus claims (for the patients).
    2. Relief to patients' families.
    3. Secure social and personal histories.
  - 1 recreational worker
    1. Visits wards each day.
    2. Assist in arranging programs.
    3. General recreation leader in Red Cross house.
  - 1 hostess
    1. In charge of Red Cross house.
    2. Hostess at parties and dances.
    3. Assist in arranging programs.
    4. Take care of visiting relatives.
  - 4 stenographers
    1. Stenographic and clerical work.
  - 2 occupational therapy aids.
    1. Chief aid.
    2. Teacher.
  - 1 occupational therapy pupil aid
    1. Assistant to head occupational therapy aid.
    2. Clerical work.

To illustrate best the extraneous activities in the hospital in relation to the individual patient admitted in the routine manner, it is thought that if he is traced from the admission ward, through the various procedures incident to admission, that the situation might be more easily appreciated or understood. The incoming patient is admitted and immediately seen by the contact officer in the admission ward. The contact officer explains our attitude toward the patient, and he is then assigned to some suitable ward or unit. He is then examined physically by the medical and surgical watch officer on duty. Upon the completion of the examination by the ward medical officer, and when a tentative diagnosis in the case has been made, he is given some light working detail and, when indicated, appropriate occupational therapy is prescribed. During the interval, the clerk in charge of compensation claims is busy adjusting these matters, and the Red Cross investigating home conditions, rendering aid when necessary to the patient's family, collecting data along social and industrial lines, and greatly assisting otherwise in bringing about as much contentment to the patient as can be hoped for during the first few days of his residence in the hospital. With a view to having the patient feel as much at home as is possible under the circumstances, he is, when his physical condition will allow, taken into that part of the building which houses the admission ward and is introduced to the Red Cross representatives, the clerk in charge of compensation claims, and other individuals with whom the patient very probably would be most intimately associated during his stay in the hospital.

In view of the large percentage of neuropsychiatric cases, the principal treatment is occupational. Present-day methods have increased the beneficial effects derived from occupational therapy. However, experience here points to the simple and natural pursuits as being the best. All of the complicated and tedious occupations have been discontinued and only the simple arts and crafts are employed. The arts and crafts department is conducted under the supervision of a Red Cross aid, the other departments being under civilian aids. At this time there are in operation departments in weaving, basketry, leather work, clay modeling, and woodwork. The elementary academic subjects are also taught to the foreigners among the patients. The school is conducted solely for the therapeutic benefit derived. No effort is made to rehabilitate the men. It is not a vocational school, but merely a therapeutic agent, and is prescribed by the medical officer just as he would prescribe a medicine. Occupational therapy is prescribed and controlled exclusively by the medical officers. After the routine and special examinations have been made and a tentative diagnosis established, the medical officer determines the spécial kind and type of occupational therapy that might be indicated. Occupational therapy is conducted both in the school and on the various wards. The patient is followed closely by the medical officer and also by the contact officer in his progress through the school. The commercial side of the work is discouraged. While not particularly interested in the by-product, whether it be

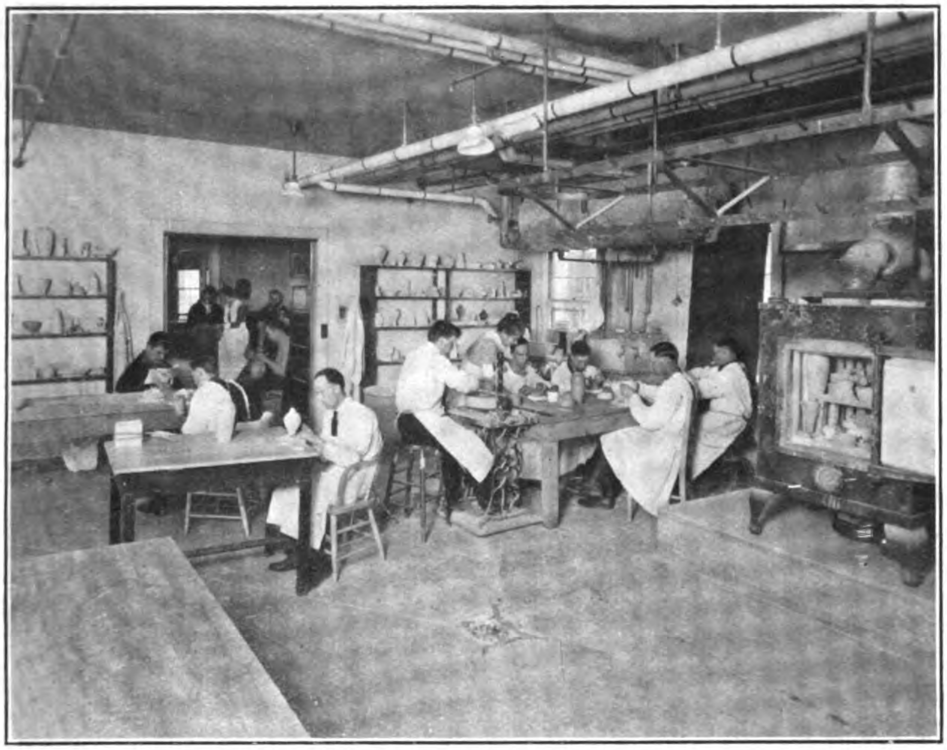

FIG. 1.—PATIENTS RECEIVING INSTRUCTION IN CLAY MODELING

FIG. 2.—SOCIAL WELFARE WORKERS

FIG. 3.—ONE OF THE ARTS AND CRAFTS WORKSHOPS

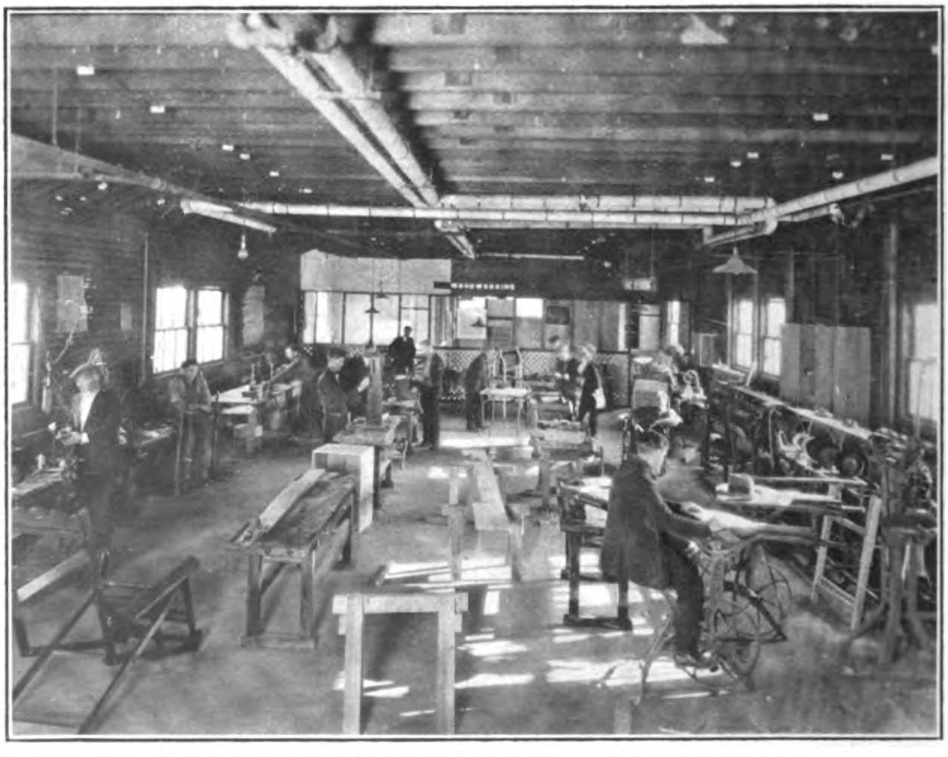

FIG. 4.—WOODWORKING AND SHOE REPAIRING SHOP

FIG. 5.—EXHIBIT OF PRODUCTS MADE BY VETERANS' BUREAU PATIENTS

FIG. 6.—ARTS AND CRAFTS IN ONE OF THE HOSPITAL WARDS

a basket, a vase, or a rug, the end result and goal at which we aim is some beneficial change, either in the man's mental condition or in a better functioning and coordination of his muscles and limbs. Special precautions are observed to avoid stereotyping, which comes as a result of having a patient employed too long a time in any one department. Many of the patients under treatment suffer from non-service disabilities, and just here the Red Cross plays an important rôle in rendering assistance. If, by chance, a patient becomes proficient in his work in the arts and crafts department, all of the various articles made by him are collected and sold by the Red Cross and this money is diverted to the patient. This, of course, only applies to a few patients and this added interest by the Red Cross is commendable and certainly appreciated by the unfortunates concerned. Of all activities, clay modeling and woodwork seem the most popular, both as a means to an end, so far as the medical officer is concerned, and real entertainment to the patient. In the clay-modeling department, the men model crude and fantastic articles as inspiration seems to prompt them, or they follow some of the standard designs, of which there are many. From the modeling, the process is carried through until the glazed article is completed. In the woodworking shop, all sorts of useful articles are made—benches, chairs, furniture, radio cabinets, etc. Weaving and basketry are along conventional lines. To stimulate interest, men are encouraged to make two articles, one of which he is permitted to keep for himself and the other goes on display in the occupational school.

A brief résumé of the Red Cross activities in relation to this hospital is incorporated in the following:

1. *Medical, social, and home service.*—It is most difficult even to outline just exactly what all the service comprises but, in a general way, it might be summed up as follows:

This work is carried on by two trained social workers who have had considerable experience in hospital social work and who are constantly in touch with new developments along social lines. In fact, the Red Cross, in order to carry on the work better, encourages and helps the individual workers to pursue special courses in the best schools in the country—offering them furloughs and part scholarships. Each social worker has certain wards assigned to her, and she is responsible for the case work in those wards. Each patient, as soon as possible after he enters the hospital, is interviewed by the worker, who first makes him feel at home and endeavors to gain his confidence. After securing identifying information, she goes into detail regarding his personal and family history and his home conditions. She endeavors to make him feel that he has a friend to whom he can bring his problems and one who will assist him in solving them. Matters of compensation, insurance, family problems along the lines of financial, legal, or medical assistance needed, personal problems, etc., are talked over in detail.

If his compensation has been disallowed for lack of evidence, the social worker obtains reports as to what is needed and sets out to round up affidavits, physicians' statements, etc.; if his insurance has lapsed for nonpayment of premiums, she endeavors to take care of it; financial assistance to the man to enable him to take care of small incidental expenses, or to purchase glasses, artificial appliances, etc. (when not furnished by the Veterans' Bureau), is granted upon the doctor's recommendation; State bonus claims are filed and prosecuted (it may here be stated that many times after a claim has been disallowed and forgotten by the man, the worker has reopened the case and obtained payment for him); if the family at home are in straightened circumstances, relief is rendered them; if assistance in handling business difficulties of the man or members of the family is needed, it is supplied; relatives are located and communication established again, and scores of other services are carried on by the worker—through the home service section of the local Red Cross chapters, of which there are about 3,000 located throughout the United States. These local chapters have workers who go out and make home visits, render the assistance needed, obtain information requested, and make reports to the hospital workers.

Here, we might also mention the fact that we assist the patients with their banking. Compensation checks are cashed, drafts issued and forwarded to the man's family, and various sums deposited in local banks. Owing to the difficulty experienced in getting to a bank, this service is in constant demand and is of great convenience for the men, helping them very often to save what they otherwise might spend.

The Red Cross also assists the men in sending and receiving telegrams; virtually acting as a telegraph office and thereby expediting telegraphic communications with the relatives in cases of emergency.

The Red Cross is anxious to assist in making home influences helpful and in bringing those influences to bear on the man in the hospital for his benefit, and we might say for the benefit of all.

In addition to the service rendered directly to the patient, social histories, verifications of statements and information of a confidential nature are secured for the use of the physicians at this hospital. In order to give an idea of the volume of work carried on by this department, we might state that during the last month 206 cases were handled in addition to approximately 700 information cases (where no actual record was made but where men called on the workers for information of one sort or another); 87 reports (social histories, verifications of patients' statements, etc.) were turned over to the doctors; 90 loans, totaling $145.25 were made to the men; 398

letters were received, and 867 letters were sent out from this office.

2. *Occupational therapy.*—The arts and crafts division of the hospital is carried on by the Red Cross along the lines outlined by the Bureau of Medicine and Surgery. The Red Cross now employs two arts and crafts aids and one student aid who are assisted by aids detailed to the shop by the Bureau of Medicine and Surgery. One of the Red Cross aids is the chief and is in charge of the arts and crafts shop. She supervises all the work—assigning the patients to the various aids, outlining plans and policies, ordering materials, etc. The Red Cross also supplies the expendable materials which go into the finished articles. The shop, which is very attractive, is indeed a busy place, as will be noted from the statistical report for the month of March. It will be noted from this report that there is sufficient variety of arts and crafts to interest almost every type of patient:

Leather	32	Knotting	5
Weaving	14	Metalry	2
Basketry	40	Glazing	5
Painting	24	Firing	3
Dyeing	19	Painting and design	3
Pottery	26	Gesso	1
Rug-making	3	Rake knitting	1
Leather and beads	13		

3. *Recreation and comfort.*—(*a*) Entertainments, recreational activities, and personal comfort of the patients constitute an important part of Red Cross work at the hospital. These activities, for the most part, are carried on at the Red Cross convalescent house, which is opened daily from 10 a. m. to 9.30 p. m. Here the ambulatory patients come to spend their idle moments and entertain themselves. Two workers are on duty, a hostess and a recreational worker. The hostess is in charge of the house and she endeavors to make it as clublike as possible. It is made cozy, comfortable, and attractive with easy chairs, rockers, stationery and writing tables, various games, pianos, victrolas, etc. Here all indoor activities are centralized. The Red Cross, acting as a supplemental agency in providing entertainment, amusement, and recreational features at the hospital, attempts to have a well-balanced recreational and entertainment program. The hostess, together with the recreational worker, arranges with organizations, clubs and individuals for entertainment and has received excellent cooperation from various American Legion posts and Legion auxiliaries, Women's Christian Temperance Union, chiefly those in Waukegan and Lake Forest, and also from the Daughters of the American Revolution, Evanston; Knights of Columbus; Daughters of Isabella; the Hawthorne Club, Chicago, and a number of smaller clubs and individuals between Waukegan and Chicago. All arrangements and contact with these

outside organizations are made by the Red Cross. An endeavor is made to have the entertainment and recreation of sufficient variety to appeal to each individual. This is made possible by having the programs clear through the Red Cross and by having a hostess and recreational worker on duty during the entertainments. The variety and amount of entertainment can be best realized from the following, which represents the figures for one month:

Motion-picture shows	13	Band concerts	4
Vaudeville	1	Teas	4
One-act plays	4	Musicals	2
Smokers	2	Stunt night	1
Dances	4		

The entertainment being made up of the patients themselves, coached by our recreational worker.

In addition to the activities at the Red Cross house, the recreational worker visits the wards daily, chats with the bed patients, supplies them with games, writes letters for them; in fact, anything necessary to help them is cheerfully done or given.

(*b*) For the comfort and welfare of the patients, the Red Cross maintains an issue room, which is well stocked with toilet articles and wearing apparel of every description. The articles are all new and are purchased by the Red Cross. These articles are issued each day between 10 and 11.30 a. m. There is a regular system of issue in use. Articles are issued to the patients only upon the recommendation of the ward doctors and in accordance with the commanding officer's order.

DIARRHŒA IN BOTTLE-FED INFANTS

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

While it is a far cry from the usual routine medical conditions met in the service to the diagnosis and treatment of diarrhœas in bottle-fed infants, nevertheless a medical officer in the Navy is quite often called in by the anxious mother of just such an infant to administer treatment, and a few words governing the diagnosis and treatment of this condition is not amiss.

In arriving at a diagnosis it is well to be informed of certain facts that may have an important bearing on the condition; i. e., age of infant, weight at birth, present weight, whether the infant is bottle fed or breast fed—if bottle fed the nature of the formula, particularly the amount of sugar, the number of feedings, the amount given at each feeding, and whether the infant is fed regularly or not.

Having determined these factors it is then necessary to ascertain the following:

1. Duration of the diarrhœa.
2. Number of stools in 24 hours.
3. Whether there is apparent pain at time of stools, with inflammatory conditions.
4. The size of stools.
5. Color.
6. Consistency.
7. Odor.
8. Reaction.
9. Mucus.
10. Presence of curds.
11. Presence of blood.
12. Whether cathartics have been administered or not.

With this information in hand a classification of the diarrhœa will materially help in the guidance of the treatment to be instituted. This is a rather difficult matter, as there is considerable divergence of opinion on this subject, some considering that all diarrhœas are due to bacterial infection, and others who attribute the condition to chemical changes due to the direct action of the sugar, salts, and fats upon the digestive system. Apparently both factors have supporters and undoubtedly both are supported by arguments obtained from careful research, but in order that the physician be not confused in a maze of technicalities, the following simple classification is adopted and forms a clear basis for a line of treatment:

1. Simple intestinal indigestion.
2. Infectious diarrhœas.
3. Miscellaneous diarrhœas.

Under simple intestinal indigestion may be included such cases as are influenced by either excess or deficiency in fat, sugar, protein, or starch; those due to underfeeding accompanied by symptoms of indigestion; overfeeding and such cases showing a diarrhœa of a recurrent type due to a lowered tolerance for various food ingredients.

Infectious diarrhœas may include the fermentative type due to sugar intoxication; the putrefactive type or proteid diarrhœa; the various dysenteries with ileo-colitis and intoxication and the condition usually known as cholera infantum.

All other diarrhœas may be classed under miscellaneous and include the mechanical diarrhœas, those due to cathartics, marasmus, and other organic or systematic causes.

Theoretically this classification appears quite simple, but practically it is often found that one merges into another, and it is quite often difficult for the physician to differentiate between them. In such cases the only recourse is the old method of trial and error. Barring bacterial and mechanical types, most diarrhœas are caused by either the carbohydrates or the proteids, and experimental feeding will be necessary to first clear up one type before attacking the other.

In simple intestinal diarrhœa the cause is usually found in mixtures containing more of the various elements in a form that can not be digested. Often we find that the original error was in one particular element, such as sugar or fat, which so lowered the digestive capacity of the intestines that the infant was unable to properly absorb even normal amounts of other elements.

Usually the physician is able to differentiate the various type of diarrhœas from the condition of the stool. A description of the stools should never be left to the mother or attendant. Best information can be obtained first hand only, and a sample stool, as fresh as possible, should be observed, in order to ascertain the odor, consistency, and appearance.

The differential diagnosis of simple intestinal indigestion presents few difficulties. The onset is gradual, and the infant becomes restless and fretful, with either a stationary weight index or showing a gradual progressive loss in weight. The temperature is normal or may show a slight declivity. The stools vary from 2 to 10 or 12 in number; usually a small amount of mucus. No blood is present in the stools unless there be some local condition to account for it, such as a fissure or polyp.

In the fermentative and putrefactive types of diarrhœa the picture presented is markedly different from that of the simple intestinal indigestion. In these types you usually have an infant that is sick. The onset is usually more rapid, with temperature and malaise, even marked prostration; the stools are greater in number and either foamy in appearance (in the fermentative type), or have a very foul odor (putrefactive), alkaline.

In dysenteries, infectious diarrhœa, and cholera infantum, there is a sudden onset, high temperature, extreme prostration, with rapid loss of weight, and usually the history of the case will give some clue to the diagnosis. In these cases the laboratory will finally determine matters.

Diarrhœas from cathartics and mechanical causes vary in type, but the history of the case usually determines the diagnosis. This is also true of the diarrhœas accompanying systemic infections, such as typhoid fever, intestinal tuberculosis, and other such conditions.

As this paper is primarily to cover the subject of diarrhœas of what may be called the dietetic type, the writer will confine himself to such cases and leave the other forms as infectious, mechanical, and those due to concurrent diseases to the choice of the reader, as most of the cases are treated symptomatically and present so many different phases as to be impossible to combine them all in a paper of this scope. It is sufficient to mention them here purely as a matter of classification and to eliminate them from the usual diarrhœa caused by incorrect feeding of infants.

Treatment.—The so-called routine treatment of diarrhœas in infants formerly, and to a great extent in the present day, consisted of a cathartic, a period of starvation, and finally a regulation of the diet. The cathartic was given on the basis that all diarrhœas were of bacterial origin and it was necessary to rid the bowels of the bacteria and their toxins. The starvation period was evidently intended to give time for the abused tissues to readjust themselves before adding any food to act as a further irritant. If one stops to consider, appreciating the fact that all diarrhœas are not of bacterial origin, it will be appreciated that there has already been a thorough purging of the bowels, and necessarily a period of starvation due to the fact that while the bowels are purging the food does not stay long enough to permit of proper digestion and absorption, so why repeat a process that wise nature has already attended to, probably long before the doctor was called.

By the above is not meant that a cathartic, or a period of starvation is never to be used. To set this down as a dogma would again be reverting to our routine course, and it is a well-established fact that in certain conditions the catharsis and starvation are absolutely essential; rather it is up to the physician to first classify his case and treat each case as a separate and distinct entity, instituting such treatment as would apply to each individual case, and not calling all diarrhœas, just diarrhœas.

One thing is absolutely certain, when we consider the condition of an infant usually brought for treatment of this condition, the first essential is to stop the diarrhœa. To do this we must often disregard the infant's actual caloric needs until the digestive organs are in proper shape to take care of the feed necessary for the infant's existence. In extreme cases it may be necessary to resort to drugs, but drugs play a very small part in the treatment and as a rule are not necessary. The proper management of the diet and hygienic conditions will suffice in the majority of cases.

As a guide to the physician the following principle of treatment may be laid down and used as a basis of procedure, applying the same according to the indications in each individual case:

1. Protein diet:
   - (*a*) One-third milk and two-thirds water, boiled together (no sugar).
   - (*b*) One-half fat-free milk (skim milk) and one-half water, boiled together (no sugar).
   - (*c*) Protein milk (Eiweiss milk).

2. Carbohydrate diet:
   Gruels and breadstuffs.

Cathartic and starvation.—Before treating an infant by the regulation of the diet, it is essential that a physician should have some knowledge of what constitutes a proper feeding for a normal healthy baby. Knowing that the activities of the body produce waste, and figuring that such waste is due to combustion it is natural that we turn to the calorie as our unit. Through experimentation we have found that so many calories daily per pound of body weight are required to furnish the heat necessary to replace the tissues destroyed by combustion, to replace the loss of heat from the body surface, and to furnish material for increase growth and activity. By laboratory tests we know the caloric value of different articles of food, and for the purpose of infant feeding it is only necessary to remember the heat value of the four principal articles of food, i. e.,

Milk, 1 ounce=20 calories.
Sugar, 1 ounce (by weight)=120 calories.
Flour, 1 ounce (by weight)=100 calories.
Malt soup extract, 1 ounce (by weight)=90 calories.

It is then necessary to remember the number of calories per pound of body weight the individual infant needs, keeping in mind that all infants do not require the same number of calories. As a guide on which to base your formula the following table will be of great assistance:

	Calories per pound
Fat infants over 4 months of age	40–45
Average infants under 4 month of age, and moderately thin infants of any age	50–55
Emaciated infants	60–65

As an example, take an infant weighing 12 pounds at 4 months of age. This infant would be considered an average infant; and after examining it, it would seem to be moderately well nourished; we would judge that it needed 50 calories per pound of body weight in 24 hours, or 600 calories ($12\times50=600$). Since well infants over 10 pounds in weight require 1½ ounces of sugar in the 24-hour amount of food, and we are giving a plain milk, water, and sugar mixture, we find by subtracting the caloric value of the 1½ ounces of sugar (180 calories) from the total number of calories required that 420 calories of milk ($600-180=420$) must be given. Dividing the 420 by 20 (the caloric value of 1 ounce of milk) would give us 21 ounces of milk and 1½ ounces of sugar. But this infant would require seven feedings of 6 ounces each at three-hour intervals, which would make 42 ounces of food ($6\times7=42$). Therefore it would be necessary to make up the difference in water, or 21 ounces of water (the 1½ ounces of sugar adding no bulk as it goes into solution).

The formula would then read as follows:

	Calories
Milk, 21 ounces	420
Water, 21 ounces	
Sugar, 1½ ounces	180
	600

Seven feedings=6 ounces each=every 3 hours

This is what would be known as the eventual formula and would be the proper feeding of such an infant as used for this example.

With this knowledge we are prepared to correct any condition that may arise from dietary errors. Going back to our care of diarrhœa, presupposing that we have a case under consideration that has been the victim of too much sugar, or one who fails to assimulate the proper amount of sugar. The first natural thing to do would be to eliminate the sugar from this baby's food. This may appear to contradict our caloric theory, but we must take into consideration that we are not dealing with a normal infant, therefore our eventual formula is above for such an infant. In addition to eliminating the sugar from this diet, it is further necessary to reduce the proteids to such a point as will merely supply the necessary calories to prevent too much waste. In severe cases it is customary to eliminate the sugar entirely and to reduce the amount of milk to one-third milk and two-thirds water; in less severe cases the milk may be a little stronger, but the sugar must always be left out. As the symptoms of diarrhœa cease the diet can again be brought back gradually until the baby is again taking the eventual formula for age and weight. In the treatment of all cases of diarrhœa the milk and water should always be boiled together.

This simple precedure will correct the majority of cases of diarrhœa. However, we must consider that in some cases of long standing the damage done by the sugar may have affected the ability to properly care for other elements of food, so that when the above line of treatment fails to produce results in three or four days the probabilities are that other conditions exist besides simple sugar indigestion. Such condition is probably due to the inability of the infant to care for fats, so that the formula may be made by using one-half fat-free milk or skim milk in place of the whole milk. To obtain fat-free milk, a quart bottle of milk is allowed to stand until all the cream has risen to the top and there is a definite line between the cream and the bottle milk, then by using a Chapin dipper, as much of the cream can be removed as may be desired.

In some cases of diarrhœa barley gruel may be used as a diluent in place of water. Very small or weak infants do not as a rule digest gruels very well, but in more vigorous and older children the gruels may be used if desired.

As a final step in these cases where the simple elimination of sugar and the reduced strength of proteids, or the elimination of the sugar and fats to give the desired results, some form of protein milk may be tried. These include Eiweiss milk, albumin milk, or casein feeding. There are various brands available and very good protein milk can be made in the home. Finkelstein's formula consists of taking the curds from a quart of milk, the whey having been removed, and adding them to 1 pint of water and 1 pint of buttermilk; or it may be made by taking 1 teaspoonful of liquid rennet, or essence of pepsin, or a junket tablet dissolved in a little cold water, thoroughly stirred into a quart of warm milk, which is allowed to stand until thoroughly jellied, it is then heated to a steaming heat (160° F.), being vigorously stirred. The curds are now separated and pressed through a wire screen in order to break them up into fine particles. To these strained curds is added a pint of cold water; this mixture is again passed through the wire screen and a pint of buttermilk is added. Protein milk should not be continued after the diarrhœa is checked.

The second method, or carbohydrate diet, is indicated in cases of putrefactive diarrhœa, most infectious diarrhœas occurring in infants over 6 months of age, chronic diarrhœas in older children, and finally infants who are not improved after a thorough and exhaustive trial of the protein diet.

While theoretically any form of carbohydrate should answer the purpose, care should be exercised in using those forms of carbohydrates that are most easily assimilated and least likely to cause further disturbances. Sugar, particularly lactose, and gruels are considered by most physicians the best form of any carbohydrate for infant feeding, although there may be objection to too free a use of sugar, as there may exist an intolerance and sugar itself may have been the original cause of the trouble.

Among the cereal gruels usually recommended may be barley, cornstarch, arrowroot, rice flour, or Imperial Granum. In addition to the gruels, especially in older children, there may be used some of the unsweetened crackers such as Uneeda biscuits, zweiback, and arrowroot. Sometimes these crackers may be used in the form of a pap (moistening in water and put on stove to cook for a moment).

A strictly carbohydrate diet, without the addition of milk, should not be continued for too long a time. After about three or four days other ingredients should be added in order slowly to bring the feeding back to a more balanced diet. If it is necessary to continue the gruel diet beyond three or four days, the gruel should be made with fat-free milk in place of water.

As soon as the stools have become brown in color and firmer in consistence, the diet should gradually be worked up to meet the eventual formula for the individual infant, care being taken especially in adding the sugar. If the changes are made too rapidly before tolerance for the food has been established there will probably be a recurrence of the diarrhea. In such cases it may be necessary to return to the gruel for a period of 24 hours and again to gradually bring the formula up to normal.

Before concluding this paper it might be well to add just a few words concerning the third method of treatment, which is indicated in the infectious types of diarrhea, dysentery, and mechanical diarrheas. In this method we have recourse to what is usually termed routine treatment; i. e., a cathartic followed by a period of starvation, after which a mild carbohydrate diet should be used, gradually working up to the eventual formula as the symptoms subside. In cases under this classification it is quite often necessary to resort to medication and the use of colonic irrigation.

Hypodermoclysis will be found useful in combatting the tremendous loss of water, and lately even better results are obtained by an intravenous injection of a 5 per cent glucose in normal saline. The treatment in these cases depends entirely on the cause of the condition, and each individual case will present its own problems to be met as the various symptoms arise.

As stated in the beginning of this article, no attempt would be made to go into the voluminous details of this subject, but rather to give only a general outline that is hoped may be useful and of assistance in caring for such cases as may come under the observation of medical officers whose duties may bring them in contact with service families.

In the preparation of this article the subject matter has been treated in the manner covered by Roger H. Dennett, M. D., in "Simplified Infant Feeding," and acknowledgment is made to Doctor Dennett for the various tables used.

THE PSYCHOANALYST AND HIS WORK

By J. C. Thompson, Commander, Medical Corps, United States Navy

This article will begin with an exposition of the manner of person one may expect to encounter upon meeting a psychoanalyst of the Freudian school; it will contain a reference to the class of diseases which are curable by an analysis; it will terminate with a brief outline of the technic employed.

All the prominent Freudian scholars in our country are, without exception, graduates of the foremost medical colleges. They are men who have had extensive training in psychiatric institutions and wide experience in neurological clinics. They are all men of standing in the American Medical Association. These facts alone make them the professional colleagues of the internist and surgeon in every sense of the word. These facts should put every doctor on his guard, lest from ignorance of the teachings of Freud he should be tempted to join the ranks of lay mediocrity and revile that which he does not understand. The position held by analysts in the medical profession automatically places an authoritative stamp upon psychoanalytic literature, to the end that the theory and practice of the art demands respectful attention, even where one is not desirous of employing or trained in applying it.

The psychological reasons why the philosophy of Freud has encountered the resistance it has experienced have been clearly elucidated by the master himself. He writes in substance that his theories have struck a severe blow to an inherent frailty of man, namely his egotism.

There are several parallels to this in history. When Copernicus published his theory that the earth was not the center of the universe, this new astronomical viewpoint so upset and outraged the ego of man, who wanted his own earth to be the principal star in the cosmos, that it took the intellectual world nearly 200 years to accept it as true. Darwin published his theory of the descent of man, establishing the fact that behind us lies a long line of anthropoid ape and Lemurian ancestors. His theory of evolution promptly came in conflict with all manner of preconceived beliefs. It hit the human ego a terrible blow when it attempted to separate man from his pet faith, the belief that he was specially created by some superior being, thereby giving him a comforting feeling of superiority over the remainder of the animal kingdom. It has taken the western world nearly three generations to make even a partial adjustment to this new kind of biology.

Then into the field of psychology came Freud, with the most intolerable of insults to human egotism. The studies of Freud have demonstrated beyond all debate that within man's head there are two distinct minds: One the conscious, the other the unconscious mind. At times, even in the perfectly normal person, the unconscious mind functions and brings about certain behavior, thinking, and reactions that are absolutely unknown and unintelligible to the conscious mind of the person.

Heretofore man has been able to delude and comfort himself by saying something like this: "Fate has been very cruel to me. I am not able to control circumstances about me; those over me annoy and harass me; others intrude upon my life; but at all events, I am supreme master of my thoughts; they are mine to dominate and direct precisely as I please." Now this as a matter of fact is exactly what is not the case. Were it true that we were czar of our mental empire there would be no neuroses, no insanities, no functional mental diseases, which to-day are responsible for 50 per cent of the hospitalized sick in this country. An understanding of Freudian psychoanalysis depends entirely upon an understanding of the unconscious mind. In principle this is no different from the fact that the crediting of principles of immunity depends upon an acceptance of Erlich's theory.

The existence of the unconscious mind is exactly as demonstrable as are bacteria. The method and technic of demonstration alone differ. They are similar in that neither the Freudian theory of the unconscious mind nor Erlich's theory of immunity are provable in a lecture room. The student desirous of proof of the unconscious mind must discuss the matter quitely with an analyst and test out the various bits of evidence as they are presented, just as one taking up bacteriology must test his cultures and sera upon the laboratory guinea pig. A person who is constitutionally indisposed to accept advances in psychology can not be taught the Freudian principles any more than one who steadfastly refuses to look down a microscope can be shown a germ.

To return to the question, "What *is* a psychoanalyst?" He is a physician who has thoroughly digested the fact that if he were to open an office for general medical and surgical practice, as time went on there would be a very large percentage of patients enter his consulation room who would be mentally sick, miserable and unhappy, but for whom no internal medication or surgical interference would bring any permanent relief.

Now the question arises "what is the matter with these sick persons who seek our help, yet for whom we have no medical or surgical aid at our command that will honestly and truly cure?"

Something is wrong with them, and that fact must be recognized. These patients will drift from one physician to another, formulating as they go the typical neurotic creed, one of the principal planks in their platform being a loss of faith in the medical profession.

The reader will readily recognize these patients as the neurotic individuals who are the bane of every internist; they are the patients with negative physical etiological findings who boast of an intricate and at times highly elaborate and complicated symptomology.

These are the cases of mental disorders which are described by Freud as psychoneuroses. They are subdivided, purely for convenience, by Jelliffe and White into the following five groups:

Hysteria.
Compulsions and obsessions.
Phobias (morbid fears).

Neurasthenia.
Anxiety neurosis.

These five groups by no means represent clinical entities in the same sense that scarlet fever and smallpox are clear-cut varieties of the exanthemata.

These various groups of psychoneuroses integrate with one another at times in a most perplexing fashion.

They all, however, have one thing in common; they have the same etiology, and this common etiology consists of a mismanagement in some way or another of the procreation instinct.

Man has two fundamental instincts: The one for self-preservation, the other for procreation.

It is well known what befalls a man who fails properly to handle his instinct for self-preservation. If he neglects the demands of nature for proper food and clothing, illness and even death will overtake him.

It is not so well known, however, that failure to give heed and appropriate expression to the procreation instinct is as surely followed by mental distress as the body is followed by its shadow when walking in the sunshine.

Hunger is the emotion associated with the self-preservation instinct—the urge to acquire food. Hunger can only be appeased by actual food; no gazing upon a picture of a roast fowl or perusing a menu will satisfy the empty stomach.

Libido is the emotion of the procreation instinct. It differs absolutely, radically, and fundamentally from the emotion of hunger, which demands food alone for its sating, in that libido can be appeased, not only by liberation in the biologically ideal path, namely, life with a heterosexual love object—a wife—but by being usefully released in all manner of intellectual and productive pursuits.

It is helpful to compare libido to the steam generated in a boiler. As long as the fire burns, more and more steam is produced. The intended use of this steam is that it be directed down the main lead into the engine. If for some reason the engine is not working, that steam must still be cared for, and released either at the safety valve or at the whistle. If this is not done the end is inevitable—the boiler explodes.

The same is true of our libido. Every hour we live libido is being generated within us. Its ideal release is in home building, with true love objects, a wife, children, and the labor necessary in providing for them the necessities and comforts of life. This release is the biological standard tending to racial fertility, happiness, and efficiency. This is comparable to the steam going into the engine for useful work.

If the libido, for some economic, social, or cultural reasons, is denied this biologically ideal release, it can readily be directed in the direction of useful creative work. This is done by thousands of unmarried people who are continent and healthy. This is referred to as sublimation of the libido; it is comparable to the escape of the steam at the safety valve, in that it averts disaster.

If the libido is not discharged along these two paths it tends to develop a psychoneurosis of a psychosis in the patient. This is comparable to the steam at the whistle—just noise and trouble.

If the libido is not released in one of these three fashions it will make its escape from the body in criminal or perverse acts. This is the explosion, the destruction of the ego and of the personality in terms of biological usefulness to the race.

To restate the situation: It is necessary to consider libido in terms of energy. Every hour we live libido is being generated and something must be done with this nascent and potent power. The ego must control and direct it, but if this is not done the libido will lay hold of the ego and will direct the behavior of the victim. This will give rise to the infinite series of symptoms of the neurotic constitution. These symptoms range from minor annoying personal mannerisms such as irritability, sensitiveness, obstinacy, egotism, stuttering, neurotic fatigue, absent-mindedness, etc., all the way down the line to the terminal mental dilapidation found in the deteriorated maniacs, dementias, and paranoic cases wasting away in the incurable ward of the asylum.

To be exact: The type of cases handled by a psychoanalyst are patients who are suffering from purely neurotic symptoms; these symptoms may be anything from almost inconsequential irritability to hysterical seizures and maniacal outbursts; these are symptoms which are a result of mismanagement of the most important of the human instincts, the instinct of procreation.

We are now at the third and last section of this thesis, a cursory view of the technic employed in treatment.

In a psychoanalytic practice the routine is about as follows: A patient presents herself with all manner of neurotic distress, including nausea and vomiting. It is at once made clear to her that pain, nausea, and vomiting may be due to a somatic disorder, an inflammation or a lesion of the stomach, or the distress may be purely a neurotic symptom.

In all branches of medicine, the mere relief of the symptom is inferior therapeutics, whereas the elimination of the cause is our standard.

With this aim at radical cure in mind, the analyst insists that each of his patients prior to an analysis be given a thorough physical examination by a very competent and trusted internist. Upon the nature of the report of this examination depends whether or not the analyst will accept the case. If a somatic etiology is found, the patient is enjoined to seek relief from her family physician.

It is quite as inexcusable malpractice for the analyst to attempt to cure an incipient pyloric cancer by psychoanalysis as it is for the internist to try to wash the emotional manifestations out of a stomach which is in the grip of a hysterical seizure.

If the report of the physical examination is negative, then, considering other characteristic syndromes, the analyst can be practically certain that he is dealing with a pure psychoneurosis. Kempf, of New York, one of the very foremost analysts and psychiatrists in the world, very wittily writes: "The golden rule in diagnosis is to know what we are looking for because then it is infinitely easier to find it."

If the diagnosis is correct so far, if the woman is suffering from a psychoneurosis of the type referred to as hysteria, the analyst knows precisely in which direction to seek for the etiology; he knows the direction, not in detail, but in principle. It runs as follows: This woman has a certain set of ideas in her head, known in analytic terminology as a "complex"; these ideas are of an unpleasant nature, and she has tried to forget them—that is, to put them out of her conscious mind. This of course can be done, but the trouble is that this mere conscious forgetting of certain affairs does not end the matter. These so-called forgotten memories do not die; they continue to live; they continue their existence in the unconscious mind, and at this point we are at the very kernel of Freud's most important discovery. Freud discovered that these forgotten memories, these repressed complexes, again return from the unconscious mind, and that every time they do so they return so disguised that the person in whose very mind they are is absolutely ignorant of their meaning; they actually return in the shape of a symptom of some kind or another. This is the mechanism of every neurotic symptom. It is a phenomenon almost without parallel in the material world.

The same is true of the neurotic symptom, which is nothing but an idea converted into a definite bit of neurotic behavior.

This of course is the rankest of heresy to the pure internist or surgeon, whose entire professional foundations are based upon physiology, anatomy, and chemistry.

Why then does it come to pass that a small group of their colleagues, the psycho-analysts, have turned to so apparently far-fetched an etiology, as an idea, to explain such a neurotic symptom as the hysterical vomiting of pregnancy, for example?

This step has been taken by the analytic school owing to the heaven-sent blessing that, if the analyst is skillful enough to find out what the idea that is causing the neurotic symptom to continue is, and can make this clear to the patient, the neurotic symptom will cease.

The analyst certainly can not be accused of going further afield in the search of the cure for neurotic symptoms than has the internist in their appeal to the preputial follicles of the musk ox of Tibet for a potion to quell unquiet nerves. The only difference being that, aside from musk costing $100 an ounce, it is useless, as it is a mere erotic soporific, whereas the eradication of the idea results in a permanent cure.

Every person without exception who has a neurotic symptom has two other things: he has a feeling of inferiority and some unpleasant problem or conflict that he is finding difficult to solve in a satisfactory and efficient manner.

These neurotic symptoms are one and all developed by the unconscious mind to compensate for this feeling of inferiority and to afford an escape from the unpleasant problem with which he is confronted.

Take the hysterical vomiting of pregnancy, for example. The analyst can be certain that the expected addition to the family is unwelcome to the mother. It may be from lack of love for the husband; it may be from fear of his fidelity during the period when she will be prevented from going about with him; it may be that she has been in some mischief of sorts and is afraid that the paternity of the illegitimate father may be evidenced in hair, eyes, or coloring of the infant; it may be that she does not want the disfigurement and the interruption of certain social activities. All these and many other factors must be borne in mind by the discerning analyst.

The unconscious mind of the neurotic patient then reasons on this subject about as follows: "I have done a very stupid thing in having allowed conception to take place, when so many of my friends are so much smarter and have prevented it." Now, all we have to do is to think we have been stupid or less smart than those about us, when we will promptly develop a feeling of inferiority which makes us wretched, unhappy, and inefficient; this is a neurosis.

Now, the pregnant patient, facing a problem which is disagreeable, employs the neurotic device of continuous vomiting in the endeavor to escape from the impending confinement and additional child. The unconscious mind again reasons about as follows: "Now, if you will only vomit your food, you will become poorly nourished, and with any kind of luck the straining and pressure upon the abdominal contents will cause you to abort naturally; but if this does not happen, all you have to do is to stay with it, keep on vomiting, and your friends will become deeply concerned, your family physician will call a consultation, and surgical interference with the pregnancy will be described."

Now, this is exactly what the unconscious mind of the patient desired; the abortion will be performed amid the sympathy of attentive friends, and this will convert the patient's feeling of inferiority, of having been stupid and in bad luck, into a feeling of being of some importance in her little world; for are not doctors and nurses and friends vieing with each other in their endeavor to bring about a realization of her most profound wishes—that is, the avoiding of having a child?

The symptom of the hysterical vomiting of pregnancy is therefore the disguised expression of an unconscious wish. This is the mechanism of a large group of hysterical symptoms.

When confronted with a neurotic patient, it at once becomes the task of the analyst to ascertain what is the nature of the pathogenic wish that is behind and motivates each symptom. The reason is this: When that unconscious wish is uncovered, when it is brought into the conscious mind of the patient, it thereupon loses its capacity to produce a symptom, and the symptom having lost its motivating energy ceases to exist, and in this manner a cure is effected.

A psychoanalysis is indicated only in a case of one of the psychoneuroses. Furthermore, it can be employed only where the psychoneurosis occurs in a patient who possesses a fairly definite moral, cultural, and educational foundation.

A psychoanalysis is contraindicated in the uneducated, in the mental and moral defectives, and all with definite stigmata of psychic disturbances due to somatic disorders, such as the neurosyphilides and the toxic psychoses.

The employment of psychoanalysis may be exactly as much a form of malpractice as the most meddlesome surgery one could mention. A blunder in the analyst's judgment and technic may result in murder or suicide, or both.

The ideal patients one finds among those who are outwardly behaving in a fairly normal fashion, but who inwardly are wretched and unhappy, and in whom this wretchedness and unhappiness and loss of efficiency are due to the faulty functioning of the procreation instinct.

Let us look at a typical case of the character which is prone to come to the attention of a naval medical officer, such as one of the war neuroses, which is termed by Kempf a repression neurosis.

A physically healthy and robust man reports that for the past two years he has been obsessed with the notion that he could not trust himself in a situation where a toilet was not immediately accessible. This neurosis, this state of mind, deprived him of all the simpler heterosexual social contacts, such as the movies, dances, parties, etc. He was thoroughly gone over by a skilled genito-urinary specialist and was found to be perfectly normal.

For such a patient there is absolutely no medical therapy or surgical interference which will bring the slightest relief. This fact the patient proved to his own satisfaction, for he went the rounds from belladonna to quiet the bladder nerves to the passage of sounds to calm an excited veru montanum.

There is no use merely comforting such a patient by telling him that he will outgrow his trouble, for he sees only too clearly that day by day he is getting slowly worse.

There is naught to be done but get such a patient to submit to an analysis. Aside from the skill of the analyst, whether the analysis is successful depends entirely upon whether or not such a patient desires to get well. If his heart is set upon retirement the analyst is quite as helpless as is the surgeon in the presence of a needed laparotomy to which the patient will not consent.

The only recourse is to retire from the case, but the analyst would then be in the scientifically secure position of being able to enter upon the medical history the fact that the patient prefers a flight into sickness and retirement than to face the realities of life and future service in the Navy.

This patient was analyzed and during the anamnesis there came up with the emotional accompaniment that betokened thorough repression the reminiscence that the only thought which entered his mind as he was blown into the air and overboard by an explosion was the hope that the trip would terminate in a toilet. The reader must bear in mind that because there is no bacterial or endocrine etiology for a psychoneurosis, the quest for cause must be sought in the ideational system of the patient. After having found that at the time of the explosion the patient was thinking of urination, it becomes necessary to learn why his entire mental machine became fixed upon the center of difficulties as to urination. Ideas of this kind, mild obsessional states, owe their formation to repressed memories of childhood situations such as bed wetting and urinary incontinence which were ruthlessly punished by parents, who were no doubt cultured in the social amenities but who at the same time were woefully ignorant of the fundamentals of child psychology. These experiences were painful to the child; they were therefore forgotten as far as the conscious mind were concerned—that is, they repressed into the unconscious. It is exactly these repressed memories which, returning from the unconscious mind, come into the field of consciousness and manifest themselves as psychoneurotic symptoms.

The proof of all this is the fact that when these repressed memories are aroused by the analytic technic of free association the result as far as the patient is concerned is that he is stripped of his capacity to produce symptoms, and the absence of symptoms thus brought about is in general terms equivalent to a cure.

After having glanced at the field covered by an analyst, it may be useful to inquire into the manifold duties of the Medical Corps of the Navy and to ascertain if there are any suitable details open for those trained in this branch of psychotherapy.

The reply to this question at once presents itself. There are two fields in which an analyst could render the most useful service, service of the greatest of professional value, which would save the administration thousands of dollars.

One of these is at a training station. Here are assembled a most heterogeneous group of lads who have come from every walk of life and who have joined the Navy for every conceivable variety of motive. Many of these boys have come from homes where parental authority is far below par. The life at the training station is probably the first situation in which they find that cleanliness, orderliness, and obedience are demanded. The classical red rag waved before the bull stirs the emotions with no greater degree of certainty than do the above demands arouse neurotic manifestations in those who are potential psychopaths.

The sound and efficient organization of a training station is an unendurable environment to boys of inferior psychic stock. Many of these at the time of enlistment were on the path of regression to the less exacting levels of simple labor or of hoboism where they find for themselves a tolerable existence. Owing to the efficiency standards maintained in our Navy the actual enlisting and entering a training station steps up, so to speak, many of the boys to a cultural level to which they are unable to adjust with any degree of satisfaction. Their inability to adjust manifests itself in their numerous and apparently stupid and inexplainable infractions of naval discipline. These boys are called bad boys; in fact they are no more bad boys than are those who have the measles. They are merely those whose psychic apparatus is faultily developed to begin with, or is well developed yet functioning faultily. The diagnostic discrimination of these two groups can only be made with any degree of assurance by a skilled psychotherapist.

For the so-called constitutional psychopath the naval surgeon has no concern other than rejection at the recruiting station or elimination by medical survey.

As to the mildly neurotic, in reality there are few diseases over which the internist has a therapeutic control that is comparable to that of the analyst in his capacity to repair the physical and psychic damage wrought by the vast majority of the psychoneuroses. The fact is that the mild neuroses are extremely amenable to proper care, and through psychoanalysis the Navy could be saved the loss of many of these cases of nervous instability, which are so prone to get into military difficulties which demand their discharge or imprisonment.

Another valuable post for the services of an analyst is at a large base hospital. Here eventually come misfits of every character. Among these are the patients who as a neurotic defense mechanism against sexual, matrimonial, and economic maladjustments develop a list of symptoms that in a few years fill a record that it will take several hours to scan. This record will contain data on dental caries, asymetrical ethmoids, cloudy antra, questionable capacity of the sella turcica, roughened breathing at right apex, metabolic manifestations, and fatigue upon exertion. To correlate these the final survey will be for peritoneal adhesions. Some of these cases are retired from sheer desperation, their services are lost, and they live on as pensioners, caring for their health as only a neurotic can.

The time has come when the recognition and psychoanalytic therapeutic care of these cases of psychoneuroses occuring in the naval service should be undertaken. There is not a group of medical men in the world with a finer record of having lived up to the highest of professional and ethical standards than is to be found in the Navy. They will be among the very first to turn their attention to any advance in serum therapy or surgical technic, and for a symmetrical rounding out of their versatile accomplishments an increase in their sympathetic understanding of the psychoneuroses will bring much needed help to many of their patients; furthermore it will solve some of the most perplexing problems confronting their boards of medical survey and certain retirement situations.

ANÆSTHESIA—REGIONAL AND SPINAL

By H. M. Stenhouse, Lieutenant Commander, Medical Corps, United States Navy

One watching Gaston Labat administer a regional anæsthetic for the first time must sense some such suspicion of magic as was aroused by the early use of ether and chloroform. But he who follows Doctor Labat for weeks and sees the magic repeated many, many times will learn that it is skill, not magic. The most natural result is that his method wins a convert.

Dr. C. H. Mayo, who induced Labat to lecture at the Mayo Foundation, said that he was not only a master of his art but that he spoke the King's English. Armed and sponsored so well, it is not surprising that his mission to the United States should have awakened in the profession a widespread interest in the sleepless prevention of pain in surgery.

The convert doubts that these successes can be repeated by a novice. But with study and practice it is found that the same results can be attained. It is from the standpoint of the novice that I record a few impressions.

The newcomer to St. Croix, Virgin Islands of the United States, is at once amazed at the prevalence of renal affections. Likewise cardiac and circulatory disorders are common. To illustrate the frequency of renal disease, 100 unselected case histories were taken from the files. Ninety-three showed evidence of nephritis. To avoid inhalation anæsthesia therefore becomes at once an important consideration in local surgery.

Prior to October, 1923, most of our operations had to be done under ether. Hydroceles and a few hernias could be done under procaine. In October, 1923, a supply of suitable needles and syringes was procured. In one of our hospitals the proportion of etherized cases has dropped to 42 per cent of the total in the few months since that time.

The variety and extensiveness of the operations possible under regional and spinal anæsthesia is an example of what has been done by a novice. A total of 64 major operations performed in St. Croix under regional and spinal methods constitutes the material on which this paper is based. The estimation of results has been omitted from the lists, as it is too much a matter of personal interpretation. It may be well to state, however, that in two cases some ether was given. In the lumbar hernia a few local injections of procaine were given with the spinal.

TABLE I.—*Operations performed under spinal anæsthesia*

[Material, neocaine, pure; Corbiere et Lionnet]

Case No.	Age	Operation	Date	Dose	Puncture site
				Cg.	
1	52	Kondoleon, inner half	Feb. 13	5	Lumbar III.
2	41	Cystocele, rectocele, cervical amputation, abdominal exploration	Feb. 27	10	Do.
3	53	Hydrocele tunica vag., bilateral	Feb. 27	10	Do.
1	52	Kondoleon, outer half	Feb. 27	10	Do.
4	34	Laterocession, uterine	Mar. 17	10	Lumbar I.
5	51	Lumbar hernia repair	Mar. 31	10	Dorsal XII.
6	48	Hernia, inguinal	Mar. 31	10	Lumbar III; also ether.
7	56	Hydrocele, circumcision	Apr. 2	10	Lumbar III.
8	50	Tumor excision foot, and hydrocele	Apr. 9	10	Do.
9	21	Hydrocele	Apr. 16	10	Do.
10	18	Prolapsed ovaries	Apr. 27	10	Dorsal XII.
11	16	Appendectomy, hysterotomy	Apr. 27	10	Lumbar III.
12	36	Mikulicz operation for rectal prolapse.	Apr. 27	10	Do.
13	47	Pyloroplasty (Finney)	May 6	10	Dorsal XII.
14	50	Cholecystectomy	Mar. 15	10	Do.
15	55	Prostatectomy	Apr. 8	10	Lumbar II.
16	29	Hydrocele	Apr. 15	10	Lumbar III.
17	44	Panhysterectomy	May 3	10	Lumbar I.

TABLE II.—*Operations performed with regional anæsthesia*

Hernia, inguinal.	Resection of ileum with anastamosis.
Femur, Lane plate removal.	Prostatectomy, suprapubic.
Granuloma left heel.	Lymphoma of iliac glands, dissection.
Elephantiasis of breast.	Ventral hernia repair.
Elephantiasis of scrotum.	Hydrocele.
Orchidectomy.	Omentopexy.
Excision of cervical tumor.	Cholecystostomy.
Breast amputation for carcinoma.	Elephantiasis of leg.

SPINAL ANÆSTHESIA

In the use of spinal anæsthesia, or, as the French say, "rachianesthesie," our results have been sometimes gratifying, sometimes equally disappointing. One thing I can say without hesitation—it is safe if properly given. By properly given I mean (1) in suitable cases, (2) with due regard to accepted rules of technic, (3) when one is prepared to immediately give stimulation if necessary, and (4) more important perhaps than all else, the drug must be pure.

The duration of the anæsthesia averages just about an hour. If the effect is perfect at the outset, you can be assured that after one hour pain sense will begin to return. Much work can be done after the hour elapses, but it is done with a troublesome patient. For my part, I have decided that in extensive work the spinal treatment should be fortified either with regional injections or ether. Otherwise the strain on the operator is too great.

In a variety of operations our results have varied. Some of the earlier cases seemed to get little or no benefit. Checking up on the technic we discovered that two important details had been overlooked. The patients had not been placed in the Trendelenberg position, with a pillow under the head. The "Barbotage" had been incomplete. Fully 10 mils of cerebrospinal fluid is now withdrawn into the syringe before any is injected.

One spinal case required stimulation on the table. Two spinal cases died in the hospital. Neither death can be attributed to the anæsthetic. One was 6 days after operation, following peritonitis. One was 15 hours after injection, from uremia. Notes from these three cases follow:

Upper abdominal operation. Pyloroplasty. Case No. 13. Operation time, 2½ hours. Through a long mid-line incision explored gall bladder, stomach, duodenum, pancreas, and left kidney. Attempted to remove tumor, probably malignant, from region of pancreas. Heart slowed to about 30 systoles per minute, and attempt to remove tumor was abandoned. Pyloroplasty done to relieve narrowing and thickening of pyloris. Closed without drainage.

Patient was a poor risk, to begin with. His kidneys were bad; his heart leaky; his blood pressure low (systolic 118; diastolic, 68 mm.

Hg.). Prostate hypertrophied. Hb. 60 per cent. R. b. c., 3,000,000. Immediately after injection he became faint. Was put in Trendelenberg position, and the windows were opened. He felt nauseated, but did not vomit. He became drowsy.

The early anæsthesia was perfect. The tumor was explored and traction made on it in effort at removal. This traction apparently irritated the vagus terminals and slowed the heart. The breathing also became shallow and infrequent. Hypodermoclysis was given, to which the response was immediate. The pyloroplasty was easily done. After this, pain sense began to return, and closure of the abdominal wall was made with great difficulty. The patient slept following the operation and convalesced satisfactorily.

Pan-hysterectomy. Case No. 17. Cervix amputated and cauterized. Effort made to remove uterus by vaginal route unsuccessful. There was not any pain, even with much traction. Neither cautery nor instrumentation caused discomfort. Abdomen opened after the first hour, and from then on manipulations caused pain. The uterus was delivered, the space packed, and the belly closed. The patient was in good shape when she left the table. She was placed in Fowler's position.

Peritonitis developed later, and the patient died on the sixth day. The death could in no way be attributed to the anæsthetic.

Hydrocele and circumcision. Case No. 7. A male of mixed race. Prior to operation it was known that he had prostatic hypertrophy with 100 mils of residual urine. For a few weeks he had suffered from anxiety and "nervousness." He thought he was going to have a "stroke." He was not considered a good risk for prostatectomy at that time, and so to utilize his hospital days it was decided to take care of the hydrocele and to perform the circumcision which the patient especially desired. The prostate was to have been done later.

The usual injection of 10 centigrams of neocaine, pure, was made in the space between the third and fourth lumbar vertebræ. The patient showed no signs of toxic symptoms; he felt no pain whatsoever during the operation. After returning to bed he joked during the afternoon with other patients, telling them about his operation and saying that he had experienced no pain. As I say, he seemed perfectly rational and remained so all that day. He voided normally. At 11 p. m., 14 hours after injection, he complained of a severe pain in the back of his head. His breathing became shallow and irregular. The doctor on watch ordered an eighth of morphine, which was given at about midnight. The patient was not benefited by this, and at 1.30 a. m., or 16½ hours after injection, the patient died in coma. There had been some spasmodic movements of the right arm after the onset of coma. (Morphine grains, one-fourth, had been given prior to operation.)

Post-mortem findings: There was a hematoma 6 centimeters in diameter and 2½ centimeters high over the site of spinal puncture. The brain and coverings bulged on opening the cranium. The cerebrospinal fluid was under increased pressure. The veins of the dura were markedly congested, as were the superficial veins. The upper surface of the cerebrum, especially bordering the fissures, was covered with a dense, gelatinous, dirty, fat-colored exudate. The entire brain, but more especially the pons, medulla, and cerebellum, were extremely softened. The portion in the region of the corpus callosum was very white and soft. There was a patch of exudate on the left cerebrum bordering this region. No gross evidence of hemorrhage seen either in the brain or its coverings. The pons and cord appeared smaller than normal, probably from pressure of rather long duration.

In the belly a greatly distended, thick-walled bladder was found. The kidneys were of a dark mahogany color. The cortical blood vessels were markedly engorged. The cut surface was deeply reddish, tinged with blue.

REGIONAL ANÆSTHESIA

As to the use of regional methods for general surgery, it is felt that wherever possible this is the procedure par excellence. The duration of the anæsthesia is prolonged. The effect is good. And in some ways it must be looked upon as safer than spinal. The administration, however, consumes a good deal of time, and where time is for any reason a factor (from the patient's standpoint) spinal has more than a shade of advantage over regional injections for short operations.

The following are some notes regarding our regional anæsthetics in different parts of the body.

Cervical region.—A large tumor growing from the anterior cervical region was removed under paracervical and brachial plexus injections. The result left nothing to be desired. The patient lay as quietly as though asleep, and yet conversed with the nurses and doctors during the dissections. In this case there were some signs suggestive of hyperthyroidism. The nature of the tumor was obscure. It had been there for a number of years. There was a flatness where the thyroid should have been; hence it was first necessary to determine whether the tumor was thyroid which had been dragged down by unusual weight from its normal location. While of course not probable, this was a possibility. A dissection down to and exposing the thyroid gland was made preliminary to any attempt to remove the tumor. As previously stated, this case can be registered as a perfect success.

Thorax.—In case of elephantiasis, the right breast was enucleated under local infiltration. Some pain was experienced when dissecting off the fascia of the pectoralis major muscle.

One early carcinomatous breast was amputated, the lymphatics being dissected out under paradorsal (dorsal I to VIII) and the brachial plexus infiltrations on the affected side. An effective and ineffective zone was discovered due no doubt to errors in technic. The upper three-fourths of the field was perfectly painless, whereas the lower one-fourth was only partially insensible to traction and dissection.

Upper abdominal operations.—The first venture in this field was made on a man with obstruction of the common duct. His general conditions was precarious, and for this reason the attempt was justified. When referred for surgical opinion he had already been jaundiced four months. The picture can be readily imagined. Nothing was attempted but drainage of the bile to prevent further absorption into the general circulation. The result was fairly good. Paravertebral dorsal was the method used. Three days after operation the patient died of pulmonary edema. Autopsy revealed a small carcinoma growing out from near the ampulla of vater.

Omentopexy has been done under local and paraveterbral methods at different times. The local methods employed proved as efficient as the more laborious and time-consuming paravertebral. One of these patients died three days after a paravertebral operation of pulmonary edema. He was an extremely bad risk. Operation was done simply as a last resort. There was temporary improvement for about a day, but this was soon followed by regression with extension of the fluid in all the tissues finally involving the lungs.

Lower abdomen.—Ventral hernia has been repaired with fair success from local injections.

Suprapubic prostatectomy has been done with fair results after local infiltrations in skin, muscle, fascia, prevesical space, and prostate. The results are not so good as under spinal anæsthesia.

In lymphoma of iliac gland excellent results were obtained from regional infiltrations. A large tumor of right iliac gland origin was dissected out through the inguinal region and closed as in a radical hernia repair.

Inguinal hernias and hydroceles: Our success with the Pauchet-Sourdat-Labat[3] methods for hernia and hydrocele operations has been most gratifying. With scarcely any modification we have followed precisely the technic outlined. Ordinary procaine made in 1:200 solution has proven as satisfactory as the French neocaine-surrenine in sterile ampoules. Apotheosine has also been used a

[3] L'Anesthesie Regionale, troisieme edition, 1921, par V. Pauchet, P. Sourdat et G. Labat, pp. 229–232, 261–263. Librarie Octave Doin, Paris.

good deal, but chiefly because there is a large supply of this drug on hand. We do not place the confidence in it that we do in procaine. However, in the cases that I have injected no untoward symptoms have developed. At the completion of the injections the operative field is draped. As soon as this has been done the patient is found ready for operation. No delay is necessary to await the effects from the anæsthetic.

In both hernia and hydrocele operations at times we have used, in addition to the standard technic, a linear dermal injection over the site of incision. This does not seem to cause any changes which interfere with healthy closure of the skin edges. When properly injected the average patient feels no pain without this linear dermal injection.

In hernia repair on two occasions it has been necessary to resect the intestine and do end-to-end anastamoses. A little injection of procaine into the mesentery given with discretion will control the additional area.

The success of procaine anæsthesia in hydroceles and hernias has been so complete in our service that ether is practically never considered any more in these operations.

One infected hydrocele case died from senile changes three months after operation. One strangulated hernia with intestinal resection died several hours after operation.

Perineal operations.—In one case of hemorrhoids caudal injection (extra-dural) was tried, unsupported by the usual parasacral method. The result was a failure. There was no relaxation of the sphincter. Pain apparently was severe and ether was given. No further effort was made to operate on the perineum by extra-dural injections.

Extremities.—Removal of a Lane plate from a femur was accomplished with good anæsthesia.

A granuloma of the left heel, 6 by 7 by 4 centimeters, was removed by regional anæsthesia. The effect was good.

A Kondoleon operation for elephantiasis of the leg was accomplished under a good paravertebral anæsthesia.

VACCINE AND SERUM TREATMENT [4]

By J. E. Miller, Lieutenant, Marine Corps, United States Navy

In the presentation of this paper an attempt will be made to give a brief résumé of the value of serum and vaccine treatment as applied to medical and surgical infections. The results from such a form of treatment I shall leave for the reader's own conclusions.

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[4] Paper read at semimonthly meeting of the staff, United States Naval Hospital, San Diego, Calif., Mar. 13, 1924.

Before attempting specific treatment in the infected, the biological and physiological care of the patient should receive proper attention. It is of importance to see that the patient is receiving the proper diet, sleep, rest, and that he is free from pain, and that the organs of excretion are performing their proper function, and that the patient is not overburdened with a process of toxemia. In this manner the patient's resistance is maintained at a suitable elevation to help him fight the infection from which he suffers.

If these principles be carried out many patients will require no other form of treatment, and will recover under a process of natural immunity, and specific treatment will be unnecessary. It is the aim of the latter type of treatment to stimulate life's immunological principles in order that the patient may have a better chance when combating any infection.

Specific treatment is not a cure-all, but it is a valuable adjunct to well-recognized medical and surgical treatment. Drugs must be used and surgical procedure must be undertaken. It is specific in character and not an empirical form of therapy. Serum and vaccines are employed as a diagnostic precedure and as a form of preventive and curative treatment. Sera of exotoxic bacteria are neutralizers of toxin within the body, and sera of endotoxic bacteria and vaccines are used to stimulate the body fluids to manufacture antibodies, bacterolysins, opsonins, agglutinins, and to increase the leucocytes, which are all beneficial to the patient.

Before proceeding further with specific treatment a few words should be said in regards to foreign protein treatment in infectious diseases. It is not a specific form of treatment unless the patient is sensitive to the particular protein employed, and this is usually not the case in infectious diseases. Its action is limited because it contains no secondary antigenic material as found in vaccines, and there are no antibodies present as found in serum. Consequently, this form of treatment should never be allowed to replace specific treatment. There appears to be some benefit from its use, however, in infectious diseases from the colloidal shock it produces, and the results appear to be derived from the leucocytosis it produces. One would never try to produce immunity to various infectious diseases by the use of foreign protein injections because of the absence of specific antigenic material, as found in various bacterial products.

Before beginning specific treatment a correct diagnosis should be made by cultural method from the blood, pus, or wound excretion obtained from the infected patient, in order that we may employ a specific vaccine or serum indicated. The diagnosis of septicemia should reveal the causative organism from blood cultures, and wound excretion should reveal the presence of the particular bacteria we are dealing with. I feel sure if this principle be carried out that many cases of infection could be treated more successfully and many faulty diagnoses could be prevented and the results of our failure in many instances ascertained.

Serums are used in generalized infections, if we have one that corresponds with the exciting bacteria causing the infection. It is likewise employed in subacute generalized infections and is often combined with autogenous vaccine in these cases with marked benefit to the patient. Vaccines are best used in chronic pyogenic infection in a patient with marked lowered resistance.

It is to be remembered that in the employment of specific treatment it is impossible to state that such a form of treatment has saved the patient. This is likewise true of any other form of treatment in infectious diseases. There is one important factor that must be considered, and that is the patient's own resistance, which must be strong enough to carry him through his infection without any form of treatment whatsoever. It is only by comparison of the results of specific treatment to nonspecific treatment that a fairly definite conclusion can be made. The results of either form of treatment should be left to the interested clinician who can better judge the value of treatment of such cases.

Before the employment of serum the possibility of anaphylactic shock should be determined by skin tests, and the presence or absence of statis lymphaticus determined. If the patient is sensitive to horse serum, which is present in nearly all of our sera, it is to be given subcutaneously, the initial dose being one-tenth of a cubic centimeter, and this is doubled each hour until the proper dosage is given. The skin tests, if negative, do not forecast the possibility of late serum disease, for over 75 per cent of serum-treated cases which gave a negative skin reaction prior to the use of serum developed serum disease at a later date. If serum disease develops, adrenalin and atropin are indicated and 5 per cent menthol ointment appears to relieve the severe itching so frequently present. I have never seen a case of late serum disease resulting in death. Acute anaphylaxis is frequent in an animal under experiment, and does occur in cases of status lymphaticus if the serum is given in large doses either subcutaneously or intravenously. It is most rapid following cases in which the serum has been given by the latter method.

The secret of the treatment of tetanus rests upon the thorough primary disinfection of lacerated or punctured wounds and the early administration of serum as a preventive treatment. The serum should be given weekly until the wound is healed. If later plastic operations are to be performed it should be continued until the day of operation. After the infection is well established the success of treatment diminishes as time passes. In moderately advanced cases with severe symptoms serum should be given in as much as

300,000 units by the intraspinal and intravenous method, and also injected about the site of injury.

In connection with tetanus, a few words should be said in regard to the treatment of infectious gangrene complicating war injuries. The serum is made from the gas bacillus, malignant edema bacillus, and the streptococcus. It was used extensively during the World War, and Bazy, in the Journal of Surgery, Gynecology, and Obstetrics, an active French surgeon during the war, states that since the employment of antigangrene serum in the treatment of the wounded, the patients ceased to die of streptococcus septicemia, and that those infected with gas gangrene made better recoveries. It can be given as a preventive or after infection has occured with good results.

In the treatment of diphtheria a prompt diagnosis must be made. Every sore throat should be considered as a potential diphtheria until proved otherwise by negative cultures. This is a routine at this hospital and a golden rule that should never be neglected. It should be performed in every case of measles or scarlet fever, for diphtheria frequently complicates the above diseases, and when present the mortality under such circumstances, even under serum treatment, can be placed at 50 per cent. All cases of diphtheria should be considered as serious. If the patient is nonsensitive to horse serum, the serum is to be warmed and diluted in nine parts of normal saline solution made from distilled water and given in the same manner that salvarsan is administered. If such precautions are taken, severe chills and untoward reactions can be avoided in most cases. Forty thousand units can be given to an adult, half this amount to older children, and children under 7 years can be given one-fourth this amount. In young children it can be given best subcutaneously, but in older children and adults, where the veins can be found and used, I always give serum intravenously. Serum given intramuscularly is painful, and from 8 to 12 hours may pass before it appears in the blood stream in sufficient strength to be of value to the patient. If given subcutaneously, 48 to 72 hours may pass before the serum is absorbed, during which time the patient may die without receiving any benefit from specific treatment. If given intravenously the antitoxin units of the blood are at their height as soon as the injection is completed.

The value of immunization to diphtheria is so well known that nothing need be said in its behalf. All attendants employed in the handling of diphtheria patients should reveal a negative Schick reaction, or be made immune by the toxin-antitoxin method, before being placed in charge of diphtheria cases. During an epidemic of diphtheria all contacts showing a positive Schick reaction should be isolated and rendered immune by the toxin-antitoxin mixture, or if they develop the infection they are to be treated with antitoxin. At the same time patients giving a negative Schick reaction should not be immunized with serum, as it is often hard to obtain during an epidemic and should be saved for the susceptible who may later develop the disease.

During the last three or four years much progress has been made in the prevention of measles by the inoculation of convalescent serum. In those cases where measles follow such a form of treatment, the mortality is markedly reduced and the disease runs a mild course. R. Delre and Ravena, of the Bretoneau Hospital, in 1921 employed immune convalescent serum from measles patients seven days after the fever dropped. Wassermann tests were made, and the serum placed in ampoules on ice. Serum so prepared will keep for two years and can be used at any time. The dose used was 2½ to 3 cubic centimeters subcutaneously. Since the introduction of this preventive procedure measles disappeared from that hospital. The immunity is of short duration and the immunization process must be repeated from time to time if prolonged immunity is desired.

S. Maggorie, in 1922, used the same serum, but the initial dose was 2 cubic centimeters. On the second and third days 4 cubic centimeters were given, making a total of immuned serum used 10 cubic centimeters. It has been a very effective method of stopping the spread of measles and has allowed children to come to his clinic without contagion.

Solomon, in 1923, found that serum from adults who had had measles in childhood or later in life was nearly as effective as convalescent serum. He uses this serum when it is impossible to obtain convalescent serum in primary cases. Solomon reported 198 infants in the hospital, all over the age of 3 months, who were exposed to measles. Sixty received no serum and all developed measles. Thirty-five died, a mortality of 58.3 per cent. Convalescent serum was given to 60 patients, 35 developed measles and 4 died, a mortality of 16 per cent. Sixty-six exposed cases were treated with serum from adults who had suffered of measles in childhood, 36 developed measles and 5 died, a mortality of 13.8 per cent. Nicolle and Conseil use serovaccination as the latest method of prevention. It consists of successive inoculations of convalescent serum until 10 cubic centimeters are given, and the following day 1 cubic centimeter of blood from a patient suffering from measles is given. It is said to be harmless and a much longer period of immunity is produced.

It is of importance to note that the New York Health Department is distributing immune serum for the prevention of measles. This immunization process could be easily accomplished aboard ship where outbreaks of measles occur from time to time, and without a doubt would lower the incidence of measles in the Navy.

Progress in the specific treatment of scarlet fever by means of convalescent serum has been remarkable. W. P. Bliss while working with this infection found a hemolytic streptococcus in 100 per cent of scarlet fever patients. If he has not actually discovered the causative organism of this infection, he has at least demonstrated the active organism from which death usually takes place in this disease. Ten different immune serums have been prepared from ten different strains of scarlet fever streptococci and each serum agglutinates more than 80 per cent of the strain isolated from scarlet fever throats. Scarlet fever antistreptococcus serum affords some degree of protection against the scarlet fever streptococcus but none against the streptococcus of other infections.

W. B. Weaver treated 50 cases of severe scarlet fever from a series of 1,200 cases at the Durand Hospital, Chicago, Ill. Immune serum was given in 60 to 90 cubic centimeter doses intramuscularly. Two of the patients died. He states that to one familiar with the disease in severe cases and its usual course the almost certain fall of temperature and the general improvement of the patient is most striking. Early administration is insisted upon. In another series of cases treated by Kling and Widfeet, receiving serum on the second day, 93 per cent recovered, while with each day's delay the mortality increased until the sixth day; when only 50 per cent recovered. Kock considers convalescent serum an almost certain weapon against the disease and states that whole blood can be used in the place of serum. There appears to be no doubt that the serum should be used in severe cases, and perhaps if used in every case many complications of the disease could be prevented.

Pneumonia has likewise yielded partially to specific treatment. Cecil and Larson studied 1,000 cases of lobar pneumonia and found that 90 per cent were due to the pneumococcus; 38.4 per cent were due to Type I infection, 18.6 per cent to Type II infection, 15.9 per cent to Type III infection, and 27.7 per cent to Type IV infection. They treated 424 cases with serum and the death rate was 21.9 per cent, and a series of controls gave a mortality of 28.3 per cent. In Type I infection in 156 cases the mortality was 13.3 per cent, while in a control series of 164 cases of Type I infection the mortality was 22.2 per cent. McQuire treated 35 cases of Type I infection with serum, the average dose being 205 cubic centimeters given during the first and second day, and the mortality was 5.7 per cent, where in a control series the mortality of Type I infection was 25 per cent. In a series of Type I infection treated at the Rockefeller Institute with serum the mortality was 9 per cent. The serum is given intravenously in 50 to 100 cubic centimeter doses, and repeated every eight hours until the symptoms subside. As much as 500 to 1,000 cubic centimeters will be required in severe cases. The mortality of Type I infection has been cut 50 per cent. Every case of pneumonia should be typed and if pneumococcus Type I be present serum treatment should be given. Cruveilier reports a case of pneumococcus meningitis that recovered under the use of pneumococcus serum and recommends its use in like cases. Pneumococcus empyema should receive serum intrapleurally if due to Type I infection in addition to necessary medical and surgical treatment.

The treatment of epidemic meningitis is so well understood that little need be said. Treatment must be given early. Blood cultures should be made of any case of infection in which the cause is not known. This procedure may prove the presence of the meningococcus in the blood stream before the appearance of the symptoms of spinal involvement. Under such circumstances proper treatment can be given by the early administration of serum intravenously. It should likewise be given intraspinally to prevent infection of the meninges. After the symptoms of meningitis are marked it should be given intraspinally for its direct effect and intravenously to prevent further contamination of the cerebrospinal system from the blood.

When given intraspinally the amount of serum given should be smaller in amount than the amount of spinal fluid withdrawn to prevent convulsions and severe headache. It can be given in from 15 to 60 cubic centimeter doses, according to the amount of fluid removed. It is given every 8 hours during the first 24 hours and once a day thereafter until the spinal fluid is negative to bacterial growth and the symptoms of the disease have subsided. If the serum is discontinued at too early a date a relapse may occur, during which time the patient may be rendered sensitive to horse serum and further serum treatment might prove dangerous.

The prevention of typhoid fever by the use of vaccine is recognized as a most effective way of controlling this infection. The immunity is only relative and must be repeated every two or three years. In regards to vaccine treatment during the acute stages of the disease, Petrovitch treated 2,270 cases of typhoid fever and the mortality of the infection dropped to 2.7 per cent. The best results of nonvaccine-treated cases has been 7.6 per cent, while the usual mortality in hospital-treated cases is from 12 to 20 per cent. The treatment is not to be given late in the disease, and intestinal hemorrhage contraindicates its use. It should be given in small daily doses. Charles Powers states that in a series of typhoid ostitis 6 cases recovered under surgical treatment, while the seventh case failed to recover under repeated operations. Autogenous vaccines in which the typhoid bacillus was present resulted in rapid recovery.

A number of patients have been treated with antistreptococcus serum at this hospital, and in some of the severe cases there appears to be no doubt that the serum was of value. The rapid subsidence of temperature and the disappearance of symptoms that rapidly followed serum treatment appears to substantiate this statement. It is to be remembered that this serum is our weakest serum and should be given early and in large doses. The dosage ranged from 300 to 400 cubic centimeters given intravenously in place of the old subcutaneous dosage of from 10 to 20 cubic centimeters. There were four deaths in the series, and all deaths were due to causes other than septicemia, the culture remaining sterile throughout the disease. Three died from bronchopneumonia complicated by lung abscesses, and the fourth case died of chronic interstitial nephritis.

Phileberst, of France, as reported by Bazy, obtained three recoveries from streptococcus meningitis after the use of antistreptococcus serum, a result that is very encouraging when one considers the mortality of this infection. Williams reports the recovery of four cases of postabortal streptococcus septicemia under the use of streptococcus serum.

In regard to vaccine treatments during the past year, over 100 cases of infection have been treated by this method at this hospital. The treatments have been very satisfactory in all cases. The exact degree of success obtained in acute cases is impossible to state, but no untoward reactions were noted. In some cases the infections ran a short course, and the patients felt greatly improved following this form of treatment. The duration of erysipelas in two cases was limited to 48 and 62 hours after the daily use of vaccines. In one patient who had run a septic temperature for 10 weeks while under ordinary medical care for erysipelas, culture of the serum from beneath the thickened skin revealed staphylococcus and streptococcus. Vaccines prepared from these organisms were used and four days after treatment the fever dropped to normal and remained there. The local signs of the chronic inflammation disappeared in one week, and the patient left the hospital after 10 days of vaccine treatment, as compared with 10 weeks of medical treatment without improvement.

Another patient, with ulcerative endocarditis with blood cultures positive for the streptococcus viridans on repeated occasions, failed to respond to antistreptococcus serum. He was given 100 cubic centimeters of the serum for three days, and the next day serum disease developed and serum was discontinued. He was given vaccine treatment after serum treatment had failed and the temperature had been high and septic for six weeks. One-tenth of a cubic centimeter was the initial dose, the next day two-tenths of a cubic centimeter was given, and the third day three-tenths of a cubic centimeter was given. The fourth day the temperature dropped to normal and remained there. Vaccines were continued, and in seven days the blood was negative by culture for bacteria. The patient made a splendid recovery.

Topie and Riser report a case of gonococcus septicemia which for a long time was considered as a meningococcus sepsis. Prolonged treatment with meningococcus serum failed, and further study revealed the gonococcus as the causative agent. Three injections of autogenous vaccine resulted in recovery. This might lead one to believe that if vaccines were used as a routine in all cases of acute gonorrhea many cases of sepsis and arthritis could be prevented. It appears to reveal the fact that the specific vaccine of the causative organism cured the patient where foreign protein in the form of meingococcus serum failed. In regard to gonococcus rheumatism and arthritis, I am convinced of the efficiency of such treatment. I have treated during the last year a number of cases of arthritis due to this microorganism successfully where all other treatment failed. In one patient the gonococcus was aspirated from the knee joint and revealed itself by ordinary smear and Gram's stain. No other form of treatment was given and the patient recovered nicely.

Bezancon, Weil, and Netter state that the introduction of the new methods of therapy, vaccines, serum, and foreign protein has made us forget the necessity of resorting to surgical intervention in certain forms of gonococcus arthritis. Bercura suspected defective technic in reported instances of failure of vaccine treatment in women with gonococcus infection. Treatment acts, however, only on closed infections. He uses vaccines for prophylaxis prior to operation. Focal reaction following injection is a warning sign against premature operation. Deferring operation, he says, allows it to be performed successfully later, if it does not become superfluous after a full course of vaccine treatment.

Loures, of Athens, injected 250,000,000 and 500,000,000 streptococci in the form of vaccine in labor cases 20 and 10 days before the expected date of labor. Women who came to the clinic too late for this received antistreptococcus serum. No generalized infection occurred in 2,500 women thus immuned, notwithstanding the bad hygienic conditions at this clinic at Athens. One per cent of the nonimmune developed sepsis. He treated 8 cases of streptococcus sepsis and 3 cases of staphylococcus sepsis by intravenous administration of autogenous vaccines and all the patients recovered.

L. L. Jocobs thinks that vaccines should be used in generalized infections, especially in cases of staphylococcus meningitis. He had two patients, some days after otitis media acute treated with proper surgical skill, show alarming symptoms against which surgical treatment was helpless. Lumbar puncture revealed purulent spinal fluid containing the staphylocci. One-fourth cubic centimeter of stock vaccine was given. Three-fourths cubic centimeter was given on the second day and 1 cubic centimeter on the third day. Both patients made good recoveries.

Crisanti concludes, from 12 cases of acute osteomyelitis in children, that vaccine does not only hasten the process of repair but likewise tones up the general health. The main thing is to begin treatment early, with large doses over sufficient time. Bazy states that in this disease vaccines are specific tonics. There have been three cases of chronic osteomyelitis treatment by vaccines with no surgical intervention. The patients gained in weight daily, and with the improvement of the general health the sinuses healed.

NOTES AND COMMENTS

THE PREVENTION OF DISEASE

Sir David Bruce, formerly Surgeon General of the British Army and a noted authority on tropical medicine, recently was elected president of the British Association for the Advancement of Science. At a meeting of the association held in Toronto, Canada, August, 1924, the presidential address was on the "Prevention of disease," in which the speaker dealt with the advances made in our knowledge of disease during the past 40 years and our means of coping with it and preventing it. The address was published in Science of August 8, 1924. Sir David said, in part:

It is not my purpose to give a detailed account of the first strivings after a better knowledge of the causes of disease, but it may be said the new era began some few hundred years ago, when it was recognized that certain diseases were contagious. For a long time it was held that this contagion or infection was due to some chemical substance passing from the sick to the healthy and acting like a ferment; and then, about the middle of last century, the idea gradually grew that microscopic creatures might be the cause. About this time it had been discovered that the fermentation of grape juice was caused by a living cell and that certain contagious skin diseases were associated with living fungi.

Things were in this position when there appeared on the scene a man whose genius was destined to change the whole aspect of medicine; a man destined to take medicine out of the region of vague speculation and empiricism and set its feet firmly on new ground as an experimental biological science. I mean the Frenchman, Louis Pasteur. It is from him we date the beginning of the intelligent, purposive prevention of disease. It was he who established the germ theory and later pointed the way to the immunization of man and animals, which has since proved so fruitful in measures for the prevention or stamping out of infectious diseases.

I need not discuss his life and work further. His name is a household word among all educated and civilized peoples. Every great city should put up a statute to him to remind the rising generation of one of the greatest benefactors of the human race.

What the change in medicine has been is put into eloquent language by Sir Clifford Allbutt:

"At this moment it is revealed that medicine has come to a new birth. What is, then, this new birth, this revolution in medicine? It is nothing less than its enlargement from an art of observation and empiricism to an applied science founded upon research; from a craft of tradition and sagacity to an applied science of analysis and law; from a descriptive code of surface phenomena to the discovery of deeper affinities; from a set of rules and axioms of quality to measurements of quantity."

With one notable exception, the medical profession was not quick to see that Pasteur's discoveries of the nature of fermentation and putrefaction had a message for them. This exception was Joseph Lister, who had been for some years endeavoring to comprehend the cause of sepsis and suppuration, which commonly followed every surgical operation and most serious injuries involving a breach of the skin.

When, in 1865, Lister read Pasteur's communication upon fermentation, the bearing of the discovery on the problems which had so earnestly engaged his attention was apparent to him. He inferred that suppuration and hospital gangrene, the causes of which had so far baffled his imagination, were due to microbes introduced from the outside world, from the air and by instruments and hands of the operator. Remember, this was years before the microbal causation of any disease was established.

To test the correctness of his inference, Lister proceeded to submit all instruments, ligatures, materials for dressing and everything that was to come directly or indirectly into contact with the wound, the hands of the operator, and the skin of the patient to treatment with chemical disinfectants. The satisfactory results which followed this practice astonished even Lister, and he spent the rest of his active life in improving and simplifying technical methods of preventing the ingress of microbes to wounds and in convincing his professional brethren of the truth of the conclusions based on this work of Pasteur.

INFECTIOUS DISEASES—(A) BACTERIAL

As soon as it was recognized that infectious diseases are caused by living germs a wave of enthusiasm swept through the medical world, and it was not long before the causation of many of the most important of them was discovered. I need not give a full list of these, but at or around about the time of the first meeting of the British Association in Canada the microorganisms of tuberculosis, typhoid fever, Malta fever, cholera, malaria, diphtheria, tetanus, and others had been discovered and described.

But it must not be assumed from what has been said that all the most important diseases are caused by living germs. Many of the ills that afflict mankind are due to quite other causes—alcoholism, for example, or the deficiency diseases, due to the absence or deficiency in our diet of some substance essential to proper growth and development. Rickets, one of the greatest scourges of industrial communities, is mainly a deficiency disease. It is reported that as many as 50 per cent of the children in the slums of some of our big cities suffer from the effects of this disease.

Then, again, there is the whole series of diseases or conditions due to defective or excessive action of our own internal glands. Added to these, and perhaps the greatest scourge of all, there is the immense amount of chronic ill health and actual disease caused or promoted by the unhealthy conditions found in our large cities, due to bad housing and overcrowding—the so-called diseases of environment.

Malta fever.—But to return to the infectious diseases. After the living germs or parasites causing them had been isolated the process of prevention was soon begun. The methods employed were varied, and I may illustrate one of the simplest by relating briefly the history of the prevention of Malta fever, with which I was myself, to some extent, associated.

Malta fever is really a widespread disease, although it is called by a local name. It is found all round the Mediterranean, throughout Africa as far south as Cape Province, in India and China, and even in some parts of America. It was very prevalent in Malta in the old days, and rendered the island one of the most unhealthy of all our foreign military stations. When I arrived in Malta, in 1884, I found that every year, on the average, some 650 soldiers and sailors fell victims to it, and, as each man remained on an average 120 days in hospital, this gave the huge total of about 80,000 days of illness per annum from this fever alone.

The British had held Malta since the beginning of the last century, and, although much attention had been given to the fever and its symptoms had been fully described, no advance was made toward its prevention until 1887, when the living germ, the *Micrococcus melitensis*, causing it was discovered. At this time a good deal of work was expended in studying the natural history of the fever and the micrococcus, but all to no purpose. Nothing was discovered to give a clue to any method of prevention.

At the naval hospital especially everything in the way of prevention was done that could be thought of; the water supply and drainage were thoroughly tested, the walls were scraped and every corner rounded off where dust might lie, immaculate cleanliness reigned; but all these precautions proved useless. Almost every sailor who came into the hospital even for the most trivial complaint took Malta fever and after a long illness had to be invalided to England.

Things remained in this very unsatisfactory state for 17 years, until 1904, when the Admiralty and War Office, alarmed at the amount of sickness and invaliding in the Malta garrison, asked the Royal Society of London to undertake the investigation of the fever. This was agreed to, and a commission was accordingly sent out in the same year and remained at work until 1906.

During the first year every likely line of approach was tried. A careful study was made as to how the micrococcus entered the body, how it left the body, its behavior outside the body, its pathogenic action on various animals; but still no indication of a method of prevention showed itself. Next year, however, in 1905, the problem of prevention was solved, and that by the merest of accidents.

In the previous year experiments had been made with the object of finding out if the goat, among other animals, was susceptible to the disease. The goats in Malta, which supply all the milk, are very much in evidence, as they are driven about in small herds and milked as required at the doors of customers. Several goats had been injected with cultures of the micrococcus, but, as they showed no rise of temperature or any signs whatever of ill health, they were put aside as being immune or refractory to the disease, and nothing more was thought about them.

In the spring of 1905, about six months after these experiments had been made, Doctor Zammit, a Maltese member of the commission, who had kept one or two of these goats, happened for some reason or other to examine their blood and found that it clumped or agglutinated the micrococcus. This was strange and seemed to show that, although the micrococcus had not caused fever or any signs of illness in the goats, it must have lived and multiplied in the tissues of these animals in order to have brought about this change in the blood.

This observation led to the reexamination of the goat question, when the extraordinary discovery was made that about 50 per cent of the goats in the island were affected by this disease and that 10 per cent of them were actually excreting the micrococcus of Malta fever in their milk. Monkeys fed on milk from an affected goat, even for one day, almost invariably took the disease.

Thus the weak link in the chain of causation had been found. The military authorities struck Maltese milk out of the dietary, and replaced it by an imported variety, and from that day to this there has scarcely been a case of Malta fever in the garrison. Malta, from being the most unhealthy of foreign stations, became a health resort, and was in fact used as a sanatorium during the late war. The disease had been blotted out at a single blow.

This, then, is one way of preventing an infectius disease; that is to say, by the discovery of the living germs, the study of its natural history, and so to a means of stopping it reaching its victim, man. This is the best way of prevention: Shutting the stable door before the horse is stolen.

Typhoid fever.—But there are other ways of preventing bacterial diseases. Let us take, for example, a method widely used in the prevention of typhoid fever.

The fundamental and sound way of attacking this disease is by ordinary hygienic measures, especially a good water supply and good drainage. It is therefore one of the first duties of those in power to see that their people have, in addition, to houses with plenty of light and air, a good water supply and a good drainage system, and money can not be spent to better advantage than in the attainment of these three essentials to health.

When typhoid fever is rife in a comunity it means that there is either a contaminated water supply or a faulty drainage system, and the municipal authorities ought to be called to account. In England, owing to improved sanitation, cases of typhoid fever are 15 times less than they were 50 years ago. But it is not always possible to insure good hygienic surroundings, for example, among troops on active service. It is therefore legitimate under certain conditions, and especially in time of war, to practice a less sound, a less fundamental, method of prevention, and this second method is known as inoculation or vaccination.

In order to understand how this acts, let us consider for a moment what takes place in a man's body when he is attacked by the typhoid bacillus. Everybody knows that the bacillus gives rise to poisons or toxins which cause the fever and other symptoms. But the cells and tissues of the man are not passive under the attack. They at once begin to fight against the infection, by forming substances in the blood to neutralize these toxins, hence called antitoxins or antibodies, and their function is finally to destroy the invading germs. If the man recovers he is immune from a further attack by the preence of these antibodies in his blood. He has become immune by passing through an attack of the disease.

This is the foundation of the second way of preventing infectious diseases. Speaking broadly, it means that you subject a man to a mild attack of the fever in order that his blood and tissues will respond to the stimulus by producing antibodies. This method takes its origin and name from that of vaccination against smallpox. Jenner solved that problem by the accidental discovery of vaccinia.

a form of smallpox attenuated or weakened by passage through another species of animal. This weakening of the virulence of a microorganism by passage through another kind of animal is by no means uncommon in nature.

Pasteur, following on these lines, conceived the idea of weakening or attenuating the virulence of the living bacilli by artificial means, so as to give rise to a mild attack of the disease, and so in this way to render animals immune. This he did with marked success in anthrax and chicken cholera. The next forward step in this method of preventing disease was made by Haffkine, a pupil of Pasteur, who about the year 1894 produced a vaccine against cholera and a few years later another against plague. In the course of this work it was discovered that it was not necessary to use living cultures of the bacilli, but that vaccines made up of dead bacilli had much the same effect. This substitution of the dead bacilli for the living was a great advance in this method, being much simpler and much safer.

The next disease to be attacked by this method was typhoid fever. This was initiated by Sir Almroth Wright at the British Army Medical School and carried out with that scientist's characteristic ability and energy. The method was mainly directed in the first place to lessen the mortality from this disease among our soldiers serving in India.

After several years' experience, the mode of inoculation which was finally settled on was to give two injections of dead typhoid bacilli, one of 500,000,000, and a second, at an interval of 10 days, of 1,000,000,000.

Now let us see what effect antityphoid inoculation has had on the prevention of typhoid fever among our soldiers in the field. In the South African war, at the beginning of the century, before the method had been developed, in an army the average strength of which was only 208,000 there were 58,000 cases of typhoid fever and 8,000 deaths. In the Great War, on the western front, with an average British strength of one and a quarter millions, there were only 7,500 cases and 266 deaths. In other words, there were fewer cases of the disease in this war than there were deaths in the South African. It is also interesting to learn from French sources that at the beginning of the war the French soldiers were not inoculated, whereas the British were. The result for the first 16 months was striking. During this time the French had some 96,000 cases, with nearly 12,000 deaths. The British had only 2,689 cases and 170 deaths. Afterwards the French soldiers were very thoroughly vaccinated, with the result that their immunity eventually became as striking as our own.

What the number of cases and death rate from typhoid fever might have been in the huge armies fighting on the different fronts had it not been for this preventive inoculation is impossible to say, but undoubtedly the suffering and loss of life would have been enormous. I may therefore conclude this account of antityphoid inoculation by saying that it certainly constituted one of the greatest triumphs in the prevention of disease during the recent war.

Tetanus and diphtheria.—I shall now pass on to consider a third method of preventing bacterial diseases which has also been evolved during the time under review; that is, by the injection of specially prepared blood sera. These are known as antitoxic sera, and the most familiar examples are antitetanic and antidiphtheritic. We have seen how the injection of living or dead bacilli or their toxins into animals gives rise to the production of antibodies or antitoxins. The blood serum of such animals in virtue of the antibodies contained in it can be used to combat disease.

Let us take in the first place the case of tetanus, until recently considered to be one of the most fatal of maladies, at least 85 per cent of the cases succumbing. As you are aware, antitetanic serum is prepared by injecting horses with large quantities of tetanus toxin. When the blood is as full as possible of antibodies it is drawn off and the serum allowed to separate out.

The idea lying behind this third method of preventing disease is to pour in these ready-made antitoxins in order to assist the body in its first struggle with the invading disease, and give it, as it were, a breathing space to prepare its own defenses.

Naturally the immunity produced by these antitoxic sera is of a passive nature and of short duration, as compared with that produced by the disease itself or even by the milder form brought about by vaccination or inoculation. Antityphoid inoculation will protect a soldier for, let us say, two years; antitetanic serum will only protect for a week or ten days. It is therefore impossible to inoculate a whole army against tetanus. It is necessary to wait until there is a danger of the disease occurring.

To illustrate this I shall describe briefly the history of the prevention of tetanus during the Great War. When the British expeditionary force went over to France, in August, 1914, only a small quantity of antitetanic serum was taken and that for the purpose of treatment rather than prevention. But shortly after the outbreak of hostilities the number of cases of tetanus among the wounded became so alarming that no time was lost in grappling with the danger. Large quantities of serum were hurried to the front, and some two months after the beginning of the war it was possible to make an order that every wounded man should receive an injection of antitetanic serum as soon after he was wounded as possible. Later on, after further experience had been gained. the single injection was increased to four, given at intervals of a week. This helped the wounded man over the dangerous time, and the results were very successful.

In August and September, 1914, before the prophylactic injection was given, roughly speaking, 9 or 10 out of every 1,000 wounded were attacked by tetanus, and some 85 per cent of these died. After the antitetanic injections had been introduced the incidence fell to little more than 1 per 1,000 and the mortality to less than half. To put the matter broadly: During the war there were 2,500 cases of tetanus in the British Army, with 550 deaths. If there had been no prophylactic injection of antitetanic serum there would probably have been 25,000 cases with 20,000 deaths—a very striking example of the recent development in the prevention of disease.

Another very important and widespread disease, somewhat resembling tetanus, is diphtheria, and there is no better example of the advance of science in methods of cure and prevention than is found in this disease. Thanks to the work of Klebs and Löffler in the early eighties and, some years later, to the brilliant researches of Roux and Yersin, the causation and natural history of this disease were very thoroughly elucidated.

Antidiphtheritic serum is prepared much in the same way as the antitetanic. By the repeated injections of gradually increasing doses of the bacilli or their toxins, a serum is produced which has a marked curative effect in cases of diptheria. It is stated that the introduction of antidiphtheritic serum in 1894 has reduced the death rate from 40 to 10 per cent and if used on the first day of the disease to almost nil. The serum is essentially a curative agent and is useful only to a limited extent in prevention.

But lately essentially preventive measures in diphtheria have come into vogue. The procedure employed is to bring about an active immunization by a mixture of toxin and antitoxin in individuals who have been shown to be susceptible to the disease by what is known as the Schick test. In the United States a campaign on these lines has been begun against this disease which promises brilliant results. It is confidently stated that by their new measures there is a possibility of robbing diphtheria of all its powers to kill and injure.

The mode of prevention of these diseases—Malta fever, typhoid fever, and tetanus—illustrates the three principal methods of preventing bacterial diseases: In Malta fever, by getting down to bed-rock and stopping the disease at its source: in typhoid fever, by giving, as it were, a mild attack of the disease, by vaccination or inoculation, so as to bring about a greater power of resistance; in tetanus, by pouring in antitoxins, already prepared in the serum of another animal, in order that they may neutralize the toxins of the invading bacilli as soon as they are formed.

Tuberculosis.—There are other important bacterial diseases, however, which can not be attacked so simply. For example, there is tuberculosis, a disease distributed over the whole world and one of the greatest scourges of civilized communities. It is a disease which has been known from time immemorial, but it is only within our own time that the bacterial cause has been recognized. I can well remember a day in 1882, when I met a fellow student who had just returned to Edinburgh from Germany. He told me that it had been recently discovered that the disease was really caused by a living germ, the tubercle bacillus. It was difficult at first to believe such a revolutionary idea, but such was the interest and excitement raised that many workers at once took up the study of the subject and in a short time the truth of Koch's great discovery was fully proved. This was a magnificant example of research work, most admirably, carefully, and completely carried out, and placed Koch at once in the front rank of scientific workers.

Before Koch's discovery a good deal had been done in the way of prevention. Before all things, this disease is a disease of environment. Its birthplace and home is the sunless, ill-ventilated, overcrowded room. The late Prof. Edmund Parkes, professor of hygiene at the Army Medical School, reduced to a great extent the incidence of tuberculosis in the British Army by procuring for the soldier more floor space and more air space in his barracks. It is related of General von Moltke that when he heard of the death of Parkes he said that every regiment in Europe should parade on the day of his funeral and present arms in honor of one of the greatest friends the soldier ever had.

The prevention of tuberculosis is thus seen to depend fundamentally on the provision of a better environment and the education of the people in physiological living. To attain this in the older civilizations will be a hard task, entailing enormous expenditure of money and energy. In the report of the Royal Commission on the Housing of the Industrial Population of Scotland in 1917 is described the unsatisfactory sites of houses and villages, insufficient supplies of water, unsatisfactory provision for drainage, the gross overcrowding in the congested industrial towns, occupation of one-room houses by large families, groups of lightless and unventilated houses in the older burghs, clotted masses of slums in the great cities—a terrible picture, the heritage of the age of ignorance, internal strife, and walled towns.

The people of new countries should see to it, and doubtless will see to it, that these old evils are not perpetuated. As Sir Robert

Philip, professor of tuberculosis in the University of Edinburgh, has eloquently said:

"Were it possible to begin afresh the scheme of civilized life, were it possible to undertake anew the creation of cities and the homes of our people, were it possible to place within the re-created dwellings an understanding race, detuberculization might be quickly attained. What a magnificent opportunity for the builders of the new cities, the molders of fresh civilizations, with the grand purpose of 'No tuberculosis.' The architect, the sanitarian, and the citizen would agree in insisting that physiological laws should be paramount, that there should be effective obedience to the larger demands of hygiene in the home, the school, the workshop, the meeting place and the cow shed.

"Mankind was born into air and sunlight; there are his natural heritage. They are more—they are the irreducible conditions of life."

In regard to the tubercle bacillus, it is so wide-spread, so ubiquitous in civilized communities, passing from one infected host to infect another, that it would seem impossible under existing conditions to prevent its spread. At present it is taught, and on what seems good evidence, that the majority of the population of our crowded cities has at one time or another been attacked by this disease. But in every 100 men who die in England, only about 10 die of tuberculosis, which shows that a large percentage of the population successfully resists the tubercle bacillus. When this occurs it means that the person attacked possessed powers of resistance which enabled him either to destroy its invading bacilli or to otherwise deal with them so as to render them harmless.

A point of importance in this connection is that it has recently been demonstrated that the disease is usually acquired in childhood. The fact is of capital significance, for, if the disease is recognized sufficiently early and the child is placed under good hygienic conditions, there is a very good chance of effective resistance and immunity against a second attack being set up. The present evidence goes to show that the presence of a latent tubercle prevents a second invasion. If further outbreaks take place, they would seem to be due to a flaring up of the old latent tubercle rather than to a fresh infection.

Metchnikoff studied the question in a remote part of Siberia where the tubercle bacillus was unknown. He states that very many of the young men and women who migrated from this clean country into the big cities died of acute and rapid tuberculosis, on account of not having been exposed to infection in their childhood.

The experience of colonial troops in the late war is instructive. Thus, in France the Senegalese, who are almost without tuberculosis in their native condition and were found to be free from tuberculosis on reaching France, developed in large numbers an acute and fatal form of tuberculosis in spite of the hygienic measures enforced by the army authorities. This raises a curious point. If it were possible for any country to clear itself of the tubercle bacillus, it would appear to be incurring a great risk for an inhabitant to migrate into any neighboring country. But, in spite of this, it is the duty of medical men to keep in check, as far as possible, the ravages of the disease.

The preventive measures against tuberculosis at the present time are, in the first place, improvement in the general hygienic conditions. Thereby individual resistance—and communal resistance—can be remarkably increased. In the second place, as every case of tuberculosis must arise from a previous case, either human or bovine, it is very necessary that methods of early diagnosis, preventive treatment, and segregation of the more infective types may be provided for. This is done by the setting up of tuberculosis dispensaries, care committees, sanatoria, hospitals, and colonies. These several elements are combined in the model tuberculosis scheme which is now universal throughout Great Britain. In the third place, if much can be done to anticipate and limit the progress of infection by the use of tuberculin, much caution is required in assessing the claims, sometimes hasty and extravagant, advanced by adventurers in this field of research.

Many other points might be brought forward, but the subject is such a vast one that I must content myself with drawing attention to the importance of a sound milk supply. The contamination of our home herds with tuberculosis is so great that no pains should be spared to secure a safe milk supply, and I understand that the city of Toronto is a model in this respect.

The result of these methods of prevention against tuberculosis may be given briefly. Sir Robert Philip writes that in Scotland 10 years before Koch's discovery the death rate from this disease was 404 per 100,000; in 1920 it had fallen to 124 per 100,000, a fall of 69.3 per cent. He also points out that the "recent acceleration of rate of reduction which is noticeable in England and Scotland is of arresting interest. In Scotland the acceleration of fall in the mortality rate likewise arrests attention. Thus, during 20 years up to 1890, the percentage fall in mortality from all forms of tuberculosis was 35, while during 20 years from 1900–1919 the percentage fall was 45."

This is very satisfactory, and has only been arrived at by hard work on the part of medical men, nurses, and voluntary workers. Any tuberculosis scheme, however perfect in theory, will require untiring energy, patience, and perseverance to bear fruit. On this side of the Atlantic, in the United States, these antituberculosis schemes have been pursued with enthusiasm, with the result that Washington in 1920 had a death rate from all forms of tuberculosis for 100,000 of the population of only 85, Chicago 97, and New York 126. London in the same year had a death rate of 127, practically the same as New York. Other nations have not been so energetic in preventive measures, Vienna having in 1920 a death rate of 405 and Paris 279 per 100,000 from the same cause.

It is evidently the duty of every nation to take up arms against a disease which exacts such a terrible toll of death, suffering, and inefficiency. If this were done with energy and enthusiasm it is not too much to hope that in a few generations the tubercle bacillus would be practically brought under control and with it many other malign influences.

INFECTIOUS DISEASES—(B) PROTOZOAL

I shall now pass on to the consideration of the second great group of infectious diseases, the protozoal, and consider what methods of prevention have been found applicable to them.

The scientific study of the protozoal diseases of man may be said to have begun with the epoch-making discovery of the malaria parasites in 1880 by the illustrious Frenchman, Laveran: next, in 1893, the discovery by Theobald Smith and Kilborne of the cause of Texas fever and the part played in its dissemination by the cattle tick: in 1894 the discovery of the trypanosome of nagana and its intermediate insect host, the tsetse fly; in 1898 the working out of the development of the malaria parasite of birds in the mosquito by Ronald Ross, greatly aided and abetted in the work by Patrick Manson, which led, through the work of Grassi and his fellow workers in Italy, to the final solution of the malaria problem. A year later the important discovery of the mosquito carrier of yellow fever was made by the American Army Commission, under the directorship of Reed, and in 1903 Leishman announced his discovery of the protozoal cause of kala-azar.

These protozoal diseases are world-wide, like the bacterial, but it is in the warmer climates that their effect is most felt. The great plagues of the Tropics, such as malaria, amœbic dysentery, kala-azar, and sleeping sickness among men, Texas fever, tsetse-fly disease, and others among domestic animals, are caused by minute microscopical animal parasites. Large tracts of country have been and are still rendered uninhabitable to white settlers by their presence. The opening up of Africa, for example, was rendered difficult by the tsetse fly, before the advent of railways. No sooner had an expedition started for the interior than the fly attacked the cattle transport, and before long the expedition had to make its way back as best it could to its base on the coast. The only way to get into the country was on foot with native porters.

The protozoal diseases of domestic animals have also led to enormous loss in all parts of the world. Texas fever, or red water, has swept whole countries of their cattle. After the Boer war, South Africa was devastated by the introduction of East Coast fever, another protozoal disease of cattle closely related to Texas fever.

How is the prevention of these diseases to be brought about? We find that up to the present little can be done by way of vaccination or inoculation or by the use of antisera as in the bacterial diseases. On studying the natural history of these protozoal parasites, however, it is found that many of them depend on an intermediate insect host for their continued existence, and it is by taking advantage of this characteristic that methods of prevention can be devised.

To illustrate this, I might cite the classical examples of malaria and yellow fever, but, as these must be familiar to you all, I shall take instead the trypanosome diseases of Africa, the best known of which are sleeping sickness in man and nagana or tsetse-fly disease in the domestic animals.

Nagana or tsetse-fly disease.—In 1894, a year after Theobald Smith and Kilborne had published their famous monograph on Texas fever, a severe epidemic among native cattle in the north of Zululand was reported to the Natal Government. The disease was called nagana by the natives, and it is curious that there was no suspicion at the time that it had any connection with the tsetse fly.

At this time a very enlightened administrator, the late Sir Walter Hely-Hutchinson, was governor of Natal and Zululand, and it was due to him that the investigation of the cause of the Zululand outbreak was at once undertaken. As I happened to be stationed in Natal at this time, I was chosen to undertake the work, and at once started on the long journey, mostly by ox wagon, to the scene of the outbreak.

On examination of the blood of the nagana cattle, a minute active flagellated protozoal parasite, belonging to the genus Trypanosoma, was discovered, and after many experiments on dogs, horses, and cattle it was decided that in all probability it was the cause of the disease. Trypanosomes had previously been described in the blood of rats and horses in India by Timothy Lewis and Griffith Evans, but nothing was known as to the mode of their transmission from animal to animal. It seemed as if the discovery of the nagana trypanosome would have ended the investigation in Zululand without any means of preventing the disease being discovered, but another observation made at this time threw more light on the subject.

In the low country between the high ground, on which the nagana camp was situated, and the sea there happened to be a so-called "fly belt." Every schoolboy had read about the tsetse fly in books of travelers and hunters, especially in those by the most famous of them all, David Livingstone, the missionary, and out of curiosity I decided to find out what happened when an animal was bitten by the fly, or, as it was termed, fly struck. Natives were therefore sent with cattle and dogs into this "fly country," with orders to form a camp and expose the animals to the bites of the fly. This was done and it was with great surprise that on their return to the hill the blood of these fly-struck animals was found to contain the same parasite as that found in the nagana cattle.

Nagana and tsetse-fly disease were finally proved to be identical. The tsetse-fly disease was shown to be caused, not, as had been believed, by the poisonous bite of the fly, but by the transference of a protozoal parasite from the fly to the animal in the act of sucking blood. Now the question arose as to where the fly found the parasite. As the tsetse flies constantly lived among and fed on wild game, such as buffalo and antelope, these animals were suspected. Their blood was examined, and before long it became evident that the wild animals acted as the reservoir of the disease, the trypanosome living in their blood as harmless parasites. When the tsetse fly fed on blood containing the trypanosome it became infected and was capable by its bite of giving rise to a fatal disease in cattle, horses, or dogs; whereas if it fed on a wild animal nothing happened, as the wild game are immune to the disease, much in the same way as the goat is immune to Malta fever.

Now that the natural history of the disease had been so far worked out, it was evident that its prevention might be attempted. This can be done in any of three ways: By getting rid of the wild game, the reservoir; or by getting rid of the fly, the vector or carrier; or, lastly, by removing the cattle, horses, and dogs to a safe distance from the "fly country."

This work on nagana led later, in 1903, to the discovery of the cause and mode of prevention of sleeping sickness.

Sleeping sickness.—About the beginning of the century an epidemic of this disease raged around the shores of Lake Victoria in central Africa. It had been introduced into Uganda from the west coast, where it had been known for many years as a curious and unaccountable disease. It was observed that although the disease spread in a west African village from man to man apparently by contact, no such thing occurred among natives exiled from their homes. The disease never spread if introduced into native compounds in the West Indies or America, however closely the slaves might be herded together.

The disease remained shrouded in mystery and nothing had been done in the way of prevention, until the matter was taken up by the Royal Society of London in 1902 and a commission sent out to investigate.

It is not necessary to go into details; suffice it to say that after one or two false starts the commission in 1903 came to the conclusion that the disease was caused, as in nagana, by a species of trypanosome.

The question of the distribution of sleeping sickness in Uganda was then taken up. This disclosed the remarkable fact that the disease was restricted to the numerous islands in the northern part of the lake and to a narrow belt of country skirting the shores of the lake. In no part of Uganda were cases found more than a few miles from the lake shore.

The next important step in the working out of the etiology was made when it was shown that the distribution of the disease was identical with the distribution of the common tsetse fly of the country, *Glossina palpalis*. Where there was no fly there was no sleeping sickness.

The problem was now solved. The epidemic could be stopped either by getting rid of the fly or by removing the natives out of the fly area. As the destruction of the fly was impracticable under the circumstances, the second method was decided on. The natives were moved from the islands and lake shore and placed on healthy inland sites, and the epidemic, which had cost the Protectorate some 200,000 lives, speedily came to an end.

This method of preventing disease, by removing man out of the zone of danger, is an extravagant one and can only be done in exceptional circumstances. In Uganda the native population could be easily moved, but it meant that from about 1910 until the present day some of the most fertile land in Uganda has been lying derelict—has returned to the primitive jungle. The war delayed things, of course, but it is only now that the natives are being returned to their old homes on the islands and lake shore, in the hope that the fly by this time has lost its infectivity.

The other method, by the destruction of the tsetse fly, has been carried out successfully in other places. For example, in the island of Principe, off the west coast of Africa, by destroying the wild animals which supplied a large part of the food of the fly and by clearing the jungle the tsetse flies disappeared, and with them the disease. This is the method employed in malaria and yellow fever. It was by destroying the mosquito carrier that Gorgas drove yellow fever out of Habana and later both malaria and yellow fever from the Panama Canal Zone.

Thus through the work of Manson, Laveran, Ross, Reed, and others has it been made possible to deal with these two scourges of the Tropics, malaria and yellow fever. I include yellow fever among the protozoal diseases, although Noguchi in 1919 brought forward strong evidence that it was caused by a spirochete.

In regard to the yellow fever the victory has been almost won. During the last century this disease, known as "yellow jack," devastated the West Indies and Central and South America. At the present time, thanks chiefly to the unremitting efforts of the late General Gorgas and the International Health Board of the Rockefeller Foundation, the disease has been driven out of the West Indies and Central America and only retains a precarious foothold in Mexico and Brazil.

So also in the case of malaria. A dozen years ago, based on the experience gained by Ross on the west coast of Africa and Ismailia and by Watson in the Federated Malay States, the method of prevention by mosquito control and drainage has been so perfected that the practical blotting out of malaria from a given locality is new merely a matter of expense. A great deal of work has been done during the last few years in the way of experiment in the United States, and Vincent, the president of the Rockefeller Foundation, lately stated that there is evidence that "under normal conditions an average community can practically rid itself of malaria at a per capita cost of from 45 cents to $1 per year."

This is an altogether inadequate account of the methods of preventing these highly important protozoal diseases. From the few examples given it will be seen that they are most rampant in warm climates, that they are as a rule conveyed from the sick to the healthy by an insect intermediary, and that it is by an attack on this insect, be it mosquito, tsetse fly, or tick, that the best chance of success in prevention lies.

INFECTIOUS DISEASES—(C) UNDETERMINED GROUP

In addition to the bacterial and protozoal infectious diseases there is a third and large class, known as the "undetermined group," in which the parasite is either unknown or doubtful. Many of these undetermined diseases are very common and familiar, such as influenza, measles, scarlet fever, smallpox, typhus fever, trench fever, dengue fever, and sand-fly fever; among animals, rabies, rinderpest, foot-and-mouth disease, and African horse sickness.

The theory generally held at present in regard to most diseases included in this group is that the living germs causing them are ultramicroscopical in at least some part of their life history, and this is strengthened by the fact that many of them pass through porcelain filters, which keep back the smallest of the visible bacteria. Hence the name of "filter passers."

Many of these undetermined diseases are highly infectious and appear to infect at a distance through the air, as, for example, in the case of influenza, scarlet fever, and smallpox. In some of them there is no attempt made at prevention, except that the sick are isolated and placed under quarantine for a longer or shorter period. But in others there are well-known methods of prevention, even when the virus is quite unknown. The best example is smallpox, the ravages of which have been completely held in check since the memorable discovery of Jenner. As has already been argued, this method of prevention, by inducing a mild or attenuated form of the disease, is at best a clumsy one, and when the natural history of the smallpox virus is better known it may be hoped that a more fundamental method of preventing this disease may be discovered. In the meantime the best means at our disposal is by the use of vaccine lymph, and people should recognize their responsibility to the community if through ignorance or selfishness they refuse to have their children vaccinated.

Another well-known disease, with an unknown virus—rabies or hydrophobia—has also, by the genius and intuition of Pasteur, been robbed of many of its terrors. The mortality following bites of rabid animals has fallen from 16 per cent to less than 1 per cent. But in rabies, when the conditions are favorable, the radical method is to drive the disease altogether out of the country by the careful administration of muzzling and quarantine laws. This was carried out successfully in England at the beginning of the century.

Trench fever.—There are among the diseases of undetermined origin a few which are slowly emerging from the unknown into the known. One of the most interesting of these is trench fever, which came into great prominence during the war. The history of the investigation of this fever is interesting and well illustrates the method of studying a disease with a view to its prevention.

Before the war, trench fever was unknown, though there is some evidence that it had been recognized at an earlier date in Poland and called Wolhynia fever. Be that as it may, it is quite certain that, though it was unknown on the western front at the beginning of the war, it is no exaggeration to say that it became one of the most powerful factors in reducing our man power, probably more than a million cases occurring among the Allies on the western front. In 1917 in the Second British Army alone, out of a total of 106,000 admissions to hospital at least 20,000 of the cases were trench fever.

Although this fever has well-marked characteristics of it own, such as a peculiar type of temperature curve and other symptoms, yet for a long time it was unrecognized as a separate entity and remained mixed up with other diseases, such as typhoid fever, malaria, and rheumatism. In 1916, MacNee, Renshaw, and Brunt in France made the first definite advance by showing that the blood of trench-fever cases was infective. They succeeded in transferring the disease to healthy men by the injection of the blood. The most careful microscopic examination of the blood corpuscles and lymph failed, however, to reveal any living germ. Nothing more was done until the following year, when the British War Office took the matter up seriously and formed a committee for the purpose of investigating the disease.

The United States of America, on coming into the war, at once recognized the importance of trench fever and without delay also undertook its investigation. In October, 1917, at the first meeting of the medical research committee of the American Red Cross in Paris, Maj. R. P. Strong recommended that a research into trench fever should be undertaken. He stated that, after several months' study of the problems relating to the prevention of infectious diseases occurring in the Allied armies on the western front, it became evident that the subject of the method of transmission of trench fever was one of the most important for investigation in connection with the loss of man power in the fighting forces.

At the next meeting, in November, 1917, this was agreed to, and a trench fever committee, under the chairmanship of Major Strong, was formed. The research was organized and experiments begun on February 4, 1918. In less than six months the investigation was completed and the report in the hands of the printer. This is a striking example of research work which, if carried out at the beginning of the war instead of at the end, might have saved the allied armies hundreds of thousands of cases of disease, which, although never fatal, were often of long duration and led to much invaliding.

The most important result of the work of these two committees was that it was amply proved that the louse, and the louse alone, was responsible for the spreading of the disease. This discovery meant that in a short time trench fever would have disappeared from our armies on the western front. Just as the elimination of goat's milk blotted out Malta fever, the elimination of the mosquito, malaria and yellow fever, so would the elimination of the louse have completely blotted out trench fever.

This method of prevention, by the destruction of the louse, although doubtless requiring careful organization and energy in carrying out, was shown before the end of the war to be a perfectly practicable proposition, and there can be little doubt that, if the war had lasted much longer, trench fever, like tetanus, would have practically disappeared.

Besides the main discovery from the preventive point of view that the louse is the carrier, there are many other points of interest in the natural history of trench fever. The living germ causing it has never been recognized in the human blood or tissues, probably on account of its extreme minuteness and its consequent liability to confusion with other small granules. But when the louse sucks blood from a trench-fever case there is apparently a great multiplication and development of the supposed microorganism. In five to nine days the louse becomes infective, and there is seen in the stomach and intestines enormous numbers of very minute bodies. What the exact nature of these bodies is, is unknown, but there can be little doubt that they are the infecting agents by which the louse passes on the disease. They pass out in countless numbers in the droppings or excreta of the louse, and it is to these bodies in the excreta that infection is due. The louse seldom if ever gives rise to the disease in the act of biting. It is the infective excreta thrown out on the skin which causes the infection. The microorganisms, or so-called Rickettsia bodies contained in the excreta, find their way into the blood through abrasions or scratches and so give rise to the fever.

From what has been said it will be seen that trench fever is an interesting disease. It also explains why it disappears in times of peace. As soon as the war was ended and our men could leave the trenches and resume their normal habits, the disease disappeared. The louse was eliminated and the trench fever with it.

Typhus fever.—Another disease of the undetermined group closely related to trench fever and also carried by the louse is typhus fever, another of the furies following on the heels of war. The French and the other countries, such as Serbia, Bulgaria, and Poland, were not so fortunate. It is stated that 120,000 Serbians died of this disease during the war, and it was only after vigorous steps had been taken in sanitary measures directed against the louse that the epidemic was got in hand.

After the long, exhausting Napoleonic wars, with the resulting poverty and destitution, typhus fever was prevalent in Great Britain and Ireland. About the middle of the century the improved economic conditions gradually led to the disappearance of the disease in Britain, although cases still occur in some parts of Ireland.

It is to Nicolle that we owe this advancement in our knowledge of this important disease. His work in Tunis on this subject dates from 1909. He showed that the blood of typhus cases is infective to monkeys, and, most important of all, that the infection takes place through the body louse. Just as in trench fever, the louse becomes infective after some five days, and it has lately been shown by the late Arthur Bacot, of the Lister Institute, that the excreta is also infective.

The minute bodies found in the typhus louse are subject to some differences, very similar to those found in trench-fever louse, and have been named *Rickettsia prowazeki* by Rocha Lima. What group these bodies belong to is still a matter of discussion. Some consider them to be protozoa, with an ultramicroscopical stage in man and a development stage in the louse, while others look on them as minute forms of bacteria. Although there is still some doubt as to the pathological significance of these Rickettsia bodies, the work of Sargent, Rocha Lima, Arkwright and Bacot, Wolbach, Todd, and Palfrey has done much to establish a casual relationship between them and these two diseases, typhus and trench fever. From the point of view of prevention, the important fact is that the infection is carried by the louse, and in the next great war it will be almost as necessary to prepare means for the destruction of the lice as of the enemy.

Rocky Mountain fever.—A third disease belonging to this interesting little group—Rocky Mountain fever—occurs in certain localities in the United States. It provides another instance of a virus transmitted by an invertebrate host to man. As the result of the work of Ricketts and of Wolbach the wood tick, *Dermacentor venustus*, is now recognized as the vector. Rickettsia bodies closely resembling those found in association with typhus and trench fever virus have been shown to be present in the stomach and tissues of the tick, and the same bodies have also been demonstrated in the tissues of infected guinea pigs.

Another interesting disease of the undetermined group is sand-fly fever, the virus of which is conveyed from man to man by the sand fly. A new era in its study has been opened up by the work of Whittingham and Rook, who have learned how to handle, breed, and keep sand flies in captivity and have shown that the virus is transmitted from generation to generation of flies without intervening passage through man or other higher animal. The knowledge of the life history of the flies will no doubt lead in due course to the suppression of the disease.

Another type of invertebrate vector is the Kedani mite, *Trombicula akamushi*, which transmits the virus of Japanese river fever to man from wild animals. The dangerous character of this disease (Tsutsugamushi) and the minute size of the mite together have presented great difficulties to the Japanese investigators. Protection from the mite by special clothing and bathing after exposure to risk of infection are at present the most hopeful methods of prophylaxis.

The prevention of diseases of this group by means of antitoxic sera has also been used with some measure of success. Degkwitz and others in Germany have been reputed as having been very successful in protecting children from measles and scarlet fever by injecting them with a small quantity of serum from convalescent patients. This method has also been found very useful under suitable condiaions to protect cattle from foot-and-mouth disease.

But far more hopeful than protection by serum alone is the use of a vaccine to produce a lasting immunity, combined with antitoxin to prevent the vaccine from producing unpleasant results—the so-called toxin-antitoxin method. Most of the diseases for which this method of prophylaxis has proved valuable have been diseases of animals, such as pleuropneumonia of cattle, rinderpest, and foot-and-mouth disease; but quite recently the method of Dick, of Chicago, in scarlet fever has been supported by a number of observations. The system of testing and producing immunity is planned on the same lines as the Schick method for diphtheria.

DIETETIC DEFICIENCIES—DEFICIENCY DISEASES

The preceding account is but a short and meager history of the marvelous advance which has been made in the prevention of infectious diseases in our times, an advance due in great part to the work of two men, Pasteur, the Frenchman, and Koch, the German; those who have come after them have merely followed in their foosteps, been their disciples.

Time will not permit even to touch upon the advances made in the prevention of other important diseases, such as the surgical infections and those caused by intestinal parasites, prominent among which are the hookworms and bilharzia. This advance has not been limited to the infectious group; it has been shared by other groups, notably those due to dietetic deficiencies, the so-called deficiency diseases. These deficiency diseases are just as important or even more important than the infectious, since they are always with us and exact an enormous toll in lowered health, lowered vitality, malformation, and inefficiency.

Until a few years ago it was taught in the schools that a complete diet consisted of certain proportions of proteins, carbohydrates, fats, and salts. But our knowledge is constantly increasing, our ideas about things constantly changing, and what is looked on to-day as absolute immutable truth to-morrow is seen in the light of some newer knowledge to be but a crude beginning. So the teaching concerning what constitutes a complete and healthy diet has changed, inasmuch as certain substances have been discovered in foodstuffs in the absence of which an adequate number of calories supplied in the form of proteins, carbohydrates, fats, and salts can alone neither promote growth nor support life indefinitely. These accessory food factors, or vitamins, as they have been named, are present in such minute quantities in foods that they have never been isolated, and their chemical composition is therefore unknown. It is still a matter of opinion as to whether they really constitute parts of the structure of living tissues or whether they merely act as catalysts of stimulators in the processes of growth and metabolism. That they are definite chemical substances which can be added to or removed from a foodstuff, with good or evil results, has, however, been abundantly proved.

The untutored savage living on the natural fruits of the earth and the chase knows no deficiency diseases. It is only when man begins by artificial means to polish his rice, whiten his flour, and tin his beef and vegetables that the trouble begins. Civilized man, living in comfort, drawing his food supply from the whole earth and able to vary his dietary at will, is in little danger; but it is otherwise with children and adults living under institutional conditions, with armies on active service, encountering extremes of climate, and with young infants on their naturally restricted diet. While it is true that deficiency diseases will only develop to their well-marked dangerous stage if the deficiency of accessory factors is severe and protracted, a slighter deficiency, if prolonged, may cause a condition of general ill health and inefficiency not less important although ill defined and difficult to diagnose. This fact is of special importance in the case of infants and young children.

The discovery of vitamins.—At the present time three, and possibly four, distinct vitamins have been described and studied, and it is probably only a matter of time for others to be discovered.

The discovery of vitamins dates to the middle of the eighteenth century. In 1747, James Lind, a surgeon in the British Navy, carried out a series of experimental observations upon sailors suffering from scurvy, the conception and performance of which were entirely admirable. By appropriate control experiments he showed that the medical means in vogue for the treatment of the disease were futile, when not harmful, but that orange and lemon juices were a specific cure. Lind attempted to ascertain the relative antiscorbutic value of various fruits and green vegetables, but was unable to observe a "superior virtue" in one rather than in another. He confirmed Kramer's observations made at the beginning of the eighteenth century, during the war between the Turks and the Holy Roman Empire, that dried vegetables were useless, and adopts the explanation of his friend Cockburn "that no moisture whatever could restore the natural juices of the plant lost by evaporation," which Cockburn imagined were "altered by a fermentation which they underwent in drying." Lind was struck with the beneficial effect of cow's milk in the treatment of scurvy. He explained it on the supposition of the milk "being a truly vegetable liquor," an emulsion prepared of the most succulent wholesome herbs." Lind applied himself to the applications of these discoveries for the prevention of scurvy in the navy, and recommended lemon juice concentrated to a sirup by evaporation to be carried in all ships and served out to the sailors.

By the beginning of the nineteenth century the carriage of lemon juice was made compulsory, first in the navy and subsequently in the mercantile marine, with the result that the ravages of scurvy were prevented. With the advent of steam traction, too, the length of voyages was curtailed and supplies of fresh provisions were obtained at more frequent intervals. Scurvy became rare, and the medical profession, being no longer faced with this disease of dietary deficiency, soon forgot the significance of Lind's discoveries.

Before leaving this subject a curious fact may be related. The lemon juice supplied to the navy was at first made from lemons grown in Spain and the Mediterranean countries. Afterwards, when England took over the West Indies, it was made from the lime, and scurvy again broke out. The reason of this is now known to be the fact that, whereas the lemon is particularly rich in antiscorbutic vitamin, the lime is correspondingly poor.

The scientific study of the disease may be said to have lapsed for a century and a half, until Holst and his coworkers in Copenhagen investigated the etiology of scurvy anew on modern lines, with the help of experiments on animals. Their work, published in 1907 and 1912, formed the basis for the numerous researches carried out in England and America during and since the recent war. As a result of this work the etiology of scurvy, discovered in effect centuries earlier, has been firmly established as due to lack of a specific undetermined, and as yet unisolated constituent of fresh foods, especially of fresh vegetables and fruits, now known as vitamin C.

In the meantime the existence of a second vitamin, the so-called antiberiberi or antineuritic vitamin, had been discovered. Eijkman's admirable studies at the end of last century, in 1897, on the etiology of beriberi in the Dutch Indies brought forward evidence for the view that this disease was of dietetic origin and was caused by a diet consisting too exclusively of highly milled and polished rice. He showed that the disease could be prevented if the outer layer (or pericarp) and the embryo of the seed, which had been removed in the process of milling, were restored to the "polished" rice. Eijkman's discovery of the analogous disease in birds, *Polyneuritis gallinarum*, provided the necessary tool for further investigation of the subject. The researches of Grijns and others showed that the bran and polishings of rice were only one of many rich natural sources of the unknown principle preventing beriberi, and it became evident that, while the disease is usually confined to tropical races subsisting largely on rice, the European white-bread eater is only protected by the varied diet he usually enjoys. Experience on active service shows that beriberi may really develop on a diet of tinned meat and white bread or biscuit.

During the late war two examples of the use made of this new knowledge occurred in Mesopotamia.

At the beginning of the campaign, on account of a difficulty in transport, there was a shortage of fresh food, with the curious result that scurvy broke out among the Indian troops and beriberi among the British. The Indians were living on dried pulses, such as peas, beans, and lentils; the British on tinned beef and biscuits. The former diet was deficient in the antiscorbutic vitamin on account of the complete drying of the seeds; the latter in the antiberiberi factor on account of the use of white flour from which the germ had been removed.

Some years ago it had been discovered that if dried seeds are germinated, a quantity of the antiscorbutic vitamin is produced by the act of sprouting. This was done. The dried peas and beans were soaked in water and then spread out in shallow layers, to cause them to sprout, which they readily did in the warm climate. The germinated seeds were then issued to the Indian troops and cooked in the usual way. As a result of this simple procedure the scurvy completely disappeared, no new cases occurred, and the sick recovered. In regard to the British troops it was known that the antiberiberi vitamin is contained in large quantities in certain cells, and notably in yeast cells. A small quantity of this substance in the form of marmite was added to the soldier's diet of bully beef and biscuits, and the beriberi in like manner disappeared.

It may seem strange that the conception of the rôle of vitamins in nutrition should have come first from the pathologist, and should not have emerged from the important advances in our knowledge of the physiology of nutrition which were made during the second half of the last century. The physiologists were preoccupied with the chemical composition of foodstuffs and their value for supplying energy and supporting growth, and with the necessity for supplying the requisite number of calories in a diet, distributed appropriately among proteins, fats, and carbohydrates, with adequate selection of mineral salts. It was only when these researches led to experiments in which animals were fed upon various mixtures of purified food elements that the investigators in this field began to realize that their repeated failures to rear animals upon such carefully arranged diets were not due to accident. The truth was suspected by Lunin in 1881, but it was not until 1912 that Hopkins published the classic experiments which proved the fact beyond a doubt. In the course of work along the same lines in the United States, McCollum and Davis in 1915 rediscovered vitamin B, and, in addition, a third essential dietary constituent, a fat-soluble vitamin, present in butter-fat and certain other fats of animal origin, especially in cod-liver oil and other fish oils. This vitamin is known as fat-soluble vitamin A.

Rickets as a deficiency disease.—The discovery of the fat-soluble vitamins proved to be of great importance in elucidating the etiology of this disease, which had for long been an unsolved problem. Some authorities had erroneously considered it to be an infectious disease, like tuberculosis. Another school held the so-called domestication theory, that it was caused by unnatural surroundings, involving a want of sunlight, fresh air, and exercise. A third considered rickets to be caused by improper feeding, though opinions differed as to the exact nature of the dietetic defect. The conclusion, first put forward by Mellanby in 1918, that a deficiency of fat-soluble vitamins plays a most important part in the causation of the disease is now generally accepted. This has been established by a large amount of work, both experimental and clinical, carried out by Mellanby himself, McCollum and Hess and their respective coworkers in the United States, and Korenchevsky and others in England. It may be laid down that if a young animal is supplied with a suffciency of these vitamins, rickets will not develop. The question of prevention is therefore one of economics. The difficulty is that these fat-soluble vitamins are chiefly found in such foodstuffs as butter, eggs, the fat of beef and mutton, and fish oils, all expensive articles of diet which the poorer classes can seldom afford. The only "butter" used by them is probably some form of margarine, made from vegetable oils which contain little or no antirachitic vitamin. The question of prevention is for the sociologist. Science can only discover the causes and point the means. It is for government and local authorities to carry out preventive measures in practice, and it is to be feared that science is often far ahead of the community in its share of the work.

Although the theory that rickets is an infectious disease has been exploded, a great and remarkable truth was contained in the domestication and hygienic theories which held that, among other unhygienic conditions, want of sunlight was concerned in the etiology of the disease. During the last five years it has been discovered that exposure to sunlight or to the ultraviolet rays of the mercury vapor quartz lamp can cure rickets in children. Experiments on animals have shown that the effective rays in the sunlight are also the ultra-violet. This discovery has indicated lack of sunlight during winter as one factor concerned in the large spring incidence of the disease in industrial cities in northern climates.

A complete and well-controlled research showing the interaction of diet and light in the prevention and cure of rickets in infants was gained in Vienna, since the war, by Dr. Harriette Chick, of the

Lister Institute, and her four colleagues. There the curious fact came to light that infants fed on a diet deficient in antirachitic vitamin only developed the disease in winter and not in summer, and, moreover, could be cured in winter by exposure to artificial forms of radiation or by administration of cod-liver oil without any other change in diet or management. Another set of children who had a sufficient supply of fat-soluble vitamins in their diet, in the form of cod-liver oil, escaped the disease altogether.

Experiments on rats have also shown that in animals fed on a rickets-producing diet, rickets does not occur if the rats are exposed regularly to sunlight or to the rays of the mercury lamp, or other form of artificial ultra-violet radiation; whereas if they were kept in the dark, rickets does develop. If, on the other hand, the diet was complete in all respects, including abundance of fat-soluble vitamins, the animals do not develop the disease, even if kept constantly in the dark. How this is brought about is not known. At one time it was thought that the action of the ultra-violet rays on the tissue might enable the animal to synthesize fat-soluble vitamins, as it does in the tissues of plants, but recent evidence brought forward by Miss Margaret Hume, in Vienna, and by Goldblatt and Soames at the Lister Institute, suggests that light can neither create nor act as a substitute for the vitamin. It seems rather to act as a stimulant, enabling the animal to make full and economical use of its store of fat-soluble vitamins, and when the store is used up growth ceases in spite of the continued action of the rays.

An important and practical point in regard to the connection between diet and sunlight and the formation of the antirachitic vitamin is the relation to cow's milk. Recent work carried out by Dr. Ethel Luce, at the Lister Institute, has shown that milk obtained from a cow on pasture in summer contains a sufficiency of the growth-promoting and antirachitic fat-soluble vitamins. In winter, on the other hand, if the cow is stall-fed and kept in a dark stable, the milk may become deficient in these respects and young animals fed on it may become rachitic. This work shows that the seasonal variation in quality of the cow's milk may be an additional factor in the seasonal incidence of infants reared upon it. It also disposes of the idea, very current in some quarters, that cow's milk possesses low and negligible antirachitic properties and that the antirachitic properties of cod-liver oil are specific and peculiar to that substance. Enough has been said to show that rickets may be regarded as a disease of sunless houses, combined with a diet deficient in the antirachitic vitamin, and the means of prevention are sufficiently obvious, if not always easy and simple to carry out.

Doubtless in the future this new knowledge in regard to the accessory food factors in diet will be used to a greater extent than it has been up to the present, in which case it is not too much to expect that the city children of some future generation will have better-grown bodies and stronger, healthier teeth than their predecessors of the previtamin age. This might be attained in a comparatively near future if only man could be allowed to work out his salvation in peace. Instead of this, great wars come and throw back the work for generations.

To saddle the country with a million and a half of unemployed, with the consequent poverty, insufficient food, clothing, and housing, is not calculated to further the prevention of disease and raise the standard of health. Is it too much to hope that some time in the revolving years a time may come when by a confederation or league of nations the world may be so policed that no one country will be able with impunity to attempt the destruction of its neighbor? Until this happens it is difficult to see how rickets, tuberculosis, and other diseases can be adequately dealt with in our city populations.

Diseases due to ductless glands.—I can only briefly allude to the astonishing advance in our knowledge of the diseases caused by a defect or excess of secretion of the ductless glands. Many of these discoveries are among the fairy tales of science. All this advance has taken place in the comparatively short space of time under review. Professor Starling, one of the chief protagonists in this advance, in his Harveian oration a year ago, states this very vividly:

"When I compare our present knowledge of the workings of the body and our powers of interfering with and of controlling those workings for the benefit of humanity with the ignorance and despairing impotence of my student days, I feel that I have had the good fortune to see the sun rise on a darkened world, and that the life of my contemporaries has coincided not with a renaissance but with a new birth of man's powers over his environment and his destinies unparalleled in the whole history of mankind. Not but there is still much to be learned. The ocean of the unknown still stretches far and wide in front of us, but for its exploration we have the light of day to guide us; we know the directions in which we would sail, and every day, by the cooperation of all branches of science, our means of conveyance are becoming more swift and sure. Only labor is required to extend almost without limit our understanding of the human body and our control of its fate."

There is one point of likeness between the vitamins which we have been considering and these glandular secretions or hormones, as they are named. Just as we have seen that the presence or absence of an extremely minute quantity of a vitamin may determine growth and health or disease and death, so an extremely minute quantity of glandular secretion may have a similar effect.

The anterior lobe of the pituitary gland is a very small body, yet an excess if its secretion will cause a child to grow into a giant; a deficiency, and the growing child will remain an infant.

The best known of the ductless glands is the thyroid, and the effect of its secretion is truly marvelous. A deficiency, and the child grows up a heavy-featured, gibbering idiot. Rectify the supply of thyroid secretion: The heavy features disappear, the eyes brighten, the intelligence returns, and instead of the former heavy-jowled imbecile you have a bright, happy, and normal schoolboy. On the other hand, if there is an excess of the thyroid hormone, exopthalmic goiter, or Graves's disease is the result. Remove the redundancy and health returns.

The active principle of the thyroid has lately been shown to be a compound containing iodine. If there is no iodine in the soil or water, goiter is the result, as in parts of Switzerland, Canada, and the United States. This aspect of the subject was taken up some 10 years ago by Dr. David Marine and his colleagues at Cleveland, Ohio. They found that endemic goiter may be prevented by the simple method of giving for a time minute doses of iodine, and conclude that with this simple, rational, and cheap means of prevention, this human scourge, which has taken its toll in misery, suffering, and death throughout all ages, can and should be controlled, if not eliminated, and look forward in imagination, a few generations hence, to the final closing of the chapter on endemic goiter and cretinism in every civilized nation in the world.

Many advances have also been made in our knowledge of the function and uses of other ductless glands, and, as you know, the latest victory in this field is the discovery of insulin and the successful treatment of severe diabetes, for which magnificent work your own townsmen Banting and Best deserve the highest honor.

In many other directions than those touched upon has there been progress in the prevention of disease. It would take more than one address to describe the activities of the Rockefeller Foundation alone. Campaigns for the relief and control of hookworm disease, malaria control, the eradication of yellow fever, antituberculosis work and education are being pursued on such a scale and at such a lavish expenditure of money as to leave us in the old country breathless with admiration and envy. This foundation, incorporated in 1913, was founded, in the words of the president, "to stimulate world-wide research, to aid the diffusion of knowledge, to encourage cooperation in medical education and public health." Its chartered purpose is to promote, not the exclusive prosperity of any one nation, but "the well-being of mankind throughout the world."

Science, indeed, knows no boundaries of nations, languages, or creeds. It is truly international. We are all children of one Father.

The advance of knowledge in the causation and prevention of disease is not for the benefit of any one country, but for all—for the lonely African native, deserted by his tribe, dying in the jungle of sleeping sickness, or the Indian or Chinese coolie dying miserably of beriberi, just as much as for the citizens of our own towns.

From what has been said it is abundantly clear that during the comparatively few years that have passed since this association first met in Canada, enormous advances have been made in the prevention of disease. Before that time we were still in the gloom and shadow of the dark ages. Now we have come out into the light. Man has come into his heritage and seems now to possess some particle of the universal creative force in virtue of which he can wrest from nature the secrets so jealously guarded by her and bend them to his own desire. But let there be no mistake; much has been done, but much more remains to be done. Mankind is still groaning and travailing under a grievous burden and weight of pain, sickness, and disease. Interruptions are sure to come in the future, as they have in the past, in the work of removing the incubus, but, in spite of these, it is the duty of science to go steadily forward, illuminating the dark places in hope of happier times.

INTRACUTANEOUS VACCINATION AGAINST SMALLPOX

From time to time articles appear in medical literature dealing with the intracutaneous vaccination against smallpox. The following extract from a paper by J. H. Gettinger, appearing in the Medical Journal and Record of August 6, 1924, reveals the fact that this method of vaccination is successfully employed in the department of pediatrics, Bronx Hospital, New York.

"The experiments of Leiner and Kundratitz show conclusively that they succeeded, by the intracutaneous vaccination of cowpox lymph, in creating an immunity against cowpox virus, and in producing a typical reaction which differs from the usual reaction following cutaneous vaccination, this reaction being, moreover, much easier to observe than that which takes place following subcutaneous inoculation. They employed lymph supplied by the State health department in dilution of 1:3. This lymph was used as it was received, or in dilutions up to 1:100. The diluent was either sterile physiological salt solution or plain sterile water. For general practice it is not necessary to have an exact dilution. In order to avoid the vaccine's coming in contact with the skin about the puncture, a separate large needle was used to draw the vaccine into the syringe, this needle being then removed and a finer one adjusted. The second needle was inserted 1.5 centimeters into the cutis and its point tilted in such a manner that during injection a typical intracutaneous wheal was produced. After the withdrawal of the needle from the skin, the point of puncture was cleansed with tincture of iodine and alcohol.

"It is important to carry out these details with precision, for the omission of any precaution might result in cutaneous vaccination at the site of puncture or, if the needle be inserted in the skin too superficially so that the point shows through, it is likely to result in a cutaneous reaction.

"Of the 50 children that Leiner and Kundratitz injected intracutaneously, ranging in ages between 2 and 11 years, 39 showed positive results; that is, a typical intracutaneous reaction with an immunity against any subsequent revaccination. In 6 patients the process was not completely typical, while in 5 there was no reaction at all, just as sometimes happens in cases with the usual vaccination.

"In order to prove that immunization had been established by intracutaneous vaccination, cutaneous vaccination by scarification was afterward done on these same patients. If the cutaneous vaccination was performed at the beginning of intracutaneous reaction, or about 2 days later, the result of the cutaneous vaccination was entirely negative. If the cutaneous vaccination was done 14 days after the intracutaneous reaction had set in, some cases showed no reaction, while others showed a slight red nodule after the eighth or tenth day. This nodule underwent a retrogressive metamorphosis after two days.

"The typical reaction of intracutaneous vaccination may be described as follows: After 24 hours, there appears at the site of injection an erythema about 6 to 10 millimeters in diameter, paler in color toward the periphery, with a distinct infiltration slightly raised above the skin level in the center. The erythema lasts but a few days, but the infiltration spreads to a larger area after 10 to 14 days, becoming distinctly limited in the subcutis and movable on the base, while the skin above is not movable; there is a slight redness over the infiltration. These transitional changes last about three weeks, the infiltration becoming smaller, the skin over it going through a fading discoloration. Finally the infiltration disappears and the skin resumes its usual color. There is little or no temperature during the entire period of reaction. The pathology of the reaction in both the cutaneous and intracutaneous vaccination is probably the same, namely, exudation, proliferation, and degeneration, the only difference being that in the intracutaneous vaccination the proliferation predominates.

"In reviewing the whole process of vaccination in the intracutaneous method, we can distinguish two reactions. The first reaches its height within 24 to 48 hours after injection; the second takes place between the tenth and the fourteenth day after the complete disappearance of the first reaction and lasts about three to four weeks. It is this second reaction that confers the immunity.

"Since the publication of Leiner and Kundratitz's article, this method has been tried in a number of clinics and in private practice with uniformly gratifying results. Curt Frankenstein reported that it had proved especially valuable in the vaccination of infants, and published an account of the treatment of 60 very young infants by intracutaneous vaccination. The first reaction expressed itself in a firm, sharply circumscribed infiltrate with an intensive central reddening which was markedly enlarged by the fourth or fifth day. This area was hard, very sensitive to pressure, and movable on the substrate. By the fifth day there was an enlargement of the axillary glands, but the reaction began to subside by the ninth day following injection. In only one case was there softening of the infiltrate; in another, a small pustule formed at the site of the injection, leaving a scarcely visible scar after healing.

"Twyman, of Missouri, employed intradermic vaccination upon 620 patients, 397 of whom had not been previously inoculated by any method. On 23 persons, who said they had had smallpox, the intradermic vaccination 'took.' The typical fully developed reaction, following the employment of this method, is an umbilicated pustule which appears about four days after the injection. Most of the cases showed a slight scar, the size of the original wheal raised at the time of the primary injection. Twyman regards this method as vastly superior to the old scarification inoculation, but his results do not compare very favorably with those obtained by Leiner and Kundratitz and others who have adopted their technic.

"The confusion often existing in the minds of many physicians between the endermic and intradermal method of inoculation is noted by Fred S. Spearman, of Colorado, when describing the technic which he employed for subcutaneous injection as a substitute for vaccination by scarification, which is substantially the same as that used abroad. Among thousands of soldiers and children vaccinated by this method he had no cases of infection, and the majority of the patients experienced little or no inconvenience. He cites, as special advantages of this method, the rapidity with which a large number may be vaccinated, the avoidance of external scars, and its adaptation to the treatment of children or the insane and feeble-minded, who are likely to disturb the healing of the usual vaccination 'sore.'

"At the clinic of the Bronx Hospital, we have practically carried out the technic of Leiner and Kundratitz, using for each case the contents of two capillary tubes of vaccine supplied by the board of health. The vaccine is emptied into the barrel of a syringe to which is added 10 drops of sterile water. The piston is then inserted and the whole mixture vigorously shaken to dissolve all particles and then injected into the skin of the left arm on the usual site.

"In conclusion we can say that vaccination lends itself to three methods of procedure:

"1. Cutaneous vaccination by scarification.

"2. Subcutaneous vaccination.

"3. Intracutaneous vaccination.

"Of all the enumerated methods, the intracutaneous holds out, in palpable manifestation, the greatest advantages.

"1. It does away with the usual ugly scar incident to scarification.

"2. It minimizes constitutional reaction.

"3. It eliminates the possibility of secondary infection, also the possibility of conveying the virus, by the fingers of the child, from the vaccination into its eyes, a not infrequent sequel to the present form of vaccination.

"4. It would induce parents to vaccinate children throughout the year instead of limiting it to the seasonal period of warm weather.

"5. There is no doubt that vaccination would become more universal in its adoption, in view of the fact that the staring hideousness of a festering wound would be eliminated.

"It is surprising that while medical men have been keenly alive to the improvement in the minutest physiological tests and allergic data, which at best serve only a theoretical interest rather than a clinical usefulness, they have shown an utter indifference to the constructive betterment of one of the first methods which formed the basic principle of immunology. We vaccinate to-day in the same manner as our predecessors did a century ago; the same needle, the same scarification, the same deforming scar, the same invitation for reinfection; all of which bear the insignia of antiquity. True, that where large groups are to be vaccinated, the old method by scarification might be more expeditious, because of its ease and simplicity; but speed and simplicity should not determine the choice of a method when the outstanding features of another proclaim its superiority. Indeed, every effort should be made to facilitate the adoption of this method, which is neither a fad nor a fancy, but a method of substantial practicability whose efficacy has been definitely established by clinical evidence and experimental data."

In a paper read before the section on pediatrics of the Medical Society of the State of Pennsylvania, and appearing in the Atlantic Medical Journal of August, 1924, D. E. Berney, of Scranton, Pa., cited his experiences with intradermal vaccination in over 100 cases successfully vaccinated by this method in St. Joseph's Infant and Maternity Hospital, Scranton, Pa. He believes that the intracutaneous method will probably not displace the usual cutaneous inoculation in the masses. However, when one fears inoculation injuries or infection and where the occurrence of scars is to be avoided, as well as where general systemic reaction is feared, the method is ideal.

SOME FEATURES OF THE FORTHCOMING PHARMACOPŒIA[1] (TENTH REVISION)

As the time is not far distant when the U. S. Pharmacopœia, tenth revision, is expected to make its appearance, it is fitting that a review of its salient features should be placed before this association, which has always contributed so largely to its development and success.

The chairman of the committee of revision has recently completed a review of much of the pharmacopœial literature of the past century and is impressed anew by the immense amount of labor and the untiring and unselfish service entering into the creation of our present national standard for medicines. The tenth revision has been builded upon the visions and ideals of a group of physicians and pharmacists whose names must not be forgotten. The book to-day stands as an enduring monument to the memory of Dr. Lyman Spalding, Dr. Franklin Bache, Dr. George B. Wood, Dr. Joseph Carson, Dr. Robert Bridges, Alfred B. Taylor, William Procter, jr., George D. Coggeshall, Dr. E. R. Squibb, C. Lewis Diehl, William H. Thompson, Frederick B. Power, Albert B. Prescott, Joseph P. Remington, Charles Rice, John M. Maisch, Dr. Horatio C. Wood, Louis Dohme, S. A. D. Sheppard, Frederick Hoffmann, P. W. Bedford, George F. H. Markoe, Charles Caspari, jr., Oscar Oldberg, and hundreds of others who properly share the credit due from our generation.

The Pharmacopœia was started by physicians, but they early acknowledged the necessity of securing the cooperation of their pharmaceutical associates, and, in fact, at one period pharmaceutical interests largely dominated the revision.

In the tenth revision this former condition has been adjusted by placing responsibility for the scope upon the 21 physicians of the committee. They also decided doses and all therapeutic questions, so that the physicians are contributing a constructive and fundamentally important part of the revision. In many other divisions, such as nomenclature, biological products, and in bio-assays, they are also taking an active part in the revision. More than in any previous revisions the work is being divided among specialists and each group held responsible for the decisions in its division, and the several subcommittees have been strengthened by the election of 60 or more experts, serving as auxiliary members to the subcommittees.

Throughout the current revision the general committee have been asked to vote only on general questions. All reports and discussions are placed before the general committee and members are invited to freely comment on every proposition, and their comments are pub-

[1] Presented by E. Fullerton Cook, chairman of the committee of revision of the U. S. Pharmacopœia, tenth, at the American Pharmaceutical Association, Buffalo, Aug. 28, 1924.

lished in the circulars, but the final decision on technical questions has remained with the groups of experts on the several subcommittees who should be best qualified to settle differences when they occur.

The selection of the therapeutically valuable substances for the new book has therefore been decided by the physicians, and the U. S. Pharmacopœia, tenth revison, will represent a materia medica selected from the entire world, and, as only controlled products were restricted, the list of drugs, chemicals, and preparations of the new Pharmacopœia should represent the most valuable medicinal agents known to the medical science of our times.

A total of about 650 articles have been admitted; among these are found some articles required only in manufacturing processes, while others represent different forms of the same remedy, so that the actual number of individual medicinal agents is much less than the total number of titles.

Admissions.—Among the titles added to the U. S. P., X, are the following:

Proposed English title	Similar market products
Acetylsalicylic acid	Aspirin.
Diacetyl tannin	Tannigen.
Albumin tannate	Albutannin, protan.
Amidopyrine	Pyramidon.
Strong silver—protein	Strong protargin, proganol, protargentum, protargol.
Mild silver—protein	Mild protargin, argyn, argyrol, cargentos.
Arsphenamine	Arsenobenzol, diarsenol, salvarsan.
Barbital sodium	Sodium diethylbarbiturate, veronal-sodium.
Barbital	Diethylbarbituric acid.
Barium sulphate	(purified for X-ray examination).
Ethyl aminobenzoate	Benzocaine, anesthesin.
Calcium iodobehenate	Sajodin, calioben.
Carbon tetrachloride	(highly purified).
Carbromal	Adalin.
Chloramine	Chloramine-T.
Dextrose	Grape sugar.
Dichloramine	Dichloramine-T.
Epinephrine	Adrenaline.
Ipomoea	Replaces scammony.
Solution of epinephrine hydrochloride	Solution of adrenaline hydrochloride (1 in 1,000).
Surgical solution of chlorinated soda	Carrol-Dakin solution.
Neoarsphenamine	Neodiarsenol, neosalvarsan, neoarsenobenzol.
Chaulmoogra oil.	
Chlorinated paraffin	Chlorcosane.
Phenobarbital	Phenyl-ethyl-barbituric acid, luminal.
Phenolsulphonephthalein	Phenol red.

Proposed English title	Similar market products
Procaine hydrochloride	Novocaine.
Quinidine sulphate.	
Quinine ethylcarbonate	Euquinine.
Resin of ipomœa	Replacing resin of scammony.
Sodium diphosphate	Sodium acid phosphate, sodium dihydrogen phosphate.
Whiskey (spiritus frumenti).	
Brandy (spiritus vini vitis).	
Thyroxin.	

Nomenclature: The subcommittee on nomenclature have carefully studied all Latin and English titles, also abbreviations and synonyms, and these have only been changed for the sake of greater scientific accuracy or for simplification.

Some modifications are indicated in the table below:

English titles proposed for U. S. P., X	U. S. P., IX, English titles
Diphtheria antitoxin	Purified antidiphtheric serum.
Tetanus antitoxin	Purified antitetanic serum.
Crude tetanus antitoxin	Antitetanic serum.
Orange flower water	Stronger orange flower water.
Tolu	Balsam of tolu.
Chloral hydrate	Hydrated chloral.
Cinchophen	Phenylcinchoninic acid.
Eucaine hydrochloride	Betaeucaine hydrochloride.
Gluside	Benzosulphinide.
Soluble gluside	Sodium benzosulphinide.
Lactose	Sugar of milk.
Lead oleate plaster	Lead plaster.
Solution of pituitary	Solution of hypophysis.
Methenamine	Hexamethylenamine.
Pituitary	Desiccated hypophysis.
Sucrose	Sugar.
Sulphonal	Sulphonmethane.
Trional (proposed)	Sulphonethylmethane.
Mercurial ointment (30 per cent)	Diluted mercurial ointment.
Stronger mercurial ointment (50 per cent)	Mercurial ointment.
Ointment of oleated lead	Diachylon ointment.
Smallpox vaccine	Vaccine virus.

Standardization.—The medical profession are asking for dependable medicines. An outstanding feature of the U. S. P., X, will be its effort to provide methods for standardizing chemicals and preparations. One of the difficulties heretofore in the application of biological assays has been the variable standards used. The subcommittee has carefully defined and fixed the standard for each substance so to be assayed, and the Department of Agriculture, Bureau of Chemistry, is cooperating by offering manufacturers (without cost it is hoped) samples of the standard conforming to the requirements of the U. S. Pharmacopœia, these samples to be used in adjusting the activity of new lots.

This service of the Bureau of Chemistry is entirely optional, but it is confidently believed that it will be taken advantage of by most manufacturing pharmacists and that in practice it will produce a degree of dependability not heretofore possible.

The opportunity and duty is before every pharmacist to supply physicians and their patients with only such official medicines as conformed to pharmacopœial standards, and this means not only a careful preparation or selection of the original product but also intelligent and conscientious storage and handling while under his control.

The comparatively recent investigations into the active constituents of cod-liver oil have led to the suggestion that an optional assay method for determining the "vitamin A" content be provided for the U. S. P., X.

A special committee, with Dr. John F. Anderson as the referee, is studying this question and is inclined to recommend its introduction. The adoption of an optional assay for cod-liver oil would have the advantage of standardizing a method, and if but a minimum standard is established it will permit a physician to select an oil of high vitamin content when a lack of fat tolerance makes large doses objectionable. It would be required that a statement be placed on the label of any oil so assayed to the effect that "this assay does not indicate the antirachitic value." Unfortunately no practicable assay for this specific and most valuable activity of cod-liver oil is yet available.

Tests for identifying chemicals.—The details for identifying tests for many inorganic chemical substances have been placed in a special chapter in Part II and are only briefly referred to under the chemical. This feature is but an extension of the policy followed in previous revisions for special tests such as those for arsenic and heavy metals, avoiding the necessity of frequently repeating details.

Sampling drugs.—The subcommittee on botany have recognized the necessity of standardizing "sampling methods" in the examinations of commercial drugs, and when the various tests for purity or strength are to be applied the lot must represent as nearly as practicable a fair and average sample. Limits have also been fixed in many drugs for "ash insoluble-in-hydrochloric acid" ("acid-insoluble ash") as a means of forcing the proper cleaning of crude drugs.

Whiskey and brandy.—The decision by the physicians of the committee to admit these articles that they might be standardized has been widely and favorably commented upon in the press of the country.

The proposed texts will soon be published and will include tests for detecting impurities which might be present, especially for those denaturing substances authorized for use in industrial alcohols, as methyl alcohol and diethylphthalate.

The proposed official requirements do not specify that whiskey must be "bottled in bond," although this is a provision of the revised "Regulation 60" of the Treasury Department.

Subdivision of texts.—The description and tests of chemicals and drugs in the new Pharmacopœia will be slightly different in appearance from those in the U.S.P., IX, as they will be divided with appropriate subtitles.

"Description and physical properties," "Tests for identity," "Tests for impurities," and "Assay" will be those most frequently used. The accurate subdivision of monographs under such titles is, in some cases, practically impossible, and often the description of color and taste is a factor in determining both identity and purity, but it is believed that this condition can be covered by a statement in the "General standards." The subdivision is only for convenience and in no degree releases the manufacturer or dealer from any of the requirements of the text.

General standards.—For several revisions important general standards have been placed in that part of the Pharmacopœia which precedes "Part I," under the heading "Introductory notices." It is proposed to place those statements in Part I, of the U.S.P., X, under the heading "General standards," and have them precede the monographs. This place will emphasize their importance and give them prominence.

Changes in preparations.—It will be of interest to many to know that but one tincture of opium will be official, and that made from opium deodorized by the paraffin process.

Chalk mixture is to be made directly from prepared chalk, with 10 per cent glycerin and sufficient cinnamon water and water. The sugar and acacia are to be omitted. Compound chalk powder will remain official, however, for those physicians who care to use it in powders or mixtures.

The title "Cinchona" will include "yellow" and "red" cinchona, and the compound tincture will no longer specify the red variety.

The tincture and oleoresin of capsicum will include an organoleptic test in which 5 cubic centimeters of a sweetened, aqueous solution, representing about 1 part of the drug in 7,000 parts of liquid (about one one-hundredth grain of capsicum) "should produce a distinct sensation of pungency and the taste of capsicum in the mouth and throat."

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NAVY NURSE CORPS

THIRTY YEARS OF PROGRESS IN NURSING[1]

By ADELAIDE NUTTING, R. N.

I am asked to tell you something of the progress made in nursing during the 30 years since this society was established, and I must acknowledge frankly at the outset that the task is attempted with some hesitation. For the idea of progress is the subject of much discussion these days, and we are not nearly as sure about it as we used to be. What is progress? Is it that kind of improvement which can be measured by statistics? This was the prevailing idea during the last century, says Dean Inge.

It was obvious to many of our grandparents that the nation which travels 60 miles an hour must be five times as civilized as one which travels only 12. I am inclined to think that this would still seem an obvious measure of progress to many of the grandchildren of those grandparents.

Or is progress a spiritual thing? There are those who believe this, and think that human betterment can only come through the development of our spiritual capacities and that all other things should serve as means to this end. And then there are numerous other ideas about it, from those of Wells, who sees only mental progress—a clearing and enlargement of ideas—to others who think progress can come only through science, or through education, or through new forms of social organization.

In trying, therefore, to show some of the ways in which nursing has grown to its present stature, I do so with no certainty as to how far such growth is evidence of real progress. It is obvious that at certain stages of our journey changes were made which seemed to lead in the right direction, but some of the results as we now see them do little to satisfy us of the wisdom of the course then taken. Moreover, we are, I am sure, quite too near the past 30 years in which most of us have lived and worked to be able to secure any adequate perspective of our field of labor—of the part we have played in it. It would be difficult to bring a dispassionate judgment

[1] Reprinted from Proceedings of the Twenty-ninth Annual Convention of the National League of Nursing Education, held at Swampscott, Mass., June 18 to June 22, 1923.

to bear upon matters with which we have been so intimately concerned. But we can at least trace the main lines of development and follow the sequence of events for such appraisal as we can bring to them.

The past 30 years in nursing show a period of intense activity, of rapid and continuous development in old and in new fields of work, of a consequent phenomenal growth in numbers and of many new and complex problems arising within the work itself and in the various relationships outside of it.

The earliest schools of nursing in this country were created independently of hospitals by boards or committees with power and freedom to develop the education of nurses as they would. From the beginning that responsibility was largely given over to the hospitals and eventually transferred wholly to them. What one surveys, then, in looking back over the developments in nursing is a period of nearly 50 years of almost unrestricted experiment with a system of education in which the school has existed as an integral part of the hospital, created and conducted to serve its needs, with the education of the nurse becoming thereby and inevitably a by-product of her service to the hospital.

Offering, as these early schools did, a new field of training and occupation for women at a time when such fields were rare, they attracted a large number of students, some of whom were women of rather exceptional ability. The result of their labors was that reform of hospital nursing to which must undoubtedly be attributed in considerable degree the extraordinary growth of hospitals which has characterized the past 30 years.

At the first convention held by this society, 30 years ago, there were present 44 heads of training schools in Canada as well as the United States. As the entire number of schools was then about 70, this was a good representation. Thirteen States were represented, nine of them by a single member only. To-day there are schools of nursing in every State and a great many in several of them. There are schools of nursing also in the Philippines, in Hawaii, in Porto Rico, and in Cuba, built up by American nurses. I see that there are now 75 trained nurses at work in far Alaska. So I suppose that schools will soon be on their way there—perhaps, indeed, they are there already.

Altogether there are now recorded about 1,800 schools of nursing which have grown up in the rapidly multiplying hospitals of the country during the past 30 years. A picture of their rate of growth is interesting. In the 10 years between 1890 and 1900 there were over 400 schools of nursing established in connection with hospitals which arose during that period; in the next 10 years, about 700 more schools were created in newly erected hospitals; and in the last 10 years just ended there are recorded a further 600 schools of nursing of similar origin.

In all of these hospitals the first imperative need was a good nursing service, and no one saw any way of providing this except by creating schools whose students could form the nursing staff. Of course, the continuous demand for nurses in such large numbers who were capable of organizing schools and of directing their work was obviously an entirely impossible one to meet. These new schools had to be built up in various sections of the country out of whatever material was available for the purpose, and the results of that period of hasty growth form a part of our educational problem in nursing to-day. Think what it meant to a young profession just beginning to develop its educational structure and to work out its standards of practice to be forced into such abnormal growth as the swiftly multiplying hospitals of the period required. Careful study of the situation will show these schools adjusting themselves more and more completely to the hospitals with which they were connected, more and more absorbed in efforts to meet their manifold and constantly increasing needs. Whichever way hospitals grew, their schools, as a matter of course, followed. Never, probably, in history, has any institution, philanthropic or otherwise, had so useful and flexible an instrument of service at its command. Seldom does history record a service of purer devotion than that which schools of nursing have rendered to hospitals.

Naturally, during the greater part of this period, there has not been much opportunity for educational development, both because the entire energies of the schools were absorbed in meeting the working demands of the moment and for other reasons which will be considered later. Yet educational advances have been made and some of them are noteworthy. It is in the direction of numbers and of enlargement in fields of nursing that the most remarkable advances have been made. Numerically, indeed, nursing is moving on with swift and apparently increasing momentum which nothing in sight seems likely to check.

Shortly before this society was formed, in 1893, there were not 500 graduates in the whole country. The last census shows that 150,000 graduate nurses, trained and registered, and it is of interest to note that a very large proportion (80 per cent) of the whole increase of women in all professional service was found in just two pursuits—nursing and teaching. It is of further interest for us to realize clearly that we have now reached a stage where we are graduating approximately 15,000 nurses annually, and that the certainty of increasing the existing number by 150,000 at the end of the current 10-year period offers something to think about. Even with any degree of depreciation that seems likely to occur there is more than a reasonable outlook that we may all live to hear the last faint echo of the final cry of a shortage of nurses.

The expansion of the field of nursing has been extraordinary and is still going on. Its extent and diversity can only be roughly indicated here. Within each field there is found a good deal of elaboration and specialization, most notable perhaps in hospitals and training schools where the single official who formerly directed the nursing service, and was the only teacher there was, has given place to a whole hierarchy of assistants, supervisors (one hospital has three distinct types of supervisors), instructors, and special workers. The bureau of occupations at nursing headquarters listed 30 different kinds of work for which nurses with some form of special training or experience were required.

Medicine is steadily transferring to nursing duties and procedures hitherto performed only by physicians. The giving of anesthetics, for instance, has been in some places turned over entirely from physicians to nurses, despite the fact that laws in other sections have been enacted forbidding it.

A recent article by Doctor Goldwater proposes the passing over to nurses of an entirely new range of duties now the province of the medical interne, and shows how in certain hospitals this transfer is already going on, such nurses becoming known as clinic assistants.

In public health work, which offers a new and apparently almost limitless field of activity for nurses, there are several quite distinct branches of work calling for special preparation, such as school nursing, maternity and infant protection, rural nursing, industrial nursing, etc.

The public health movement did not create the public health nurse, it found her at work in her district nursing the sick, watching over their families and the neighborhood, and teaching in the homes those sanitary practices, those measures of personal and home hygiene, which do much to prevent disease and to promote health. Such visiting nurses, whose teaching was a cardinal principle of their work, were occupied in 50 communities when the public health campaign was set in motion. But 40 years before this date the work had its origin in England as one of the first results of the reform in nursing then taking place. The duty of inculcating hygienic habits in home life was always as incumbent upon the district nurse in England as her actual care of the sick. The importance of this kind of teaching is hardly understood until one sees it in the light of the modern public health movement and realizes that it has become a corner stone of that whole structure. The nurse familiar with the ravages of disease becomes your zealous crusader against it.

There are now 12,000 nurses engaged in some form of public health work, and the usefulness of their efforts so far has created a steady demand for more of them and for the kind of preparation which will enable them to contribute more fully and effectively to the growing needs of the most promising field which nurses have as yet entered.

A most important phase of progress has been the development of nursing associations. The formation of the society of superintendents was the recognition of problems common to all nurses, which could not be handled by any isolated effort, and called for their united energies. One of its avowed purposes was to foster the creation of a national association of trained nurses. A few training school alumnæ associations were already in existence, and within a few years there arose, first, the Nurses Associated Alumnæ, which later became the American Nurses' Association. Then there followed in rapid succession the organization of State nurses' associations, which within a comparatively brief period were formed in every State. With these organizations began, in 1903, the first attempt through appropriate legislation to bring order out of chaos in educational standards, methods, and ideals which had resulted from the rapid and uncontrolled growth of training schools for nurses over a long period of years.

The laws secured are very modest in all of their requirements, and most of them are as yet permissive only. Their educational standard is a moderate one—in most States one or two years of high school followed by two years of hospital training, as a rule, accompanied by a slender body of formal instruction.

The entire profession of nursing is now organized very much after the fashion of the medical and other professions. Every State has its body of practicing nurses, its schools for training them, its associations of nurses, its laws regulating the practice of nursing, and in some small degree the preparation for it. There are three national associations and an International Council of Nurses, of which 14 countries are members and which has held conferences in London, Paris, Cologne, and San Francisco. It is now gathering itself together, following the suspension of work during the war, and holds its next congress at Helsingfors, Finland, in 1925.

Nursing has also developed something in the way of literature. Thirty years ago there were but one or two very elementary books on nursing; now several eminent publishing houses vie with each other in ministering to the needs of student nurses. One of the generous contributions of medicine to nursing is the array of textbooks for nurses written by physicians, especially those on the sciences.

There are two or three excellent nursing periodicals of national scope, and several State and alumnæ publications.

Thus, roughly reviewing the general growth and development in nursing, we reach the most important element in the situation—the school of nursing. Contrasting the conditions in our leading schools to-day with those of the past, we may well feel that great advances have been made. Measuring them by the changing need in the large and growing field of work occupied by nurses, or by any generally accepted standards of professional education, they seem relatively small. It is little wonder, however, that they seem large to those who have labored to secure them, and know how slow and difficult the process has been, and how precarious often the gains made. For against suitable educational and other requirements for admission, the hospital sets its imperative need for large numbers of workers irrespective of the fine shades of qualifications; against reasonable hours of duty for student nurses, it holds up the undeniable necessity of the sick for nursing service. There is a clearly discernible tradition in most hospitals that every hour the nurse spends in the class-room or study is taken away from the patients to whom by right it belongs. Against the indispensable costs in any deserving scheme of education the hospital opposes its lack of resources for such purposes. But costs must be placed somewhere. They are incurred in a measure for every act, and are as inevitable as death. Somebody always pays. And schools of nursing, which in the very nature of things should be a matter of constant and appreciable expense, have been for years, through the service of their students, contributors to hospital incomes.

In a sense the superintendent of a school of nursing is ever at war with herself. She is not only the director of the school but of the nursing service, and her desire to take good care of the sick is presumably as great as to provide adequate training for her students. In her battlefield, which the hospital is, the balance between them is struck with difficulty. Hospitals should be placed in a position to pay for such nursing and other services as they require, and the value of the services of students should not enter the situation. A sort of haunting nightmare of every superintendent of nurses is, I suppose, something like this: How shall I be able to secure enough applicants to form a class of students to enter next September which will be large enough to take care of this hospital full of sick persons? But this should never be her real problem.

Of genuine and permanent improvements, the most outstanding would probably be found in the quality of teaching and supervision, and in the enlargement and wider range of instruction. The employment of trained teachers in schools has now been going on for about 10 years, and is steadily increasing, and this, together with the introduction in 1914 of a curriculum for schools of nursing, has helped to strengthen teaching in nearly every subject.

The preliminary courses which offered something in the way of a reform 20 years ago are now found in most schools of good standing, and they have done much to insure at least a minimum of sound teaching in the sciences.

Hours of duty are still a most serious problem. With the exception of the State of California, in which student nurses in hospitals come under the provisions of the 8-hour law, the 8-hour day has made slow headway in hospitals generally. A 9-hour day is still the working day for students in the majority of hospitals, and 12 hours the all but universal system for night duty.

There is no one condition which stands more squarely in the path of progress in nursing than this survival of long hours for student nurses in hospitals. It is difficult to refrain from asking why they should be longer tolerated in institutions devoted to the saving of human life and health. One would naturally expect the whole purpose and spirit of hospitals to find appropriate expression in measures for conserving and safeguarding the strength and energies of those whom it employs.

The difficulty in giving the desired amount and variety of instruction within the two-year course led to the extension of that course to three years. This was begun with the highest hopes of effecting numerous improvements in the whole scheme of training; but as time went on it became increasingly clear that the third year was of great importance to the hospital but of most uncertain benefit to the students as a body. The third year was virtually swallowed up by the hospital and became largely an added year of experience, often in services in which the student had already spent her required number of months.

Those with some promise of executive ability were placed in charge of wards or other departments, spending from 6 to 10 months in this capacity. The length of the period of night duty, already too long, was extended, sometimes to 10 or 12 months, as was also almost universally the length of the period of service in the private wards either on general or special duty. Except in a few instances, no new branches of training were available and no resources to develop new courses of instruction or to find adequately qualified teachers for them. The amount of theory offered in the third year is sometimes less than half of the amount given in the first and second year, and the school is evidently put to it to find either subjects or teachers to fill this period creditably with instruction. The work of the third year must either be required or elective. If required, then the training and instruction given must offer equal opportunity for all.

Now the electives offered are few, suited only to the capacities of a small number, and are chiefly in the form of experience unaccompanied by instruction.

Eventually, after a trial of years, it seemed evident that a proper use of the students' time was probably impossible, and that the attempt to improve the education of nurses by thus lengthening the course of training was not, under the existing system, a sound or just policy. To me, at least, it finally became entirely clear that we had not made the best possible use of the two-year period of training before embarking upon the third year, and that what we now must do was to retrace our steps and study carefully the whole of the two-year course with the view of finding out just what could be done to make the best possible use of the students' time. It is because I take the ground, as the report does, that the training school must remain for some time to come within the hospital, as it now is (though I hope with increasing freedom to pursue its work), that I am willing to see the three-year course to which I looked forward years ago with highest hopes reduced to a period which can be properly used within the hospital. It is not against three years of training (in itself), but three years in the hospital, that one finds oneself opposed. The appeal made by this Society of Superintendents of Schools of Nursing to the Carnegie Foundation in 1911 to make a study of the work in schools of nursing testifies to our growing anxiety over our educational problems, which we seemed powerless to solve unaided. Upon the school of nursing in the final analysis all true progress in nursing must depend. Its standards and methods and its ideals are matters of serious moment, not only to nurses but to all who are or may be concerned with sickness or the safeguarding of health; in a word, the entire public.

The education of nurses has long been a favorite subject for controversy, but it is not always realized that schools of nursing hold a peculiar relationship to hospitals, whose needs and interests they have universally been created to serve. They have not, therefore, either the freedom, the power, or the resources to deal adequately with their very complex educational problem, or to develop their schools beyond a certain point. This should always be remembered in any discussion of their work. Ten years later, however, such a study was in progress. The developments in the field of nursing had reached a stage where a serious study of the method of training had become imperative, and financed by the Rockefeller Foundation, directed by a committee representing medicine, nursing, and the laity, the entire system of education in nursing has been subjected to careful scrutiny and impartial evaluation. The study has occupied three years, was conducted by experts in various branches of education, and guided by a trained investigator of eminence in her particular field—Josephine Goldmark. This study, with the full report which has just been published, is an event of the first magnitude, and it is difficult to estimate in any adequate way the effect which it will have upon the whole nursing situation. Already it has clarified to the public mind a number of obscure or complex issues, and has served to set in motion that discussion and consideration of the desired changes in method which is the first step toward their realization. Every nurse should not only study this report but should bring it to the attention of as large a number of others outside of nursing as can be reached. The report should be in the hands of all hospital trustees and of physicians concerned with the education of nurses.

There is one point in the report which we must not overlook, Nursing had always cut a wide swath in its own conception of its task, and has brought thereby within the range of its own efforts much that had little to do with nursing, and a good many patients whose ailments were not such as to require the skilled care of a trained nurse. Having accepted the idea that trained attendants are necessary in the care of certain mild forms of sickness, it is incumbent upon us to live squarely up to our convictions. We shall need to apply that same zeal, energy, and resourcefulness in our efforts to train attendants that we apply to our other problems. There should be a committee at work on this matter in every State, selecting sutiable places for training, working out appropriate ways of finding a suitable supply of applicants, advising and guiding every step of their training, and continuing to safeguard their practice and working lives in every practicable way in order not only that those who employ them but that these workers themselves may be protected.

Surveying the course of events during the years in which we have been struggling with our educational problems, one is tempted to wonder if the decisive moment in our educational progress may not have come unseen and unrecognized on the day when some part of the education of nurses passed out beyond the hospital and into the university—when some institution became interested in the education of nurses which did not need or desire to profit by their services—the day when Isabel Hampton, with the support of this society, prevailed upon the dean of Teachers College to open her doors of that department of Columbia University to graduate nurses. For within a few years an organized body of instruction for nurses was built up there, a professorship in nursing established, and the first endowment for the university education of nurses received through which the college was enabled to lay the foundation for the training of public-health nurses. Within a few more years, that valorous friend of nursing, Doctor Beard, had brought about the establishment of a University School of Nursing in Minnesota, and how this has been followed by similar schools in other States you all know. The past few weeks have seen another step forward, in the founding of two more schools of nursing, on a distinctly new basis. These are the schools at Western Reserve University, Cleveland, endowed by Mrs. Chester Bolton, and at Yale University, by the Rockefeller Foundation. Greatly as we have rejoiced in every new link which connects nursing with the university, we have here cause for deeper satisfaction. Schools of nursing in the past have all lacked two great essentials: First, adequate funds for their support; second, an administrative body charged with the responsibility of conducting educational work. What sets this new school at Yale University far in advance of any other in its possibilities is that it has seen these two conditions as fundamental to the proper education of nurses. The school is to have its own funds (I deliberately put these first), its own dean, faculty, buildings, and equipment. Although the plans are not fully formulated, there is little reason to doubt that the school at Western Reserve University will follow a somewhat similar plan.

So at last we have reached the stage where these things—the everyday conditions of other forms of professional education—are now to be applied to the education of nurses. The school at Yale University is avowedly committed to an experiment, a much-needed and most important one in our educational field. Our Miss Goodrich, who has undertaken this task, is by temperament and habit a pioneer and a resolute and adventurous one. She has no fear of treading any new path. Her capacity for brilliant leadership is well known, and her long and richly varied experience in administrative tasks in nursing will enable her to make the fullest possible use of the inspiring opportunities and resources before her. The loss at Teachers College of her devoted work for our students is very great. There is no one who can take her place. There never in fact could be anybody to do that. But our interest in the important educational experiment she is courageously attacking is almost as great as her own; our anxiety to help forward new things in nursing is a part of our very being.

The picture of the growth of nursing as I have tried to sketch it outlines only main factors in our progress and not all probably even of them. How coldly bare and formal it all sounds in the mere recital, how full in actual life it has been of warm devotion and of splendid energy, of heroic tasks carried through with unfaltering courage and of the common daily tasks patiently and faithfully fulfilled. Our golden age, however, is not in the past, it is in the future; and the best inheritance we can carry over from the past is the spirit which has brought us through these difficult years with undiminished courage and unshaken faith in the beliefs and principles for which we have striven.

That spirit leads one to seek ever a better way; leads one to question, to grope for the right solution to the difficult problem. Following where it leads one may falter, may fail if need be, but the spirit which giveth life survives error, survives even failure. It alone leads to progress.

BOOK NOTICES

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

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

For review.

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

THE PRINCIPLES AND PRACTICE OF DERMATOLOGY, by *William Allen Pusey, A. M., M. D., professor of dermatology in the University of Illinois, emeritus; past president of the American Dermatological Association; president elect of the American Medical Association.* Fourth Edition. D. Appleton & Co., New York, 1924.

It was the writer's privilege to review the last edition of this book, and it is a pleasure to again read and gain instruction from Doctor Pusey's work. The style of expression is lucid. The description of the several diseases and conditions is clear, definite, and satisfying and therefore easily grasped. The author states in the title-page that the book is "designed for students and practitioners." He has succeeded in his purpose, for one must highly commend the work to those interested in the field. Much new matter is observed. The author has endeavored to retain the good of our former knowledge and also to keep abreast of advances being made in the specialty introducing the most reliable of the new data. The reviewer is particularly impressed by the chapter on syphilis, the discussion of this subject in all its phases being most complete and up to date. That section treating on the Wassermann reaction has been thoroughly revised.

The author states that "perhaps the most important practical addition to a knowledge of dermatology in the last few years has been the bringing home to us the fact of the very great importance of fungus infections in the production of eczema." He has endeavored to cover this new data, reference being found under the headings of eczematoid dermatitis and eczematoid ringworm of the extremities, as well as in paragraphs treating with the factor of bacteria and fungi in the causation of dermatitis.

The illustrations are excellent and numerous.

The contents are well arranged and the printing is clear-cut and pleasing to the eye.

A Practical Medical Dictionary, by *Thomas Lathrop Stedman, A. M., M. D.* Eighth edition. William Wood & Co., New York, 1924.

The first edition of this work appeared in the spring of 1911, the second in the autumn of 1912, and since that time a new edition has been called for every second year, indicating the popularity of the volume and the rapid advance in medical terminology. New terms coined since the appearance of the last edition have been most numerous in the fields of biologic chemistry, endocrinology, immunology, and neurology, yet it is apparent that in the revision of the text each branch of medical science has received its share of new terms. In order to make room for many hundreds of new titles the entries regarding mineral springs in this country and in Europe which appeared in former editions have been dropped. An innovation is the inclusion of many terms relating to dentistry, which is becoming very closely allied to the practice of medicine.

The Treatment of the Common Disorders of Digestion, by *John L. Kantor, Ph. D., M. D., chief in gastrointestinal diseases, Vanderbilt Clinic, Columbia University; associate gastroenterologist and associate roentgenologist, Montefiore Hospital for Chronic Diseases, New York City.* The C. V. Mosby Co., St. Louis, 1924.

This book will serve as an excellent guide in the treatment of those forms of digestive disorder most commonly met in practice. Beginning with a discussion of general principles and methods, the author proceeds with clarity and precision to a consideration of the general management of functional digestive disorders—those disturbances of the nerve control of digestion arising independently of gross lesions of the organs involved in the process.

An illuminating chapter is that on the treatment of ptosis and the asthenic state, a subject which until very recently has received but scant notice in textbooks. The asthenic patient with ptosis may be considered as being in a state of chronic fatigue or exhaustion. The primary indication in treatment, therefore, is rest, both mental and physical. An endeavor should be made to overcome the diminished intra-abdominal pressure and the drag and malfunction of the displaced viscera by increasing the intra abdominal fat by forced feeding and improving the configuration of the body by means of special exercise. Abdominal support is indicated in every case of ptosis and the principles involved in the application of the various supports applied in this condition are outlined.

It frequently happens that one is called upon to treat symptoms or an entire syndrome before it is possible to make a differential diagnosis. In digestive diseases we frequently encounter a syndrome of gastric irritation which is associated with one or more of the following disorders of gastric physiology: Hyperacidity; hypersecretion; hypertonicity, which may lead to spasm of the orifaces; hyperperistalis; and hypermotility, causing rapid gastric emptying.

The symptoms of this syndrome are commonly epigastric distress, weight or fullness after meals; hunger distress or pain; heartburn; belching; occasionally vomiting, and the underlying causes are various. The general management of these cases, the diet required, and the drug therapy employed is fully indicated by the author.

Several chapters are devoted to the treatment of gastric and duodenal ulcer. There is an excellent chapter on the treatment of delayed gastric emptying. Much space is properly allotted to a discussion of the treatment of constipation and the treatment of the diarrhœas.

There are excellent chapters on the treatment of achylia gastrica, the treatment of gall-bladder disease, and the treatment of headaches associated with indigestion.

MODERN METHODS OF TREATMENT, by *Logan Clendening, M. D., assistant professor of medicine, lecturer on therapeutics, medical department of the University of Kansas; attending physician, Kansas City General Hospital.* The C. V. Mosby Co., St. Louis, 1924.

This is a readable volume in which the author presents a comprehensive statement of the accepted modern thought and practice upon the treatment of disease. The book is unique in several respects. The author, with happy results, has employed the historical method of approach in his discussions of the various therapeutic methods which experience has shown to be of value. This method is made of more interest to the reader by quoting at some length the words of those clinicians who first struggled with the problems involved in the use of a given method of treatment. At the end of each chapter he has placed a short list of references. These refer largely to articles written in English and to publications easily available, as it has been his experience that most medical students are not familiar with German and French; hence, they avoid references to medical literature published in these languages.

The author considers his subject in two parts. In the first part he discusses the methods used in treatment, such as rest, drugs, biologic therapy and prophylaxis, extracts of the ductless glands, dietetics, hydrotherapy, medical gymnastics and massage, exercise, electrotherapeutics, radiography, climate, heliotherapy, mineral springs, health resorts, psychotherapy, and various miscellaneous procedures. Among the latter are blood transfusion, venesection, lumbar puncture, the technical procedures used in diseases of the chest and in gastrointestinal diseases.

The second part deals with the application of therapeutics to particular diseases, namely, the infectious diseases, those due to allergy, diseases of metabolism, of the blood, of the cardiovascular, respiratory and digestive systems, of the kidney and of the ductless glands.

The book is profusely illustrated and is gotten up in the excellent style characteristic of the publishers.

DISEASES OF MIDDLE LIFE. THE PREVENTION AND TREATMENT OF THE MORBID PROCESSES OF SPECIAL SIGNIFICANCE IN THIS CRITICAL LIFE PERIOD, COMPRISING TWENTY-TWO ORIGINAL ARTICLES, by various eminent authorities, edited by *Frank A. Craig, M. D., associate director of the clinical and sociological department of the Henry Phipps Institute of the University of Pennsylvania,* in two volumes. F. A. Davis Co., Philadelphia, 1923.

These two volumes contain a series of monographs covering those diseases which are most common during middle life or which have a bearing upon the health, efficiency, and well-being of the individual during that important period.

The authors of these monographs have selected this age period for special consideration because it is during this time of life that one detects the first appearance of many of those maladies which have the most important bearing upon the length of life of the individual and upon the efficiency and well-being of old age. Nearly all of these disease processes are most amenable to treatment during the early stages, hence, the recognition of their presence during middle life is essential if the individual is to enjoy the greatest possible degree of usefulness in his later years.

Medical officers who are concerned in the annual physical examination of officers will find these volumes of assistance in advising and treating those individuals in whom examination has revealed the presence of some signs or symptoms indicative of a beginning pathological process; in estimating the relative importance of various evidences of disease from the standpoint of efficiency and duration of life; in affording an outline of the most approved methods for the detection of these evidences of disease.

The first volume contains papers on diet, muscular exercise, and occupation in relation to middle life, diseases of the heart, arteries, kidneys, respiratory tract, ear, nose and throat, diabetes mellitus, bronchial asthma, hay fever, and bronchitis. The second volume deals with the gastric disturbances of middle life, diseases of the intestines, liver, gall bladder and pancreas, male genito-urinary tract, skin, blood and eye, nervous and mental diseases, the inflammatory arthropathies, gout, obesity, and cirrhosis of the liver.

The contributors of the various articles are authorities in the special branch covered in each paper, and the editor is to be congratulated on securing the services of so many men of special training, experience, and judgment.

AMPUTATIONS. OPERATIVE TECHNIQUE, FORMATION AND AFTER-TREATMENT OF THE STUMP FROM THE STANDPOINT OF PROSTHESIS. A STUDY BASED ON SEVENTEEN HUNDRED CASES OF AMPUTATION FOR INJURIES AND DISEASE OCCURRING IN THE WORLD WAR AND SINCE ITS TERMINATION, by *Norman Thomas Kirk, M. D., F. A. C. S., Major, Medical Corps, U. S. Army, chief of the amputation section, U. S. General Hospital No. 3, Colonia, N. J. and chief of amputation and orthopaedic section, Walter Reed General Hospital, Washington, D. C.* Medical Interpreter Co., Washington, D. C., 1924.

Surgeon General Ireland, in the introduction of this book says: "The author of this manual has drawn upon an extensive experience in this particular field * * * and it is believed that his discussion of the best methods of obtaining the desired results will fill a definite place in the field of war and industrial surgery and prove to be of great assistance to the surgeon engaged in this line of endeavor." The chapter headings are: Chapter 1, "The ideal stump; the closed method; the guillotine or open method." Chapter 2, "Amputation of the upper extremity." Chapter 3, "Amputation of the lower extremity." Chapter 4, "The guillotine stump; its preoperative treatment; operative and plastic repair; postoperative care; treatment of infected bone and soft parts." Chapter 5, "The care of the stump; joint deformities." Chapter 6, "Temporary prosthesis; types of prosthesis, their fitting and instruction in their use."

This is a very practical and valuable manual, which will be found useful to the hospital surgeon and to the medical officer on board ship who may be called on to do an occasional amputation.

CANCER, HOW IT IS CAUSED; HOW IT CAN BE PREVENTED, by *J. Ellis Barker*, with an introduction by *Sir W. Arbuthnot Lane, consulting surgeon at Guy's Hospital, London.* E. P. Dutton Co., New York, 1924.

It is well known that cancer is on the increase in all highly civilized countries; in fact the mortality of cancer has more than doubled during the past few years, not only in the United States but in England and other countries. We know very little about the etiology of this insidious disease, hence any well thought out theory concerning the cause deserves serious consideration. The author of this book is not a medical man, but for many years he has been a writer trained in bringing together masses of facts and statistics and deducing their meaning. Becoming interested in the subject of cancer, he made an extensive study of it and evolved a theory as to its causation. In order to test the soundness of his theory he went through the vast literature bearing on cancer and accumulated an enormous number of facts supporting every point in his argument. As a result the book is a veritable storehouse of information.

The author believes that cancer is due to chronic poisoning and vitamin starvation. Chronic poisoning leading to cancer, he believes, is due partly to autointoxication, following constipation, to bowel poisons which are formed in consequence of the consumption of foodstuffs which have been deprived both of the vitamins contained in them and of the rougher material, such as the husks of grain, the skin of fruit, and the coarser vegetable fiber. Partly it is due to the continued absorption over a period of years of chemical poisons, among which food preservatives are most important.

The preventive measure advocated is to remedy the faults of modern feeding and defective personal hygiene which contributes to constipation.

Just how tenable time will prove Mr. Baker's theory to be, we can not say. The theory is plausible and deserves serious thought. Unfortunately he offers no solution of the problem of feeding the population of large cities who must depend on the cold-storage preservation of food and the various refined products of the food industry.

The book is well worth a careful perusal for the mass of information it contains concerning cancer, the faults of modern feeding, and personal hygiene.

If the treatment advocated does not prevent cancer, it will certainly be productive of a ripe old age.

TOXICOLOGY, by *Frank P. Underhill, Ph. D., professor of pharmacology and toxicology, School of Medicine, Yale University.* P. Blakiston's Son & Co., Philadelphia, 1924.

The subject matter of this small volume has formed the basis of the author's course of lectures given to students at the Yale University School of Medicine. In it are a discussion of the principles of toxicology and short, concise descriptions of the effects of the various poisons on the organism, the post-mortem findings and treatment. No attempt has been made to enter into the details of the chemical reactions involved in the isolation and identification of poisons, as these matters have been adequately treated in several well-known books on the subject. The volume is of use as a handy reference book of the essentials of the science of poisons.

MANUAL OF THE DISEASES OF THE EYE, by *Charles H. May, M. D., director and visiting surgeon, eye service, Bellevue Hospital, New York; consulting ophthalmologist to the Mount Sinai Hospital, to the French Hospital, to the Italian Hospital, New York.* Eleventh Edition. William Wood & Co., New York, 1924.

Twenty-four years have passed since Doctor May gave to the medical profession the volume which he intended should serve the student and the general practitioner of medicine as a concise, practical, and systematic manual of the diseases of the eye containing the fundamental facts of ophthalmology. The book attained an immediate popularity which has never diminished. Over 150,000 copies have been sold. Eleven editions have appeared in the United States and five in Great Britain. The book has been translated into Spanish (seven editions), French (four editions), Italian (five editions), Dutch (four editions), German (two editions), Japanese (two editions). A Chinese translation appeared in 1923.

The eleventh edition, which has just come from press, follows the general plan of the former editions. The chapters on the disturbances of motility and on uveitis have been rewritten, and some of the illustrations have been replaced by better ones. A few colored plates and halftone illustrations have been added.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

REVIEW OF RECENT SCARLET FEVER LITERATURE[1]

By Surgeon R. E. DYER, United States Public Health Service

The almost constant presence of the streptococcus in the throats of patients suffering from scarlet fever has been known for several years, but it has only been within the past few years that its etiologic relationship has been definitely established. Its presence was early noted in many of the complications of scarlet fever; and as early as 1902, Moser and Moser and Von Pirquet prepared immune serums using the streptococcus of scarlet fever as an antigen, and reported apparently favorable results. At that time it was noted that these serums would agglutinate specifically various strains of hemolytic streptococci isolated from cases of scarlet fever, but would not agglutinate hemolytic streptococci from other sources. These results were, in general, confirmed by Meyer in 1902 and by Rossiwall and Schick in 1905. Others, however, as Hasenknopf and Salge, Aronson, and also Neufeld, were of the opinion that it is not possible to differentiate between different types of hemolytic streptococci by agglutination reactions. In 1905, Jochmann in a review concluded that the streptococci are the most common and most dangerous secondary infections in scarlet fever but are not the causative organisms. This view was generally accepted for several years.

In 1914, G. F. Dick and G. H. Dick cultured blood from 24 cases of scarlet fever, using anærobic methods, getting cultures in 20 cases. They described a number of organisms, among them an hemolytic streptococcus, from seven cases. From the throat and blood in other cases they cultured a spore-forming organism that produced a rash and desquamation in a guinea pig. They compared the organisms found in the blood cultures and organisms present in the throat and urine and concluded that during acute scarlet fever the

[1] Read and discussed before the fortnightly meeting of the staff of the United States Hygienic Laboratory, Washington, D. C., Sept. 5, 1924.

organisms enter the blood stream in considerable numbers and are excreted in a viable condition through the kidneys and that this fact may have some connection with the development of scarlatinal nephritis.

In the same year Krumwiede, Nicoll, and Pratt attempted to produce scarlet fever in monkeys, success having been reported by Cantacuzene and Bernhardt. They were led to try this through a laboratory accident. Two years before a laboratory assistant, while preparing a suspension of streptococci, sucked some of the suspension into her mouth and developed scarlet fever. The organisms in the suspension were 2 hemolytic streptococci and 2 *Streptococcus viridans* from scarlet fever throats, 3 hemolytic streptococci from mastoiditis, 3 from puerperal sepsis, 1 from erysipelas, and 1 green streptococcus from erysipelas. They smeared the throats of monkeys with this same suspension with negative results. They injected blood intraperitoneally into monkeys from a scarlet fever case on the fourth day of fever. They also tried nose and throat discharges from patients into the throats of monkeys. All their results were negative.

In 1919 and 1920 Dochez, Avery, and Lancefield succeeded in differentiating the different types of hemolytic streptococci by agglutinin absorption tests. Four types were originally described and two more added later. Bliss studied 25 strains of hemolytic streptococci from 25 scarlet fever cases and found that 20 of these were agglutinated by 4 different antistreptococcus Sera made with streptococci from scarlet fever cases. None of the 25 were agglutinated by 5 sera from streptococci of nonscarlatinal origin. Tunnicliff the same year isolated 27 strains of hemolytic streptococci from early cases of scarlet fever; 20 of these were from the throat, others from such complications as otitis, finger infections, etc. She tested these by agglutination and by agglutinin absorption and the opsonic index. She concluded that the serum of sheep immunized with hemolytic streptococci from throats and complications of scarlet fever contains opsonins and agglutinins for hemolytic streptococci of scarlatinal origin, but not for hemolytic streptococci found in other conditions.

Gordon in 1921 found that the streptococcus present with the greatest constancy in the throats of scarlet fever patients could not be distinguished culturally or morphologically from the streptococci from other sources. He then typed by agglutinin absorption several strains of hemolytic streptococci and found that they fell into three groups or types. Sixty-six of sixty-eight strains from tissues other than scarlatinal fell into his type I, one into type II, and one into type III. Ten strains from puerperal sepsis fell into type I. Thirty-five strains from all parts of the respiratory tract from nonscarlatinal cases gave thirty-one in type I, one in type II, and three in type III. Eighteen strains from the throats of early cases of scarlet fever gave sixteen in type III and two unidentified with either of the three types. Summarizing, he states that type I is the *Streptococcus pyogenes* and is the common one in localized or general streptococcic infections, type II is rare, and that type III is found chiefly in scarlet fever. He made the statement in closing that "The opinion that this streptococcus represents merely a secondary infection in scarlet fever since it was based mainly on the view that it is indistinguishable from specimens of the *Streptococcus pyogenes* recovered from sources other than scarlet fever is no longer tenable. The possibility, therefore, must be realized that the streptococcus in question may ultimately be established as the essential cause of scarlet fever."

Tunnicliff, in 1921, made agglutination tests on twenty strains of hemolytic streptococci (isolated from the rooms and eating utensils of attendants of scarlet fever cases) against serum from a sheep immunized with a hemolytic streptococcus from the throat of an acute case of scarlet fever. Five of the twenty were found to belong to the scarlet fever group of streptococci. She tried various other strains isolated from scarlet fever patients and found that they agglutinated with this serum. She also found that the hemolytic streptococci disappeared from the throats of scarlet fever cases in from three to four weeks but remained in the discharges from the ears for a much longer period.

Bliss found the hemolytic streptococcus in 100 per cent of all scarlet fever patients cultured in the first week. It was the predominating organism during the first few days and diminished after the first week. It was found still present as late as the twelfth day. He gave the average length of time that these organisms are carried in the throats of patients as 10 days. In one case he found it as late as one year after an attack. He also found that ten immune sera prepared from different strains of scarlet fever streptococci agglutinated more than 80 per cent of the strains isolated from scarlet fever throats. On the other hand scarlet fever streptococci were not agglutinated by immune sera prepated from hemolytic streptococci isolated from other sources. He reported also one carrier and the specific streptococcus in the throat of one contact with a case of scarlet fever.

It may be well to mention that in 1921 di Cristina isolated a small gram positive anærobic diplococcus from blood and bone marrow of patients with scarlet fever. This was confirmed by Catteruccia, Vitetti, Ritossa, Caronia, and Sindoni. The latter two state in 1923 that they constantly find this organism in scarlet fever and that they have produced in young rabbits a clinical picture resembling human scarlet fever. Their cultures are very turbid and the organisms few in smears, suggesting the presence of some ultra-microscopic form in addition. They claim positive agglutination and complement fixation tests and also a passive immunity conferred upon infected rabbits by serum of human convalescent scarlet fever cases and the active immunization of children by killed cultures and later tested by exposure to scarlet fever. They injected five children with their cultures and developed what they considered an attenuated form of scarlet fever. In a later publication Sindoni (March 1, 1924) gave three intramuscular injections (2 cubic centimeters each) of di Cristina's organism (killed) to 292 persons. One of the 292 ("a nursling") later contracted scarlet fever. The others, although exposed, remained healthy.

Mallory and Medlar, in 1916, described a small gram positive bacillus from cases of scarlet fever and state that it seems reasonable to infer that scarlet fever may be due to this organism. He mentions streptococci as early secondary invaders and states that, "When the streptococci are abundant the bacilli of scarlet fever usually disappear quickly."

EXPERIMENTAL SCARLET FEVER

Hektoen, writing in January, 1923, stated that the first experiments in inoculating scarlet fever into man were probably made in the first half of the nineteenth century with scales and miliary vesicles. Stoll is quoted before 1830 as having produced scarlet fever by inoculation with scales. Rostan, in 1830, stated that scarlet fever is the result of a specific cause susceptible of inoculation. Miguel, in 1867, inoculated a 28-months-old girl with material from a vesicle from a scarlet fever case on the third day. Thirty hours later a zone of redness appeared which remained two or three days. Subsequent inoculation from another case produced no result. He then inoculated two children, one 1½ years old, the other 9. Local redness followed. These children were later made to sleep with a sister who had scarlet fever and neither contracted it. Others had no success. Hudson, in 1862, described some accidental cases of scarlet fever arising from smallpox vaccinations. The scabs for the smallpox vaccinations were taken from boys, who had scarlet fever about the time of the development of their vaccinations, and were used to vaccinate 30 children, 23 of whom came down with scarlet fever on the fifth or sixth day. These inoculated cases of scarlet fever were all mild, but secondary cases from these were malignant.

Greenbaum, in 1904, obtained doubtful results in a chimpanzee which he swabbed with throat mucus from a case of scarlet fever. Hektoen and Waller in 1911 had negative results with rhesus monkeys. Cantacuzene, in the same year, claimed that he had transmitted the disease to a number of lower animals with blood and lymph nodes suspensions, also (1911) Landsteiner, Levaditi, and Prasek claimed successful inoculation in a chimpanzee. With the exception of this last case, no test was made of immunity. Draper and Hanford review the above animal experiments and decide that the symptoms in all cases were doubtful at least.

Takahashi, in 1921, attempted to inoculate his own children with blood from scarlet fever cases taken on the sixth day. No symptoms followed. He later smeared their throats with throat secretions from scarlet fever cases on the fourth day. No symptoms developed from this, so he concluded that he had protected the children by his previous inoculations.

Dochez and Stevens state that in 1921 they produced scarlet fever in a dog. There was a rash for 48 hours, followed by desquamation. They failed to repeat this. They then tried monkeys, rabbits, rats, mice, hogs, and guinea pigs, and state that they produced in hogs and guinea pigs the main features of scarlet fever—fever, leucocytosis, loss of weight, transient erythema on the second and third day, and general desquamation, especially of the pads of the feet in guinea pigs, on the eighth to the twelfth day. Dochez says " It seems, therefore, that the circle is complete; first, the streptococcus is present; second, it is a specific streptococcus; third, the lesion can be produced in guinea pigs; fourth, it can be differentiated immuniologically from other streptococci; and fifth, an animal immunized with this organism produces a serum which can cause the local disappearance of the rash, as does the convalescent serum of the patient."

In 1921, G. F. and G. H. Dick reported some inoculation experiments on volunteers between the ages of 18 and 35 who gave no history of having had scarlet fever. There was no statement as to whether these volunteers were from rural districts or from the city. The Dicks drew blood from four cases of uncomplicated scarlet fever shortly after the onset, in one case just as the rash was appearing. The blood was allowed to clot and then centrifuged. Within 15 minutes of the time the blood was drawn the blood serum was swabbed on the tonsils of four volunteers, one volunteer to each serum. The results were negative. They obtained new serum in the same way from six cases of scarlet fever and inoculated six volunteers subcutaneously. Neither local nor general reaction followed. Whole blood was tried on five volunteers with negative results. It was attempted to learn whether the disease was caused by a filterable virus by filtering throat mucus from cases through a Berkefeld N filter and then swabbing the filtrates on the throats of volunteers. The results were negative. They had scarlet fever patients gargle bouillon. They then filtered the bouillon and injected the filtrate subcutaneously with negative results. Three of the volunteers on this last experiment (receiving the largest doses—2 cubic centimeters) showed slight local redness the next day, disappearing in 48 hours. Complement fixation tests with streptococci from scarlet fever throats as antigens with serums of cases and convalescents gave inconclusive results. However, the hemolytic streptococci gave a higher percentage of positives than other streptococci, for example, *Streptococcus viridans*. Using blood agar, they then isolated pure cultures of hemolytic streptococci from early scarlet fever cases. These cultures were swabbed on the throats of 30 volunteers. As a result 23 of these were entirely negative, 7 showed sore throat, fever, leucocytosis, but no rash. These 7 varied in age from 22 to 34. They also tried to transmit scarlet fever with a pleomorphic organism from a scarlet fever case. Sore throat was produced in 2 of 9 volunteers, 1 of the two showed a rash on the palate. One of their conclusions was: "The 30 streptococci throat inoculation experiments constituted a series large enough to discourage further experiments of the same kind with hemolytic streptococci."

However, in October, 1923, they reported the isolation of a hemolytic streptococcus from the infected finger of a nurse with a mild case of scarlet fever. (This organism gave acid in mannite.) With this organism they produced scarlet fever in one of five volunteers by swabbing the cultures on the tonsils and pharynx. The Berkefeld V filtrate of a blood agar culture in the water of condensation was negative on five volunteers by throat and subcutaneous inoculations. Four of these same volunteers were later inoculated with the unfiltered 4-day-old culture with one resulting case of scarlet fever. They concluded that the two cases of scarlet fever were probably caused by the hemolytic streptococcus or some organism closely associated with it in cultures and that the conclusion that all cases of scarlet fever are caused by this organism is not justified.

Then in January of this year they reported recovering a hemolytic streptococcus from each of 100 cases of scarlet fever; 16 per cent of these fermented mannite and 84 per cent did not. As the two experimental scarlet fever cases reported in October, 1923, were caused by a hemolytic streptococcus which fermented mannite, they swabbed one of their nonmannite fermenters on the tonsils of two volunteers, one of whom showed a positive skin test (first described in the same journal carrying this article), the other showing a negative skin test. The positive skin test volunteer developed scarlet fever and the other did not. They then concluded that since the organism had been shown to be constantly present in scarlet fever and had caused the disease, it was the causative organism of scarlet fever.

SKIN TEST FOR SUSCEPTIBILITY

As a companion article to the one just mentioned, G. F. and G. H. Dick published a description of their skin test for susceptibility to scarlet fever. They made intracutaneous injections of the Berkefeld V filtrate that had failed to cause scarlet fever in volunteers. These injections caused reactions more frequently in persons who had not had scarlet fever than in those convalescing from scarlet fever. They used a 1:1,000 dilution in normal salt. (It was later passed through a Berkefeld W filter without affecting its action.) 0.1 cubic centimeter of this dilution was used in the skin of the forearm. Positive reactions began to appear from 4 to 6 hours after inoculation. First a small circular area of erythema; this increased and reached its maximum size and intensity in 18 to 36 hours. Less strongly positive reactions reached the maximum in 18 to 24 hours. The reddening was frequently associated with some swelling of the skin. Soon after reaching the maximum the erythema began to fade. None persisted over 48 hours. They made their readings at 24 hours. A faint yellowish area was left which sometimes desquamated in a week or 10 days. They classed the reactions as negative, slightly positive, positive, and strong positive, giving the criteria for each.

They made tests on 65 convalescents (2 to 35 years old, on seventh to thirty-third day of disease and found 62 negative and 3 slightly positive; 16 with history of scarlet fever (3 to 47 years old); scarlet fever 6 months to 37 years before = 16 negative; 72 with no history of scarlet fever (12 months to 33 years old) = 35 negative, 7 slightly positive, 17 positive, and 13 strong positive. They controlled possible reactions from foreign proteins in culture medium by injecting the undiluted fluid from sterile culture medium.

They then took fresh serum from a convalescent scarlet-fever case and mixed it with an equal volume of a 1:100 dilution of their filtrate, a second portion of the 1:100 dilution was mixed with an equal volume of a normal salt solution, and incubated both mixtures 30 minutes. Then these mixtures were tested on a patient who had shown a strong positive reaction with the 1:1,000 dilution. The convalescent serum mixture was negative and the NaCl mixture a strong positive. This experiment was repeated five times, using a different convalescent serum and a different positive subject each time. Two nurses, with no history of scarlet fever, one with a slightly positive skin test and the other with a positive skin test, were each given 10 cubic centimeters of convalescent scarlet-fever serum. On the second day the skin tests were negative. A third nurse, with a strongly positive skin test, required three doses of convalescent serum in 10 cubic centimeter amounts before the test became negative. Later, 2 of the 13 strongly positive skin-test volunteers referred to above had scarlet fever, the skin test becoming slightly positive on the sixteenth day and negative on the twenty-eighth day in one and becoming negative on the eighteenth day in the second case. In this article the Dicks concluded that the skin test described bore a specific relation to immunity in scarlet fever.

The same authors in February of this year published the results of four experiments to produce active immunity by injection of the filtrate. In the first experiment a girl 9 years old, with no history of scarlet fever and showing a strongly positive skin test, was given 1 cubic centimeter of a 1:100 dilution of filtrate intramuscularly into the arm four days after the skin test. Local reaction followed in 5 hours; swelling and tenderness and reddening of the skin over the upper arm. Maximum in 36 hours; subsided early; no general reaction. Four days later 0.1 cubic centimeter undiluted filtrate was injected into the other arm. In 4 hours the child vomited; the temperature went to 101.4° by mouth; a light rash resembling scarlet fever developed over the arms and legs, more intense at 24 hours. There was less local reaction this time. The rash faded in 48 hours after the injection. During the third week following there was some desquamation of the hands. The skin was negative on the twenty-third day.

A second experiment was made on a young woman who showed a slightly positive skin test. Five cubic centimeters of 1:10 dilution were injected. This injection was followed by a marked local reaction. The skin test was unchanged on the eleventh day.

In the third experiment 0.075 cubic centimeters of undiluted filtrate was injected into a young woman who had shown a strongly positive skin test. A slight general reaction followed. The skin test was slightly positive 5 days later.

Fourth experiment: A young woman with a strongly positive skin test was given 1 cubic centimeter undiluted filtrate. Nausea, light rash, and a temperature of 101.6° followed. There was slight local reaction. The skin test became negative on the sixth day.

By heating the filtrate to various degrees and then testing, the Dicks found that at 90° C. and 100° C. for 20 minutes they got a negative skin test on known positive cases. At 55°, 60°, and 65° C. for 1 hour no change in the test was noted. It was concluded that the short incubation period after the administration of the filtrate and its heat resistance were evidence in favor of a toxin and against a filterable virus. It was also concluded that some degree of immunity had been conferred as judged by the skin test.

CONVALESCENT AND OTHER SERA IN DIAGNOSIS AND TREATMENT

In 1918 Schultz and Charlton stated that if 1 cubic centimeter of the serum from a normal person or from a scarlet fever convalescent was injected into the skin of a scarlet fever patient with a bright rash, there occured in about 6 hours a blanching of the rash over an area one-half inch to a few inches in diameter. The color of this blanched area was that of the normal skin. The duration of the phenomenon coincided on the whole with the general rash itself, or at least remained quite visible for several days. In a series of 46 cases of scarlet fever they produced blanching in 40 cases, 5 doubtful, and 1 negative. The source of the serum is not definitely given, but they do state that they could detect no qualitative difference between the action of normal and convalescent sera. They tried the serum from acute cases of scarlet fever on other scarlet fever cases with negative results. In these trials they found no positive blanching was produced by sera taken in the first 13 days of scarlet fever. (One of the sera was taken on first days of scarlet fever.) On the thirteenth day they got 1 out of 3 positive. On the twenty-first day they got 3 out of 3 positive. They then concluded that this power of blanching the scarlet rash was a property of normal serum, which was regained during convalescence "about the nineteenth day." In 1921 they stated that blanching had occured in 60 per cent of the cases tested on first day of the rash, 100 per cent of the cases treated on second day of the rash, 78 per cent of the cases tested on third day of the rash, 60 per cent of cases tested on fourth day of the rash, and none when tested on the fifth day.

Their conclusions were followed by Paschen in 1919, although Paschen tested the serum of a child five days before she had scarlet fever and found it negative. Neumann, in 1920, tested the sera of 59 cases of acute scarlet fever and found that only 3 gave the reaction. He also tested the sera from 3 cases of rubella and found these negative, but he regarded these as exceptions, and stated that if the serum gave a positive Schultz-Charlton it was not from a case of scarlet fever, and if the serum gave a negative reaction it was from a case of scarlet fever.

Mulson, in 1921, drew blood from convalescents 21 to 28 days after the appearance of the rash and from acute cases in the first 21 days from the beginning of the rash. He heated this serum to 56° C. for one hour and on testing found that heated and unheated sera reacted alike. He then injected serum from an acute case of scarlet fever and serum from either a normal person or a convalescent into the same rash. He got 53 per cent blanching in the first four days with convalescent serum; 40 per cent blanching in the first four days with normal serum. Sera from acute cases were always negative. He noted also that when the rash was faint or fading no blanching occurred. His conclusions were that serum from acute scarlet fever rarely produced blanching and that, in general, if no blanching occurred it meant little, but that if blanching did occur the serum was not from an acute case of scarlet fever. Tron, in 1921, failed to get as many positive reactions as the other workers. During this period, rashes of measles, various erythemas, serum and drug rashes were tested and found to be negative.

Rijo, in 1922, found blanching positive by the second day in 14 out of 18 acute cases.

Steinkopf, in 1922, using normal serum, got a positive result in 83.7 per cent of 49 cases she tested.

Mair, in 1923, noted that the rash sometimes reappeared over the blanched area, and considered it a toxin-antitoxin phenomenon. He took exception to the conclusion of Schultz and Charlton that the power of blanching was possessed of normal serum and was lost at the onset of scarlet fever, to be regained during convalescence, and stated that it was due to the lack of antitoxin in the blood during the early stages of the disease and that the positive results obtained with normal serum were due to immunity acquired by reason of unrecognized attacks, etc. He noted variability in the degree of reaction produced by the same serum on different cases and reported 1 negative and 17 positive reactions with the same serum on 18 cases of known scarlet fever. In 1921, Wöhlisch and Radecki noted a negative reaction on a fatal case. Mair explained this on the ground that there was more toxin present than could be neutralized by the antitoxin injected. Mair also noted the different degrees of reactions produced by equal amounts of different sera on the same rash. This he explained on the ground of different amounts of antitoxin present in different sera. He found that the serum developed its power to produce the reaction between the fifteenth and twenty-ninth days (25 cases). A 5-year-old girl's serum was negative four days before she developed scarlet fever, becoming positive on the thirty-eighth day of the disease. The sera of mother and newly born babies were found to coincide. He also found that a positive serum will retain its power after being heated to 55° C. for one-half hour and would remain active after nine months cold storage. He gave the quantity to be used as between 0.5 and 1 cubic centimeter. He prophesied that the organism when eventually found would be found to be a toxin producer.

Convalescent positive serum was probably first used in treatment of acute cases by Weisbecker in 1897, and during the following six years similar work was done by Huber and Blumenthal, Von Leyden, Rumpel, and Scholtz. The quantity of the serum injected was small and was given subcutaneously. Results were not striking nor constant, and the treatment fell into disuse for a few years. In 1912 Reiss and Jungmann tried larger doses intravenously, with favorable results. Weaver, in 1916, reported treating 19 cases of scarlet fever with favorable results. Zingher got favorable results with the intramuscular injection of whole citrated blood. Kling and Widfelt, in 1918, reported the use of convalescent serum in 237 cases; 17.7 per cent dide against a corresponding 91 cases with 70 per cent mortality and no serum. Bode, using instramuscular injections of 60 cubic centimeters of convalescent serum on 30 cases noted defervescence in 24 hours. He stated that the eruption was not modified or the complications warded off.

Weaver again, in 1921, used 60 to 90 cubic centimeters of serum intramuscularly on 54 severe cases; 38 he described as being toxic in type, 6 with septic complications. One of the toxic cases and one of the septic cases died. He also found little influence on septic complications. The toxic symptoms, however, were relieved markedly and very soon after the administration of the serum. He found the results more favorable if the serum was administered early, and advised the use of normal serum should no convalescent serum be available.

He mentions one patient, a young man, who received serum intramuscularly in the outer side of each thigh. An abscess from which "only hemolytic streptococci were grown" developed at one of the sites of inoculation. He concluded that the organisms were evidently already in the patient's blood, as the serum was shown to be sterile.

Favorable results with serum therapy have also been reported in the past two years by Debré and Paraf and by Mironesco and Sager. Daniél used whole convalescent blood on 35 severe cases, with 5 deaths. Ribeyrolles reported protection in exposed persons by injection with convalescent serum (January, 1923).

Dochez, in February, 1924, reported the production of an antiserum in a horse. He injected a small amount of liquefied agar into the cellular tissues of the neck of a horse. After this solidified he injected sedimented scarlatinal streptococci into the center of the agar nodule. The theory being that the agar protected the organisms from phagocytosis. The agar finally sloughed out. Dochez tested this serum on cases of scarlet fever. He found that this serum would blanch the acute rash of scarlet fever but not other rashes. Normal horse serum was found not to blanch the scarlet fever rash. Tested therapeutically the administrator of the Dochez serum was usually followed by a prompt fall in temperature, an improvement of the angina, a disappearance of the rash in 12 to 24 hours, and an abatement of the general symptoms. Antisera prepared by immunizing an animal in the usual way with injection of dead and living hemolytic streptococci were found not to have the blanching power. Dochez stated in this article that he had attempted to produce a soluble toxin in vitro, but had not succeeded in producing one of any strength. Also the prolonged immunization of animals by filtrates of the organism did not in his hands produce a blanching serum.

Blake, Trask, and Lynch used Dochez serum in rash extinction tests, using 0.2 to 0.5 cubic centimeters controlled with same amount of normal horse serum. This was found positive on 13 cases of scarlet fever and negative on 2 cases of erysipelas. The serum was then tried therapeutically on 9 children and 4 adults. In the first 10 cases, injected within 24 to 60 hours of onset (40 to 60 cubic centimeters given in one dose intramuscularly), there was "a prompt and complete recovery in 12 to 24 hours." In one severe case 45 cubic centimeters were given intravenously, followed 6 hours later by 50 cubic centimeters intramuscularly, and 50 cubic centimeters intramuscularly twice the next day. Recovery followed. A second case received 90 cubic centimeters at 7 a. m., 45 cubic centimeters at noon, and 50 cubic centimeters at 5 p. m., all doses intramuscularly. Recovery followed. One case seen first on the fifth day. The effect on the rash was marked—patient died; this last case was complicated with ulceration, tonsillitis, thrombophlebitis, "bull neck," and septicemia.

Blake further reported in July an additional 13 cases with no additional deaths. He stated that in an article "in press," Trask and Blake describe the demonstration of a toxic substance in the blood of acute cases by making intracutaneous injections of their sera in persons proven to be susceptible by the failure of their serums to produce blanching. This was controlled by injecting into persons whose sera would blanch the scarlet fever rash. These latter were all negative. The same authors used sera from 19 cases of acute scarlet fever into susceptibles and got 12 positive and 7 negative. The 7 negative serums were from mild cases. The 12 positive serums and 1 of the negative were then tested on insusceptibles with all negative results.

Blake stated that they have further shown that this toxin is absent from the blood of convalescents and is present in the urine in some cases. It is neutralized by in vitro incubation with Dochez serum, but not by nonblanching human nor by normal horse serum. They also collected serum from patients just prior to serum treatments and at frequent intervals after treatment. One case given serum treatment showed a serum which was no longer toxic four hours after the treatment.

Zingher mentioned in a later article that he has tried Dochez serum in treatment with encouraging results, but not as startling as the results reported by Blake and Trask.

G. F. and G. H. Dick, two months after Dochez described his antiserum, reported using their filtrate to immunize a horse by subcutaneous injection. They first tested the horse serum by mixing with toxin and making skin tests with no neutralization shown. After the immunization of the horse they found that 10 cubic centimeters of the serum contained enough antitoxin to neutralize twenty times the amount of toxin which had produced nausea, vomiting, fever, and rash in susceptible adults. The dosage given the horse during immunization was not stated, but they stated that they ran it up to 250 cubic centimeters.

Zingher at a meeting of the Medical Society of the State of New York, in the latter part of April, stated that there has been produced in the New York laboratory an antitoxin, 10 cubic centimeters of which will neutralize 50,000 times the skin test dose.

METHODS OF TESTING THE TOXIC FILTRATE

In March, 1924, Williams, Hussey, and Banzhaf reported making toxic filtrates which Zingher on tests found, like the Dicks' filtrate, active. They produced the toxin by inoculating pneumococcus broth containing 5 per cent citrated horse blood with a 24-hour culture of the specific hemolytic streptococcus. This was incubated five days, phenol 0.5 per cent added, and the precipitate allowed to settle. The supernatant fluid was decanted. They reported reactions on young rabbits and stated that the reactions on guinea pigs were not as clean cut as those on rabbits. (The reactions were not described.) It was stated, however, that the strongest and most lasting reactions were produced in rabbits by using the broth at the end of the second day of growth.

Zingher stated that guinea pigs tested by him showed only slight effect to intradermal or subcutaneous injections of undiluted toxin, and the mouse showed no effect. Rabbits reacted with rapidly diminishing intensity, showing only a slight reaction to 1:100. Using the rabbit test, it has been shown that convalescent serum will not neutralize toxic filtrates from a hemolytic streptococcus from endocarditis.

Huntoon stated that the best toxin has been produced after seven days' growth. He has purified the toxin to a considerable degree. He found that the toxin is precipitated between 70 and 75 per cent saturation with NH_4SO_4. His final product contained three-quarters of the original toxicity and very little nitrogen. He concentrated one toxin (method not given) so that it yielded a positive skin test in one-twentieth cubic centimeter of 1:6,000 dilution. He also found that the toxin is a protein substance inactivated by trypsin, also inactivated by heat at 90° C. for one hour. It is not lipoidal in nature, is not of the nature of a globulin, and is precipitated with higher albumin fractions.

Zingher stated that the toxin as produced has not been found sufficiently fatal to small laboratory animals to permit of their use for standardization. He compares it with a toxin kept on hand and tests the new toxin with the known toxin on susceptible individuals. The final dilution is more stable than the diphtheria toxin for Schick test and can be kept several weeks.

The antitoxin Zingher standardizes by adding an equal amount of double-strength toxin to graduated dilutions of the serum and noting the smallest amount of the serum that must be added to cause complete neutralization of the toxin. He controls his tests with another Dick test at the same time.

SUSCEPTIBILITY TO SCARLET FEVER AND THE PRODUCTION OF IMMUNITY

Zingher divides his reactions into: (1) Positive, resembling at 24 hours the maximum Schick on the third or fourth day. It fades fairly rapidly and is followed by pigmentation and slight or no scaling. Pigmentation may persist a week or more. (2) Psuedo, which are due to proteins in the test fluid. These are nonspecific, and he controls either with toxin neutralized by convalescent serum or by boiled toxin (one hour in water bath at 100° C.). The proteins causing the pseudoreaction are not much affected by the heat. (3) A combined reaction. Zingher considers that the positive and combined reactions probably indicate a susceptibility while the negative and pseudoreactions do not.

Zingher has tested several large groups, and in general they show much the same characteristics as to age groups, private schools versus public schools, etc., as the Schick tests do. He also got about 60 per cent agreement between the Dick and Schick tests on the same persons. He found that the reactions of mother and offspring are the same for the first six months of life.

Zingher also found that the serum of a person giving a negative or pseudoreaction gives a positive Schultz-Charlton, while the serum of a person giving a positive or combined reaction gave a negative Schultz-Charlton. The Dick test was found positive the first 2 days of scarlet fever, as a rule becoming less positive toward the end of 7 days and negative in 10 to 15 days. A few of those tested were positive throughout convalescence. He noted that some of these did not show desquamation and suggested that they might not have been cases of scarlet fever. He also suggested that there might be more than one toxin produced by the hemolytic streptococcus.

Exposed susceptibles can be protected by the injection of either convalescent or Dochez serum.

Zingher is attempting active immunization by giving from 100 to 1,000 skin test doses intramuscularly at intervals of one week. Retests are made after two to three months. Retest of a group of 40 Dick positive children actively immunized by above method one month later showed 45 per cent negative and 25 per cent less positive than in original test; 30 per cent remained the same.

A second group of 143 Dick positive children after one month showed 72.7 per cent negative. Of this 72.7 per cent, 94.6 per cent showed a pseudoreaction on the second test, indicating that a certain amount of protein sensitiveness had developed after the toxin injection.

Zingher further stated that young children show the least reaction to the injections and that the first dose is sometimes followed by low fever and a diffuse rash lasting 24 to 48 hours. He also observed that such reactions occasionally follow the second and third doses. He gives his doses subcutaneously or intramuscularly in 0.2 cubic centimeter or 0.5 cubic centimeter amounts for children up to 12 years of age and up to 1 cubic centimeter amounts to adults. Doses under 12=100, 250, and 250 skin-test doses. Doses over 12=100, 250, and 500 skin-test doses. Doses adults=100, 250, and 1,000 skin-test doses.

Zingher states that the modern conception of scarlet fever is that it is a local disease where the organisms produce a soluble toxin which gives rise to the rash and the constitutional symptoms. The toxin paves the way for the secondary invasion of the system by the specific streptococci and by other organisms. The immunity produced must be antitoxic rather than antibacterial, since the secondary septic conditions develop often from the hemolytic streptococcus during convalescence and after the patient develops a negative Dick test.

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OUTBREAK OF FOOD POISONING ON BOARD THE U. S. S. "NEW YORK"

An outbreak of food poisoning ascribed to fresh-beef hash served for breakfast occurred on board the U. S. S. *New York*, July 14, 1924, while the ship was at sea. Including mild cases, about 400 midshipmen and members of the crew were attacked. The following information was furnished by Commander J. D. Manchester, Medical Corps, United States Navy, senior medical officer of the *New York*.

The earliest symptoms appeared about two hours after eating the suspected hash in the cases of the men who first reported ill, and all who were affected became sick in a period of about two hours. There were men who had eaten hash who did not become ill, but no one became ill who had not eaten some of the hash.

In the more serious cases the first indication of illness was nausea and vomiting. The onset was characteristically sudden and the patients were seen in almost all cases within a few minutes of the onset of the attack. The patients appeared to be in acute distress immediately after the onset, with pallor and sweating associated with frequent vomiting. Later there were varying degrees of prostration in different individuals, with cyanosis and some degree of lethargy. In some cases vomiting continued for more than 24 hours.

Intestinal colic was marked in some cases and not present in others. In some cases abdominal pain was continuous; in others, spasmodic. Diarrhea began rather early in some cases and in others not until after the administration of a saline purge which was given to all patients early in the treatment. Whether there would have been diarrhea in cases where it appeared late had the patients not been given the saline cathartic it is impossible to state. In no case was diarrhea as prominent a feature as vomiting.

In a few of the more severe cases chills were noted. On account of the large numbers of men suddenly attacked, no temperatures were taken until several hours after the onset. When temperatures were taken no patient had fever.

In the more severe cases there was sudden and rather marked prostration. In several instances there was frontal headache. A few patients complained of some general aching. In a few of the most severe cases cramps of the leg muscles were noted.

In most cases there was a tendency to dryness of the mouth. Excessive salivary secretion was not noted. There were no ocular symptoms.

The pulse was persistently over 100 in well-marked cases, but regular. The respiration rate was within normal limits, but in a few cases breathing was shallow. There were no skin eruptions. Because of the vast amount of emergency work, blood pressure readings were not taken, and facilities were not available for toxicological examinations or for attempting to recover the offending microorganism from the feces and urine of those affected.

The menu for breakfast July 14 and for all meals of the preceding two days follows:

BREAKFAST

Monday, July 12	*Tuesday, July 13*	*Wednesday, July 14*
Tinned apricots.	Raisin buns.	Corn bread.
Baked pork and beans.	Hamburger loaf.	Sirup.
Tomato catsup.	Onion gravy.	Fresh-beef hash.
Coffee cake.	Mashed potatoes.	Tomato catsup.
Bread, butter, coffee.	Rolled oats, milk.	Boiled rice, milk.
	Bread, butter, coffee.	Bread, butter, coffee.

DINNER

Vegetable soup.	Chicken soup.
Pot roast of beef.	Fricassee of chicken.
Brown gravy.	Egg dumplings.
Mashed potatoes.	Mashed potatoes.
String beans.	Pumpkin pies.
Bread, butter, coffee.	Bread, butter, coffee.

SUPPER

Fresh beef stew.	Cold sliced tongue.
Dumplings.	Lyonnaise potatoes.
Baked macaroni.	Cold beans.
Cold slaw.	Pickled beets.
Rice pudding.	Coconut cake.
Bread, butter, tea.	Bread, butter, cocoa.

Suspicion attached to the hash served for breakfast July 14 because of the close order in which the cases developed. The beef used in preparing the hash was Argentine beef obtained in England. It was removed from cold storage July 12, and was put on to cook at 1 p. m. July 13, and was ground up for hash that night after which it was kept in a steam-jacket kettle until the morning of the 14th, when it was mixed with the vegetables, cooked again for a short time as hash, and served immediately.

Little comment need be made regarding this outbreak beyond publishing the facts as ascertained for record. There is little doubt that the hash was the food involved, and, as concluded by Commander Manchester, that poisoning was due to contamination of the beef with some member of the B. enteritidis-paratyphoid group of bacilli. There is the usual question as to when and where contamination occurred; whether by a carrier on board the *New York*, by rats or cockroaches, or before the beef was frozen.

Previous outbreaks have been fully discussed in this bulletin in the July and August, 1924, numbers, and medical officers are expected to familiarize themselves with the information presented therein, but it may not be out of place to summarize again the conditions and circumstances which are to be considered in connection with possible contamination of food, especially meat, with microorganisms of the B. enteritidis-paratyphoid group.

The most probable methods of contamination are—

(*a*) Meat infected during life of the animal—a sick animal overlooked during inspection on the hoof.

(*b*) Meat contaminated by intestinal contents in cutting up the carcass after slaughter—the intestines of healthy animals not infrequently contain bacilli belonging to the meat-poisoning group.

(*c*) Contamination by rats or mice or by flies or cockroaches which have had access to the feces of rodents in the slaughterhouse, storage rooms, or galley on board ship.

(*d*) Contamination by the hand of a human carrier or diseased person. Such contamination may occur at any point from the slaughterhouse to the galley. It is perhaps most likely to occur while the meat is being prepared for cooking or after it has been cooked. The food handler who fails to wash his hands carefully after visiting the toilet is always a potential menace to health when the circumstances are such that a period of incubation follows opportunity for contamination of the food.

With any of the methods of contamination listed the essential condition, of course, is that a period of incubation at suitable temperature must follow to permit the bacilli to grow and produce toxic substance. Rapid growth may take place in a warm room in 10 or 12 hours. The bacilli are not heat resistant and they are usually destroyed by a temperature as low as 145° F. in about 15 minutes. The toxic substance produced by the bacilli is resistant to heat, however, and is often capable of withstanding a temperature of 212° F. for 10 minutes. Therefore, cooking of certain kinds can not be relied upon to prevent poisoning if growth of the bacilli has taken place in the food. The bacilli tend to die out in the course of time when meat is held in cold storage. Unfortunately, any toxic substance that has previously formed is, like other toxins, preserved by the low temperature of cold storage.

It must be evident to medical officers from the information already published relative to the three battleship outbreaks of hash-for-breakfast poisoning—that of the U. S. S. *North Dakota*, October 21, 1921; the outbreak which occurred on board the U. S. S. *Idaho*, March 23, 1923; and the U. S. S. *Maryland's* outbreak April 16, 1924—that special danger may attend the preparation of hash for breakfast, and, more broadly, that there may be danger under other conditions when meat is handled or exposed to contamination by insects or vermin many hours before it is to be cooked or served.

The outbreak on board the *Maryland* served to heighten a suspicion already aroused that contamination of the meat occurred on board ship in the previous outbreaks.

Medical officers have now been acquainted with the ascertainable facts, probabilities, and possibilities, and it is expected that they will make suitable recommendations within the organizations in which they are serving with a view to preventing or minimizing the danger of any more similar outbreaks of food poisoning. While instructions in the Manual of the Medical Department do not relate or refer specifically to the preparation of hash, medical officers must expect, in view of the information that has been published concerning these outbreaks, if future outbreaks occur careful inquiry will be made regarding such action as may have been taken to warn against the danger of permitting a period of incubation to elapse after possible contamination by a food handler, by rodents, or by insects; the degree of infestation by insects and vermin. and the methods employed to reduce the infestation. Obviously, all persons who handle food should be instructed as to the importance of thoroughly and invariably washing the hands after attending to calls of nature.

It would of course be best to abolish the practice of grinding up meat, or otherwise preparing food that must be intimately handled, the night before it is to be used, and a recommendation has been made to the Bureau of Supplies and Accounts that instructions to that effect be issued if practicable. There are few epidemiological problems in the Navy in which overcrowding is not a factor. The practice of grinding up meat in the afternoon or evening that is not to be finally cooked until the following morning, and keeping it overnight in the warm galley, appears to have grown out of the necessity of preparing the food for large crews in comparatively little space by relatively few men. However, it would appear practicable to overcome the danger so far as the preparation of hash is concerned, either by requiring the galley force to work during the night or to return the ground meat to the cold-storage room in suitable containers.

OUTBREAK OF FOOD POISONING ON BOARD THE U. S. S. "MONTCALM"

The following information relating to an outbreak of food poisoning that occurred on board the U. S. S. *Montcalm*, station tug at the United States naval station, Guantanamo Bay, Cuba, July 29, 1921, was obtained by questionnaire from Lieut. J. T. Miller, Medical Corps, United States Navy, senior medical officer of the station.

Twelve members of the crew were affected; ten were on the sick list for two days.

The suspected food was corned-beef hash served for breakfast. It is stated that the corned beef was probably left over from a meal of the previous day. The meat was canned corned beef of a standard brand.

The earliest symptoms of poisoning developed between four and five hours after breakfast. All who ate of the hash were affected. The first indication of illness was reported as abdominal pain and vomiting. The cases developed suddenly, and the patients were seen by a medical officer within half an hour. Slight prostration was noted. Vomiting was a prominent feature in these cases but did not continue during the entire day. The cases were reported as having continuous rather than spasmodic abdominal pain. A few of the patients had diarrhea. No patient had a chill. In some of the cases slight fever developed a few hours after the onset. Frontal headache was also reported. Some of the men complained of general muscular soreness after the attack. Dryness of the mouth was also a symptom.

There were no ocular symptoms. The pulse and respiration rates were not affected. Blood counts were made and slight leucocytosis found. Albumin was not present in the urine.

Bacteriological and toxicological examinations were not made.

It was stated that there was nothing unusual about the handling, preparation, cooking, and serving of the food. No part of the suspected hash was obtainable for examination.

THREE CASES OF FOOD POISONING AT THE UNITED STATES SUBMARINE BASE, COCO SOLO, CANAL ZONE

The following information relating to three cases of food poisoning was furnished by Lieut. Commander A. J. Toulon, Medical Corps, United States Navy, in reply to a questionnaire blank forwarded by the Bureau of Medicine and Surgery.

The three men who manifested symptoms of poisoning were on regular guard duty and about midnight they ate lunch consisting of cold ham, bread, and coffee. No other person besides these three ate the same food, and no other food was eaten by those attacked except that served at regular meals on the station. The ham served to these men at midnight lunch had been cooked several days before, and it was taken from an ice box in which there was no ice. There was obviously an incubation period. The question of possible method of contamination was not discussed and no mention was made of infestation by rodents or cockroaches.

Symptoms began in these cases about three hours after the suspected food was eaten. The onset was sudden in each case. The first indications of illness were abdominal cramps and nausea. The men had been ill for about an hour when seen by a medical officer. At that time they were vomiting, groaning with pain, and sweating. The pain was spasmodic in character. Vomiting continued for about nine hours. Diarrhœa followed catharsis. These patients had fever—101° F. There was some prostration, but it was not marked.

Urines and feces were not examined bacteriologically. No ham was obtainable for examination. It was regular issue Government-inspected ham. In the opinion of the medical officer it was left too long after cooking in an uniced icebox.

TYPHOID FEVER REPORTS

The following case of typhoid fever has recently been reported to the bureau:

Apprentice seaman, United States Navy, admitted to the sick list July 9, 1924, with diagnosis undetermined at the United States naval training station, Newport, R. I. He was transferred to hospital July 12. The diagnosis was established at the United States naval hospital, Newport, R. I., August 12, 1924, as typhoid fever.

This man enlisted June 25, 1924, and reported at the training station two days later. He stated that he had not felt well for about one week before he enlisted. He received a first inoculation with triple typhoid vaccine July 1, and the second, July 8.

He reported sick the day after his second inoculation. The symptoms were continued fever, relatively slow pulse, stupor, and enlargement of the spleen. Blood cultures were sterile, but the *Bacillus typhosus* was isolated in pure culture from the urine and also from the feces. The Widal reaction was positive, but no weight could be attached to that finding in view of the fact that he had received two inoculations of vaccine.

There was continuous fever for 14 days after which the temperature declined to normal by lysis. There were no complications or sequellæ, and the patient was discharged to duty September 4, 1924.

A DISCUSSION OF ACCIDENTS AND THEIR CAUSES

The following paragraphs formed part of an article which appeared in the July, 1924, number of Health, a journal dealing with developments in the field of public health, issued by the Department of Health, Commonwealth of Australia. The article, entitled "Accident causation, with an account of an inquiry into the accidents of an Australian dockyard," was written by Frank R. Kerr, D. S. O., M. D., D. P. H., division of industrial hygiene, Commonwealth Department of Health.

"The science of psychology is rapidly coming into its own. Its scope is widening and evidence of its application is now found in the spheres of medicine, education, and industry.

"The physician, in estimating the keenness of vision of his patient by means of test-type cards on which letters of different sizes are printed, can not permit himself to be content with the determination of sensation purely as such, but must take into account the influence of excitement, fatigue, familiarity with the alphabet, and individual intelligence. All these factors may have some effect on the end result of such an experiment. In modern problems of education, too, the power of concentration, originality, memory, and physical weariness all have their place. Industry in turn calls upon psychology to investigate the questions of efficiency and accident causation.

"The muscular work curve can be obtained in the laboratory by means of the ergograph, an instrument which records on a rotating blackened surface the movements of a finger raising and lowering a known weight by alternate motions of flexion and extension. In proportion to the weight lifted, the rate of repetition, and the physical condition of the individual, exhaustion sooner or later sets in, to be followed after a suitable period of rest by recovery and return of the power of movement.

"By modified proof correcting or other simple exercises, the mental curve can also be obtained, and the result studied in the light of practice, incitement, spurts, settlement, and fatigue. These terms need amplification. That "practice makes perfect" is obvious to all. The human organism, however, needs "warming up" after an extended rest period; it may not be out of practice, but it needs "incitement." Thus maximum efficiency is not reached all at once. The word "spurts" speaks for itself, and refers to the irregular fluctuations of ouput occurring during a work session. A spurt often occurs immediately after a pause. Other workers, in spite of fatigue, can quicken up when they realize that the end of the shift is very near. "Settlement" is the stage reached by an operative when he is wholly absorbed in his task, having overcome its difficulties by practice and having passed through the stage of incitement.

"These factors have varying influences and complicate the work curve. We often find, for example, that near the close of a day's work the effect of practice or of spurting will result in greater output than during the earlier hours. At the same time the number of accidents is often found small during the first few hours of the morning and after lunch, becoming greater toward the end of the morning and afternoon, due to the combined operation of these various factors. During a rest period the effects of practice and fatigue are partly lost and help to counterbalance one another. At the same time the results of warming up and settling down disappear. Attempts have therefore been made to discover where the most favorable pause should occur and of what length it should be so that a maximum amount of work would follow the pause. For this reason the mid-shift rest period is now gradually being introduced.

"*Predisposing causes of accidents.*—In looking for the causes of accidents, we must not be satisfied therefore with purely physical causes, but must delve deeper into the underlying psychical conditions. These predisposing causes may be dealt with under four headings: Ignorance, absent-mindedness, predisposition, and fatigue.

"Ignorance is provocative of many accidents—ignorance of the use of tools, ignorance because of lack of the mental faculty of understanding instructions, ignorance leading to errors in judgment. An absent-minded employee does not give all his thought to his work, because, through no fualt of his own, perhaps, his mind is preoccupied elsewhere. He may be troubled over his home life, worrying about his sick child, wondering whether he can afford to send his wife away for a holiday this summer. Then, again, many people are temperamentally unsuited to their jobs. They are misfits and consequently have no work interest. No attempt has been made by the employer to determine the individual's natural speed of work, and to place him at a congenial task. Among this type accidents are common, both in the temperamentally excitable and the naturally slow. Lastly, excessive fatigue may be a prolific cause of accidents.

"Can anything be done to counteract these predisposing causes? A great deal can be done. Take ignorance, for example: A man should never be given a job which he is incapable of understanding. The use of every tool, every piece of mechanism, should be fully explained before work is commenced. Dangerous possibilities should be pointed out, and written instructions posted up to which the workman can always refer. Instruction is necessary, not only in the particular work for which the man is employed, but in the general safety methods adopted throughout the plant.

"The preoccupied mind will be relieved of much of its burden by comfortable home conditions and adequate wages. The happiness of employees is reflected in better work and greater freedom from accidents.

"Predisposition is at times a difficult thing to deal with. A proper system of medical examination and vocational placement will, however, insure as far as may be possible suitable tasks for everyone. Further than this little progress can be made. Many people are temperamentally liable to accidents. They can not help themselves, and benefit little by organized attempts at prevention.

"To reduce the effects of fatigue, working conditions should be studied. Poor lighting and ventilation, uncomfortable seats, vibration, excessive noise, overcrowding, and lack of well-arranged rest periods are all conducive to fatigue, and may even cause it in circumstances where the work is light and the hours short.

"A certain amount of fatigue is inevitable; in fact the production of a healthy unworried fatigue is desirable. It is only excessive fatigue unrelieved by a night's sleep which is harmful. The satisfaction felt by normal persons at the end of a hard day's work is never experienced by those in whom a psychical conflict is present, when every effort has to be made twice as hard as it would be if they were wholly united with themselves. The right kind of fatigue comes at the close of day and prepares the mind for sound sleep. Undue exhaustion, occasioned by excessive work, long hours, unhealthy surroundings, or a distracted mind, assists in bringing about that play of circumstances when an accident is inevitable.

"So much for the psychical or mental causes of accidents.

"*Direct causes of accidents.*—The direct or immediate causes are numerous, and can only be classified in view of the actual operation being performed at the time or the particular experience undergone by the injured man. Many of these causes are quite trivial, examples of which are cleaning or oiling machinery in motion, the employment of defective tools, carlessness in the use of ladders, and tripping over obstacles. The following, adopted by an International Conference of Official Statisticians at Geneva in November, 1923, is perhaps the best classification of causes:

I. Machinery—
  (*a*) Prime movers.
  (*b*) Transmission machinery.
  (*c*) Lifting machinery.
  (*d*) Working machinery.
II. Transport—
  (*a*) Railways.
  (*b*) Ships.
  (*c*) Vehicles.
III. Explosions—fire.
IV. Poisonous, hot, or corrosive substances.
V. Electricity.
VI. Falls of persons.
VII. Stepping on or striking against objects.
VIII. Falls, objects.
IX. Falls of ground.
X. Handling without machinery.
XI. Hand tools.
XII. Animals.
XIII. Miscellaneous.

"*Accident waste.*—In counting up the cost of accidents, we have to consider the distress in the home, the amount of time lost, the loss of output, the cost of hospital upkeep, and the compensation paid. Every accident is an economic waste."

The author concludes that every accident in an industry should be thoroughly investigated, the scene reconstructed, and the surroundings inspected. Only in this way can means be adopted to prevent a repetition.

Among the figures presented by the author relating to dockyard accidents are the following:

The inquiry into accidents occurring in the dockyard in question covered the years 1919 to 1923. Employees were divided into those under 21 years and those 21 years of age and over. The principal findings were as follows:

1. The average number of working days per year per man lost through accidents was 3.55 for all employees; 3.35 for men under 21 and 3.59 for men 21 and over.

2. The percentage of men injured relative to total number employed was 19.24 per cent in the course of the three years. Of employees under 21, 26.65 per cent were injured, and of those 21 years or over, 17.66 per cent. The frequency was therefore greater in the young-age group, but with regard to time lost, men under 21 averaged only 12.6 days while the older men averaged 20.4 days. For men of all ages the period of incapacitation resulting from accidental injuries averaged 18.5 working days.

Figures for hours worked and details relating to distributions of the injured among various jobs could not be obtained and frequency and severity rates could not be computed.

ACCIDENTAL INJURIES AND COMPENSATION IN 1923 AMONG NAVY YARD EMPLOYEES

The following information relating to accidents among civilian employees and compensation in 1923 was published by the Assistant Secretary of the Navy (Navy Yard Division) for the information of commandants and commanding officers of navy yards and naval stations, in a letter dated August 15, 1924.

The total cost of compensation for accidental injuries, civilian employees of the Naval Establishment, in 1923 was $386,229.41. In 1922 the cost was $599,582.22.

The cost per case of injury dropped from $387.33 in 1922 to $266.37 in 1923, a decrease of 31.2 per cent. Of the total number of compensated injuries in 1923, 87 per cent were due to nonmechanical causes, and the cost of compensation was $335,161.66 or 86.8 per cent of the total cost.

Handling of objects.—Among the various kinds of accidents, those connected with the handling of objects were responsible for the largest amount of compensation required for any single classified cause—$64,919.27, or 16.8 per cent of total compensation. This class of accidents represented 26.6 per cent of all accidents other than those associated with mechanical causes, and the compensation involved represented 19.4 per cent of the compensation required for injuries resulting from nonmechanical causes.

Falls of persons.—This class of injuries cost $64,354.94 in compensation, 16.7 of total compensation, and constituted 21.2 per cent of total compensated injuries, and 24.3 per cent of injuries resulting from nonmechanical causes. Falls of persons resulted in injuries that involved 19.2 per cent of the compensation paid because of nonmechanical accidents.

Cranes and conveyors.—Accidents associated with the use of cranes and conveyors were responsible for compensation amounting to $34,278.48, or 8.9 per cent of total compensation. These were 54 or

3.7 per cent of the total number of compensated injuries. This class of accidents represented 28.6 per cent of compensated accidents due to mechanical causes.

Machinery.—Machinery accidents were responsible for $16,645.13, only 4.3 per cent of total compensation. There were 130 cases or 8.9 per cent of the total cases of compensated injuries. Machinery was responsible for 68.8 per cent of accidents due to mechanical causes, and for 32.6 per cent of the compensation due to such causes.

Compensation ratios.—In 1923, for the 16 major industrial yards and stations, the amount of compensation per million hours worked was $5,263.03. In 1922 the amount was $8,559.39. Thus, in 1923 there was a decrease of 38.5 per cent as compared with the preceding year.

In 1923 there were 18.6 compensated accidents per million hours worked in the 16 major yards and stations. In 1922 the rate was 21.8, so there was a decrease of 14.7 per cent in this rate for 1923.

The Navy Yard Division, in presenting these figures, remarked that the substantial decreases show what can be done when all cooperate in the interests of safety. The division believes that while many of the accidents and much of the compensation for 1923 are due to unsafe practices, with greater efforts on the part of each and everyone there will be fewer accidents with less compensation than heretofore. The appeal is made to everyone concerned to practice and talk safety in all its forms to insure the doing of all that can be done to lessen the number of needless accidents and unnecessary hours of pain and suffering resulting from accidents. It is remarked that many hours for productive effort will thus be saved to the Government, and all employees as well as the Government will be benefited as the result of such safety efforts.

ADMISSIONS FOR INJURIES AND POISONINGS, JANUARY TO AUGUST, INCLUSIVE, 1924

Form F cards received in the bureau between January 1 and August 31, 1924, notified injuries and poisonings as follows:

	With command		Leave, liberty, or A. W. O. L.	Total
	Connected with actual performance of work or prescribed duty	Not connected with work or prescribed duty		
Injuries	2, 228	1, 102	665	3, 995
Poisonings	13	99	20	132
Total admissions	2, 241	1, 201	685	4, 127

Of these admissions, 83.40 per cent were for injuries or poisonings occurring within the command, and 16.60 per cent for cases incurred while on leave or liberty.

Of the cases incurred within naval commands, 65.11 per cent were connected with the actual performance of prescribed work or duty, and 34.89 per cent were not so connected. Of the total admissions for injuries and poisonings, 54.30 per cent were connected with the actual performance of work or prescribed duties; i. e., the result of true naval industrial hazards. The remainder were incidental to liberty, athletics ashore or afloat, skylarking, quarreling, falls other than those connected with work, etc.

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases are of special interest from a preventive medicine viewpoint:

Two instances were recorded in which the parting of lines supporting stages were responsible for accidental injuries. In one case the accident resulted in multiple contusions, and in the other a fracture of the fibula was the result.

On board a large ship a man slipped and fell down the ladder leading into the steering-engine compartment, and caught his arm in the steering gear. Fortunately he did not lose his arm, the injury being limited to a lacerated wound. There was no guard or protective device to prevent contact with the gear in case of a fall.

A member of a landing force from the Scouting Fleet placed a loaded gun against his chest and, thinking it was not loaded, pulled the trigger. A wound of the chest resulted. Fortunately, it was a blank cartridge. Numerous fool accidents are reported. They indicate how necessary it is for "safety first" talk constantly by division officers and leading men to reduce the incidence of common accidents less foolish in character but nevertheless resulting from thoughtlessness, negligence, and carelessness.

A member of a marine expeditionary force was severely burned while filling a gasoline tank. The gasoline caught fire from a near-by lantern. A man had both arms burned on board ship when a thoughtless person threw a lighted match into a bucket containing gasoline.

Falls through open hatches occur with considerable frequency. During the month one man was invalided from the service after 127 days on the sick list with permanent disability resulting from fracture of the right radius caused by falling through a hatch which through negligence had not been closed.

On board a destroyer a man suffered multiple burns as a result of a flareback caused by lighting off a burner on a hot bridge wall.

A gangplank without handrails or lines between two destroyers was connected with the drowning of a man. He was returning from liberty and slipped on the gangplank. He fell between the two ships, was carried away by a swift current, and drowned before help could reach him.

While working at an emery wheel, a flying piece of emery became embedded in the eye of a worker who was not wearing protective goggles. Similar cases are frequently reported; also cases where flying particles of paint and rust lodge in the eye and cause injury while chipping paint without wearing protective goggles.

A case of injury to the eyes by the actinic rays of a searchlight on board a destroyer was reported. The case was recorded as resulting from inadequate protection by the safety device used. The man was disabled for three days. One other case of this kind has been reported this year.

The following case of fatal injury would have been prevented by the exercise of ordinary caution. A man was towing signal flags in a cofferdam. The door of the cofferdam, which he had neglected to secure, fell on his head and caused a compound fracture of the skull.

A case of acute lead poisoning was reported as due to chipping paint and painting in double bottoms.

HEALTH OF THE NAVY

This report is for the month of October. The general admission rate as based on admissions to the sick list for all causes was 516 per 1,000 per annum, a figure lower than for the preceding month. The reduction is largely accounted for by a lower incidence of venereal diseases. The median October all-cause admission rate, based on the experience of the last five years, is 598. From this time of year on through the winter months a gradual increase in admissions to the sick list for disease is to be expected because of the increasing prevalence of acute infectious diseases of the respiratory type. Admissions from such causes are, as a rule, so numerous that the trend of the general admission rate is materially influenced by them. No other class except the venereal diseases produced so marked an effect upon the general admission rate. No great increase in the prevalence of the common respiratory infections has occurred so far this autumn. Communicable diseases of the Class VIII (A) group, United States Navy Nomenclature of Diseases and Injuries, require little mention this month. Only 7 cases of measles were reported.

A very slight increase in the number of cases of influenza occurred in October as compared with September—115 cases against 93. There were 25 cases at the marine barracks, San Diego, Calif. Those cases practically represent the increase; elsewhere in the service the cases were scattered in about the same proportions as in the previous month.

A few more cases of scarlet fever were reported—11 cases in October as compared with 5 in September. Last year scarlet fever was unusually prevalent in many parts of the United States, but as might be expected the disease became less prevalent during the summer months. In returns made to the Bureau of the United States Public Health Service, 102 cities reported 932 cases for the week ended October 25, 1924, as compared with 843 cases for the corresponding week last year. However, the estimated expectancy for those cities was only 728 cases, so the disease continues to be somewhat more prevalent than in recent years. Although the cases are actually few in number the same is true of the Navy.

Three cases of cerebrospinal fever occurred on board the U. S. S. *Wyoming* in October.

The common diseases of the respiratory type, grouped as Class VIII (B) under the Navy classification, showed no more than the expected increase in admission rates with the advance in season toward winter. The increase so far has been principally in the number of cases of acute tonsilitis reported. Admission rates for all forms of pneumonia continue lower than expected rates. Comparatively few cases of acute bronchitis were reported for this time of year.

The following table shows admission rates per 1,000 per annum for the principal communicable diseases, October, 1924. For comparison, corresponding median rates are given for the same month, years 1919 to 1923, inclusive:

	October, 1919–1923	October, 1924
Cerebrospinal fever	0	0.31
Diphtheria	.31	.10
German measles	.51	.20
Influenza	11.70	11.70
Malaria	28.02	6.31
Measles	1.74	.71
Mumps	6.43	.71
Pneumonia	2.93	.91
Scarlet fever	.70	1.12
Smallpox	0	0
Tuberculosis	3.36	3.87
Typhoid fever	0	0

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TABLE No. 1.—*Monthly report of morbidity in the United States Navy and Marine Corps for the month of October, 1924*

	Forces afloat	Forces ashore	Entire Navy	Marine Corps
Average strength	70,856	47,068	117,924	21,171
All causes:				
Number of admissions	2,933	2,136	5,069	960
Annual rate per 1,000	496.72	544.57	515.83	589.49
Disease only:				
Number of admissions	2,468	1,835	4,303	823
Annual rate per 1,000	417.97	467.83	437.88	505.37
Communicable diseases, exclusive of venereal disease:				
Number of admissions	578	485	1,063	279
Annual rate per 1,000	97.89	123.66	108.18	171.32
Venereal diseases:				
Number of admissions	983	284	1,267	161
Annual rate per 1,000	166.48	72.41	128.94	98.86
Injuries:				
Number of admissions	444	295	739	137
Annual rate per 1,000	75.19	75.21	75.20	84.12
Poisons:				
Number of admissions	21	6	27	1
Annual rate per 1,000	3.56	1.53	2.75	0.61

TABLE No. 2.—*Number of admissions reported by Form F cards for certain diseases for the month of October, 1924*

	Forces afloat, Navy and marines (strength, 70,856)		Forces ashore, Navy and marines (strength, 47,068)		Total (strength, 117,924)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases	2,468	417.97	1,835	467.83	4,303	437.88
Injuries	444	75.19	295	75.21	739	75.20
Poisons	21	3.56	6	1.53	27	2.75
Total admissions	2,933	496.72	2,136	544.57	5,069	515.83
Class II:						
Varicocele	7	1.19	5	1.27	12	1.22
Class III:						
Appendicitis, acute	40	6.77	41	10.45	81	8.24
Autointoxication, intestinal	4	.68	12	3.06	16	1.63
Cholangitis, acute	29	4.91	18	4.59	47	4.78
Cholecystitis, acute	1	.17	2	.51	3	.31
Colitis, acute	4	.68	1	.25	5	.51
Constipation	9	1.52	10	2.55	19	1.93
Enteritis, acute	19	3.22	28	7.14	47	4.78
Gastritis, acute catarrhal	17	2.88	16	4.08	33	3.36
Gastroenteritis	27	4.57	40	10.20	67	6.82
Hemorrhoids	21	3.56	25	6.37	46	4.68
Ulcer of duodenum	2	.34	3	.76	5	.51
Ulcer of stomach	1	.17	3	.76	4	.41
Total	174	29.47	199	50.74	373	37.96
Class V:						
Laryngitis, acute	3	.51	3	.76	6	.61
Pharyngitis, acute	5	.85	5	1.27	10	1.02
Rhinitis, acute	6	1.02	3	.76	9	.91
Total	14	2.37	11	2.80	25	2.54
Class VIII (A):						
Cerebrospinal fever	3	.51	0	0	3	.31
Chickenpox	5	.85	3	.76	8	.81
Diphtheria	0	0	1	.25	1	.10
German measles	1	.17	1	.25	2	.20
Influenza	60	10.16	55	14.02	115	11.70
Measles	7	1.19	0	0	7	.71
Mumps	7	1.19	0	0	7	.71
Pneumonia, broncho	0	0	2	.51	2	.20
Pneumonia, lobar	5	.85	2	.51	7	.71
Scarlet fever	7	1.19	4	1.02	11	1.12
Total	95	16.09	68	17.34	163	16.59

Table No. 2.—*Number of admissions reported by Form F cards, etc.*—Continued

	Forces afloat, Navy and marines (strength, 70,856)		Forces ashore, Navy and marines (strength, 47,068)		Total (strength, 117,924)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Class VIII (B):						
Angina, Vincent's	27	4.57	24	6.12	51	5.19
Bronchitis, acute	85	14.40	93	23.71	178	18.11
Catarrhal fever	80	13.55	84	21.42	164	16.69
Tonsillitis, acute follicular	227	38.44	100	25.50	327	33.28
Total	419	70.96	301	76.74	720	73.27
Class IX:						
Dysentery, bacillary	2	.34	0	0	2	.20
Dysentery, entamebic	2	.34	0	0	2	.20
Total	4	.68	0	0	4	.40
Class X:						
Dengue	26	4.40	50	12.75	76	7.73
Malaria	20	3.39	42	10.71	62	6.31
Total	46	7.79	92	23.46	138	14.04
Class XI:						
Tuberculosis (all forms)	14	2.37	24	6.12	38	3.87
Class XII:						
Chancroid	258	43.69	53	13.51	311	31.65
Gonococcus infection	634	107.37	187	47.68	821	83.55
Syphilis	91	15.41	44	11.22	135	13.74
Total	983	166.48	284	72.41	1,267	128.94
Class XVIII:						
Pleurisy, acute fibrinous	5	.85	4	1.02	9	.92
Class XX:						
Hernia	24	4.06	18	4.59	42	4.27

Table No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for September, 1924, and from various shore stations for the four-week period October 5 to November 1, 1924*

	Annual rate per 1,000 September, 1924			Average rate since July 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All ships	0	180.84	1,080.00	0	203.10	1,909.09
Battleship divisions:						
Battle Fleet	79.47	190.61	296.30	106.51	164.15	215.59
Scouting Fleet	21.92	127.00	220.69	56.84	219.01	350.91
Asiatic Fleet [1]	0	344.53	551.02	105.26	446.79	804.12
Light cruiser divisions:						
Scouting Fleet	0	172.41	629.03	0	173.70	475.81
Destroyer squadrons:						
Battle Fleet	0	107.30	540.54	0	127.84	454.26
Scouting Fleet	0	109.54	535.71	0	97.86	289.86
Asiatic Fleet [1]	0	440.93	1,080.00	108.60	517.87	1,909.09
Miscellaneous: [2]						
Battle Fleet	0	144.58	469.27	0	147.13	470.59
Scouting Fleet	0	121.44	500.00	0	135.01	529.66
Asiatic Fleet [1]	0	323.19	818.18	0	410.30	700.39
Naval Forces, Europe	302.52	614.21	653.85	135.85	413.90	646.16
Special Service Squadron	71.43	181.08	519.23	143.51	244.19	392.45
Naval Transportation Service	0	288.29	819.67	71.22	272.85	452.01
Special duty	0	144.39	255.32	0	217.03	282.65

TABLE No. 3.—*Summary of annual admission rates for venereal diseases reported from ships for September, 1924, etc.*—Continued

	Annual rate per 1,000 Oct. 5 to Nov. 1, 1924			Average rate since July 1, 1924		
	Minimum rate	Mean rate	Maximum rate	Minimum rate	Mean rate	Maximum rate
All naval districts in the United States	0	67.92	317.07	0	68.78	251.67
First naval district	0	85.65	147.45	0	47.92	85.48
Third naval district	29.89	51.10	73.65	29.89	52.98	67.92
Fourth naval district	56.69	111.97	192.39	21.51	57.93	78.77
Fifth naval district	0	77.93	126.42	17.11	80.63	164.09
Sixth naval district	37.90	48.13	171.81	49.14	63.85	151.90
Seventh naval district	162.50	162.50	162.50	37.50	37.50	37.50
Eighth naval district	0	62.26	70.42	70.79	83.09	173.55
Ninth naval district	95.98	95.98	95.98	94.74	94.74	94.74
Eleventh naval district	25.74	25.20	32.14	31.15	53.86	69.86
Twelfth naval district	10.32	22.58	55.67	45.89	49.28	50.41
Thirteenth naval district	0	148.03	317.07	80.25	126.73	251.67

RATIO OF GONOCOCCUS AND SYPHILIS INFECTIONS TO TOTAL CASES OF VENEREAL DISEASES

	Per cent September, 1924		Per cent since July 1, 1924	
	Gonococcus	Syphilis	Gonococcus	Syphilis
All ships	67.78	7.41	78.60	3.93
Battleship division:				
Battle Fleet	81.94	7.49	82.88	7.80
Scouting Fleet	68.06	8.33	71.36	4.86
Asiatic Fleet [1]	42.37	22.03	47.10	15.48
Light cruiser divisions:				
Scouting Fleet	62.22	4.44	70.34	2.73
Destroyer squadrons:				
Battle Fleet	78.00	6.00	83.14	6.98
Scouting Fleet	69.39	14.29	71.67	11.67
Asiatic Fleet	55.70	1.27	51.01	5.05
Miscellaneous: [2]				
Battle Fleet	80.56	15.28	76.71	14.61
Scouting Fleet	68.12	2.90	67.80	5.08
Asiatic Fleet [1]	43.48	0	41.18	3.52
Naval Forces, Europe	59.26	11.11	65.00	11.43
Special Service Squadron	61.54	3.85	62.86	2.86
Naval Transportation Service	62.50	7.50	60.85	6.59
Special duty	59.26	7.41	78.60	3.93
	Per cent Oct. 5 to Nov. 1, 1924		**Per cent since July 1, 1924**	
All naval districts in the United States	71.52	10.60	73.28	18.13
First naval district	69.57	4.35	78.95	7.02
Third naval district	70.00	10.00	82.98	10.64
Fourth naval district	90.00	0	81.08	5.41
Fifth naval district	61.67	1.67	67.38	15.25
Sixth naval district	72.73	9.10	71.70	5.66
Seventh naval district	50.00	0	50.00	0
Eighth naval district	80.00	20.00	85.71	7.14
Ninth naval district	88.89	0	89.47	5.26
Eleventh naval district	85.43	14.57	81.03	17.24
Twelfth naval district	100.00	0	38.46	53.85
Thirteenth naval district	81.82	9.10	78.57	9.52

[1] Month of August, 1924. [2] Vessels of train, base force, etc.

TABLE No. 4.—*Number of admissions reported by Form F cards and annual rate per 1,000, entire Navy, for the four-week period October 5 to November 1, 1924, inclusive*

	Navy (strength, 96,753)		Marine Corps (strength, 21,171)		Total (strength, 117,924)	
	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000	Number of admissions	Annual rate per 1,000
Diseases of—						
Blood	0	0	2	1.23	2	0.22
Circulatory system	34	4.57	14	8.60	48	5.29
Digestive system	278	37.35	110	67.55	388	42.77
Ductless glands and spleen	3	.40	1	.61	4	.44
Ear	281	37.76	69	42.37	350	38.58
Eye and adnexa	44	5.91	22	13.51	66	7.28
Genito-urinary system (nonvenereal)	92	12.36	13	7.98	105	11.58
Communicable diseases transmissible by—						
Oral and nasal discharges (A)	113	15.18	39	23.95	152	16.76
Oral and nasal discharges (B)	517	69.47	123	75.53	640	70.55
Intestinal discharges	4	.54	0	0	4	.44
Insects and other arthropods	84	11.29	47	28.86	131	14.44
Tuberculosis, all forms	30	4.03	6	3.68	36	3.97
Venereal diseases	1,019	136.92	161	98.86	1,180	130.08
Other diseases of infective type	198	26.60	64	39.30	262	28.88
Diseases of—						
Lymphatic system	35	4.70	16	9.82	51	5.62
Mind	36	4.84	11	6.75	47	5.18
Motor system	71	9.54	14	8.60	85	9.37
Nervous system	22	2.96	4	2.46	26	2.87
Respiratory system	46	6.18	5	3.07	51	5.62
Skin, hair, and nails	49	6.58	27	16.58	76	8.38
Herniæ	32	4.30	7	4.30	39	4.30
Miscellaneous diseases and conditions	69	9.27	47	28.86	116	12.79
Parasites (fungi and certain animal parasites)	41	5.51	16	9.82	57	6.28
Tumors	15	2.02	5	3.07	20	2.20
Female diseases and conditions	1	.13	0	0	1	.11
Injuries	549	73.77	130	79.83	679	74.85
Poisoning	26	3.49	1	.61	27	2.98
Dental diseases and conditions	27	3.63	6	3.68	33	3.64
Total	3,716	449.29	960	589.49	4,676	515.48

TABLE No. 5.—*Deaths reported, entire Navy, for the four-week period October 5 to November 1, 1924, inclusive*

	Navy (strength, 96,753)	Marine Corps (strength, 21,171)	Total (strength, 117,924)
Cerebrospinal fever	1	0	1
Meningitis, cerebrospinal	1	0	1
Poliomyelitis, acute anterior	0	1	1
Tonsillitis, acute	1	0	1
Syphilis	1	0	1
Other diseases	6	0	6
Drowning	7	0	7
Other accidents and injuries [1]	24	0	24
Total	44	1	45
Annual death rate per 1,000, all causes	5.91	.61	4.99
Annual death rate per 1,000, disease only	1.34	.61	1.21

[1] Fourteen of these deaths were caused by multiple burns resulting from an explosion of gunpowder on the U. S. S. Trenton at sea, Oct. 20, 1924.

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