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COVER PHOTOGRAPH

With United Nations Forces in Korea.—A South Korean nurse dresses the arm of an American soldier.

VOL. I

NOVEMBER 1950

NO. 11

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Foreword

The UNITED STATES ARMED FORCES MEDICAL JOURNAL represents the unification of the BULLETIN OF THE UNITED STATES ARMY MEDICAL DEPARTMENT, published since 1922, and the UNITED STATES NAVAL MEDICAL BULLETIN, published since 1907. This joint periodical is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense.

It is the aim to include in each issue administrative directives, original scientific and professional articles, editorial comments on current professional literature of special interest, clinical notes, descriptions of new devices and instruments, abstracts of articles from various medical periodicals, and notices and reviews of newly published professional books of interest to all commissioned medical personnel of the Department of Defense.

The Director, Medical Services, and the Surgeons General of the several services extend an invitation to all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, officers of the Veterinary Corps, all officers of the ancillary services of the medical services of the Armed Forces, and to the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

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(Army Medical Library) Monthly listing of journal contents; subject and author index monthly; cumulative index annually.

Quarterly Cumulative Index Medicus

(American Medical Association) Author and subject.

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OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON 25, D. C.

MEMO: Personnel of the Medical Services of the United States Armed Forces.

The fighting in Korea has tested the capabilities of the medical services in many ways. One formidable foe was distance. How well that obstacle was hurdled is illustrated in the Department of Defense Blood Program.

As you are aware, whole blood must be used within 21 days after it is drawn from the donor. Thanks to careful planning and a tremendous amount of work and cooperation by many people, whole blood has been donated by patriotic Americans throughout the continental United States; assembled from many points by the American National Red Cross; refrigerated and flown 9,000 miles to Japan and Korea by planes of the Military Air Transport Service, the Air Force, Navy and Marine Corps; and used by front line and hospital medical teams of all three services.

Many of you have attended the wounded in the field and in hospitals, where this whole elaborate operation is reduced to one simple end-product--the saving of an American life.

Richard L. Meiling

Richard L. Meiling, M.D.
Director of Medical Services

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Volume I

November 1950

Number 11

Medical History of the Berlin Airlift

HARRY G. MOSELEY, *Lieutenant Colonel, U. S. A. F. (MC)*¹

THE Berlin Airlift, or "Operation Vittles" was undertaken to maintain the life of Berlin which depended on tremendous ton-nages (5,620 daily) of coal, food, raw goods, machinery, news-print, and all the necessities of a complex civilization. It was also necessary to avoid the demoralization of economic life which was dependent on export of its man-made products. This mission began on 26 June 1948 and terminated on 30 September 1949, and operated 24 hours a day, 7 days a week from its beginning until its end. Ex-traordinary effort was required and at times strained human tolerance. This article is concerned with the health of the participants and the factors of medical importance effecting their ability and performance.

For the sake of authenticity all available medical reports²⁻⁵ were carefully analyzed. Although the Medical Questionnaire⁴ was not distributed until the late stages of the Airlift, when its termination was in sight and when there was less incentive for remarks and criti-cism than during the height of the operation, this report gave con-siderable insight into many of the intangible factors such as morale and opinion.

The medical problems mentioned here were recognized by Command. The fact that many deficiencies were encountered reflects the magni-tude of the mission. The more important fact is that without fore-

¹ Deputy Air Surgeon, Headquarters, U. S. Air Force in Europe.

² Care of Flyer Reports, AF Form 203.

³ Monthly Sanitary Report, WD AGO Form 8-140.

⁴ Medical Questionnaire, First Airlift Task Force.

⁵ TOWNER, A. A., JR., and PATTERSON, R. A.: Aeromedical Report of the Berlin Airlift Task Force.

warning or foreplanning, a small segment of the United States Air Force (USAF) transported almost 2 million tons of material into Berlin. This article covers only the Airlift as conducted by the USAFE⁶ (4 Air Force Wings, 2 Naval Transport Squadrons, and USAFE supporting troops). The contribution of the U. S. Army in Europe, the Third U. S. Air Division in England, of the Air Matériel Command in the Zone of the Interior, and of the British and French Forces are beyond the scope of this study.

ORIGINAL SITUATION

A review of the situation when the Airlift began is essential for full understanding of the difficulties encountered. The following factors were severe handicaps in the engagement and performance of this mission.

Indefiniteness.—The mission of flying over 5,000 tons of material daily to a given destination could probably be accomplished with no extraordinary difficulty if there was a clear delineation of the beginning and ending of such a project and if there could be prior planning. The Berlin Airlift began with scant warning and there was no possible way to estimate the length of the mission.

Personnel available.—In June 1948, there were about 15,000 USAF personnel assigned to USAFE. Of these, less than 2,000 were aircrew members. The majority, if not all, of such aircrew members were, at the beginning of the mission, engaged in other duties essential to the mission of USAFE, and as such, could not be spared en masse to take over the Airlift.

Available airfields.—In June 1948, USAFE had only two operational air fields within reasonable flying distance of Berlin. These two air bases, Wiesbaden and Rhein/Main (fig. 1), had shortages of storage space, maintenance space, and above all, troop housing, that did not allow the performance of the minimal demands of the mission.

Housing facilities.—In June 1948, Wiesbaden and Rhein/Main housed about 1,000 and 3,000 military personnel, respectively. Full use of these air bases demanded doubling of the population of both, but even this could not meet the minimal needs of the Airlift.

Number of available aircraft.—In June 1948, the only transport type aircraft available to USAFE were 107 C-47's, all of which were worn war products and presented serious maintenance difficulties. The number of operational C-47 aircraft could not have carried the minimal tonnage to Berlin, although they had been operated constantly.

⁶ United States Air Force in Europe.

Extent of aircraft maintenance facilities.—In June 1948, USAFE maintenance facilities consisted of the number of personnel necessary to meet the maintenance needs of the assigned C-47's. Intensification of use of C-47's would severely tax the available facilities. Using them 24 hours a day was beyond the maintenance capabilities.

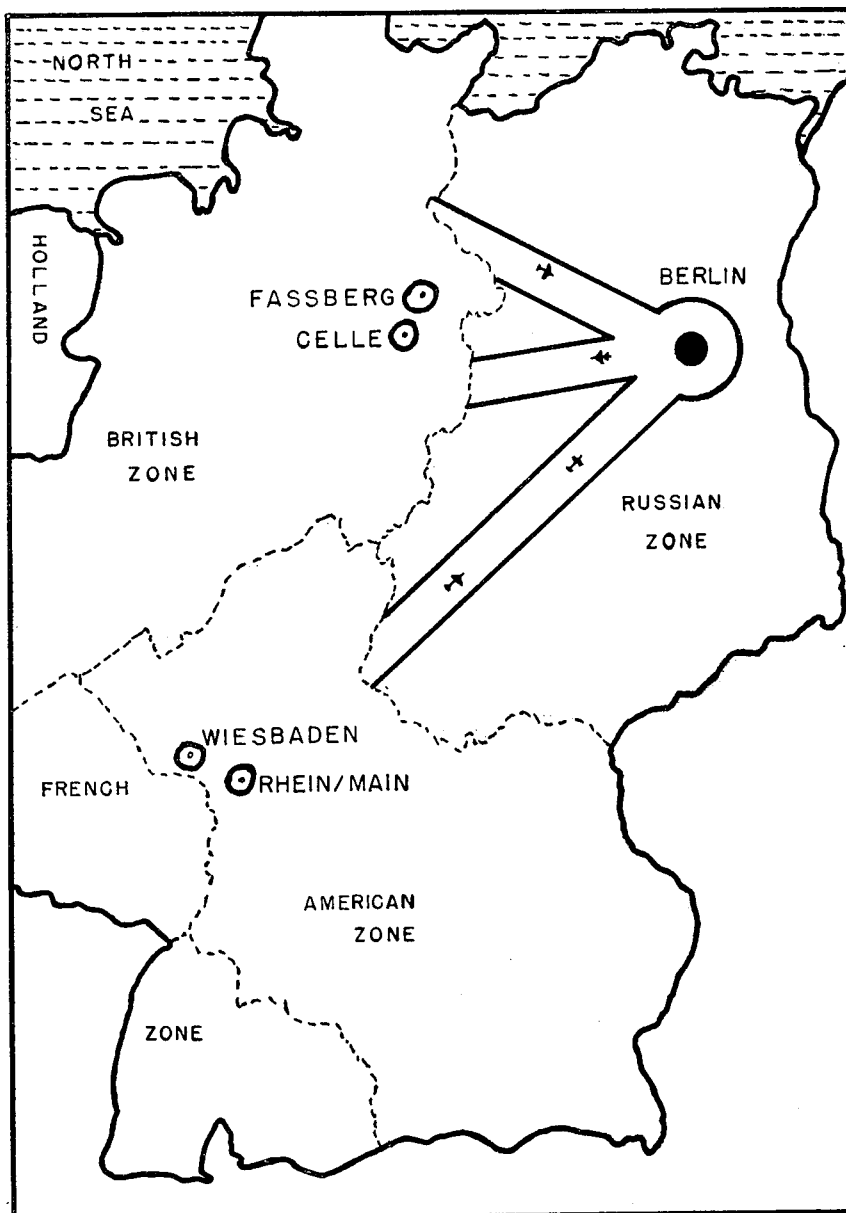


Figure 1.

Schedules.—In order to approach the tonnage requirements, it became immediately apparent that the normal working day would have to be expanded. There was no alternative but the establishment of a 24-hour-a-day, 7-day-a-week operation.

DEVELOPMENT AND PERFORMANCE OF THE MISSION

Scope.—The fact that no one knew whether the operation would last 2 weeks or 2 years lends insight into many of the problems encountered. Not until the continuous nature of the operation was appreciated did stability begin to be attained. In the early months of the effort there was no such stability.

Personnel.—From 26 June 1948 until early in July, the mission was performed solely with USAFE personnel. Aircrew members from other USAFE bases were placed on temporary duty at the Wiesbaden and Rhein/Main Air Bases. Supporting troops were brought in to augment the operation of these bases. On 4 July the first increment of personnel to assist in the mission arrived on temporary duty from the Zone of the Interior. This number steadily increased until June 1949 when 11,480 military personnel were assigned or attached to the Airlift. It was not possible to fit a single block or unit of Medical Service personnel into the Airlift. Most of the USAFE personnel were involved in the effort, the Airlift bases being the critical points. At the beginning of the Airlift there were about 30 physicians assigned to USAFE. Despite the rapid influx of additional troops, only 1 physician arrived in the first few months. On 2 September 1948 there were 31 physicians in USAFE (physicians assigned to the 495th Air Force Hospital not included because this installation was under the Department of the Army at the time) serving 28,000 troops, a ratio of about 1.1 physicians per thousand troop strength. Although the shortage of medical officers was somewhat alleviated in January 1949 with the receipt of additional personnel from the States, and further alleviated in February with the transfer of 4 physicians from the European Command, the number of physicians did not meet the minimal demands during the entire Airlift. This undoubtedly contributed to troop noneffectiveness.

Impermanence of duty assignments.—All the original troops who were sent to the European Command for the Airlift came on a temporary duty basis. At that time most personnel expected to be returned to their home stations in a matter of a few days, or at the most, in a few weeks. As this temporary duty was prolonged to 60, 90, and then 120 days, the feeling of indefiniteness grew and the number of personnel problems multiplied out of proportion to the number of people involved. In this period the per diem allowance was abolished and the discomforts and vicissitudes of the operation, which were

originally overlooked because of the impermanency of the situation, became matters of major concern.

Dislocation.—Seldom, even in time of war, have persons been so abruptly removed from their homes or from their established society as they were in the early phases of the Airlift. Believing their departure would be for a matter of a few weeks, some left their families in tourist courts, left cars parked under a tree, and left impending legal and financial problems. As the absence was prolonged, these problems assumed a magnitude that defied all counseling and rationalization. It is strange that there was not more acute situational maladjustment than was observed.

Air bases.—Wiesbaden and Rhein/Main Air Bases rapidly became supersaturated with personnel. Because even under these conditions the minimal tonnage requirements could not be met, bases were opened at Fassberg and Celle in the British Zone in September and December 1948, respectively. These bases had the advantage of being adjacent to the short corridor into Berlin, which allowed transportation of material in about one-half the time required from Wiesbaden and Rhein/Main. The rapid expansion of Wiesbaden and Rhein/Main Air Bases and the conversion of the relatively inactive bases of Celle and Fassberg into major operational sites, precipitated a multiplicity of problems in base sanitation. The more pressing of these were:

(a) *Water supply:* Of all the bases participating in the Airlift, only Rhein/Main had an established water supply system capable of meeting the demands of the population. Wiesbaden experienced difficulty at the beginning of the operation, but this condition was corrected in September 1948 and thereafter presented no major problems. The water supply problems at Celle and Fassberg, however, were never adequately solved. These bases in the British Zone had never had their water chlorinated prior to United States occupancy. Through lengthy liaison with the British forces, chlorination was attempted in the spring of 1949, and Celle was able to maintain acceptable chlorine residuals. The water supply at Fassberg was never adequately chlorinated during the operation. At both Fassberg and Celle there were recurrent shortages of water and in many instances this interfered with personal hygiene.

(b) *Mess halls:* Inadequate space, inadequate equipment, and untrained personnel all contributed to the recurrent deficiencies. Almost every sanitary report submitted by surgeons of the Airlift bases noted inadequate mess-hall sanitation. Fortunately, only one major epidemic of food poisoning occurred and it was of brief duration and without fatalities.

(c) *Refrigeration* was inadequate in all bases. Thanks to the relatively cold climate, food spoilage was not a major problem.

(d) Other sanitary problems: On occasions the laundry facilities were inadequate. Many Airlift personnel complained of the complete absence of drinking fountains at all bases. Such problems as providing suitable garbage racks, repairing floors, painting walls, and screening doors and windows were constantly arising.

Troop housing.—The doubling and tripling of personnel quartered at Wiesbaden and Rhein/Main Air Bases and the establishment of a troop population at Celle and Fassberg far in excess of housing facilities had a demoralizing effect. Every type of shelter was used and often distant barracks were renovated and occupied. The major problems were:

(a) Inadequate rest: There was relatively no segregation of personnel according to the shifts on which they worked. This created a continual traffic, especially in the larger rooms, which made all sleepers subject to frequent disturbance.

(b) Inadequate heat: In many cases attics and hastily renovated structures were used for housing prior to the installation of adequate heat. During the colder months room temperatures were far below desirable levels.

(c) Inadequate lighting, natural and artificial, especially in attics.

(d) Inadequate furnishings: In many instances the number of occupants in a room precluded the installation of any furniture other than double-deck beds. Clothes were hung from rafters and letter writing was practically impossible.

(e) Inadequate latrine and washroom facilities: As a natural consequence of using all possible space for housing, there was a troop population far in excess of washroom and latrine facilities. Complicating this situation was a frequent lack of hot water, as the demand was far beyond the capacity of the water reservoirs or boilers.

(f) Inadequate transportation: The use of housing areas at a great distance from Airlift sites, raised a transportation problem beyond the facilities at hand. This not only caused great inconvenience, but further detracted from Airlift personnel's normal rest and recreational periods.

When conditions were at their worst, such as at Fassberg in the winter of 1948-49, rooms crowded with double-deck beds with no space for wardrobes, chairs, or tables were similar to those found in concentration camps. No base was able to solve the problem satisfactorily, although in the later stages of the Airlift, additional construction alleviated the pressure.

Dependent housing.—No single aspect of the Airlift was more bitterly protested than the inadequacy of dependent housing facilities. In June 1948 there were barely enough dependent quarters for the

relatively stable USAFE forces. When the USAFE troop population doubled, there was no possibility of housing dependents of all USAFE personnel. Inasmuch as the original Airlift troops arrived on temporary duty, the problem was not acute, but when it became apparent that the length of the tour was going to be prolonged and permanent change of station orders were received, the concern over dependent housing became acute. To offer some type of housing, a relatively large number of resort hotels were renovated for the dependents of Airlift personnel. This in itself, however, posed a serious problem because many such hotels were 100 or more miles from Airlift bases, making it impossible for personnel to see their dependents more than once or twice a month and then at a sacrifice of rest and sleep. The crowded conditions in dependent hotels also constituted a sanitary problem that required constant surveillance. The general effect of the dependent housing situation is indicated by the following comments from the Airlift Questionnaire.

"If personnel who are married have to remain on duty with the Airlift they should be given some consideration and action should be taken to assure that they can have their families with them. If the Airlift is worth anything to the people of the U. S., the least that could be done is to give every man the pleasure of being with his family. If this cannot be arranged, then the Airlift is depriving the personnel of the very thing they stand for, the right to live like human beings under a democracy."⁷

"More convenient housing for dependents would eliminate a lot of worry and mental strain among married aircrew members. The fact that our families are here and we cannot get to see them but about 24 hours out of 2 or 3 weeks does not do a thing for the morale. Our families are stuck in a hotel 100 miles from us. They live out of suitcases and if the insecurity that they are forced to live under is good for small children, I wish someone would explain it to me. I feel that we have been let down by our service very badly."⁸

Aircraft.—The Airlift was accomplished chiefly with C-54 aircraft. The C-47's originally used presented no problems other than the maintenance difficulties inherent in using a worn product intensively. The C-54 pilots frequently expressed dissatisfaction of cockpit lighting, heating, and instrument panel arrangement. Although cockpit lighting was investigated, and recommendations were made for improvement, no modification was effected during the Airlift. Opinion as to the most suitable type of earphones was varied and further investigation to produce a more comfortable soundproof earphone is

⁷ Questionnaire 527 from a married co-pilot.

⁸ Questionnaire 596 from a married engineer.

probably indicated. The question of earphone sanitation also arose. Climatic factors, however, were such that the dissemination of fungus disease was not a problem. Individual issue of well-fitted and comfortable earphones would probably solve any problems in this field. Many pilots stated that the individual issue of fitted parachutes would be preferable to the method used in the Airlift; i. e., drawing a parachute from general issue for each flight. Because of altitudes flown, the use of oxygen was minimal. Had an oxygen requirement existed, the issue and fitting of masks would have been a problem.

Flying in the Airlift was not in itself a fatiguing operation. Although flying was frequently on instruments and under adverse weather conditions, there was a surprisingly small amount of operational fatigue. Furthermore, the cases of removals from flying because of operational fatigue were usually the result of environmental and maladjustment factors rather than concern over flying. The accident rate was low, being continuously under the rate for the continental U. S., and fear of survival was not a factor. In the Aircrew Questionnaire, many crew members complained of tiredness, indigestion, and similar manifestations of fatigue and maladjustment that arose not from flying, but rather from the vicissitudes of living. The following comment was submitted by a married pilot:

"The accidents that have occurred on the lift have been caused by tiredness and the resulting lack of alertness rather than by a lack of proficiency. There have, no doubt, been many near accidents due to tiredness. A flying schedule showing the time of take-off for each crew must be set up many days in advance. In this way the men can plan their rest. Only when steps are taken from higher headquarters and enforced will accidents decrease."

Performance.—From a medical viewpoint the performance of a task must be judged by human rather than logistic standards. The nature of the Airlift, which operated on a 24-hour-a-day, 7-day-a-week basis, although logistically sound, was not conducive to maximal human efficiency. The human body adapted as it is to diurnal occupation and nocturnal rest, with periodic phases of relaxation, did not fit naturally into the physiologic abnormalities of the Airlift. Although many participants in the Airlift performed their task creditably, maximal human efficiency was continually compromised by maladjustment, fatigue, and illness. The two main causes for altered human efficiency were scheduling and morale problems.

In regard to scheduling, the only workable method to carry out a continuous operation was to schedule participants in the mission as to the hours and days on which they would work. Scheduling was left up to the squadron and group commanders, with no general guidance except the demands of the mission. Two main types of schedules

were devised: (a) 8 hours on duty, followed by 16 hours off; and (b) 12 hours on duty, followed by 24 hours off. Both schedules provided for intermittent breaks when participants were allowed a few days for rest and relaxation. Although mathematically fair and impartial, these schedules usually fell far short of allowing sufficient rest and recuperation because most persons had to work much longer hours than the schedule called for in order to meet the demands of the mission and because adequate rest was frequently difficult or impossible. Fifty percent of a person's time on duty and 50 percent off more closely approximated the actual working conditions than the allocation that the schedules called for. Day sleepers frequently found that their off-duty time was during nighttime hours when the post exchange, laundry, or similar facilities were closed, and when the normal pursuit of recreational outlets was not open to them. The combination of long duty hours, interrupted sleep, and inadequate recreation detracted from human efficiency and from the performance of the mission.

Hospitalization.—The number of personnel stationed at Airlift bases put demands on the medical facilities far in excess of the designed capacity. Rhein/Main, with a population that exceeded 8,000, had a small wooden dispensary with a normal capacity of about 12 beds. A new dispensary with a 50-bed capacity was in the process of being built, but was not completed during the Airlift. Definitive hospitalization could not be provided at the base. Wiesbaden Air Base had a 16-bed dispensary in a permanent building, but because of the close proximity of the base to the 495th Air Force Hospital, no problem in hospitalization was encountered. At Celle and Fassberg, however, a hospitalization problem did exist. Each base, housing over 3,000 troops and being over 100 miles from the nearest medical installation, had only a 35-bed dispensary. Only the common illnesses could be attended at base level, and hospitalization was effected through the medium of air evacuation. A further complication of inadequate medical facilities was that medical personnel shortages allowed only one full work shift a day. Therefore, sick call, roentgenographic, and laboratory facilities, and all supporting activities were primarily designed to meet the daytime needs of the mission, with skeleton and emergency medical crews covering other hours. Airlift personnel frequently could not meet normal sick call hours because of their schedules, and were reluctant to ask for special consideration. Early symptoms were often neglected and many prophylactic measures were not effected. Thus, the forced conservation of medical personnel had the end result of intensifying the need for medical attention.

Air evacuation was used to transport patients from Celle and Fassberg to hospitals. Originally patients were removed from these bases in base C-47 aircraft on an on-call basis. This method soon proved to be unsatisfactory because there were no flight nurses assigned to Fassberg or Celle, and the pilots were unfamiliar with air evacuation routines. This resulted in aborted missions and even delivery of patients to the wrong destination. On 1 March 1949, scheduled air evacuation was inaugurated. C-47's assigned to Rhein/Main were used and each plane carried a flight nurse and one or more Medical Service technicians. The flights were conducted on a biweekly basis and patients were delivered to Rhein/Main for immediate transportation to the 97th General Hospital in Frankfurt. Between 1 March and 23 September, 616 patients were transported—a total of 161,753 patient-miles. All evacuation flights were without incidents detrimental to patient welfare and there were no serious delays or interferences because of weather or traffic.

HEALTH OF THE AIRLIFT PERSONNEL

Sources of data.—Much of the data desirable for the study of the health of the Airlift personnel does not exist because the medical installations serving them were dispensaries and served to a large extent as clearing houses for patients who were transferred to other medical installations. Most patients were transferred to Army general hospitals where it was impractical to break them down statistically as to the bases from which they came and to compute locational noneffective rates. Furthermore, the method of handling patients at Airlift bases frequently was not conducive to biometric analysis; for instance, lack of sufficient space resulted in a large number of patients who normally would be hospitalized, being placed in quarters because of respiratory and other diseases. Further complicating a statistical review was the method in which medical records were kept. The majority of physicians assigned to Airlift bases were recent graduates who had little administrative experience and even less administrative interest. Inasmuch as their time was almost completely absorbed in giving professional attention to the extraordinary demands of the Airlift, there was little incentive to maintain any but the most sketchy medical records. Fortunately, the Care of Flyer Report was maintained carefully and accurately throughout the entire operation. This has been used as the basis for the statistical evaluations.

Incidence of disease and disability.—The value of the Care of Flyer Report for studying the incidence of disease and disability is limited by the fact that (*a*) it only covers flying personnel and (*b*) although it enumerates the causes for removals from flying, it does not give the actual time lost by persons so removed and thus cannot be used to

COMPARISON OF RATES OF REMOVALS FROM FLYING FOR RESPIRATORY DISEASES

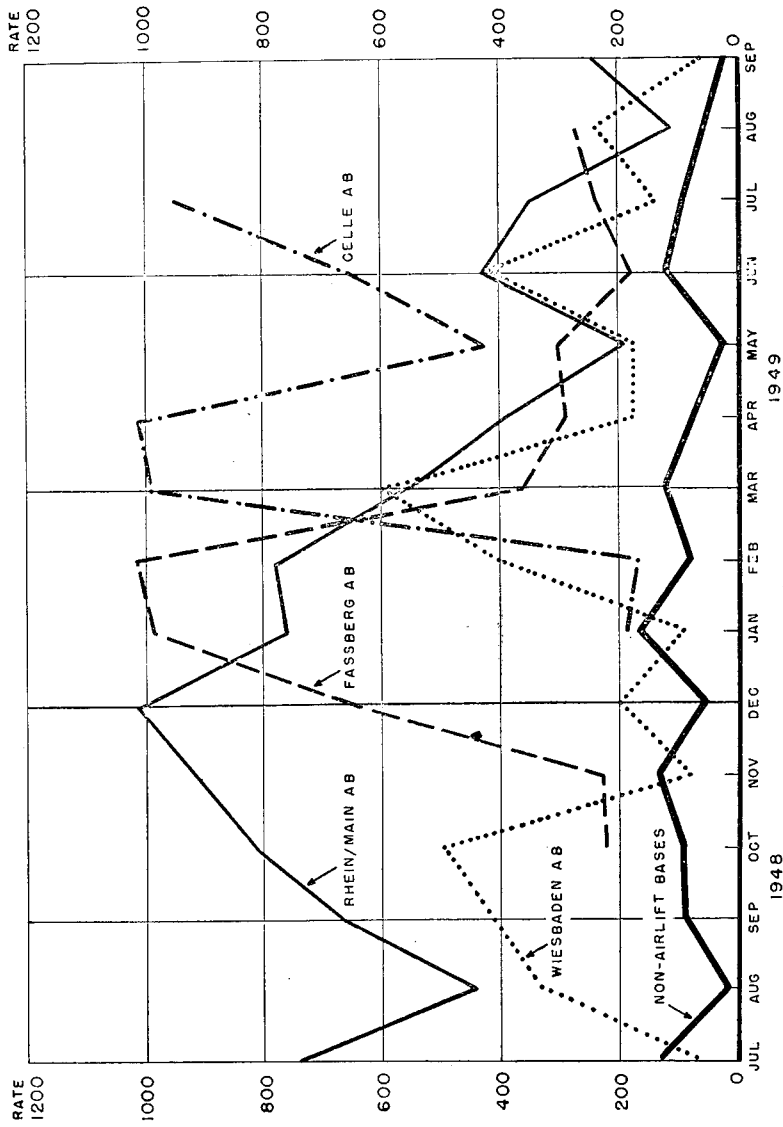


Figure 2.

compute noneffective rates. Because both flying and nonflying personnel at Airlift bases were subject to similar environmental and epidemiologic factors, the report on the disability of flying personnel reflects the disability of the supporting troops. Furthermore, by taking the Care of Flyer Reports submitted by Airlift bases and comparing them with those submitted by other USAFE installations, a reasonably accurate comparison is gained as to troop noneffectiveness.

(a) *Personnel removed from flying:* The number of personnel removed from flying at Airlift bases because of disease and injury was many times more than at non-Airlift bases. The percent of personnel removed from flying each month from Airlift bases was generally in excess of 10 percent of the total aircrew strength, as compared to about 2.5 percent at non-Airlift bases. These percents represent number of removals only and do not represent off-duty time for the entire period as there is no accurate method for computing the average time lost for removal.

(b) *Removals for respiratory disease:* The predominant cause of removals was respiratory disease. The number of removals per month at Airlift bases because of these diseases and their complications, were excessive and in general, about five times higher than at non-Airlift bases (fig. 2). Furthermore, the removals for respiratory diseases do not include such complications as aero-otitis and aerosinusitis.

For comparative purposes, the average flying strength of Airlift personnel was about 4 times greater than that of non-Airlift personnel. Even if incapacities caused by flying at non-Airlift bases was multiplied by 4, they would fall far short of the disabilities encountered at Airlift bases (table 1). Although it has been impossible to obtain facts on the number of persons who sought removal from flying because of subclinical fatigue guised under other symptoms, flight surgeons working with the Airlift stated that the number who requested relief from flying in order to rest or otherwise escape pressure of their duties, was very large, and that it was not unusual to remove persons with excessive physical fatigue under a diagnosis of common cold, or a similar evasive guise.

TABLE 1.—*Removals for incapacities caused by flying*

Diagnosis	Removals at airlift bases	Removals at non-airlift bases
Aerosinusitis.....	18	4
Aero-otitis.....	238	6
Operational fatigue.....	28	2

(c) *Removals for miscellaneous causes:* While respiratory disease was excessive and fatigue was an appreciable factor, other disabilities

did not materially deviate from normal expectations. Table 2 shows the number of removals during the Airlift for the more common disabilities.

TABLE 2.—Removals of Airlift personnel from flying for miscellaneous causes, 2 July 1948 to 1 October 1949

Cause	Total
Skin diseases.....	62
Hemorrhoids.....	23
Infectious hepatitis.....	23
Aircraft injuries.....	22
Appendicitis.....	16
Peptic ulcer.....	15
Pneumonia.....	12
Tuberculosis.....	4
Hernia.....	3
Total.....	180

Venereal disease.—The incidence of venereal disease among Airlift troops was excessive. Fortunately, with modern therapy there was little lost time as the majority of patients were treated on a duty status and periods of removal from flying were brief. Whether or not there have been any undesirable sequela associated with this high incidence cannot be determined at this time, but the fact that the rates were excessive was a cause for concern as it reflected adversely on the morale and discipline of the troops. The chief cause for this high incidence was the fact that persons suddenly removed from their established homes and placed in a new environment made hasty heterosexual adjustments. This is strongly supported by the marked rise in rates when new troops were brought in and the subsequent decline as readjustment took place and better control measures were effected. Also contributing to the high rate was the fact that acceptable recreational outlets were either overcrowded or could not be used because of the shifts on which many persons were working, and until they could have their off-duty time channeled into authorized recreation, there was much time spent in careless sexual pursuits. Another factor was the fact that when bases were expanded and new fields were opened, a large number of camp followers accumulated in the hope of gaining a livelihood from the American troops, self-support being difficult in a war-impooverished nation.

Attempts were made to control the number of transient women in the base areas and to treat those who were infected. Attempts were also made to control exposure but this was difficult. There was great resentment among the troops against any disciplinary measures taken when they were infected with venereal disease, and it is believed that many received treatment from outside sources. It is difficult to esti-

mate what the rate would have been had all patients reported to Air Force physicians. As dependents arrived, and as authorized recreational outlets improved, the recorded rate fell. The incidence of venereal disease in the Airlift appeared to be inversely proportional to morale and stability. Whether or not disciplinary measures were beneficial in its control is a matter of conjecture.

SUMMARY

The Berlin Airlift was an intensive flying mission undertaken without warning or preparation. There was a lack of housing, aircraft and equipment, and recreational and medical facilities. The effect on the health of Airlift personnel was adverse. The respiratory disease rate was five times as high, and the number of persons removed from flying because of physical disability was four times as high as among non-Airlift personnel. Various incapacities caused by fatigue, maladjustment, and low morale were also unduly high. The logistic demands of the mission required priority over the correction of the environmental problems. As a result, unsatisfactory living and hygienic conditions could not be rectified during the mission although some progress along these lines was being made when the mission ended.

CONCLUSIONS

1. *Dislocation.*—Sudden dislocation of troops from their homes in the early stages of the Airlift resulted in appreciable situational maladjustment. Adequate advance notice prior to transfer in order to take care of personal problems and to provide for dependents is essential to morale and stability.

2. *Overpopulation.*—The sudden increase in troop strength overtaxed housing and sanitary facilities thereby contributing to noneffective rates. Fortunately no major epidemics occurred. The construction of adequate housing and sanitary facilities before occupancy is essential to troop health.

3. *Work schedules.*—The Berlin Airlift was the first major peacetime operation conducted on a 24-hour-a-day, 7-day-a-week basis. Lack of guidance and uniformity resulted in schedules that contributed to fatigue and noneffectiveness. Schedules should be uniform, allow sufficient time off for proper rest and relaxation and should not be changed at intervals of less than 7 days, in order that troops may adapt to changes in sleeping habits. Food, medical, and laundry services should operate on schedules comparable to that of the troops they support.

4. *Recreation.*—The normal recreational outlets of Airlift personnel were blocked through schedules that did not provide for passes of 3 or more days, or did not provide for daylight off-duty time. This

contributed to fatigue, lowered morale, and probably increased the incidence of venereal disease.

5. *Flying*.—Although fear of flying or survival were negligible factors, the physiologic abnormalities of the schedules used and concern over families and personal problems contributed to fatigue, lowered efficiency, and probably contributed to aircraft accidents. Intensive peacetime flying in a low-altitude operation, even under adverse weather conditions, is not in itself detrimental to health or efficiency, provided there is reasonable environmental adjustment and adequate rest and recreation.

6. *Hospitalization*.—The existing medical facilities and personnel were not capable of providing other than dispensary-level care. This resulted in an increased noneffective rate because of the referral of patients to distant sites, and inability to give early attention to symptoms.

7. *Air evacuation*.—Scheduled air evacuation proved superior to on-call flights.

8. *Recording of troop disability*.—In an operation of major magnitude requiring extraordinary effort on the part of participating personnel, there is a point at which loss through fatigue and disability increases faster than productive results. In such a situation troop disability should be charted with logistic accomplishments.



Infant Diarrhea¹

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INFANT diarrhea occurs in three age groups: (a) under 1 month old; (b) 1 to 6 months old; and (c) over 6 months old. The newborn infants have the highest case fatality rate; those 1 to 6 months old follow closely; and those over 6 months old are least likely to die of this disease.

EPIDEMIOLOGY

Infant diarrhea is essentially caused by fecal contamination entering the body through the mouth. Studies of possible viral diarrheas indicate that the respiratory tract may be the point of entry for the etiologic agent, but in general the alimentary route is the means of transmitting the disease.

Epidemic diarrhea of the newborn.—In its epidemic form, this is probably a disease of modern times. Clifford (1) noted that although the out-patient department of the Boston Lying-In Hospital delivered 1,015 babies in the home in 1935, they only delivered 47 babies in the home in 1945, and none in 1946. The American mother has discovered that she has a better chance of survival when delivered in a hospital, but her infant appears to be getting the worst of the deal. Statistics show that the infant mortality rate has declined only slightly in the last 25 years (2) primarily because of the prevalence of epidemic diarrhea of the newborn. The trend toward hospital deliveries, the increased birth rate, and the inadequate facilities and personnel have caused a breakdown in nursery and formula-room techniques, making infection possible. When maternity hospitals learn to cope with the situation, the disease should become less prevalent.

The older age groups.—Woodbury (3), studying the problem in Baltimore, found a definite correlation between the low earnings of the father and the high case fatality rate from gastrointestinal disturbances in infants. Halle (4) showed that of 170 infant deaths, 161 occurred among the poor, 9 among the well-to-do, and none among the rich. Diarrhea in the low-income group is often terminal and

¹ Presented at the Seminar of the Fourth Army Area Medical Laboratory, Fort Sam Houston, Tex., 6 July 1949.

would not have occurred or would not have been fatal without some prior condition such as malnutrition, marasmus, neglect, or ignorance.

ETIOLOGY

Infant diarrhea is not a pathologic entity, but a miscellaneous group of diseases from known and unknown causes bound together by a common symptom, diarrhea.

Bacterial agents.—In addition to epidemics caused by such pathogens as the *Shigella* or *Salmonella*, epidemics have been reported in which so-called nonpathogenic organisms have been incriminated. Among these are *Pseudomonas aeruginosa*, *Proteus morganii*, the hemolytic staphylococcus, Lancefield's group D streptococcus (including *Str. faecalis*), paracolon organisms, and hemolytic strains of *Escherichia coli*. These organisms can usually be found in normal persons but it is believed that almost any organism can cause disease if present in sufficient numbers.

Ensign and Hunter (5) investigated a series of outbreaks of infant diarrhea in a hospital in a fairly large community in Kansas. They noted that 6 of the outbreaks had occurred in the nursery between 1 June and 1 October and involved 24 infants, 9 of whom died. Their study revealed that: (a) the outbreaks were separated by periods of 15, 7, 49, 31, and 10 days, indicating that the infection was being introduced from without; (b) no secondary outbreaks, with one possible exception, occurred in the nursery; (c) a mother or a nurse became ill before each outbreak; (d) every time a mother became ill, her child did also; (e) children on the pediatric ward would occasionally develop the disease; and (f) a generalized epidemic of diarrhea was occurring in the community at the same time.

TABLE 1.—Incidence of positive cultures for *Pseudomonas aeruginosa* in an outbreak of diarrhea

	Number	Positive culture
Patients under 2 years of age.....	38	24
Normal infants under 2 years of age.....	13	15
Patients examined after death.....	2	2
Nurses and other employees.....	103	216

¹ 4 of these became ill later.

² 1 nurse was also a carrier of *Eberthella typhosa*.

Having decided that the infection was being introduced from the community they investigated the water and milk supplies and found that the hospital and most of the community received their milk from two dairies. Investigation of these dairies revealed grossly unsanitary conditions, improper pasteurization, and plate counts of over 3 million bacteria per milliliter. In one of the dairies a water leak,

directly over one of the coolers, was partially controlled by a dirty rag. The water dripped from the rag directly into the so-called pasteurized milk. Cultures from this rag yielded *Ps. aeruginosa*. Previous cultures from the infected children had yielded the same organism, but little attention had been paid to this fact. The results of thorough bacteriologic study are shown in table 1.

McClure (6) investigated a series of outbreaks of infant diarrhea in hospital nurseries and noted the greater predominance of hemolytic *Escherichia coli* in the sick than in the normal children. Of 42 patients, 15 of whom died, hemolytic *Esch. coli* were found in the stools of 34 and paracolon organisms were found in 21, whereas in 34 normal children *Esch. coli* were found in 2 and paracolon organisms in 8. Four nurses in one institution also harbored hemolytic *Esch. coli* and one of these strains was similar, biochemically, to those isolated from the infected infants. The same strain of this organism was also recovered from a bathing table on which all the infants were bathed. A bacteriologic study of the formula used revealed the presence of a nonhemolytic *Esch. coli*.

McClure attempted to demonstrate the ability of these organisms to produce a toxin by growing them in a semisolid medium, centrifuging to obtain the supernatant fluid which was passed through a bacterial filter, and using the filtrate for testing in cats. His results were not entirely conclusive, but in general the hemolytic strains of *Esch. coli* produced vomiting, diarrhea, and death in a much larger percent of cats than did the nonhemolytic strains. Mice were only slightly susceptible to the toxin, and rats, guinea pigs, rabbits, and monkeys were not susceptible.

Breast feeding is superior to bottle feeding in preventing outbreaks of epidemic diarrhea in the newborn (7). Infants need a normal "fecal-oral" transmission from the mother through breast feeding to establish a normal bacterial flora in the intestines. Aseptic feeding techniques rob the child of these normal coliform organisms, and make the child more susceptible to any pathogen he may encounter. Mayes (7) even advocates the rectal injection of a suspension of the so-called normal flora to prevent outbreaks of this disease.

Viral agents.—Although viruses have long been suspected as one of the causes of infant diarrhea, most of the evidence was negative, resting on the absence of a demonstrable bacterial agent, the fact that the infants involved showed a normal or subnormal leukocyte count and that the child failed to respond to chemotherapy. The first positive evidence that a filtrable virus could cause infant diarrhea was submitted by Light and Hodes (8) (9). After attempting to isolate a filtrable agent in a variety of small animals without success, they turned to the calf. Four strains of a virus that caused a bloody,

mucous diarrhea in calves and lasted about 3 weeks were readily isolated. Thirteen percent of the infected calves died. Serial transfers were readily made with all four strains. Specific neutralization of the virus was demonstrated, using the serums of infants convalescing from the disease. Cummings (10) partially confirmed this work by passing the agent serially through five calves before losing it.

Buddingh and Dodd (11) observed an outbreak of infant diarrhea, complicated by stomatitis in about 30 percent of the patients, in which they successfully transferred a filtrable agent to the cornea of rabbits. They differentiated this disease from herpetic keratitis by cross-immunity tests. Buddingh (12) claims to have successfully transmitted the disease serially through 45 passages in the rabbit's cornea. Unfortunately investigators attempting to corroborate this work have not substantiated their findings. Meikeljohn (13) believes that he has duplicated Buddingh's work, but has had little success in proving, by means of the neutralization test, that a virus is present. Cummings (10) found that many nonspecific factors such as trauma, trauma plus alundum, stools and oral washings from normal persons, and various bacteria produce a keratitis in the rabbit's cornea similar to the one described by Buddingh and Dodd.

Lyon and Folsom (14) witnessed 3 outbreaks of this disease in a hospital nursery in 1926, 1934, and 1938. During each outbreak, they noted that influenza was prevalent in the community. During the 1938 epidemic, involving 16 infants with 5 deaths, they assumed that the disease was caused by influenza virus and inoculated each of 3 critically ill infants with 30 milliliters of blood from an adult patient convalescing from influenza. All 3 patients improved immediately and, although the diarrhea persisted for several more days, they made an uneventful recovery. High et al. (15) noted an outbreak of infant diarrhea that they suspected to be caused by a virus. At the time an epidemic of nausea and vomiting was prevalent in the community. Trying Lyon and Folsom's technique, they injected the infants with blood from a convalescent adult patient, but with no success. The only results that have been confirmed are those of Light and Hodes who worked with the calf, a rather cumbersome and expensive laboratory animal.

Unknown agents.—Although most of the literature on this subject deals with outbreaks of unknown cause, filth and poor nursing techniques appear to play an important part in almost every outbreak: Diapers were changed just prior to feeding; hand-washing was performed in cold or tepid water or in rinse solutions that contained as many as 7 million bacteria per milliliter; formulas were inadequately sterilized, and many other lapses in aseptic technique were noted.

CLINICAL FINDINGS

Most cases of infant diarrhea are characterized by (*a*) severe intestinal intoxication, (*b*) yellow watery stools, (*c*) abnormal distention, (*d*) rapid loss of weight, (*e*) drowsiness, (*f*) dehydration, (*g*) shock, and (*h*) in moderate to severe cases, acidosis (*16*). High and his group (*15*) added a feature that they have noted—a biphasic phenomenon in which the patient may have recurrent bouts of diarrhea and then may suddenly collapse and die. Of the 11 patients in their series who demonstrated this phenomenon, 9 collapsed suddenly and 8 died. Feldman and Anderson (*16*) found that the average case fatality rate reported for outbreaks of infant diarrhea was 27.8 percent; the range was from 10.5 to 81.8 percent.

AUTOPSY FINDINGS

Most workers found no significant findings at autopsy. Many noticed a terminal pneumonia or atelectasis and a slight intestinal edema, but unusually little pathologic change for a disease with such a violent course. Christensen and Biering-Sorensen (*17*) believe that an encephalitis occurs in some patients and have presented the following post-mortem findings: (*a*) no evidence of intestinal infection; (*b*) fatty degeneration of the liver; (*c*) bronchitis and pneumonia suggestive of a general infection with gastrointestinal symptoms; (*d*) encephalitis; (*e*) meningitis with no inflammatory changes in the brain; and (*f*) edema of the brain. The cerebral changes may be non-specific like those of toxic encephalitis found in other diseases (*18*). Lyon and Folsom (*14*), who suspected influenza virus to be the cause of their cases of diarrhea, found severe generalized edema of the brain with many pin-point hemorrhages at autopsy. The blood vessels were unusually friable, and the convolutions of the brain were almost flattened by the edema. In the intestinal tract, the mucosa was almost completely denuded and pin-point hemorrhages were present. Generalized atony of the intestine was prevalent.

FOURTH ARMY AREA MEDICAL LABORATORY PROJECT

We are trying to determine the agents that may cause infant diarrhea. Complete bacteriologic studies and attempts to isolate filtrable agents from cases that are probably caused by viruses are made. Table 2 summarizes our findings on the enteric pathogens. In the group studied thus far no *Shigellae* were isolated from the group 1 to 6 months old. Three children demonstrated central nervous system signs and their infection was thought to be viral. Two of these children died. One was 2 months old and had the typical stomatitis described by Buddingh and Dodd (*11*). The other was 4 months

old and his course was characterized by a severe stupor and intermittent diarrhea. The third child, 7 months old, demonstrated similar symptoms but recovered spontaneously. Tissues were obtained on autopsy and complete bacteriologic and viral studies were made with negative results. Suckling mice, 2 to 6 days old, were used in the viral work. Twenty percent suspensions of the tissues were prepared in 10 percent inactivated normal rabbit serum and inoculated intracerebrally in 0.01 milliliter amounts. Remaining tissues and suspensions are stored at -70°C .

TABLE 2.—*Bacteria found in stools of infants with diarrhea*

Age in months	<i>Shigella</i>	<i>Proteus</i>	<i>Pseudo- monas</i>	Paracolon	<i>Escherichia coli</i> only	Total
1 to 6	0	5	1	1	3	10
7 to 12	1	2	0	0	2	5
Over 12	5	1	0	4	1	11

SUMMARY

Crowding, lack of trained personnel, and faulty techniques in handling and feeding infants have made the hospital nursery a hotbed of infection. In the home most cases occur among the low-income group because of neglect, malnutrition, poor sanitation, and ignorance. The disease may be caused by a host of bacterial and viral agents. Continued research may reveal a number of agents now unknown, but proper sanitation will continue to be the most important factor in the prevention of this disease.

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The Clinical Use of Antibiotics

IV. Treatment of Infectious Processes¹

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AT PRESENT the problem of the clinical use of antibiotics in the treatment of infectious disease is complex, and will probably become more so as new and effective agents make their appearance. This means that the medical officer must select with care and intelligence the antibiotic he plans to use for the treatment of any patient, and, in certain instances of disease, he is confronted with the problem of choosing the most effective combination from among several antibiotics. The following recommendations are based on the effectiveness of the drug, its toxicity, the ease of its administration, its cost, and the possibility of the organism becoming resistant.

Group A hemolytic streptococcal infection.—The antibiotic of choice is a preparation of penicillin G. Aureomycin is the second most effective agent, with chloramphenicol and streptomycin trailing. For topical use, tyrothricin or bacitracin can be recommended.

Group B hemolytic streptococcal infections.—Penicillin G is preferred. Aureomycin is second choice.

Infections with Streptococcus faecalis.—Aureomycin is the drug of choice with penicillin second.

Infections with Streptococcus viridans.—A preparation of penicillin G is the drug of choice with aureomycin second if the infecting organism belongs to that group of *Str. viridans* that inhabits the rhinopharynx. If the organism belongs to the enterococcal group, then aureomycin is the drug of choice.

Nonhemolytic streptococcal infections.—If the organism is an enterococcus, use aureomycin; otherwise penicillin.

Staphylococcal infections.—In view of the increasing incidence of staphylococcal infections produced by organisms that are resistant to penicillin, aureomycin is the agent of choice, with penicillin G sec-

¹ The fourth and last of four articles on this subject.

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ond. Streptomycin may be used if penicillin and aureomycin are not available. For topical use, tyrothricin or bacitracin can be recommended.

Pneumococcal infections.—A preparation of penicillin G is the drug of choice, with aureomycin, chloramphenicol, and streptomycin following in that order.

Meningococcal infections.—A preparation of crystalline penicillin G is the drug of choice. Streptomycin is second. Not enough data have accumulated to evaluate aureomycin or chloramphenicol in the therapy of these infections.

Gonococcal infections.—A preparation of penicillin G is the drug of choice, with streptomycin coming second. Aureomycin and chloramphenicol, while excellent agents, do not have the high degree of effectiveness possessed by penicillin.

Clostridial infections.—A preparation of penicillin G is the drug of choice.

Diphtheria.—*This disease should always be treated with an adequate dose of antitoxin.* The concomitant administration of a preparation of penicillin G will decrease the convalescent carrier period.

Infection with Gaffkya tetragena.—A preparation of crystalline penicillin G should be used.

Anthrax infections.—A preparation of crystalline penicillin G is the drug of choice. Aureomycin also appears to be effective.

Coli-aerogenes bacillary infections.—Chloramphenicol or aureomycin appear to be equally effective, with streptomycin next. The use of penicillin is not recommended.

Pyocyanous bacillary infections.—Streptomycin is the drug of choice. If polymyxin can be obtained, it should be used in severe systemic infections of this type. Chloramphenicol and aureomycin have some effect in urinary tract infections produced by *Pseudomonas aeruginosa*.

Friedländer's bacillary infections.—Either aureomycin or chloramphenicol should be used. Streptomycin is third choice.

Proteus bacillary infections.—Streptomycin is first choice; chloramphenicol, second.

Salmonella infections.—Chloramphenicol is the drug of choice for the treatment of typhoid fever. Treatment should be continued for 2 weeks. Aureomycin has some effect. Neither aureomycin nor chloramphenicol is much good in food poisonings or diarrhea produced by other members of the salmonella group.

Bacillary dysentery.—To date, no antibiotic has proved itself superior to sulfadiazine in the treatment of bacillary dysentery.

Pasteurella infections.—In plague, streptomycin is the drug of choice. In tularemia, aureomycin is the drug of choice, with chloramphenicol second.

Brucellosis.—Either aureomycin or chloramphenicol in full doses should be used. Treatment should be continued for 2 weeks.

Listerella infections.—Experimental data, coupled with the favorable results of treatment of infections in animals, points to the use of aureomycin in these infections.

Cholera.—Experimental data suggests the use of chloramphenicol, aureomycin, or streptomycin in the order named.

Hemophilus infections.—In meningitis caused by *Hemophilus influenzae*, aureomycin combined with sulfadiazine is the treatment of choice, with chloramphenicol combined with sulfadiazine second. In whooping cough, clear-cut clinical evidence of effectiveness of a high order has not been obtained as the result of therapy with any of the antibiotics. Chancroid responds to aureomycin, chloramphenicol, or streptomycin.

Lymphogranuloma inguinale.—Either aureomycin or chloramphenicol is the drug of choice, with streptomycin next.

Spirochetal infections.—In syphilis or yaws, a preparation of penicillin G is the drug of choice. The same is probably true insofar as pinta is concerned. Relapsing fever generally responds to penicillin therapy, as do infections produced by spiral organisms of the mouth and *Borrelia vincentii*. Penicillin is also the agent of choice for the treatment of leptospiral infection. There is not enough clinical data available to make specific recommendations respecting the use of chloramphenicol or aureomycin in spirochetal infections at this time. Both have shown anti-spirochetal activity.

Streptobacillus moniliformis infections.—Streptomycin is the drug of choice.

Bartonella infections.—Use chloramphenicol in full doses.

Bacteroidosis responds well to therapy with aureomycin.

Actinomycosis.—A combination of a preparation of penicillin G with sulfadiazine should be used in treating this disease.

Rickettsial infections respond promptly to therapy with either chloramphenicol or aureomycin.

Primary atypical pneumonia responds to treatment with either aureomycin or chloramphenicol.

Psittacosis.—Either chloramphenicol or aureomycin is the drug of choice.

Lymphogranuloma venereum.—Either aureomycin or chloramphenicol should be used.

Herpes simplex.—The effects of aureomycin in the treatment of lesions produced by this virus are in dispute. Good results are claimed from its use in dendritic ulcers of the cornea.

Herpes zoster.—Use aureomycin early in this disease and in the doses recommended for moderately ill patients.

Vaccinia (generalized).—Aureomycin is a valuable therapeutic agent in the control of this disease.

Acute amebic dysentery.—Aureomycin in the doses recommended for moderately ill patients is effective in acute amebic dysentery. The drug should be given for at least 7 days.

THE USE OF COMBINATIONS OF ANTIBIOTICS

The physician must bear in mind that the modes of action of the various antibiotics are different, and that under certain conditions (especially in seriously ill patients) superior results can be obtained by using a combination of two or more of these agents. For example, in certain patients suffering from subacute bacterial endocarditis a combination of penicillin and streptomycin gives much better results than penicillin alone. With this example before him, the physician can use a judicious combination, perhaps of the first and second choice antibiotics, in a number of severe infections.

BACTERIAL RESISTANCE

Much is heard about the development of resistance by infecting micro-organisms to the antibacterial effects of antibiotics. Generally speaking, the development of resistance is not a frequent occurrence except when streptomycin or dihydrostreptomycin is used. Against either of these agents, bacteria may develop a high degree of resistance within a relatively short time, even in a few days. This possibility must be constantly borne in mind when either of these drugs is used. Infecting bacteria may also develop a high degree of resistance to the antibacterial effects of penicillin. This has not proved to be a serious problem, but there is evidence from various parts of the world that penicillin-resistant, pathogenic strains of *Staphylococcus aureus* are being encountered with increasing frequency.^{3,4} Whether these strains were originally resistant or whether they represent resistant mutants which have displaced penicillin sensitive strains is unknown. The fact remains that they are becoming much more common and every medical officer should be familiar with this situation. Both strepto-

³ THOMSON, E. F., and ROUNTREE, P. M.: Incidence of penicillin-resistant and streptomycin-resistant staphylococci in a hospital. *Lancet* 2: 501-504, Sept. 17, 1949.

⁴ BARBER, M.; HAYHOE, F. G. J.; and WHITEHEAD, J. E. M.: Penicillin-resistant staphylococcal infection in a maternity hospital. *Lancet* 2: 1120-1125, Dec. 17, 1949.

mycin and penicillin may produce rapid-developing types of resistance. Aureomycin and chloramphenicol do not appear to do this often, with the result that, while a four-, eight-, or sixteen-fold increase in resistance against these agents may be observed, it rarely becomes hundred- or thousand-fold. It is rarely necessary to test the susceptibility of infecting micro-organisms before proceeding with treatment. In any given patient to whom adequate doses of a proper antibiotic have been given, if the expected therapeutic effects are not noted within 48 to 72 hours, the medical officer should consider the possibility that the infecting organism may be resistant to the antibiotic he is prescribing.

DOSAGE

It is beyond the scope of this report to present detailed information concerning the dosage of the antibiotic that should be used for the treatment of specific infections. In acute infectious processes that in the course of their natural evolution do not tend to relapse or become chronic, the initial dosage of the antibiotic may generally be halved after 48 hours of normal temperature have elapsed, and discontinued all together after 5 to 7 days have passed without fever. In acute infectious diseases that have a tendency to relapse or become chronic, therapy with antibiotics should be continued in the initial dosage until about a week of normal temperature has elapsed. Then the dosage may be halved and the agent continued for another week or two. In chronic infections, it is generally necessary to continue treatment over a period of weeks, and in infections of bone, in tuberculosis, in subacute bacterial endocarditis, and in other types of chronic infection, it may be wise to continue therapy for months. Contained pus, sequestra, renal stones and obstruction of the urinary tract, and other such factors militate against the chances of obtaining the best therapeutic results from the use of antibiotics. Therapy with antibiotics that have a *bactericidal* action against a given infectious agent need not be continued as long as with agents that have a *bacteriostatic* effect.

Tyrothricin is used as a topical agent in liquid or ointment form. It may be applied three or four times a day. All necessary auxiliary forms of therapy that are indicated should be used. Solutions for local use should contain 0.5 milligram of tyrothricin per cc. and should be made up in sterile 5 percent glucose.

Bacitracin is used as a topical agent in an aqueous or ointment form. In aqueous solution (500 units per cc. in sterile isotonic saline solution), it may be used in moist dressings or for local infiltration. When the latter route is used, from 0.5 to 5 cc. of the solution may be injected

once or twice a day into the base of the infective process. The addition of enough procaine to produce a 1 or 2 percent solution of this local anesthetic in the solution of bacitracin will please the patient who receives it. *Bacitracin solutions must be refrigerated. They lose their potency in 3 weeks.* If the ointment is used, it may be applied to the infected part from one to three times a day depending on the type and size of the lesion.

Penicillin.—Only preparations containing penicillin G should be used. Aqueous solutions of crystalline penicillin G should be used when it seems desirable to obtain high concentrations of penicillin in the blood, for injection into the cerebrospinal canal, for injection into the body cavities, or when the patient is known to be sensitive to procaine. Procaine penicillin G may be used when a slow, relatively long lasting effect is desired. It must be remembered that aqueous suspensions of procaine penicillin G produce detectable blood concentrations of the antibiotic for about 12 to 16 hours, oily suspensions of procaine penicillin G for 36 to 48 hours, and oily suspensions of procaine penicillin G with 2 percent aluminum monostearate for about 48 to 72 hours. Aluminum penicillinate behaves like procaine penicillin G in oil with 2 percent aluminum monostearate added. These factors concerning the release of procaine penicillin G must be considered by the physician when he plans his dosage schedule. The least desirable method of administering penicillin in therapeutic doses is by mouth because it is expensive and not always reliable. If the drug has to be given by mouth, the dose should be five times that which would be satisfactory if aqueous solutions of penicillin were being administered intramuscularly. An antacid should be given concomitantly with the penicillin and the time schedule for therapy should be every 3 hours. When penicillin is to be inhaled, a preparation in which the bulk of the crystals of penicillin are 10 microns or less in diameter must be used if much of the drug is to penetrate into the smaller recesses of the lung. *The use of penicillin as a topical agent should be avoided because the chances of sensitizing the patient to the drug are great.*

Streptomycin (or dihydrostreptomycin) may be used parenterally or orally. *It should never be used as a topical agent because its sensitizing properties are great.* When administered parenterally, streptomycin should be made up in solution in sterile distilled water or sterile isotonic saline solution in a concentration of 0.5 gram per cc. In acute bacterial infections in adults, from 0.5 to 1.5 grams of streptomycin administered every 12 hours intramuscularly for from 5 to 10 days *or less* is an average dose. In children, the amount of streptomycin is scaled down according to weight and age. In tuberculosis, with the exception of tuberculous meningitis or miliary tuberculosis,

the standard dose in adults is 0.5 gram of streptomycin every 12 hours for 42 days. In the excepted conditions, the dose is 1.5 grams every 12 hours for 90 to 120 days. In children, the total daily dose should be from 7 to 10 milligram per kilogram of body weight. This is divided into two parts, one of which is given at intervals of 12 hours for the periods recommended above.

Aureomycin may be administered orally, parenterally, or topically. The oral route is preferred. In moderately ill patients, the total daily dose is 20 to 30 milligrams per kilogram of body weight (the lower figure being used for adults and up to the higher figure for children) which is divided into four or six parts and is administered at interval of 6 or 4 hours day and night until the temperature has been normal for 48 hours and the infection is under control. At this time the dose may be halved if the physician believes this is the best course. In severely ill patients, the oral priming dose is 10 milligrams and the total daily maintenance dose is 50 milligrams per kilogram of body weight. This dosage is continued until the infection is well controlled, at which time it may be decreased at the physician's discretion. Chocolate powder containing 50 milligrams of aureomycin per teaspoon, may be used for children who cannot or will not swallow capsules. This powder may be given in milk or water. Aureomycin may also be given intravenously in severely ill patients. A priming dose of 10 milligrams per kilogram of body weight is recommended. The total daily dose for intravenous therapy is 25 to 40 milligrams per kilogram of body weight. This is divided into three or four parts, each of which is given at intervals of 8 or 6 hours. A total of 300 milligrams at any one intravenous dose should not be exceeded although it may be given repeatedly. The solution must be injected slowly and care must be taken to avoid *extravascular extravasation*. The solution may cause irritation and some phlebitic reaction. Oral therapy should be initiated as soon as possible. Aureomycin is also available in an ointment for topical use and in a special borate solution for ophthalmic use.

Chloramphenicol is given primarily by mouth, although, when it is impossible to use this route, it may be given rectally. The initial priming dose is 60 milligrams per kilogram of body weight. This is divided into three parts, one of which is administered every 4 hours for three doses. The total daily maintenance dose for patients who are moderately ill is 60 and for those who are seriously ill, 60 to 120 milligrams per kilogram of body weight. These doses are divided into four or six parts and are administered at intervals of 6 or 4 hours until the temperature has been normal for 2 days and the infection is under control. At this time the physician may regulate the dose at his discretion. No preparation of chloramphenicol for parenteral use is available as yet.

CONCLUSIONS

Effective antibiotics are now available for the treatment of all rickettsial, most bacterial, and certain viral diseases. To employ these agents properly the medical officer must have some understanding of their clinical pharmacology and toxicology, the range of their antibacterial activity, and of the various preparations of these drugs that are currently available.



Aneurysm of the Coronary Artery

Report of a Case

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AN ANEURYSM of the coronary artery can result from atherosclerosis and medial elastic fiber destruction. To date, 18 cases of coronary aneurysm on an atherosclerotic basis have been reported. Another case is herewith reported.

CASE REPORT

A 78-year-old white man was admitted with the chief complaint of precordial pain and dyspnea of 11 years' duration. Physical examination revealed blood pressure of 160/100 mm. Hg; pulse 120, regular and strong. Coarse râles were heard at both lung bases; the heart was enlarged to the left and the apical beat was in the sixth interspace at the anterior axillary line. On auscultation, a loud "machinery" murmur was heard in the third right interspace; it was transmitted to the right epigastrium. This murmur was audible on auscultation of the posterior chest. Two days after admission, the patient suddenly became unconscious; Cheyne-Stokes respiration occurred, and he died.

The pertinent autopsy findings were: Cerebral hemorrhage in the right internal capsule; a 4 by 6 cm. aneurysm in the right coronary artery, 4 cm. from aortic ostium, with mural thrombus; cardiomegaly, 650 gm.; hydropericardium, 75 cc.; and atherosclerosis (a) coronaries, grade 3, (b) aorta, grade 4, and (c) cerebral vessels, grade 4.

DISCUSSION

Rigdon and Vandergriff (1) in a review of the literature report a total of 151 cases of coronary aneurysm. According to Packard and Wechsler (2) coronary aneurysm is three times more common in men than in women. Coronary aneurysms are caused by arteriosclerosis, mycotic embolism, congenital defects (Harris (3)), or syphilis (Snyder and Warren (4)). Rigdon and Vandergriff believe that coronary aneurysms most commonly arise at the bifurcation of a branch from the main vessel. Mitchell (5) reviewed the literature and found 17 cases of atherosclerotic coronary aneurysms.

The case reported here falls into the category of atherosclerotic aneurysm. Grossly, the coronary arteries were extremely athero-

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Figure 1.

sclerotic and, on microscopic examination, revealed a decrease in the elastic fibers of the medial layer. Sixty percent of the aneurysmal sac was replaced by a mural thrombus and the distal coronary orifice was thickened (fig. 1). This resulted in a patent lumen which allowed complete circulation through the aneurysm.

REFERENCES

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Field Trial of "Shigella flexneri III" Vaccine

Report of Bacteriologic Studies

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AS AN integral part of the field trial of *Shigella flexneri III* vaccine in the prevention of recurrent shipboard epidemics of shigellosis, a series of rectal swab specimens was taken and cultured from all personnel included in the program; the background of the studies was outlined in a previous article (1). Several factors contributed to the plan for extended regular culturing of the officers and men involved in the investigations. All five of the light cruisers selected for the project had experienced at least one epidemic since 1945. It was necessary to obtain further information concerning the numbers of asymptomatic carriers that were still aboard and thus determine whether endemic conditions had persisted. Although the intervals between successive samplings were considerably longer than ideal, it was hoped that additional data could be collected regarding the intermittency in recoveries of *S. flexneri III* from the carriers (2) (3). Finally, it was believed essential to have available a cultural history of each subject in the event that an epidemic occurred or could be considered imminent on the basis of the appearance of acute cases of diarrheal disease; outbreaks have occasionally been preceded by pilot cases (2).

PROCEDURES AND MATERIALS

The original plans provided for 1 year of postinoculation studies with routine rectal culturing scheduled once every 2 weeks, or a total of 26 follow-up cultures from the personnel included in the program. In addition, 3 cultures were to be taken from each person at short intervals before administration of the vaccines. Furthermore rectal cultures were made from persons who reported to sick bay with symptoms of

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gastrointestinal illness. The cultures were made as promptly as possible and more often than usual. Of the 5 ships included in the project, 3 were decommissioned prior to the scheduled termination dates of the study; operational plans for another vessel made it impracticable to obtain the last 2 scheduled cultures. The numbers of post-inoculation cultures actually obtained on the cruisers were, therefore, 12, 15, 19, 24, and 26 respectively.

The technical procedures followed and materials employed were described in another article (1). Of importance in the interpretation of results were histories of previous exposure to infection with *S. flexneri III*, ship's division to which a man was assigned, and whether the subject represented an "original" or "replacement" in the project; replacement personnel were those who reported aboard the vessels subsequent to initiation of the program on the ship and such persons were excused from the routine preinoculation studies.

RESULTS

Five thousand, eight hundred and sixty officers and men were included in the studies; of this number, 3,532 (60.3 percent) were originals and 2,328 (39.7 percent) were replacements; this study classification is shown in table 1. There were 106 intership transfers of personnel during the course of the program.

TABLE 1.—Study classification of officers and men on 5 cruisers

Ship	Originals		Replacements		Totals
	Number	Percent	Number	Percent	
A.....	654	55.6	523	44.4	1,177
B.....	748	58.7	527	41.3	1,275
C.....	723	57.2	541	42.8	1,264
D.....	708	63.4	409	36.6	1,117
E.....	699	68.1	328	31.9	1,027
Total.....	3,532	60.3	2,328	39.7	5,860

In all, there were 10,518 preinoculation cultures and 86,587 post-inoculation cultures scheduled for the group of subjects, an anticipated total of 97,105 specimens. Actually, there were 8,805 preinoculation, and 75,784 postinoculation, rectal swab specimens taken, or 84,589 cultures examined; these represent 87.1 percent of those scheduled. Of the entire number of specimens taken, 411 cultures positive for either *Shigella* or *Salmonella* were obtained from 190 asymptomatic subjects or 3.2 percent of the study population.

Asymptomatic carriers of S. flexneri III.—Of critical importance in the study is the fact that *S. flexneri III* was recovered at least once from 103 subjects, or 54.2 percent of the persons with cultures positive

for the 2 genera previously mentioned; this group of carriers comprises 1.8 percent of the total population studied. The majority of the carriers was concentrated on 2 of the 5 ships; the distribution was Ship A, 9; Ship B, 42; Ship C, 41; Ship D, 6; and Ship E, 5. At the termination of the studies, because of decommissioning, there were 1,955 officers and men still aboard Ships B and C of whom 62, or 3.1 percent, were carriers of *S. flexneri III*. The possible epidemiologic significance of this situation will be discussed later. Two hundred and sixty cultures of *S. flexneri III* were recovered from the group of 103 carriers; that is, 63.3 percent of all positive cultures recovered from 190 subjects were *S. flexneri III*. A summary of the cultural studies of the *S. flexneri III* carriers is given in table 2.

An examination of this summarization reveals some interesting observations. It will be noted that 90 (87.4 percent) of the group were originals; that is, they were aboard when the program was begun. Of particular importance is the fact that 87 (84.5 percent) of the subjects reported their presence in a previous epidemic presumably caused by *S. flexneri III*; 51, or 49.5 percent, of them had been ill at the time of the outbreak, but only 9 of the 103 had records of previous cultures positive for the organism. Of the entire group, 16 (15.5 percent) were detailed to food-handling duties during periods when *S. flexneri III* was isolated from them. Some additional evidence of the intermittent shedding of the organism was obtained; it was recovered only once from 48 subjects but in the remaining group of 55 subjects from whom *S. flexneri III* was obtained 2 or more times the largest number of negative cultures between positives was 21. The highest number of consecutive positive cultures isolated was 7, but from one person there were 12 positive cultures with only 3 negative specimens intervening. From the group of 103 carriers, 1,259 specimens were secured for culturing; of these, 260 or 20.7 percent were identified as *S. flexneri III*. *S. flexneri II* was recovered from 2 men subsequent to the isolation of *S. flexneri III*. From 1 specimen from one of the subjects, a mixed infection of *S. flexneri III* and *S. dispar III* was demonstrated. From another person, *S. alkalescens* was recovered 7 weeks subsequent to the isolation of *S. flexneri III*; no additional positive cultures were obtained from this man in 19 successive attempts.

A careful examination of the case histories of the 16 asymptomatic carriers of *S. flexneri III* who denied being present in a previous epidemic elicited further pertinent information. Nine of them had only recently started their naval careers, their ages ranged from 17 to 19 years, and only 1 had had previous sea duty. Of 8 who had had previous sea duty and whose ages varied from 19 to 34 years, 7 had been aboard ships that either were known to have suffered previous

TABLE 2.—Summary of data on 103

Line No.	Study number	Date aboard	Division	Food handler		Study classification		Previous contact			Rectal swab cultures before and after inoculations				
				Yes	No	Orig.	Replace.	Pres. in epid.		Rectal cultures	Before				
								Date	Ill		A	B	C		
1	A 103	9-46	M		X	X									
2	A 171	4-48	M		X	X			11-46	X	O		X	X	X
3	A 174	8-46	A		X	X			O	O					
4	A 242	10-46	7		X	X			11-46	X	X	3	X	X	X
5	A 378	10-46	B		X	X			11-46	X	X		X	X	X
6	A 461	9-46	B		X	X			11-46	X	X		X	X	X
7	A 468	10-46	K		X	X			11-46	X	X		X	X	X
8	A 474	9-46	B		X	X			11-46	X	X		X	X	X
9	A 605	9-46	R		X	X			11-46	X	X		X	X	X
10	BA 92	7-46	F		X	X			11-46	X	X		X	X	X
11	B 144	8-47	Ex		X	X			2-46	O	O				
12	B 149	8-47	Ex		X	X			11-47	X	X				
13	B 176	4-47	T		X	X			6-47	X	X	3X	O	O	O
14	B 5	2-48	Off.		X	X			—45	X	X		X		
15	B 200	10-45	CR		X	X			5-46	X	X				
16	B 881	9-48	M		X	X		X	O	O	O				
17	B 207	2-47	H		X	X			6-47	O	O				
18	B 229	4-48	S2	X		X			10-47	X	X				
19	B 242	9-47	H		X	X			11-47	X	X		X	X	X
20	B 249	8-47	1-Ex		X	X			2-48	X	X				
21	B 282	9-46	7		X	X			6-47	X	X	10	O	O	O
22	B 299	4-47	Ex		X	X			6-47	X	X		O	O	O
23	B 311	8-47	2	X		X			11-47	X	X		O	O	O
24	B 355	9-46	M-B		X	X			6-47	O	O		O	O	O
25	B 1157	9-48	6		X	X		X	O	O	O		O	O	O
26	B 423	8-47	K		X	X			11-47	O	O				
27	B 438	12-46	2		X	X			9-47	O	O				
28	B 1008	9-48	CR	X		X		X	O	O	O				
29	B 821	8-47	5		X	X			2-48	X	X		O	X	O
30	B 504	4-46	S2	X		X		X	6-47	X	X		O	O	O
31	B 546	1-47	R		X	X			5-47	X	X		O	O	O
32	B 522	10-46	8		X	X			6-47	X	X		O	O	O
33	B 523	7-46	S1		X	X			6-47	X	X		O	O	O
34	B 558	8-47	1		X	X			11-47	X	X	2	O	O	O
35	B 581	8-47	R		X	X			2-48	X	X		O	O	O
36	B 590	8-47	4		X	X			11-47	X	X		O	O	O
37	B 596	9-46	E		X	X			6-47	X	X		O	O	O
38	B 8025	4-47	8		X	X			6-47	X	X		O	O	O
39	B 635	1-47	4		X	X			6-47	X	X		O	O	O
40	B 646	1-46	E		X	X			6-47	X	X		O	O	O
41	B 653	7-47	Ex		X	X			2-48	X	X		O	O	O
42	B 663	9-46	5		X	X			5-46	X	X		O	O	O
43	B 675	1-47	F		X	X			2-48	X	X	2	O	O	O
44	B 689	8-46	M-E		X	X			6-47	X	X		O	O	O
45	B 690	9-46	CS-Ex		X	X			6-47	X	X	3	O	O	O
46	B 694	1-47	6		X	X			6-47	X	X		O	O	O
47	B 712	7-47	6		X	X			11-47	X	X		O	O	O
48	B 759	9-47	2		X	X			11-47	X	X		O	O	O
49	B 771	8-47	K		X	X			11-47	X	X		O	O	O
50	B 51	9-46	Off.		X	X			6-47	X	X		O	O	O
51	B 820	8-47	4		X	X			11-47	X	X		O	O	O
52	C 925	8-48	1		X	X		X	O	O	O		O	O	O
53	C 84	10-45	A		X	X			4-47	X	X		O	O	O
54	C 99	8-47	5		X	X			4-47	X	X		O	O	O
55	CE 155	5-48	K-2		X	X			10-47	X	X		O	O	O
56	C 105	7-47	6	X		X			10-47	X	X		O	O	O
57	C 129	5-46	M		X	X			10-47	X	X		O	O	O
58	C 135	4-47	6		X	X			4-47	X	X		O	O	O
59	C 142	8-47	CS		X	X			10-47	X	X		O	O	O
60	C 213	4-47	A		X	X			4-47	X	X		O	O	O
61	C 232	9-47	2		X	X			O	O	O		O	O	O
62	C 236	8-47	1		X	X			O	O	O		O	O	O
63	C 251	4-47	S2	X		X			10-47	X	X		O	O	O
64	C 289	4-47	A		X	X			10-47	X	X		O	O	O
65	C 291	6-47	K		X	X			10-47	X	X		O	O	O
66	C 334	8-47	2		X	X			10-47	X	X		O	O	O
67	C 1276	9-48	2		X	X			O	O	O		O	O	O
68	C 1224	9-48	4	X		X		X	O	O	O		O	O	O
69	C 835	4-46	S2	X		X		X	4-47	X	X		O	O	O
70	C 432	7-46	S2	X		X		X	O	O	O		O	O	O

TABLE 2.—Summary of data on 103

Line No.	Study number	Date aboard	Division	Food handler		Study classification		Previous contact			Rectal swab cultures before and after inoculations		
				Yes	No	Orig.	Replace.	Pres. in epid.		Rectal cultures	Before		
								Date	Ill		A	B	C
71	C 449	3-47	6		X	X		10-47	X	O	—	—	O
72	CE 463	9-48	CR		X	X	X	10-47	O	O	—	—	—
73	C 467	8-47	B		X	X	X	10-47	X	O	—	—	X
74	C 476	1-47	B		X	X	X	4-47	O	—	—	—	X
75	C 537	12-45	A		X	X	X	10-47	O	O	—	—	—
76	C 541	8-47	R		X	X	X	10-47	O	O	O	O	O
77	C 544	8-47	R		X	X	X	10-47	X	O	—	—	—
78	CA 470	7-47	4	X		X		10-46	O	O	X	—	X
79	C 1308	8-47	F		X	X	X	10-47	X	O	—	—	—
80	C 569	8-47	S1	X		X		10-47	O	O	O	—	X
81	C 575	9-47	S2	X		X		10-47	O	O	—	—	O
82	C 600	8-47	CR		X	X	X	10-47	O	O	—	—	O
83	C 611	7-47	F	X		X	X	10-47	O	O	—	—	O
84	C 624	8-47	4		X	X	X	10-47	X	O	—	—	—
85	CD 408	6-46	F		X	X	X	10-47	X	O	—	—	—
		9-48						12-46	O	O	X	X	—
86	C 660	9-47	CS		X	X	X	10-47	X	O	—	—	—
87	C 694	8-47	6		X	X	X	10-47	X	O	—	—	—
88	C 698	6-48	4		X	X	X	4-47	X	16 X	X	—	—
89	C 1070	9-48	F	X		X		O	O	O	—	—	—
90	C 708	4-47	B		X	X	X	4-47	X	3X	X	—	—
91	C 778	4-46	T		X	X	X	4-47	O	4	—	—	—
92	C 1357	11-48	M		X	X	X	O	O	O	—	—	—
93	D 513	4-48	2		X	X	X	9-46	O	O	—	O	O
94	D 122	10-46	K		X	X	X	12-46	X	6	—	—	—
95	D 214	7-46	S1		X	X	X	12-46	O	O	—	—	—
96	DC 442	2-47	S1		X	X	X	7-47	X	3	—	—	X
		9-48											
97	D 770	5-48	A	X		X	X	O	O	O	—	—	—
98	D 410	8-45	A		X	X	X	10-45	X	O	—	—	—
99	E 202	7-46	1		X	X	X	10-46	O	—	O	X	—
100	E 253	7-46	1		X	X	X	10-46	O	—	O	—	—
101	E 520	5-48	CS		X	X	X	O	O	O	—	—	—
102	E 618	3-47	4		X	X	X	O	O	O	—	—	—
103	E 657	7-46	S2	X		X	X	10-46	O	4	—	—	—
104	Total			16	87	90	13	87	51	2X			

Legend: Date aboard shown in column 2 is the month and year. Dates shown in column 8 for presence in epidemic are the latest given if more than one was listed. Symbols under cultural results indicate the following: X, positive for *S. flexneri* III; —, no pathogen recovered; O, no specimen obtained; 1, *Shigella flexner*

epidemics or had visited ports where the infection could have been acquired; it was believed that information furnished by the other subject was erroneous and that he was actually present in a previous epidemic. Thirteen of this group of 16 carriers were assigned to ships' divisions in which there was at least 1 other carrier who had been present in a previous epidemic. It is possible to speculate only as to the sources of infection in these 16 men; it is believed, however, that circumstances could have permitted 8 of them to acquire the organism after reporting aboard the ships in the study. Of these 8 men, 3 received parenteral *S. flexneri III* vaccine; the first positive cultures were obtained from 2 men prior to completion of the courses of vaccine. The first positive culture from the third man (D 770) was recovered, however, 26 days after completing the course of vaccine. Unfortunately, no preinoculation serum was obtained from this man and consequently no serum mouse protection studies were made; however, agglutination tests with two postinoculation serums showed titers of 640 and 320 respectively, neither of which indicates a significant rise above the "normal" level (4). Two others of this group of 8 had received oral *Shigella* vaccine with intervals of 4 and 11 days after completing the course before the first positive culture was isolated; the other 3 men had received placebos only. A condensation of the data concerning these 16 men is presented in table 3.

TABLE 3.—Historical data concerning 16 men who denied presence in previous epidemics of diarrheal disease

Study number	Age (years)	Study classification	Vaccine		Date entered Navy (month and year)	Date aboard study ship (month and year)	Previous sea duty	Date of first positive culture
			Kind	Date course completed				
B 1157	19	Replacement	Pa. ¹	11-4-48	6-48	9-48	None	10-25-48
C 1357	19	do.	Pa. ¹	12-16-48	8-48	11-48	None	12-14-48
B 1008	18	do.	Or. ²	10-21-48	6-48	9-48	None	10-25-48
C 1276	17	do.	Or. ²	10-21-48	6-48	9-48	None	11-1-48
C 1224	17	do.	Pl. ³	10-14-48	6-48	9-48	None	12-2-48
C 1070	19	do.	Pl. ³	9-30-48	2-48	9-48	None	11-1-48
B 881	19	do.	Pa. ¹	10-21-48	10-47	9-48	1947-48	11-21-48
C 925	21	do.	Or. ²	9-30-48	12-43	8-48	1947-48	12-14-48
CE 463	20	do.	Or. ²	9-30-48	10-45	9-48	1946-48	11-1-48
A 171	26	Original	Pl. ³	5-26-48	?-39	4-48	1945-46	5-12-48
C 232	21	do.	Pl. ³	7-6-48	9-45	9-47	1946-47	6-17-48
C 236	22	do.	Pl. ³	7-7-48	3-44	7-47	1945-47	10-5-48
C 432	21	do.	Pl. ³	7-7-48	5-46	7-46	1946-48	8-10-48
D 770	17	do.	Pa. ¹	6-7-48	10-47	5-48	None	6-28-48
E 520	18	do.	Pl. ³	7-26-48	11-47	3-48	None	9-27-48
E 618	34	do.	Or. ²	7-26-48	1-31	3-47	1945-48	9-1-48

¹ Parenteral *S. flexneri III* vaccine.

² Oral *Shigella* vaccine.

³ Placebo.

Asymptomatic carriers of Shigella alkalescens.—Of interest is the number of times *S. alkalescens* was isolated during the studies; it was recovered from 127 specimens taken from 69 asymptomatic subjects. A total of 1,174 specimens for culturing was obtained from these

subjects; the number of cultures positive for *S. alkalescens* represented, therefore, 10.8 percent of those taken from this group. From the total of 411 cultures of *Shigella* and *Salmonella* isolated during the studies, those positive for *S. alkalescens* comprised 30.9 percent in contrast to 63.3 percent positive for *S. flexneri III*. *S. alkalescens* was recovered only once from 46 persons, twice from 9 others, 3 times from 7 individuals, and 11 times from 1 man. The greatest number of negative cultures between positives was 16, and the highest number of consecutive positive cultures was 5. Twenty of the sixty-nine persons reported their presence in a previous epidemic (presumably due to *S. flexneri III*) and 7 of them stated they were ill during the outbreak.

Miscellaneous Shigella and Salmonella types isolated.—There was a total of 20 cultures of *Shigella* and *Salmonella* types, other than those already mentioned, recovered from 19 different persons. *S. flexneri II* was encountered in 2 consecutive specimens from 1 of these subjects who denied any history of gastrointestinal illness or presence in an epidemic; this type was recovered from another man subsequent to the isolation of *S. flexneri VIII*. *S. flexneri VII* was recovered once from a person who had been aboard a ship during an outbreak in October 1947 and who had been ill for 3 days at that time. *S. rio* (5) was identified in a single specimen from a man who gave a history negative for diarrheal disease or presence in an epidemic. *S. sonnei* was isolated once from 1 subject who had been present and ill for 10 days during a shipboard outbreak in October 1947. Of 12 individuals from whom *Salmonella* types were isolated, 9 denied any history of gastrointestinal illness or presence in an epidemic; the organisms, which were recovered only once from each subject, were *S. anatum*, *S. bredeney*, *S. javiana*, *S. montevideo*, *S. newport*, *S. oranienburg*, and *S. typhimurium*.

Sporadic cases of gastrointestinal illness.—During the course of the project, there were 65 sporadic cases of gastrointestinal illness reported from 4 of the 5 ships. A total of 165 specimens taken from 59 cases during illness yielded no cultures positive for *Shigella* or *Salmonella*. Of these 59 subjects, 38 were originals and 21 were replacements; in none of the persons was the illness severe and the average duration was approximately 1.5 days. Only 7 of the 65 sporadic cases were foodhandlers and all 7 were among the 59 with transient illness just described.

Of importance is the fact that from each of the other 6 cases, *S. flexneri III* was recovered on at least 2 days during the illness, with 7 as the maximum number of positive specimens; no other type of *Shigella* or *Salmonella* was encountered in any of the specimens examined. Three of the cases occurred on Ship B and 3 were on Ship C; it is of interest to note that these 2 cruisers had the highest asymptomatic

carrier rates for *S. flexneri III*. All 6 patients exhibited characteristic signs and symptoms of acute shigellosis with watery diarrhea, abdominal cramps, and headache reported in every instance; the average maximum number of stools per day was between 11 and 12 and maximum temperatures recorded varied from 99.0° to 104.0° F. Blood in the stool was observed in 3 cases and mucus in 1 of these; tenesmus was present in 5 persons, and nausea in 4. Two patients reported vomiting, one a maximum of 16 times. The first symptoms of illness noted were chills, headache, nausea, abdominal distress, and diarrhea; the disease lasted from 6 to 16 days with an average duration of 11.5 days. Two of the six shigellosis cases were originals who had been present on the ship, but denied illness, during an epidemic due to *S. flexneri III* in the summer and fall of 1947; the other 4 patients were replacements in the program and all denied sporadic illness or presence in an epidemic.

TABLE 4.—Summary of data relative to 6 sporadic cases of acute *S. flexneri III* infection

Study number	Age (years)	Study classification	Vaccine		Date entered Navy (month and year)	Date aboard study ship (month and year)	Previous exposure to infection (month and year)	Date of onset of illness	Date of first positive culture	Cultures during illness	
			Kind	Date course completed						Number taken	Number positive
B 328	19	Original	Pl ¹	7-6-48	4-47	8-47	8-47	2-12-49	2-14-49	6	2
B 545	24	do	Pl ¹	7-6-48	9-41	9-47	9-47	12-21-48	12-21-48	9	6
B 914	24	Replace	Pl ¹	10-21-48	8-42	9-48	Denied	10-4-48	10-6-48	9	6
C 971	19	do	Pl ¹	9-30-48	8-47	8-48	Denied	11-14-48	11-15-48	8	4
C 970	18	do	Or ²	10-21-48	12-47	9-48	Denied	11-5-48	11-9-48	13	7
C 981	21	do	Or ²	9-30-48	11-44	8-48	Denied	11-9-48	11-11-48	10	2

¹ Placebo.

² Oral *S. flexneri III* vaccine.

The vaccines administered to these 6 cases of shigellosis in relation to the onset of illness represent a point of considerable importance. Four of the subjects, including the two originals, received placebos only so that no protection could be expected against acquiring an infection due to *S. flexneri III*; in 1 instance, the onset of disease occurred before completion of the course of placebos. The other 2 patients, however, were given oral *S. flexneri III* vaccine plus parenteral placebo. In 1 of these 2 instances, the last dose of oral *Shigella* vaccine had been administered only 14 days prior to the onset of illness and the subject received 14 instead of the 15 scheduled tablets. The other patient had completed his course of oral vaccine 39 days prior to the first appearance of symptoms of illness. Unfortunately, no serums were obtained from either of these 2 subjects so data on humoral antibody studies were not available. A brief summary of data relative to these 6 sporadic cases is given in table 4. It may be noted

that a total of 55 cultures from the 6 patients was studied during illness and that 27 (49.1 percent) of the specimens were positive for *S. flexneri III*; in no other instance, of a total of 62 specimens taken from these 6 subjects before and after their illnesses, was a culture found positive. Reference to table 2 shows that there were asymptomatic carriers of *S. flexneri III* in the same ships' divisions in which the 6 sporadic cases occurred; these carriers could have provided the sources of infection. It is of interest, furthermore, that the 3 cases on Ship C became ill during a period of only 9 days.

DISCUSSION

The observations described in this report are of considerable public health importance. Approximately 85 percent of the asymptomatic carriers of *S. flexneri III* detected during the studies were known to have been present in previous epidemics of shigellosis; it is reasonable to suspect that most of such individuals became infected during exposure in the outbreaks and have been excreting the organisms at intervals since that time. It appears probable that the majority of the carriers who had not been in a previous epidemic acquired their infections as a result of contact with men whose carrier condition was established earlier. It is possible, in view of the 2-week interval between culturing, that some carriers aboard the ships were not detected; another factor contributing to this possibility is that the shipboard studies were terminated earlier than originally planned on three of the cruisers. It has been suggested (2) that more than 30 consecutive cultures taken at short intervals may be necessary to detect 95 percent of carriers, whereas the maximum number of follow-up specimens examined in the present studies was 26.

The fact that 1.8 percent of the total population studied aboard the five cruisers were found to be carriers of *S. flexneri III* suggests that an appreciable number of naval personnel exposed to the infection in Leyte Gulf, Tokyo Bay, and elsewhere (1) may also still be carriers; when such individuals become concentrated, as they were on two of the ships studied, endemic conditions are established in such proportions that other outbreaks could result particularly if an adequate number of susceptible personnel were present. Contributing to the complex situation is the apparent intermittency in shedding of the organisms by asymptomatic carriers, which was again observed in these studies.

The six sporadic cases of illness due to *S. flexneri III* that appeared during the program are of significance with regard to the type of vaccine they received. Only two of the patients had been given *Shigella* vaccine; in each instance the material had been administered orally, the last doses in the course being taken 14 and 39 days prior to the

onset of illness respectively. Unfortunately, no adequate data are available at present to determine whether sufficient immunity should have been developed in these two patients to protect them against infection; further studies are planned in an attempt to collect more evidence on this point. It appears possible that these six cases might have been an indication of impending epidemics on the two cruisers, particularly on Ship C where three cases occurred within 9 days; this question remains unanswered, however, since both vessels were decommissioned shortly thereafter.

Of possible significance is the fact that in these studies there was no definite evidence of failure of the parenterally administered *S. flexneri III* vaccine to produce the desired results; none of the six sporadic cases of illness had received this type of material. Of the eight asymptomatic carriers who could have acquired their infections after reporting aboard the study ships, three had been given the vaccine subcutaneously; from two of these, however, the first positive cultures were recovered prior to completion of the immunization process. The first positive culture was obtained from the remaining patient, however, 26 days after the last dose in his course of vaccine; it is possible that this instance represents a failure of the vaccine to prevent infection. It is equally possible that the man had actually acquired his infection aboard the ship prior to being inoculated; there was an interval of about 6 weeks during this period when no specimens were taken from him for culturing. On the basis of data at hand, this case does not represent a failure of the vaccine to prevent illness due to the infection. It is hoped that analysis of data to be collected may provide more adequate evidence concerning this question.

SUMMARY

From 5,860 officers and men aboard 5 light cruisers, a total of 84,589 rectal swab specimens was taken before and after administration of *S. flexneri III* vaccines and cultured for members of the *Shigella* and *Salmonella* groups; 411 strains of organisms belonging to these 2 genera were isolated from 190 (3.2 percent) of the personnel studied.

S. flexneri III, the *Shigella* type predominantly responsible for recurrent shipboard epidemics in the Pacific Fleet, was recovered 260 times from 103 asymptomatic carriers; this group represents a carrier rate of 1.8 percent. It was shown that about 85 percent of these persons had been present in a previous epidemic of shigellosis at which time the carrier condition presumably was initiated; it was believed that the balance of the group became infected as a result of exposure to organisms excreted by the established carriers. Intermittency in the recovery of *S. flexneri III* from carriers was again observed. The

majority of the carriers (80.6 percent) was concentrated on two of the ships on which six sporadic cases of illness due to this organism occurred just prior to decommissioning of the vessels.

Suggestive but inconclusive evidence was obtained which indicated that the parenterally administered *S. flexneri III* vaccine had produced the desired results; analyses of additional data are planned with the objective of obtaining more definite information on this point.

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The Isolation of Three "Shigella paradysenteriae" Serotypes From One Patient

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A PATIENT was admitted to the 155th Station Hospital, Yokohama, on 6 December 1949, with moderately severe dysentery. The stools were frequent, grossly bloody, and contained much mucus. Fecal material was streaked directly onto S. S. and E. M. B. agar plates. On the appearance of nonlactose fermenting colonies the plates were submitted to this laboratory. Four colonies (S-1, S-2, S-3, and S-4) from the S. S. agar plate and two (E-1 and E-2) from the E. M. B. plate were transferred to Kligler's medium. S-1, S-2, and S-4 gave typical *Shigella* reactions, while gas formation along with the typically alkaline slope was observed in S-3 and E-2. Culture E-1 was a strain of *Escherichia coli*. The sucrose-mannitol agar inoculations indicated that S-1 fermented neither of these carbohydrates; S-2 and S-4 fermented mannitol with the formation of acid only; S-3 and E-1 produced gas on the fermentation of mannitol.

Preliminary slide agglutination tests showed culture S-1 to be *Shigella paradysenteriae* Type IV (Boyd 103); S-2 and S-4 to be *S. paradysenteriae* Type I, III (VZ); and S-3 and E-1 to be *S. paradysenteriae* Type VI (Boyd 88). The cultures were purified by restreaking on tryptose agar and definitive biochemical and serologic studies were made. The fermentation of both dextrose and mannitol with the evolution of gas by S-3 and E-1 was verified, thus identifying them as Manchester strains. The Type IV culture failed to ferment mannitol, a characteristic of most Japanese strains of this type. The immunologic characteristics remain as previously indicated.

Large outbreaks of bacillary dysentery are often not caused by a single type. On previous occasions we have isolated two serotypes but

¹ 406th Medical General Laboratory.

are not aware of three types previously being isolated from one patient. The man from whom the organisms were isolated had had an attack of dysentery 10 weeks earlier but had not been hospitalized. It is possible that he was harboring one or more of the types in the interim and had been the victim of a reinfection at a later date. Since multiple infections can confuse any definitive epidemiologic studies, the value of selecting several colonies for study is evident. Three subsequent stool specimens, taken at 4-day intervals following sulfonamide therapy, revealed only the Types I, III organism, although 20 or more colonies were selected for study.



Mental Reactions of the Airborne Soldier

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THE airborne soldier is a volunteer. For this reason, it is often assumed that any basis for unwillingness or fear of parachute jumping is eliminated. In this connection it is interesting to note the reasons offered by troops volunteering for the airborne ranks: (a) Some seek parachute training out of curiosity; (b) some undergo the training as a challenge, to see if they are able to complete it; (c) many men seek the training solely to earn the extra pay offered; (d) a small group desire to become airborne for the sake of prestige, the reasons being vague in details but strongly felt; and (e) many men ask for airborne training under the strong influence of a relative, friend, or even a recruiting officer. This last group appears to furnish the greatest number of jump refusals, as well as most of the psychogenic problems encountered.

The initial test of the airborne soldier's ability to maintain emotional stability begins the first day of his training when he commences a long period of fatiguing physical conditioning. This conditioning is purposely emphasized in order to "separate the men from the boys." It is during this stage, while the student is laboring over his fiftieth "push-up," that his instructor offers the consolation, "It's all a matter of mind over matter. We don't mind and you don't matter." It is also during this stage that word "quitter" is first brought into the man's working vocabulary. This word serves as a means of branding vividly the man who chooses to discontinue parachute training, and is held over his head throughout the rest of his airborne life. This attitude plus the hazing practiced make it difficult for a man to consider discontinuing his training, once he has begun. Thus many an impressionable young man continues his training in order to avoid the chagrin and disrespect showered on a quitter and thereby unsuitable candidates may be forced into the airborne ranks. This unsuitability may

¹ 11th Airborne Division.

manifest itself for the first time, many months later, in gross resentment toward the training, or, possibly, in some somatic complaint of emotional origin. The rigorous curriculum and stern discipline practiced during the training are designed to make the goal more difficult to reach, thereby creating more pride in the graduate on receipt of his "wings." In defense of this attitude, the morale of the soldier has unquestionably increased by the time he has completed his training and tends to remain high.

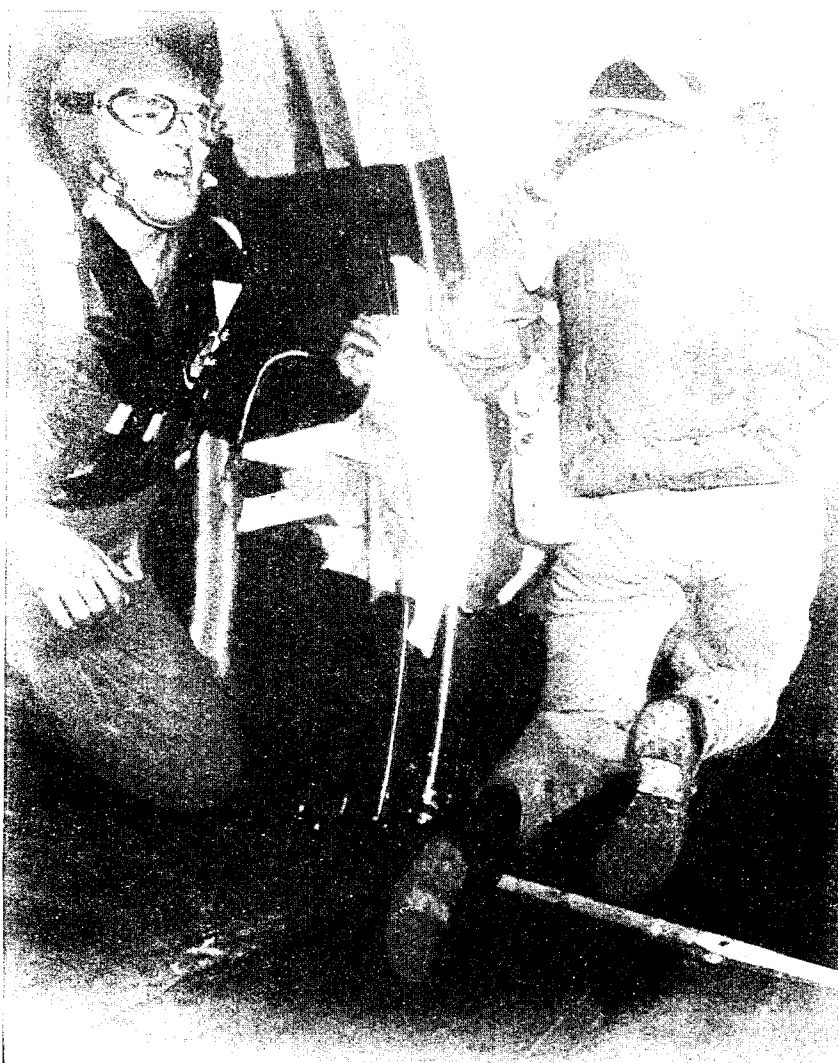


Figure 1.—The jump. A hurried word of encouragement is shouted by the safety officer as the parachutist leaves the airplane. The mounting tension will soon be dissipated.



Figure 2.—A mass jump.

The next stage of training in which the soldier may falter is his first actual jump from a plane (figs. 1 and 2). Rarely does a soldier desire to discontinue his training prior to his first jump, for it is only after this point that he realizes the dangers involved. The same undesirable stigma is attached to the quitter in this phase of training, and at times a man who admits to a fear of jumping and desires to leave the school is urged by his friends or his pride to continue. The desire to continue airborne duty vies with the drive for self-preservation and causes some degree of conflict in every parachutist. Those

who were coerced into parachute training or were too proud or embarrassed over the thought of giving it up are bound to have the greatest mental upheaval. The emotionally stable soldier can maintain his equanimity under this stress. By the same token, those who are predisposed to mental disorders are often unable to cope with the same stress. Those who succumb to the mental hazards of parachute training manifest varied symptoms which may be acute or chronic.

On the day of the jump, the medical officer may encounter an occasional malingerer but rarely a true psychosomatic complaint. During the actual jump, however, one of the following reactions may be noted:

(a) It is not uncommon to find a deliberate and conscious refusal to jump even after the airplane has left the ground, this being a result of overwhelming fear.

(b) There are a few men who participate in a jump and yet are not aware of their actions for varying periods of time during the jump. This amnesic state undoubtedly results from the tremendous mounting tension arising from the situation. This lack of awareness may prove dangerous if the soldier does not follow the correct procedure for leaving the airplane. This condition probably was responsible for the cases on record in which the soldiers failed to hook their static lines within the airplane before exiting through the door with the result that their parachutes did not open. If a jumper does not regain his sense of being during his descent, he may tangle with others and jeopardize their safety in landing. The alert parachutist can generally avoid mid-air tangles. Similarly, in the landing, mental alertness is often essential in avoiding mishap. In one training jump, a man was so overcome that he approached the door of the airplane and sat down. As if he had left the airplane, he counted 3 seconds and feeling no "opening shock" of his parachute, pulled the rip cord of his reserve parachute and opened it, while still inside the airplane. The possible serious outcome of such an incident is obvious. This man remembered none of his actions.

(c) An acute reaction occasionally seen is complete loss of consciousness while in the airplane. This usually occurs after the first men begin to leave the plane and the man involved falls in a heap on the floor. As in most psychogenic fainting this would appear to be the easiest means of escape by the man from the seemingly insurmountable threat to his safety.

Occasionally a man completes several jumps without obvious difficulty. Then each jump seems to be more difficult to accomplish. Finally, he comes to dread future jumps, though not consciously fearing the experience. His pride or the urging of his friends force him to continue. He may later appear on sick call complaining of back-

ache, headache, dyspepsia, or effort syndrome, for which no somatic cause can be discovered. I have not seen or heard of a case of frank psychosis attributable to parachute duty.

Often, alleviation of the emotional ills caused by jumping may be accomplished by the first echelon of medical service. The man who suffers from one of the reactions mentioned may on occasion be aided by a conference with a medical officer. The latter often can help by explaining the basis of the symptoms. Parachute jumping is far less dangerous than popular opinion suggests, and assurance of this fact may help the man. Any condition necessitating more involved treatment should result in pronouncing the man unsuitable for further parachute duty. Thus, the man is usually relieved of his symptoms by removal of the cause. Occasionally, because most of these men have concomitant cause for maladjustment, some require more advanced psychiatric assistance. These are not desirable as parachutists.

Far more can be accomplished in preventing than in treating these mental ills. The most advantageous point of attack is the initial physical examination which the candidate undergoes prior to acceptance for airborne training. Many obvious and seemingly hindering physical defects may be overlooked in soldiers who are determined and interested in pursuing this training and who appear to be emotionally sound. On the other hand, any neuropsychiatric difficulty should be carefully investigated and weighed prior to acceptance of the candidate. Often the examinee appears unsuitable from gross observation of his temperament and actions.

The statement is often heard, and not always in jest, that one must be grossly maladjusted to request airborne training. Doubtless only those of certain interests and personality would be attracted to such activities, just as some people hesitate or refuse to travel by airplane or to ride in an automobile. Feelings of inadequacy in varying degrees exist in all of us. On this basis, unquestionably, many an airborne soldier has earned his wings and maintained his parachute status solely in response to his feeling of insecurity. The accomplishment lends self-confidence so necessary to proper psychologic balance. A significant degree of immaturity reaction is probably common to all airborne soldiers. This is proved by noting their zealous response to the "romance" and fanfare associated with airborne life.

Fear of parachute jumping varies with the soldier, but few will admit actual fear. Such fear may be manifested by symptoms reflecting a hyperfunctioning of the autonomic system with an outpouring of epinephrine into the blood. Subjectively, the soldier may experience palpitations, excessive perspiration, a feeling of emptiness in the epigastrium, a desire to relax anal and urinary bladder sphincters, and

a general feeling of tension. A soldier undergoing such an experience, may appear calm, or the increased tension may be obvious. This tension differs with each person, and is essential in maintaining the proper degree of mental acuity. Regardless of whether one admits being afraid, the previously described sensations, at least in part, are experienced by all. The tension produced and the tremendous amount of energy thereby expended bring to light a serious problem. Parachute jumps in training, and even more significantly in combat, usually take place about dawn or earlier. This is usually necessary for tactical purposes and because ground winds are apt to be less active at that time. This necessitates waking the soldier at 0200 or 0300 hours. Rarely can one adequately compensate for this loss of sleep. This factor alone jeopardizes the high standard of physical stamina sought in the soldier, but when coupled with the tremendous energy drainage resulting from the anxiety and tension present, the soldier is apt to be considerably beneath his normal physical status. In fact, on completion of the landing, the man experiences profound fatigue. For this reason, he often must be driven to vacate the drop field and assemble with the other troops. This is not a desirable situation because his most important tactical duties follow the actual jump. In other words, the stress of the jump and fatigue produced often cause the soldier to believe that his task is completed as soon as he lands on the ground. Further study and consideration of this problem is indicated. The development of means of preventing the condition discussed as well as means of revitalizing the soldier after landing presents a distinct challenge to the field of airborne medicine.

SUMMARY

Paradoxically many emotionally immature or unstable soldiers improve their personalities and bolster their confidence by completing parachute training. They are, however, usually poor risks and it is much safer to overlook certain physical deficiencies than any clinically significant emotional defects.



Adenocarcinoma of the Second Portion of the Duodenum

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LESS than 450 cases of carcinoma of the duodenum had been reported in the literature through 1946. A case which was diagnosed roentgenologically prior to operation, and illustrates the difficulty of definitive management after the diagnosis was suspected, is presented.

CASE REPORT

A 33-year-old white man was transferred to this hospital from the European Command on 31 August 1948 complaining of pain in his abdomen, weakness, lack of appetite, and intermittent fever. He had been in good health until June 1947. At that time he noticed a burning pain in the left upper abdominal quadrant that was aggravated by ingesting fruit juices, spicy or greasy foods, and by smoking. The pain was relieved by antacids. In October he was admitted to a general hospital in Europe for gastrointestinal studies. The roentgenograms suggested a diagnosis of gastritis. Early in November, after symptomatic improvement, the patient was returned to duty.

He was admitted to a station hospital in May 1948 complaining of anorexia and cramplike pains high in the right side of the abdomen, precipitated by ingesting food. Roentgenograms again showed gastritis. At this time the erythrocyte count was found to be low. The patient was given a bland diet, tincture of belladonna, and barbiturates. Because his symptoms had become worse and he had lost 35 pounds within the year he was transferred to a general hospital in July for further study. Here a gastrointestinal series demonstrated a 25 percent retention of the barium meal on the 4-hour roentgenogram and he was returned to the United States.

¹Oliver General Hospital, Augusta, Ga.

On admission to this hospital physical examination revealed definite loss of weight. His temperature was 101° F. His pulse was 100 and his blood pressure was 95/50. His skin was pale but not icteric. A soft systolic precordial murmur which was not transmitted was heard and there was moderate tenderness in the right upper abdominal quadrant. The liver was not enlarged and no masses could be palpated. The hemoglobin was 8.2 grams; hematocrit, 28 percent; sedimentation rate, 23; and the alkaline phosphatase was consistently over 20 units.

The patient was given 5,000 cc. of whole blood between 1 September and 7 December. A specimen of inguinal lymph node removed on 17 September revealed reactive hyperplasia. Toward the end of September the patient's scleras were slightly icteric and he began to complain of mild generalized itching. The serum bilirubin at this time was elevated and the urine was positive for bile and urobilinogen. The liver was not palpable. Early in October the patient's temperature became remittent and almost septic in type. A roentgenographic survey of the skeleton on 11 October was negative. Therapeutic trial with emetine was begun because of the high alkaline phosphatase. Because of the possibility of cholangitis the patient was given 21 grams of streptomycin between 29 October and 14 November. During this time his jaundice faded perceptibly. Two roentgenograms of the chest in November were negative. A gastrointestinal series on 3 September was normal, as was a barium enema. A small bowel series on 1 December revealed filling defects of the second and third portions of the duodenum (fig. 1). A review of previous roentgenograms, taken as far back as May 1948, showed the presence of similar defects in the duodenum that were not considered diagnostic (fig. 2). The patient continued to complain of low epigastric discomfort and to lose weight. His normal weight was 165 lb. On admission it was 129 lb. and on 6 December it had dropped to 115 lb.

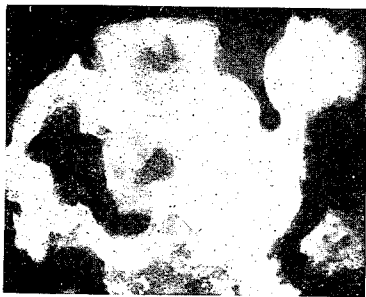


Figure 1.—Roentgenogram showing filling defects of the second and third portions of the duodenum.

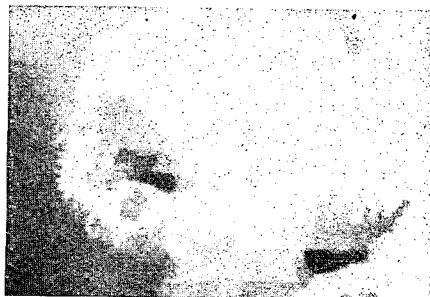


Figure 2.—Roentgenogram taken 11 May 1948 showing the filling defects of the duodenum.

On the basis of the roentgenographic findings a tentative diagnosis of a malignancy of the second portion of the duodenum was made and the patient was transferred to the surgical service for an exploratory laparotomy which was performed on 7 December. At operation it was not apparent whether the lesion was inflammatory or neoplastic. A frozen section taken from the region of the ampulla of Vater at this operation was not diagnostic. The lesion was not removed and the patient had a rather stormy postoperative course, developing a nearly complete intestinal obstruction. Although the frozen section taken at the time of the operation was not diagnostic, the paraffin sections revealed an adenocarcinoma, infiltrating the ampulla of Vater and adjacent duodenum. On 21 December a cholecystostomy was performed because of increasing septic-type fever and jaundice. About 500 cc. of bile-stained fluid was found in the peritoneal cavity. The patient improved slightly following this operation. The tube from the cholecystostomy came out on the night of 27 December but a profuse drainage of bile from the wound continued. On 31 December it was noted that the patient had ascites. A paracentesis was performed and about 2,500 cc. of clear straw-colored fluid was obtained. This fluid revealed over 3,000 mg. of amylase per 100 cc. and 500 mg. of trypsin per 100 cc. From this time until the patient died, therapy was directed toward maintaining his nutritional status. On 20 January 1949 he became dyspneic and oxygen therapy was started. Shortly after this he became semicomatose and died on 22 January.

Postmortem Examination

Gross findings.—At autopsy the external topography of the duodenum appeared to be normal. The duodenal mucosa of the second portion was red-gray and showed numerous soft polypoid processes forming an annular neoplasm that completely encircled the duodenum (fig. 3). These processes extended for about 3.5 cm. in the long axis of the bowel. Several such processes were scattered over the cut surface of the duodenum at this site. The largest of them involved the site of entrance of the biliary and pancreatic ducts into the duodenum. A definite duodenal papilla was not demonstrated at autopsy. This tumor showed its polypoid tendencies most at the superior and inferior limits of its extent. Between these zones, the lining of the bowel appeared flattened and somewhat thin. Palpation prior to opening of the duodenum had revealed that at the aboral limit of the neoplasm the lumen of the bowel admitted only one finger.

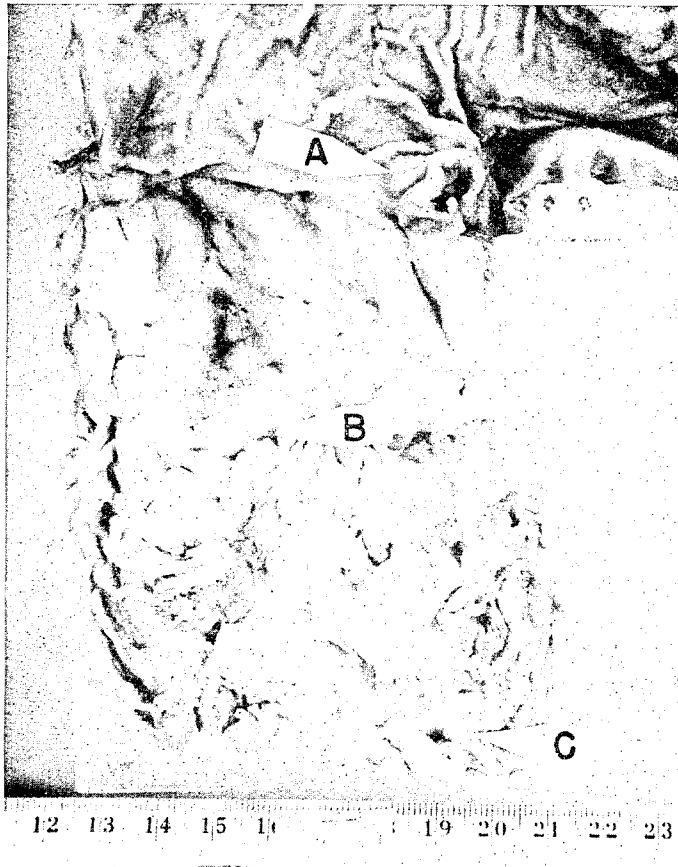


Figure 3.—(A) The pyloric ring. Lesion extends from (B) to (C).

Microscopic findings.—Microscopic sections of duodenum showed a mucosal new growth composed of glands lined with tall columnar epithelium having vesicular nuclei, faintly basophilic cytoplasm, and coarsely clumped nuclear chromatin (fig. 4). Moderate numbers of mitotic figures were present. The mucosal architecture was fairly well preserved. The neoplastic glands were disposed on fibrous connective tissue stalks resembling the normal mucosal folds. En masse invasion of the submucosa appeared to be present, for Brunner's glands were absent and the atypical epithelial surface extended almost to the muscularis mucosae. External to the muscularis were cystlike spaces filled with fibrillar basophilic material and lined by a single layer of atypical epithelium resembling that lining the glands seen within the mucosa. Elsewhere in the fibrous tissue, external to the muscularis, were small clumps of glandular spaces resembling those noted on the mucosal surface. Sections from the superior and in-

ferior extremities of the ulceration of the duodenum, noted on gross examination, revealed an abrupt transition from the normal duodenal and jejunal mucosa, which gave way suddenly to an atypical mucosal structure of the type previously described. The impression given by the histologic preparation was that a neoplasm of the mucosa was arising in a fairly orderly manner, showing appreciable retention of the normal mucosal architecture, but displaying its malignant properties by invasion of the submucosa, local extension and local metastasis beyond the limits of the muscular wall of the intestine.

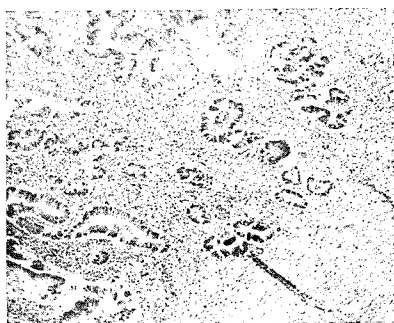


Figure 4.—Photomicrograph of section through lesion.

DISCUSSION

Primary carcinoma of the duodenum is extremely rare. Feldman² states that it is seen on the average of only once in 30,000 gastrointestinal series and makes up only 3.5 percent of all carcinomas of the small intestine. Dixon et al.³ found it to comprise only 0.3 percent of all intestinal carcinomas. Sixty-five percent of carcinomas of the duodenum occur in the periampullar, 20 percent in the infra-ampullar, and 15 percent in the supra-ampullar portion. Symptoms have usually been present for a few months to a few years before the patient seeks medical advice. The most common symptom is pain in the epigastrium, followed by weight loss, anorexia, and blood in the stools. Later, as a result of the obstruction, jaundice, vomiting, and occasionally the presence of a palpable mass in the abdomen may be observed.

It is unfortunate that the diagnosis of duodenal carcinoma is seldom made preoperatively. This is probably because, being so rare, it is not considered. Careful repeated roentgenologic examination is the only means of detection. It is easily confused with ulcer, carcinoma of the pancreas, inflammatory lesions, and polyps. At operation the identification of the existing lesion may be difficult. The orderly arrangement of the tumor cells may be most deceptive in the frozen section. Radical excision offers the only hope of cure and this has

² FELDMAN, M.: *Clinical Roentgenology of Digestive Tract*. Williams & Wilkins Co., Baltimore, Md., 1945. Pp. 316-317.

³ DIXON, C. F.; LICHTMAN, A. L.; WEBER, H. M.; and McDONALD, J. R.: Malignant lesions of duodenum. *Surg., Gynec. & Obst.* 83: 83-93, July 1946.

proved discouraging. Berger and Koppelman⁴ reported 5-year cures in only 5.2 percent. Carcinoma of the duodenum is a disease that must be kept in mind if these patients are to be sent to the surgeon while they are still operable.

⁴ BERGER, L., and KOPPELMAN, H.: Primary carcinoma of duodenum. *Ann. Surg.* 116: 738-750, Nov. 1942.



Isolated Fat Replacement of Body and Tail of Pancreas

Report of a Case

ERNEST S. REDFIELD, JR., *Lieutenant, junior grade, MC, U. S. N.*¹

AN INSTANCE of virtually complete fat replacement of the body and tail of the pancreas with only a few scattered islands of Langerhans present, in association with a normal pancreatic head and neck, was observed at autopsy on an obese diabetic man. Reference to the literature (1) (2) (3) (4) revealed only four cases, all in children, in which the acinar tissue of the pancreas was entirely replaced by adipose tissue. In our patient the fat replacement was limited to a portion of the pancreas, and it is this unique feature which prompted the following case report.

CASE REPORT

Clinical summary.—A 75-year-old Negro was first admitted to the hospital in October 1943 because of an infection in the small toe of the right foot. He had been diabetic for several years and also had senile dementia. The infection in the toe progressed in spite of conservative therapy so that in November a supracondylar amputation of the right leg was done. Arteriosclerosis with occlusion of the popliteal artery and one of its branches was found. Healing of the stump was uneventful.

In the late summer of 1944, the left foot became similarly affected. The infection progressed despite conservative therapy and in September 1944 a supracondylar amputation of this limb was performed. Pathologic changes similar to those in the right leg were found. Again recovery was uneventful and the stump healed well.

Insulin requirements were described as "moderate" except during episodes of infection. An episode, described as a possible cerebrovascular accident, characterized by stupor, stiff neck, and inability to speak, occurred in March 1946. The patient recovered within a few days. In January 1947, albuminuria with casts occurred and continued until death. There were frequent episodes of watery diarrhea during his hospitalization. The clinical diagnosis of intercapillary glomerulosclerosis was considered although no definite hypertension was present.

The patient's mental condition gradually deteriorated. On 21 January 1948, his insulin requirement suddenly increased, bronchopneumonia had developed,

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and diabetic acidosis occurred and could not be controlled. He became semi-comatose on 31 January and died 8 February 1948 after 4 years and 4 months of hospitalization.

Autopsy

Gross autopsy findings.—Autopsy was performed 18 hours after death. The body was that of an obese, elderly Negro. Both legs had been amputated above the knees and the stumps were well healed. The eyes were hazy and there appeared to be an opacity in the right lens. The panniculus adiposus was thick and the mesenteric, omental, perirenal, and anterior mediastinal fat was abundant. A moderate bilateral pleural effusion and patches of bronchopneumonia were present. There was an abundance of epicardial fat and slight hypertrophy of the right and left ventricles. The coronary arteries and aorta showed little atherosclerosis. The liver, spleen, gastrointestinal tract, and adrenals showed no abnormalities. The kidneys were of normal size and were finely granular. The brain showed moderate atherosclerosis of the arteries, atrophy of the frontal and temporal lobes, and small foci of old encephalomalacia in the right basal ganglia.

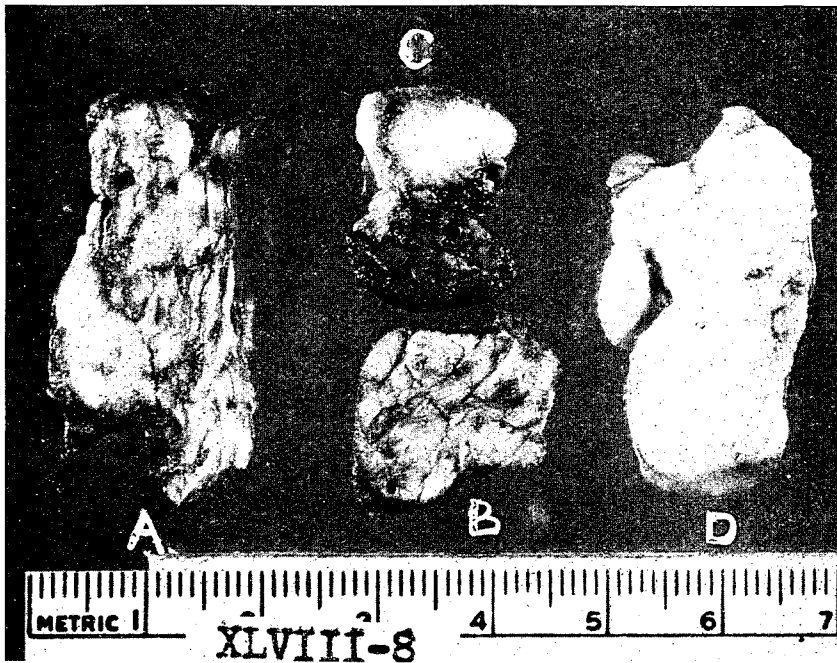


Figure 1.—Sections of pancreas from: (A) Head, (B) neck, (C) neck and body, and (D) tail. Note fat replacement of body and tail and abrupt transition from pancreatic tissue of neck to fat of body.

The body and tail of the pancreas (fig. 1) were difficult to distinguish from the abundant surrounding fat. The head and part of the neck had the normal yellowish gray color and lobular architecture. There was an abrupt transition in the neck region to tissue which appeared to be entirely fat. However, this tissue retained the shape of pancreatic body and tail. The latter fact, together with the position of this mass of tissue, its continuity with the head of the pan-

creas, and its relationship to the splenic artery and vein, indicated that it was the body and tail of the pancreas largely or completely replaced by fat.

Microscopic autopsy findings.—Microscopic findings confirmed the gross impressions. Slight focal fatty metamorphosis was seen in the liver. The kidneys showed considerable hyaline sclerosis of arterioles but no intercapillary glomerulosclerosis.

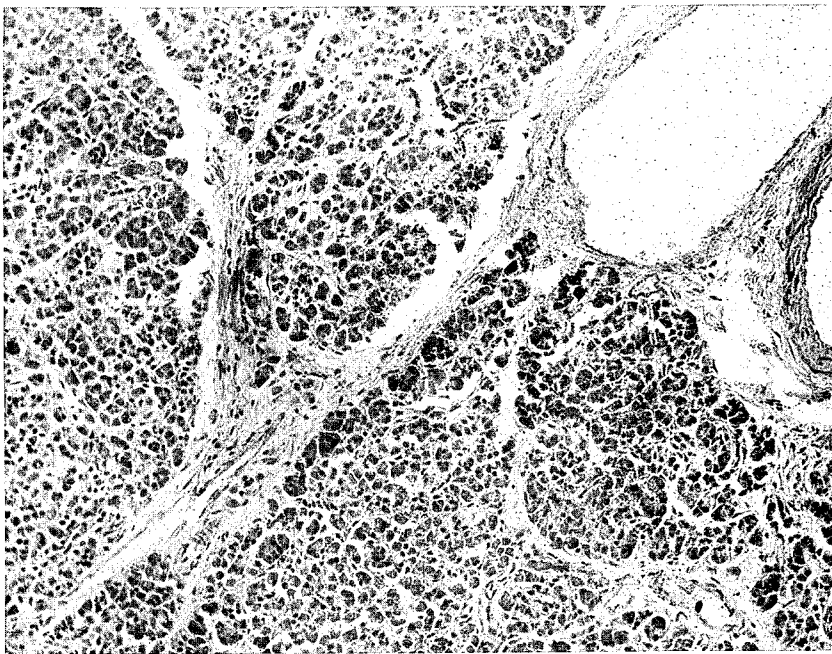


Figure 2.—Photomicrograph of head of pancreas showing normal lobular architecture with slight inter- and intra-lobular fibrosis.

A section from the head of the pancreas (fig. 2) showed post-mortem change. The lobular architecture was normal with slight increase in the inter- and intra-lobular stroma in some areas. Only an occasional island of Langerhans could be definitely identified. This apparent sparsity of islands was probably due, to some extent at least, to post-mortem change, making identification difficult. No other abnormalities were noted in this section.

A section of the neck of the pancreas (figs. 3 and 4) showed groups of pancreatic lobules widely separated by adipose tissue. The pancreatic tissue in this section was similar to that previously described. In the adipose tissue between the groups of pancreatic lobules there were some scattered isolated nests of cells which had the appearance of islands of Langerhans. Some of these were the size of an average island but most were smaller. Also in this adipose tissue, and separated from the pancreatic lobules proper, was a rounded nodule, about 7 mm. in diameter, having the features of an island cell adenoma. It consisted of smaller and larger irregular nests and cords of uniform, medium-sized, rounded or polyhedral cells with acidophilic cytoplasm and round, deep-staining nuclei. These cell groups were widely separated by bands of dense connective tissue. An occasional small ductlike structure was present in the stroma among these

cell groups, but there was nothing resembling acinar tissue. The arterioles in the pancreatic and adipose tissue showed considerable hyaline sclerosis.

Three sections taken from different portions of the body and tail of the pancreas were essentially alike (figs. 5 and 6). These consisted of normal adipose tissue scattered through which, at rather infrequent intervals, were groups of islands of Langerhans similar to those described in the neck of the pancreas and lying almost entirely within or adjacent to irregular bands of fibrous tissue. These islands were occasionally larger, but for the most part were smaller than average. Nothing resembling acinar tissue or pancreatic ducts could be made out in any of these three sections. No significant inflammatory changes were noted. Only a few lymphocytes and plasma cells were seen in the adipose tissue and in the fibrous tissue in which the islands lay.

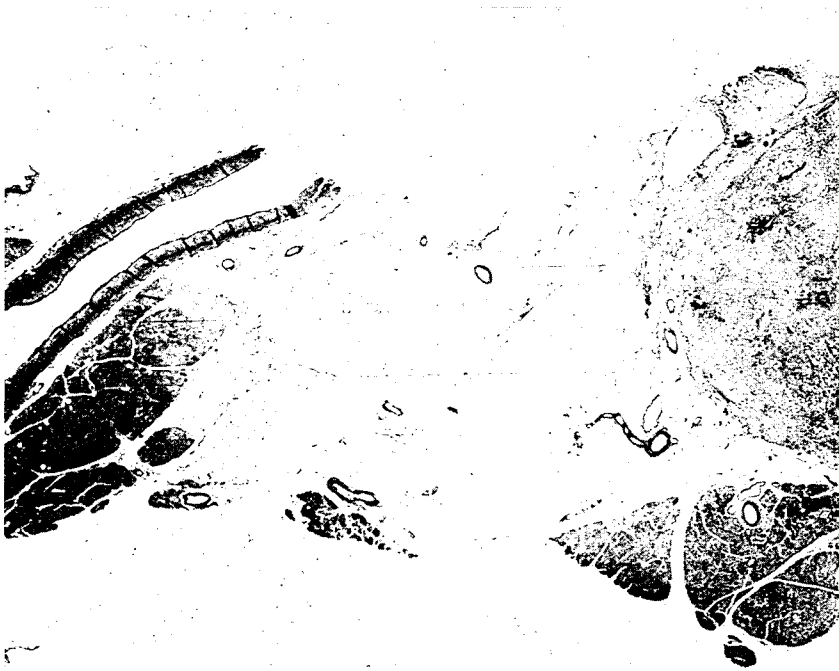


Figure 3.—Photomicrograph of neck of pancreas showing transition to adipose tissue in body and tail and island cell adenoma (upper right portion of field).

COMMENT

The pathogenesis of the fat replacement or lipomatosis of the body and tail of the pancreas was not established in this case. Because no other such instance of local fat replacement of the pancreas was found in the literature, it becomes necessary to examine all the possible causes of such a condition. These causes may be: (a) congenital or developmental anomaly or malformation; or (b) acquired lipomatosis secondary to such conditions as chronic interstitial pancreatitis, obesity, changes in the pancreatic ducts associated with vitamin A deficiency, and occlusion of one of the main ducts by calculus.

In considering the possible role of congenital anomalies or malformations in the pathogenesis of the condition here reported, a brief review of the embryology of the pancreas is pertinent. It is generally accepted that the pancreas arises from two anlagen, ventral and dorsal. Rotation of the stomach and formation of the duodenal loop cause the ventral and dorsal anlagen to assume medial and lateral positions respectively. The dorsal anlage appears to arise first and grows more rapidly. It forms part of the head and uncinete process and the entire body and tail of the pancreas. The ventral anlage is closely associated with the common bile duct and as this lengthens and the duodenal wall continues its unequal growth with the process of

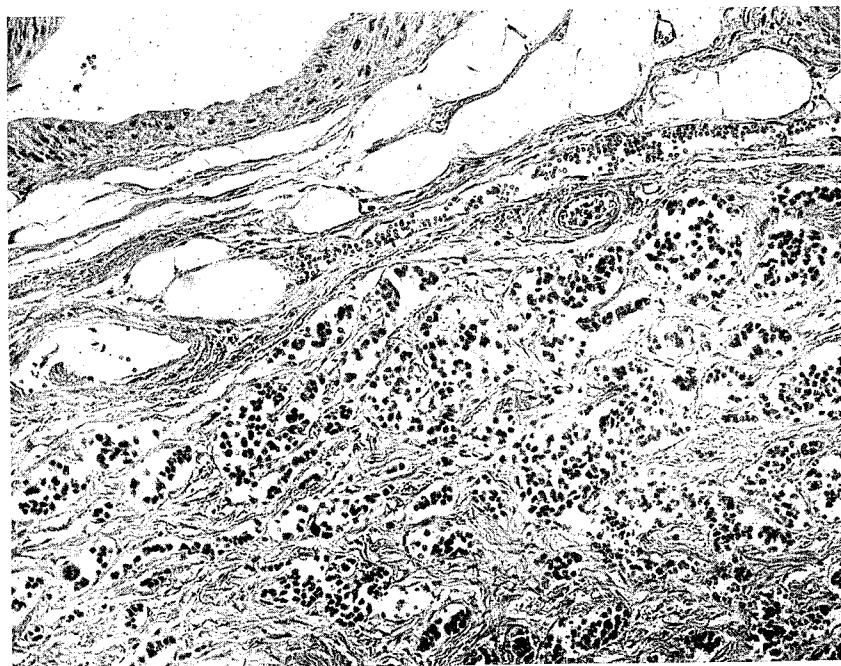


Figure 4.—Higher magnification of periphery of island cell adenoma shown in figure 3.

loop formation, the ventral anlage is carried dorsad to a position near the stem of the dorsal anlage. During the sixth or seventh week in utero the two anlagen unite. Each anlage has its own duct but the short ventral duct normally fuses early with the dorsal duct. The combined long distal segment of the dorsal duct and the entire ventral duct form the main duct of Wirsung which empties into the duodenum through the ampulla of Vater with the common bile duct. The proximal segment of the dorsal duct forms the accessory duct of Santorini which may become a tributary to the ventral duct but which frequently

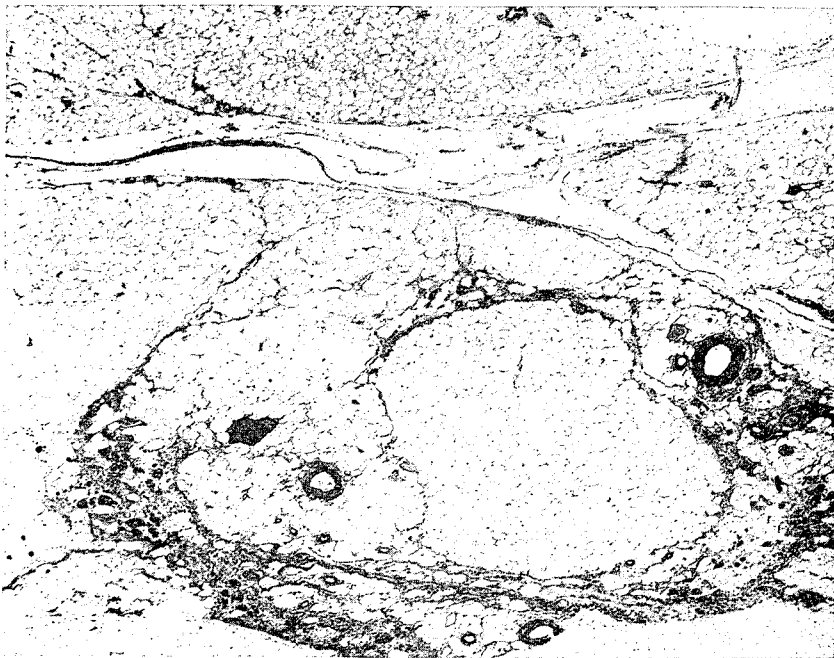


Figure 5.—Photomicrograph of body of pancreas showing adipose tissue with bands of fibrous tissue containing scattered islands of Langerhans.

retains its own duodenal outlet. Many anomalies or malformations associated with these developmental steps have been reported. Cameron (5) summarizes these in his exhaustive treatise published over 25 years ago. He described accessory or aberrant pancreatic tissue, annular pancreas, pancreas divisus, horizontal or vertical pancreas, transpositions, pancreas minus, and absence of the entire gland or failure of one anlage to develop. Absence of that part of the gland derived from the dorsal primordium, namely the body and tail, is also described. The latter anomaly seemed at first to offer a possible explanation of the condition here reported. However, the finding of a mass of fat having the shape and occupying the usual position of the body and tail of the pancreas, and showing on microscopic examination scattered islands of Langerhans would seem to preclude this explanation. These findings, on the contrary, suggest that the condition was acquired rather than developmental.

Definite increase in the interstitial fat of the pancreas with extensive replacement of the acinar tissue, and later, and to a lesser degree, even of the island tissue, has been observed in obese persons. (Fat replacement of similar degree has also been described as a sequel of chronic interstitial pancreatitis. In both instances, however, the process is more or less diffuse and never, apparently, has it been ob-

served under these conditions in any such limitation as here reported.) The relationship of lipomatosis of the pancreas to diabetes mellitus and interstitial pancreatitis has been commented upon by Weichselbaum (6), Warren (7), and Opie (8) who do not believe that this is a constant nor necessarily causal relationship.

Obstruction of the main ducts of the pancreas also results in atrophy of the acinar tissue with fat replacement. Such obstruction might be accomplished by calculus, and it has been suggested (9) by the metaplasia of the duct epithelium caused by vitamin A deficiency. Neither of these conditions, however, has been reported to produce localized fat replacement such as here described. Nevertheless, it would appear to be theoretically possible for an obstruction at or distal to the junction of the two main ducts to result in such fat replacement limited to the body and tail of the pancreas. It is suggested that this may have been the pathogenesis of the pancreatic lesion in the present case. An obstructive mechanism, however, was not apparent since no pancreatic calculi were noted and, in the microscopic sections of the pancreas examined, no indication of squamous metaplasia of the duct epithelium was found. The possibility that the obstruction arose on the basis of something akin to a congenital stenosis of the duct at the site mentioned suggests itself.

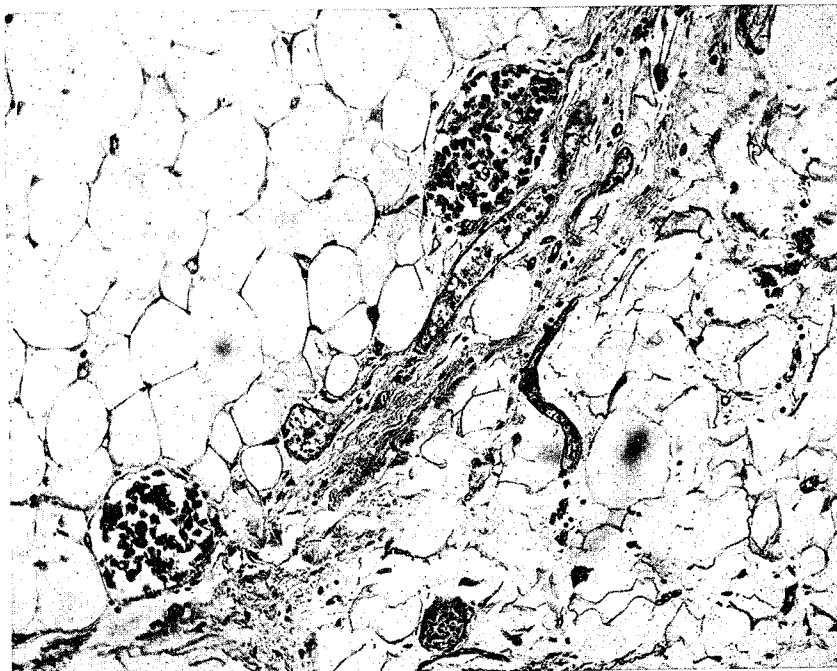


Figure 6.—Photomicrograph of body of pancreas showing adipose tissue with scattered island of Langerhans along bands of fibrous tissue.

The relationship of the diabetes mellitus to the almost complete replacement of the body and tail of the pancreas by fat would appear to be more than coincidental. The large amount of island tissue lost represents well over half the total amount normally present. Consequently, even though the normal complement of island tissue varies within wide limits, such a great loss might well have reduced the margin of safety to the point where any increased demands upon the remaining island tissue could not be met. The presence of the island cell adenoma is considered a compensatory phenomenon and, therefore, further evidence of island tissue deficiency. Such island cell adenomas, as well as island hypertrophy, have been observed in connection with extensive destruction of pancreatic tissue from other causes, e. g., by tumors (10) (11). That this adenoma, due to its location, might have caused the lipomatosis of the body and tail of the pancreas by compressing the main duct is considered improbable because of its small size and the absence of any duct of significant size in the immediate vicinity.

SUMMARY

A case is reported of almost complete fat replacement of the body and tail of the pancreas with a normal pancreatic head and neck in a 75-year-old diabetic Negro. Various possible causes, both congenital and acquired, are briefly considered. It is suggested that the most likely cause was acquired obstruction of the distal part of the main pancreatic duct. It is also suggested that the diabetes mellitus was caused by the fat replacement of the body and tail of the pancreas and that the presence of an island cell adenoma may be a compensatory phenomenon for the great loss of island tissue.

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Monostotic Fibrous Dysplasia of the Skull

Report of a Case

ADRIAN J. DELANEY, *Captain, MC, U. S. N.*¹

FIBROUS dysplasia is one of the benign isolated lesions of bone commonly seen by the orthopedic surgeon. It is usually found in the metaphysis of long bones, and has a predilection for the ribs. The lesion as a general rule presents little difficulty in diagnosis or treatment.

The term fibrous dysplasia was suggested by Lichtenstein in 1938 in an attempt to clear up the confusion in the terminology then employed to classify the various forms of fibro-osseous disease.

Because the disease entity has been discussed infrequently in otolaryngologic literature it is considered desirable to bring it to the attention of otolaryngologists, and to urge the reporting of all proved cases in which the bones of the skull are involved.

There are several recognized forms of fibrous dysplasia. The two principal types are (*a*) the monostotic, involving one bone only, and (*b*) the polyostotic, involving several bones, as a rule. In the monostotic variety, a single long bone, usually the rib, femur, tibia, or fibula, is involved. In the polyostotic type, pigmentary changes in the skin accompanied by precocious sexual development in young females may be present (Albright-McCune-Sternberg syndrome). In the polyostotic form without the skin changes or sexual precocity the lesions are isolated and are usually distributed unilaterally. There is neither the generalized rarefaction nor the demineralization of the skeleton, nor are the characteristic changes present in the serum calcium, phosphorus, or alkaline phosphatase that one would expect in generalized disease of the skeleton. The lesions of fibrous dysplasia may become quiescent but they do not disappear. Sarcomatous changes in bone adjacent to areas of fibrous dysplasia have been reported by Coley.²

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² COLEY, B. L.: Neoplasms of Bone and Related Conditions. Paul B. Hoeber, New York, N. Y., 1949. pp. 141-160.

Of 67 cases of monostotic fibrous dysplasia reported from the Army Institute of Pathology by Schlumberger³ in 1946 there were 7 cases in which the maxilla was involved, 2 in which the frontal bone was affected, 1 case each involving the parietal, the mastoid process of the temporal bone, and the occipital bones, and 2 cases in which the mandible was involved. Geschickter and Copeland⁴ described the pathologic changes in fibrous dysplasia occurring in single bones, and reviewed 30 cases. Over two-thirds of the lesions occurred in patients under 30 years of age; in facial lesions, the maxilla and the mandible were involved most often. A painless swelling, slowly increasing in size, was usually the first sign noted by the patient. Occasionally the swelling interfered with dentition or with nasal breathing, but in most instances a change in the configuration of the face was the feature that caused the patient to seek medical advice.

When the lesion occurs in a long bone or the mandible the roentgenogram shows the fairly characteristic circumscribed rarefied area in the metaphysis of the bone. However, in lesions of the maxilla, frontal, ethmoid, and sphenoid bones the characteristic roentgenologic appearance that permits a positive diagnosis of fibrous dysplasia is absent. A high index of suspicion must be maintained by the roentgenologist at all times in interpreting areas of rarefaction in bone. Of the 67 cases reported by Schlumberger not a single lesion had been diagnosed as fibrous dysplasia by the roentgenologist. Among the diagnoses made on the basis of the roentgenograms in these cases were the following: bone cyst, giant cell tumor of bone, osteochondroma, osteitis fibrosa cystica, osteoma, adamantinoma, eosinophilic granuloma, and osteomyelitis. In the reported cases in which the bones of the face were involved, the diagnosis was made by biopsy. In Schlumberger's series several cases of fibrous dysplasia of the maxilla were diagnosed on biopsy as ossifying fibroma. However, Lichtenstein has pointed out the identity of the histologic appearance of ossifying fibroma of the maxilla and fibrous dysplasia in other bones.

The cause of fibrous dysplasia of bone is not known. Coley, among others, believes that it is probably a skeletal developmental anomaly that is characterized by single or multiple areas of fibrous tissue in bone. It is usually recognized in childhood or early adulthood, has a slow clinical course, and eventually produces deformity. The role of trauma as an etiologic factor is a controversial one. In certain cases,

³ SCHLUMBERGER, H. S.: Fibrous dysplasia of single bones (monostotic fibrous dysplasia). *MIL. SURGEON* 99: 504-527, Nov. 1946.

⁴ GESCHICKTER, C. F., and COPELAND, M. M.: *Tumors of Bone*. 3d edition. J. B. Lippincott Co., Philadelphia, Pa., 1949. pp. 283-287.

the typical lesion appeared in the neighborhood of a fracture of a rib or other long bone after the fracture had healed.

The following case report presents several unusual features including (a) the widespread involvement of the bones of the face and base of the skull on one side; (b) the rapid development of new lesions in the scar tissue left after resection of an involved middle turbinate, and (c) the apparent response of the lesions to hormonal therapy.

CASE REPORT

L.D., 20-year-old white man, on 1 March 1948 complained of recurrent dull aching pains of several months' duration in the left scrotal sac. At the U. S. Naval Hospital, Corpus Christi, a presumptive diagnosis of teratoma of the left testicle was made. The left testicle and cord were removed surgically on 4 March 1949. The pathologic diagnosis was simple fibrosis of the left epididymis; the testicle was normal. During convalescence the patient complained of a very slow-growing, painless enlargement of the right side of his face, and of a peculiar displacement of the right upper central incisor tooth. Examination revealed a diffuse enlargement of the entire right maxilla and an enormous, firm, right inferior nasal turbinate which was covered by cyanotic, grayish brown, wrinkled mucosa. The right antrum, anterior ethmoids, and frontal sinuses did not transilluminate. The left side of the nose appeared normal and the anterior group of sinuses transilluminated clearly. Roentgenograms of the sinuses revealed a diffuse space-occupying opacity of the right maxillary antrum and the ethmoid labyrinth. The maxilla and zygoma on the right side appeared enlarged. The right inferior turbinate was enlarged. Attempts to irrigate the right maxillary antrum through the area under the inferior turbinate were unsuccessful; the trocar met firm resistance for a distance of 1 inch. Biopsy of a specimen from the right antrum taken through the anterior wall over the right molar and bicuspid teeth showed irregularly arranged fibrous tissue stroma in which there were numerous small bone trabeculae. No normal marrow tissue was found. Many osteoblasts were seen but there were no osteoclasts. A diagnosis of monostotic fibrous dysplasia of the maxilla was made, and the patient was transferred to this hospital for further treatment.

On admission the patient had few complaints. His chief concern was the cosmetic disfigurement caused by the displaced upper right central incisor. Examinations revealed essentially the same findings as noted previously, except that the right inferior and middle turbinates were hypertrophied, and the right maxillary antrum was filled with solid tissue. The right frontal sinus was small but both walls showed dense involvement. The serum phosphorus, calcium, and alkaline phosphatase were normal. No pigmentary skin changes and no abnormalities of the genitalia were noted. The anterior chest had no hair; the pubic esutcheon was male type. The basal metabolic rate was -12 percent. On 24 May 1949 a modified Caldwell-Luc approach to the right maxillary antrum was made. The anterior wall was widely resected, exposing a solid mass of grayish brown, firm tissue that filled the entire sinus cavity and engulfed the roots of the teeth anterior to the molars. It involved the alveolus, the anterior wall medially, and the nasal wall. The roof of the antrum was not affected. Removal of the tumor mass was difficult even with the use of sharp Lempert-type mastoid curets. As the resection progressed, it became obvious that the mass extended upward into the ethmoid labyrinth and frontal sinus. Therefore, after completing

the resection of the antrum and sparing all of the teeth, a wide resection of the lower nasal wall, including the entire inferior turbinate, was performed. A large opening into the nose was left, and the opening in the anterior wall of the antrum was closed by approximating the mucosa with interrupted silk sutures. Then through an external fronto-ethmoid-sphenoid approach on the right side, an attempt was made to resect all affected areas. However, the lesion had spread from the frontal sinus to the floor of the anterior fossa of the skull and no further surgery was indicated. The ethmoid labyrinth was then resected, leaving the middle turbinate intact. The firm tumor involved the entire ethmoid labyrinth and extended posteriorly to involve the sphenoid. Surgery was not extended beyond the ethmoid capsule because the uselessness of further intervention was quite apparent by this time. A poor result was expected from the operation because complete removal of the lesion was not accomplished in any direction.



Figure 1.—Proliferation of fibrous tissue, with a tendency to whorl, about which are bony lamellae.

The tumor tissue everywhere was quite firm, resembling somewhat the type of bone encountered in a sclerotic mastoid in a young child. A gritty sensation was imparted to the curet.

Histologic examination revealed dense fibrous tissue undergoing metaplasia with osteoid tissue and adult bone formation. A diagnosis of spongy osteoma, probably representing an advanced type of ossifying fibroma, was made (figs. 1, 2, and 3).

Convalescence after the operation was complicated by lacrimation from the right eye, evidently caused by interference with the nasolacrimal duct, and by a prolonged discharge from an oro-antral fistula which developed in the anterior wall of the antrum. A small piece of iodoform gauze was eventually recovered from the posterolateral recesses of the antrum, and the foul discharge ceased.

The lacrimation however, persisted for a long time in spite of dilatations of the nasolacrimal duct, and the use of mildly bacteriostatic collyria.

On 7 September 1949 the thickened and moderately deviated nasal septum was resected and a submucous resection of the right middle turbinate, which appeared to be undergoing bony enlargement, was performed. Convalescence was uneventful. The histologic examination of the bone from the middle turbinate revealed the same type of fibrous tissue metaplasia with bone formation similar to that found in the specimens removed from the right maxilla and frontal bones. A diagnosis of spongy osteoma or ossifying fibroma was offered by the pathologist. Surprisingly enough, specimens of bone from the nasal septum showed the same pathologic changes whereas specimens of septal cartilage were normal except for one small area where there was minimal replacement of cartilage by fibrous tissue.

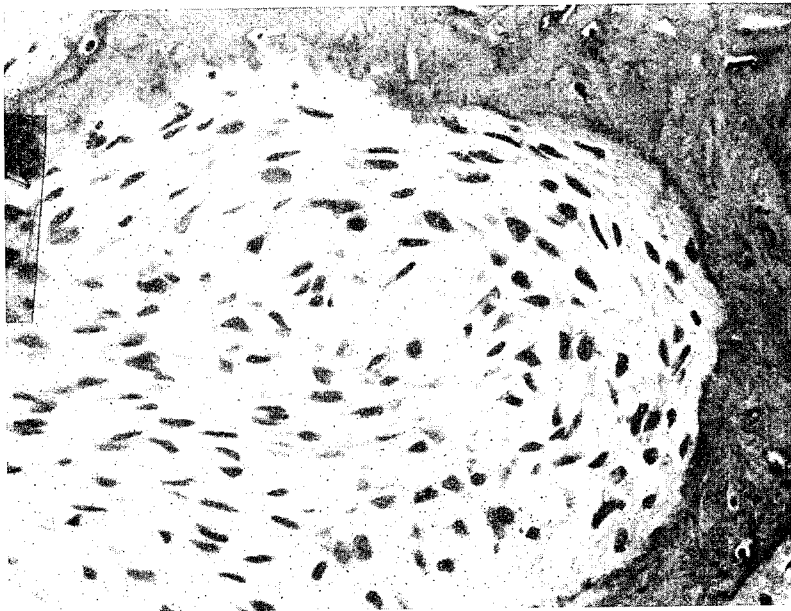


Figure 2.—Detail of figure 1. Note the abundant collagenous tissue.

Healing of the mucous membrane remnant of the right middle turbinate proceeded rapidly. The patient then had very few complaints. However, because all tissue that had been removed had shown actively proliferating osteoblasts, and because the involved areas of the skull were located in regions where vital structures could be interfered with, it was apparent that all efforts should be directed toward arresting the local proliferative process. On the advice of the consultant,⁵ a daily dose of 25 mg. testosterone with calcium in oil was given to the patient by intramuscular injection. After 2 weeks of this therapy there was an increase in the sexual libido but this leveled off as treatment continued. There was an increase in the pubic escutcheon and some scattered hairs appeared on the chest.

⁵ Dr. Charles F. Geschickter, Consultant in Pathology to the Naval Medical School, National Naval Medical Center, Bethesda, Md.



Figure 3.—In the center there is a membranous bone formation in an area of proliferating connective tissue. In the lower right-hand corner is older bone.

On 4 October 1949 the mucosal remnant of the right middle turbinate was removed. On histologic examination metaplastic bone formation was noted in the dense fibrous tissue. The pathologist suggested that this might represent a diathesis in which connective tissue metaplasia to bone occurred as a result of trauma. No further surgery has been done following this report.

At the present writing the prominence of the right half of the face is less than it was on admission. The patient is asymptomatic and blood chemistry and urinalysis are normal. If this condition is a localized disarrangement of collagenous tissues, it may be desirable to use the ACTH factor or cortisone if any further evidence of growth is noted.



Complications of Meckel's Diverticulum

Report of Nine Cases

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EARLY descriptions of intestinal diverticula were made by Haldanus in 1598 and by Lavater in 1671. Fredericus Ruysch in 1707 gave us the first description of a diverticulum of the ileum. Morgagni in 1769 described intestinal diverticula and probably was the first to ascribe to them a congenital origin. Meckel, in three articles (1808 to 1815), discussed the embryology and significance of the diverticulum which bears his name.

INCIDENCE

It is estimated that Meckel's diverticulum occurs in from 1 to 3 percent of all persons.¹⁻³ Howell⁴ gives these figures from 1934 to 1944 at Duke University: Of 122,490 admissions there were 61 Meckel's diverticula, an incidence of 0.05 percent. In 3,522 autopsies a Meckel's diverticulum was discovered 3 times, an incidence of 0.08 percent. Howell's patients ranged in age from 4 months to 61 years with 50 percent in the second decade; this coincides with the findings of most authors. Meckel's diverticulum is three times more frequent in males than in females.

EMBRYOLOGY

At about the third week of embryonic life, the embryonic disk, on cross section, occupies about one-fourth of the circumference of the

¹ HABER, J. J.: Meckel's diverticulum; review of literature and analytical study of 23 cases with particular emphasis on bowel obstruction. *Am. J. Surg.* 73: 468-485, Apr. 1947.

² CHRISTIE, A.: Meckel's diverticulum; pathologic study of 63 cases. *Am. J. Dis. Child.* 42: 544-553, Sept. 1931.

³ GOODMAN, B. A.: Meckel's diverticulum; its incidence and significance in routine operations on abdomen. *Arch. Surg.* 36: 144-162, Jan. 1938.

⁴ HOWELL, L. M.: Meckel's diverticulum; consideration of anomaly, with review of 61 cases. *Am. J. Dis. Child.* 71: 365-377, Apr. 1946.

yolk sac. As development continues, with elongation and infolding of the embryonic disk, part of the yolk sac is incorporated within the embryonic disk forming the intra-embryonic portion of the yolk sac which later becomes the alimentary tract. With continued infolding of the embryonic disk and the rapid growth of adjacent structures the remaining (extra-embryonic) portion of the yolk sac becomes differentiated from the intra-embryonic portion and diminishes in size. With further growth of the surrounding structures the body stalk forms and later develops into the umbilical cord. In this process most of the extra-embryonic portion of the yolk sac becomes transformed into a tube called the vitelline duct or yolk stalk lying within the umbilical cord. By the sixth or seventh week the vitelline duct (yolk stalk) usually undergoes complete obliteration up to its intra-embryonic connection with what later becomes the small intestine. However, in about 3 percent of cases continuation of the intra-embryonic portion persists as a diverticulum from the small intestine, Meckel's diverticulum, situated about 3 or 4 feet above the ileocolic junction

ANATOMY

A typical Meckel's diverticulum is 5 cm. in length, cylindrical in form, with a tapering tip and a broad base about the size of the lumen of the ileum. It is situated in the terminal ileum, about 20 inches proximal to the ileocecal valve, opposite the mesenteric attachment. The blood supply may come either from the adjacent intestinal wall or through an independent mesentery of its own.

Variations from this typical picture are infinite. Meckel's diverticulum has been described as varying in size from a tiny out-pouching to a huge viscus, filling half the abdomen.⁵ Some investigators believe that these giant diverticula are remnants of both the yolk stalk and yolk sac. The distance from the ileocecal valve has been reported as varying from a few centimeters to 192 centimeters, and has been described as occurring in duodenum, jejunum, and colon, as well as throughout the ileum. It has been described as occurring on the mesenteric border of the ileum.⁶

HISTOLOGY

The usual diverticulum is lined with mucosa of the same pattern as the ileum. Often there are nests of heterotopic tissue. Figures on

⁵ YATES, H. B.: Remarkable Meckel's diverticulum. *Brit. J. Surg.* 17: 456-462, Jan. 1930.

⁶ PAULLUS, G. E.: Intramesenteric Meckel's diverticulum. *Memphis M. J.* 22: 45-46, Mar. 1947.

the incidence of this vary and must be interpreted according to the origin of the cases; that is, whether they are discovered at laparotomy or incidentally at autopsy. The usual order of incidence of aberrant tissue is gastric, then pancreatic, rarely duodenal or colic, and very rarely bile ducts.⁴ The incidence of aberrant tissue in Meckel's diverticulum varies from 12 to 60 percent, most investigators giving about 16 percent gastric mucosa and 3 to 4 percent pancreatic tissue.^{4 7-10}

PATHOLOGY

The presence of an anomalous Meckel's diverticulum may be considered abnormal, but it does not become the concern of the patient or physician until pathologic complications occur.

Cases which occurred over an 18-month period (January 1946 to July 1947) in the U. S. Naval Hospital, Philadelphia, Pa., and reported here, are illustrative of the usual pathologic complications.

CASE REPORTS

Meckel's Diverticulum as an Incidental Finding

The anomaly has been found during exploratory laparotomy as an incidental finding, and the ileum should always be examined for its presence.

Case 1.—A 36-year-old white man was admitted on 15 October 1946 complaining of generalized abdominal pain shifting to the right lower quadrant, nausea, and constipation. His temperature was 100.6° F. Examination of the abdomen revealed tenderness, rigidity, and rebound tenderness in the right lower quadrant of the abdomen. The rectal examination was negative. There was leukocytosis. At operation a gangrenous appendix was removed through a McBurney's incision. A Meckel's diverticulum measuring 2 by 5 centimeters was found and excised 30 inches from the ileocecal valve. Pathologic examination revealed no evidence of inflammation but gastric mucosa was demonstrated.

Case 2.—A 34-year-old white man was admitted on 26 May 1947 complaining of generalized abdominal pain which had shifted to the right lower quadrant. There was nausea and anorexia. His temperature was 99° F. Examination of the abdomen revealed tenderness, rebound tenderness, and rigidity over McBurney's point. There was leukocytosis. At operation, an acutely inflamed appendix was removed through a McBurney's incision. A benign Meckel's diverticulum was found and excised 18 inches from the ileocecal valve.

⁷ KIMPTON, A. R., and CRANE, A. R.: Heterotopic gastric mucosa and reduplications of intestinal tract. *Am. J. Surg.* 49: 342-350, Aug. 1940.

⁸ MATT, J. G., and TIMPONE, P. J.: Peptic ulcer of Meckel's diverticulum; case report and review of literature. *Am. J. Surg.* 47: 612-623, Mar. 1940.

⁹ GREENBLATE, R. B.; PUND, E. R.; and CHANEY, R. H.: Meckel's diverticulum; analysis of eighteen cases with report of one tumor. *Am. J. Surg.* 31: 285-293, Feb. 1936.

¹⁰ TROLL, M. M.: Aberrant pancreatic and gastric tissue in intestinal tract. *Arch. Path.* 38: 375-380, Dec. 1944.

Case 3.—A 26-year-old white man was admitted on 9 January 1947 with a 2-year history of five episodes of right lower quadrant pain lasting for 24 hours. The physical examination and roentgenologic studies were negative. Because he was an officer on independent duty, it was decided to perform an interval appendectomy. At operation a normal appendix was removed. Exploration of the terminal ileum revealed a Meckel's diverticulum with a 1-inch base. The diverticulum was excised and the pathologic examination revealed evidence of chronic inflammation.

Hemorrhage and Ulceration

In melena of undetermined cause, Meckel's diverticulum should be considered, particularly in the presence of negative gastrointestinal studies. Bleeding from ulceration is one of the more frequent complications of this anomaly and often occurs from a peptic ulcer arising in aberrant gastric or duodenal mucosa.

Case 4.—A 28-year-old white man was admitted on 1 May 1947 with a 10-year history of six episodes of weakness, tarry stools, and an occasional burning sensation in the left upper quadrant of his abdomen. The present episode began 24 hours before admission. Gastrointestinal studies, barium enema, sigmoidoscopic and esophagosopic examinations were negative for pathologic changes. On admission his red blood cell count was 3,800,000; the hemoglobin 10 grams. His red blood cell count decreased to 2,000,000 before the hemorrhage ceased. After repeated blood transfusions an exploratory laparotomy was performed and a 5-centimeter Meckel's diverticulum was found and resected 20 inches from the ileocecal valve. The pathologic examination revealed a peptic ulcer in aberrant gastric mucosa. A 2-year follow-up showed complete postoperative relief of previous complaints.

Inflammation

Meckel's diverticulitis is difficult to differentiate from acute appendicitis and when there are insufficient appendiceal pathologic changes to account for the clinical findings a careful search should be made for a Meckel's diverticulum.

Case 5.—A 19-year-old white man was admitted on 13 September 1946 with a 4-day history of right lower abdominal pain, diarrhea, and vomiting. There was some dysuria. The physical examination revealed generalized abdominal muscle guarding with right lower quadrant tenderness and rebound tenderness. Hyperperistalsis was present. The white blood cell count was 5,700 with a normal differential count. He was observed for several hours, but when his symptoms increased, an appendectomy was performed through a McBurney's incision. A normal-appearing appendix was removed. Eighteen inches from the ileocecal valve an acutely inflamed Meckel's diverticulum, with the tip adherent to a loop of ileum, was found and excised. The pathologist's report revealed a normal appendix and acute Meckel's diverticulitis.

Case 6.—An 18-year-old white man was admitted on 10 December 1946 with a 12-hour history of periumbilical pain localized in the right lower quadrant of the abdomen and nausea. There was a history of three previous episodes which subsided spontaneously. The physical examination revealed rigidity, tenderness, and rebound tenderness over McBurney's point and rectal tenderness high on the right side. The white blood cell count was 9,600 with 2 percent band forms, 79

percent segmented forms, and 19 percent lymphocytes. A preoperative diagnosis of acute appendicitis was made. At operation a normal appendix was removed. Twenty-four inches proximal to the ileocecal valve an acutely inflamed Meckel's diverticulum, 4 inches in length and with a broad base equal to the lumen of the ileum, was found and excised. The pathologist's report revealed a normal appendix and a Meckel's diverticulum showing acute inflammatory changes.

Obstruction

The attachment of the anomalous diverticulum to other structures has frequently resulted in the complication of intestinal obstruction and often with strangulation of the involved intestine.

Case 7.—A 28-year-old white man was admitted on 20 March 1946 with a 12-hour history of severe abdominal pain localized in the right lower quadrant of his abdomen. He had vomited once and was constipated. Physical examination revealed rigidity, tenderness, and rebound tenderness in the right lower quadrant. The rectal examination showed tenderness on the right side. The preoperative diagnosis was acute appendicitis. At operation a normal appendix was removed. About 20 inches from the ileocecal valve was a Meckel's diverticulum, the tip of which was adherent to the mesentery of the ileum. Through the loop thus formed had passed several segments of small bowel which had become twisted and obstructed. The obstruction was relieved by freeing the tip of the diverticulum. The diverticulum was resected. The pathologist's report showed aberrant gastric mucosa in the tip of the diverticulum.

Case 8.—A 23-year-old Negro was admitted on 5 July 1947 with a 15-hour history of periumbilical cramplike pain shifting to the right lower quadrant 6 hours after its onset. There was nausea, vomiting, and constipation. Physical examination revealed rigidity, tenderness, and rebound tenderness in the right lower quadrant of the abdomen with rectal tenderness on the right. The white blood cell count was 11,000 with a differential Schilling's shift to the left. The preoperative diagnosis was acute appendicitis. At operation a normal appendix was found and further exploration revealed a Meckel's diverticulum whose tip was adherent to the posterior peritoneum. A partially obstructed segment of small bowel was incarcerated in the internal hernia thus formed. The obstruction was relieved by freeing the tip of the diverticulum. At this point the patient's condition became very poor and resection of the diverticulum was deferred. The postoperative course was uneventful and the patient was discharged and returned in 3 months for elective excision of the diverticulum.

Intussusception

Intussusception with a Meckel's diverticulum as the causative factor is more common in children than in adults. The following case report is interesting in that a careful evaluation of the patient's past history revealed numerous episodes of intussusception with spontaneous reduction.

Case 9.—A 30-year-old white man was admitted on 12 May 1946 with a 2-year history of episodes of abdominal pain, borborygmus, and diarrhea. The episodes were of 2 to 4 hours' duration with sudden onset and cessation. After prolonged study he was discharged from the Army with the diagnosis of psychosomatic gastrointestinal disease. Four previous admissions to this hospital revealed no pathologic explanation for these episodes. In 9 gastrointestinal series a normal gastrointestinal tract was reported. The present episode occurred 12

hours prior to admission with severe abdominal pain, distention, nausea, and vomiting. Because of his past experiences, the patient delayed seeking medical care. The physical examination revealed abdominal distention, tenderness, most noticeable in the lower right quadrant with rectal tenderness on the right and a tense mass (which was described as dilated bowel) on the right. Peristalsis was high-pitched and borborygmie. Roentgenograms of the abdomen revealed dilated small bowel with fluid levels. A diagnosis of intestinal obstruction was made and Miller-Abbott intubation was accomplished. The signs of obstruction increased and his white blood cell count suddenly rose from 13,500 to 26,600. At operation a nonreducible intussusception of the terminal ileum into the colon was found and a right hemicolectomy with a transverse ileocolostomy was performed. The postoperative course was uneventful. The pathologic specimen revealed a large Meckel's diverticulum which had intussuscepted into the colon. A follow-up 2 years later showed the patient to be symptom-free.

Tumors have been reported in Meckel's diverticulum and are usually incidental findings. Those reported are carcinoma, carcinoid, leiomyoma, leiomyosarcoma, fibroma, sarcoma, and benign polyps.¹¹⁻¹⁶

Foreign Bodies

Foreign bodies have been found in a Meckel's diverticulum causing inflammation and occasionally perforation. Calculi¹⁷ and fish-bones^{12 13 15 18 19 20} have both been reported.

Incarceration in Hernias

One of the original descriptions of an ileal diverticulum was made by Lettre, who found one incarcerated in a hernia. They have also been reported as occurring in femoral, ventral, inguinal, umbilical, and crural hernias.^{19 21-23}

¹¹ COSTICH, K. J., and McNAMARA, W. L.: Carcinoma of Meckel's diverticulum: case report. *Ann. Surg.* 124: 503-507, Sept. 1946.

¹² ALBRIGHT, H. L., and SPRAGUE, J. S.: Primary adenocarcinoma in Meckel's diverticulum. *New England J. Med.* 226: 142-146, Jan. 22, 1942.

¹³ KOUCKY, J. D., and BECK, W. C.: Perforated leiomyoma of Meckel's diverticulum; report of case. *Surgery* 10: 630-641, Oct. 1941.

¹⁴ SKINNER, I. C., and WALTERS, W.: Leiomyosarcoma of Meckel's diverticulum, with roentgenologic demonstration of diverticulum: report of case. *Proc. Staff Meet., Mayo Clin.* 14: 102-107, Feb. 15, 1939.

¹⁵ BOWEN, F. H.: Intussusception associated with polyp in Meckel's diverticulum; report of case. *J. M. A. Georgia* 30: 390-391, Sept. 1941.

¹⁶ COLLINS, D. C.; COLLINS, F. K.; and ANDREWS, V. L.: Ulcerating carcinoid tumor of Meckel's diverticulum: case report. *Am. J. Surg.* 40: 454-461, May 1938.

¹⁷ ALLEN, A. W., and DONALDSON, G. A.: Meckel's diverticulum containing calculi. *Arch. Surg.* 50: 286-287, June 1945.

¹⁸ WEINSTEIN, V. A.: Fish-bone perforation of Meckel's diverticulum. *J. M. Sinai Hosp.* 9: 29-32, May-June 1942.

¹⁹ LUM, R., and LADD, S. T.: Left inguinal hernia with acute Meckel's diverticulitis and peritonitis; report of case. *New England J. Med.* 226: 15-16, Jan. 1, 1942.

²⁰ TAMRAZ, J. M.: Case of acute gangrenous diverticulitis (Meckel's) with perforation due to fish bone. *Mil. Surgeon* 87: 328-329, Oct. 1940.

²¹ PATTERSON, F. M. S.: Incarceration of Meckel's diverticulum in femoral hernia: report of case. *North Carolina M. J.* 7: 59-60, Feb. 1946.

²² STROHL, E. H., and McARTHUR, S. W.: Incarcerated Meckel's diverticulum in femoral hernia. *Arch. Surg.* 38: 783-787, Apr. 1939.

²³ KEELEY, J. L.: Meckel's diverticulum in sac of ventral incisional hernia; report of case. *Wisconsin M. J.* 36: 733, Sept. 1937.

DIAGNOSIS

The preoperative diagnosis of this condition is rarely made. Gastrointestinal series have occasionally revealed the presence of a Meckel's diverticulum, but for the most part the diagnosis is invariably made at operation.

TREATMENT

The treatment of Meckel's diverticulum with its complications is surgical, the extent of surgery being governed by the pathologic changes found. The diverticulum should be excised. If the base is broad, it may be divided longitudinally and closed transversely to the long axis of the bowel. If the base is narrow, simple purse-string inversion may be carried out without narrowing the lumen of the ileum.

SUMMARY

Congenital Meckel's diverticulum is subject to various complications, and the treatment is surgical. Our series of nine cases over an 18-month period illustrates most of the complications encountered. It should be reemphasized that in all celiotomies a search should be made for this anomaly, and particularly should the search be made when the pathologic changes found in the appendix are not sufficient to account for the subjective and objective findings.



Amebiasis and the Complement-fixation Test¹

CHARLES F. CRAIG, Colonel, MC (Ret.), U. S. A.²

IN ORDER to understand what may be expected from the complement-fixation reaction in the diagnosis of amebiasis, one must have a clear conception of this infection. When I first became interested in the condition over 50 years ago, amebic dysentery was the name applied to all infections with *Endamoeba histolytica*. It was believed that this was a disease entity and that all infections were accompanied by a severe dysentery. At that time I was stationed at what is now the Letterman Army Hospital, San Francisco, Calif. Hundreds of our soldiers with amebic dysentery were seen at the hospital on their return from the Philippines. Amebic dysentery was one of the most important infections among our troops in those islands at that time. Unfortunately, the concept that amebic dysentery is a disease entity still lingers and few cases of infection with *E. histolytica* are reported to our boards of health unless the patient has dysentery. Actually, dysentery is but one of the symptoms caused by this parasite and the term "amebiasis" includes all infections with it. Such infections may be symptomless or accompanied by numerous symptoms connected with the intestinal tract or with invasion of the tissues of the body by the parasite.

E. histolytica has two principal life cycle stages: (a) a vegetative or trophozoite stage and (b) a cystic stage. In the former, it is actively motile, able to penetrate the tissues of the intestine or other parts of the body through the action of a cytolytic substance, or substances, and by its mobility. The trophozoite state, in which it multiplies by binary division, continues until conditions become unfavorable; then the parasite becomes motionless, spherical, and secretes a cyst wall. These cysts do not undergo full development within the

¹ Presented at the Fourth Army Area Medical Laboratory Seminar on 1 March 1950.

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intestine but are passed in the feces and are the infective agents which, when ingested in contaminated food or drink, liberate eight young trophozoites in the intestinal tract, and the life cycle is repeated. *Cysts do not occur in any of the tissues invaded by this parasite but only in the lumen of the large intestine when conditions become unfavorable for the existence of the trophozoites.*

The pathologic changes produced by *E. histolytica* vary from microscopic excoriations and areas of lysis, caused by the cytolytic substance secreted by the ameba, to extensive necrosis of the tissues and the formation of large ulcers extending to the peritoneal coat of the intestine or amebic abscess of the liver, lung, brain, or other organs, as well as lesions elsewhere in the body, including the skin. The great variation in the severity of the pathologic lesions caused by this parasite, and the variations in the response of the tissues to the infection, account for the apparent contradictions in the results of the complement-fixation test. Thus, one may get a four-plus reaction in patients showing slight symptoms, or no symptoms of the infection, although in a severe symptomatic infection the result of the test may be a weak or even a negative reaction. The severity of tissue invasion cannot be judged by the symptomatology, or lack of it, as it has been shown by several observers that severe lesions may be present in the intestine, even in symptomless infections. Thus, Bartlett,³ in 1917, described the postmortem findings in 22 soldiers admitted to the hospital for other conditions. Eleven of them had never had diarrhea or dysentery, and were apparently asymptomatic carriers of *E. histolytica*. In all of the latter definite ulcers caused by this parasite were present in the large intestine, some of large size and penetrating to the muscular and peritoneal coats of the intestine. In such latent cases the complement-fixation test would, in all probability, give a positive result, as is the case in a large proportion of latent infections, although in some cases of severe amebic dysentery the reaction may be negative because of the inability of the body to produce complement-fixing bodies when the infection is very severe. There is no lasting immunity in amebiasis and a positive complement-fixation test disappears within 2 to 4 weeks following elimination of *E. histolytica*. Its persistence after this period, even though the parasite has disappeared from the stools, indicates that a focus of infection is still present in the body, perhaps in the liver, to be followed weeks or even months later by an amebic abscess of that organ.

The methods that are available for the diagnosis of amebiasis include the microscopic examination of unstained and stained preparations of

³ BARTLETT, G. B.: Pathology of dysentery in the Mediterranean Expeditionary Force, 1915. Quart. J. M. 10: 185-244, Apr. 1917.

the stools, using concentration methods, the use of the sigmoidoscope, the cultivation of *E. histolytica* in suitable culture media, and the complement-fixation test. In all suspected cases the stools should be examined for the ameba and if sufficient time be expended and the examiner is trained in the differentiation of *E. histolytica* from the four other species of amebas occurring in the intestine of man, generally accepted as nonpathogenic, and if the examination is repeated several times when the first one is found negative, the parasite will be found if present. This often means the expenditure of much time and money. Sigmoidoscopic examination should be made if the stools are negative but about one-third of the infections may be missed if this method of examination is used alone, especially if there are few or no symptoms, because about one-third of the lesions occur only in the ileocecal and upper portion of the large intestine. Cultivation of *E. histolytica* from the stools should also be attempted routinely and some authorities believe this method of diagnosis is more useful than the microscopic examination of the stools.

Complement fixation is, at present, merely an aid in the diagnosis of amebiasis and should not be attempted until the diagnostic methods previously mentioned have been employed. If we possessed a complement-fixation test that always gave positive results in all infections with *E. histolytica*, and never in other disease conditions, it could be used as a routine diagnostic test to the exclusion of other methods of diagnosis; but unfortunately the complement-fixation test for amebiasis is not perfected at present and does not always give positive results in all infections with this parasite and negative results in all other infections and disease conditions. As with most complement-fixation tests, false positive and false negative results may be obtained.

At present the antigens employed in the test are not made from pure cultures of *E. histolytica* and are always contaminated by bacteria. It has been repeatedly demonstrated that such contamination does not cause false reactions and that complement fixation in amebiasis is a specific reaction; that a positive reaction disappears within a comparatively short time, usually 2 to 4 weeks after the elimination of *E. histolytica* by treatment; that a positive reaction is obtained with antigens made from washed cysts of the parasite; and that positive reactions are obtained with the blood serum of animals immunized to the ameba and from whose blood serum antibodies against the accompanying bacteria in the inoculum employed in immunizing the animals have been removed.⁴

⁴ SHERWOOD, N. P., and HEATHMAN, L. L.: Further studies on antigenic properties of pathogenic and free living amebas; complement fixation in amebic dysentery. *Am. J. Hyg.* 16: 124-136. July 1932.

Employing the technic I have recommended for the test, from 85 to 90 percent of positive results were obtained in symptomatic amebiasis and from 70 to 80 percent in asymptomatic or latent infections. False positive reactions were obtained in some cases of chronic ulcerative colitis but few such reactions have been reported in other diseases. The results obtained with the test by other observers have varied greatly, probably because of variations in technic and the strength of the antigens used. It is a natural inclination, on the part of laboratory workers, to devise individual technics and this has been notably true of the complement-fixation test for amebiasis; hence it is not surprising that variations in the results obtained with this test have been reported by those who have modified my original technic. Refinements have been made in the technic that were unnecessary and that have led to confusion and a smaller percent of positive results, especially in symptomless infections with *E. histolytica*. Unlike generalized infections, infection with this parasite is usually localized in the tissues of the large intestine and apparently the production of antibodies is much lower and the complement-fixing antibody is present in small amounts, thus making it more difficult to demonstrate its presence by a complement-fixation test. This fact probably explains the negative results obtained in a large proportion of infections with *E. histolytica* by some of the modified technics employed by certain investigators. In other words, too much refinement in technics has injured the value of the test as a diagnostic agent in amebiasis.

When a positive reaction is obtained in a suspect, it is justifiable to regard it as strong presumptive evidence that infection with *E. histolytica* is present and treatment should be administered. A negative reaction does not prove that such an infection is absent although such a reaction in conjunction with negative results with the other diagnostic tests mentioned would be conclusive. The permanent disappearance of a positive reaction after treatment and negative stool or other examinations definitely indicates that the parasite has been eliminated and treatment has been successful.

While, as stated, this test cannot, and should not, replace the other methods of diagnosis available in amebiasis, the complement-fixation test possesses a definite value in the diagnosis of this infection. It is most valuable in those infections in which, for any reason, it is impossible to make proper examinations of the stools, but it is also valuable under other conditions. The complement-fixation test has definite practical value in (a) the discovery of carriers or cyst-passers (when used as a routine diagnostic procedure), (b) the diagnosis of amebic liver abscess, (c) the diagnosis of acute and chronic amebic dysentery, (d) the control of the treatment of amebiasis and the

evaluation of drugs used in such treatment, and (e) testing the efficiency of proposed amebicidal drugs in animals. It should be employed whenever possible but never to the exclusion of stool examinations and cultivation of the ameba.

The discovery of carriers or cyst-passers.—In many hospitals routine stool examinations are not made, but blood examinations and a Wassermann test are made on every patient. The complement-fixation test for amebiasis could be made at the same time and such a procedure has resulted in picking up many latent amebic infections in carriers or cyst-passers. This procedure was used at the Army Medical School in Washington while I was stationed there and resulted in the discovery of amebiasis in many asymptomatic persons whose stools would not routinely have been examined. Subsequent examination of the stools of these persons almost invariably resulted in the demonstration of *E. histolytica*, and thus proved the value of the test in the discovery of latent amebic infections.

The diagnosis of amebic abscess of the liver.—The complement-fixation test usually gives a strong positive reaction in amebic hepatitis and amebic abscess of the liver, and when it is impossible to make stool examinations, or when the stools are negative for *E. histolytica*, it is of great practical value. Not infrequently an amebic abscess of the liver develops after the elimination of the intestinal infection and in such cases a positive complement-fixation reaction is absolutely diagnostic, and should always indicate proper therapeutic or surgical treatment of the patient giving such a reaction and in whom there are suspicious symptoms of hepatitis or abscess formation.

The diagnosis of acute and chronic amebic dysentery.—When, for any reason, it is impossible to examine properly the stool for *E. histolytica*, the complement-fixation test is of practical value in differentiating acute or chronic amebic dysentery from other forms of dysentery. In the majority of patients with dysentery caused by this parasite, the complement-fixation test gives a positive reaction, and when stool examinations cannot be made, this test should be of great value in diagnosis.

The control of the treatment of amebiasis and the evaluation of the drugs used in treatment.—A positive complement-fixation reaction usually becomes negative within from 2 to 4 weeks after the elimination of *E. histolytica* by treatment. If it does not become negative, even though the ameba has disappeared from the stools, one may be practically sure that the infection still persists somewhere in the tissues, and this will be proved by the reappearance of the parasite in the stools. In such patients treatment should be repeated and continued until the reaction becomes permanently negative. If used in this manner, the complement-fixation test for amebiasis is of practical

value in controlling treatment and in evaluating the amebicidal properties of the drugs used in the treatment of amebiasis.

The testing of amebicidal compounds.—The complement-fixation test may also be used in testing the efficiency of new compounds proposed for the treatment of amebiasis, as animals susceptible to infection with *E. histolytica* can be employed for this purpose and the value of the drug proposed for treatment can be ascertained by its effect on the complement-fixation reaction. We have shown that this is true. By experiments on dogs and the use of the complement-fixation test, it was found that the recommended dose of a well-known commercial compound, used in the treatment for amebiasis, had to be increased at least six times to eliminate the amebic infection in the animals.

This test should never be used to the exclusion of stool examinations and cultivation of *E. histolytica* and it should be limited to laboratories in which well-trained personnel is available. At present the technical difficulties connected with the test, especially the difficulty in securing efficient antigens, precludes its general use, but improvements in this direction will undoubtedly be made and it will become a much more useful diagnostic procedure.



Medical Service Field Research Laboratory

RAY G. DAGGS, *Ph. D.*¹
FREDERICK J. KNOBLAUCH, *Colonel, MC, U. S. A.*²

THE Armored Medical Research Laboratory was established at Fort Knox, Ky., 1 September 1942 through the continued efforts of the Surgeon General, U. S. Army, the Surgeon of the Armored Forces, and the Committee on Industrial Hygiene of the National Research Council. The mission of the Laboratory at that time was to study additional physical and mental stresses placed on the soldier in the operation of armored vehicles with a view to improving his comfort and providing additional safety measures to protect him in the performance of his military tasks. Soon after the establishment of the Laboratory it became evident that such a research organization could well serve the entire Army by providing information relative to individual stresses and tolerances of soldiers participating in various military tasks in addition to the operation of armored vehicles. Its mission, therefore, was broadened.

During the war the Laboratory operated under the direct supervision of the Army Ground Forces. At the end of the war the Laboratory was placed under the direct control of the Surgeon General, U. S. Army. The Laboratory was then reorganized and shortly thereafter renamed the Medical Department Field Research Laboratory. The reorganization was based on long-range planning, and civilian scientists were engaged to head all phases of the research activity. Its mission was again broadened with more emphasis being placed on basic physiologic research.

The present mission of the Laboratory is to provide, through research, scientific information on physiologic and closely related problems that may have military significance. Particular emphasis is placed on problems of environment and reaction to stress. Although

¹ Directory of Research, Medical Service Field Research Laboratory, Fort Knox, Ky.

² Commanding officer, Medical Service Field Research Laboratory, Fort Knox, Ky.

encompassing activities in such basic sciences as physiology, biochemistry, biophysics, radiobiology, and psychology the work is controlled to the extent that all projects, no matter how basic, aim at providing sound fundamental data that will eventually be useful in applied or clinical research. Applied research of immediate importance is carried out, mostly in cooperation with other Army agencies such as the Army Field Forces Board No. 2, Fort Knox, Ky., the Quartermaster Corps, and the Signal Corps. The Laboratory is a class II activity, located at Fort Knox, but is under the direct supervision of the Chairman, Research and Development Board, Office of the Surgeon General, U. S. Army.

Organization.—The Laboratory is comprised of an administrative and research division, both under the general supervision of the commanding officer. The administrative division is composed of five branches under the administrative supervision of the adjutant. In addition to routine responsibilities the administrative division administers such services as the technical library, supply, animal farm, and shops.

The research division is composed of six branches (physiology, biochemistry, biophysics, radiobiology, psychology, and x-ray and photography) under the technical administration of the director of research (a civilian scientist). Although the research division is composed of separate branches for technical administrative purposes, the research work is performed under a flexible system of research teams or sections which may be changed depending on interests and requirements. At present the following teams are operating under the leadership of nationally known scientists: cardiovascular; central nervous system physiology; renal physiology; environmental (hot and cold) physiology; hematology; endocrinology; metabolism; enzymology; protein chemistry; radiation; biophysics; x-ray technics; psychophysiology; and testing.

Research program.—At the time of the reorganization of the Laboratory (1946) it was authorized to set up subprojects under a few long-term project headings of four types:

(a) Those seeking new and better methods and instrumentation for the study of environmental physiology. At present the projects of this type deal mostly with attempts to develop more accurate measuring devices.

(b) Those dealing with problems of stresses of environments and tasks, especially cold. The military interest in cold environments as well as the scarcity of fundamental physiologic knowledge of cold adaptation has provided the impetus for projects of this type.

(c) Those seeking more accurate, fundamental knowledge that will aid in the conduct of future clinical problems. Many of these problems warrant attention because of recent scientific findings and because of stresses brought about by modern warfare.

(d) Those of immediate applied interest. These are generally conducted in cooperation with other agencies within the Department of the Army.

Facilities.—The illustration (fig. 1) shows the main laboratory building; other laboratories are housed in temporary wooden-barracks and mess-hall type buildings. The Laboratory occupies about 70,000 square feet of floor space. It has various experimental shops, i. e., electronic, glass blowing, machine, and small instrument. Large “cold” and “hot” rooms are located in the main building. Several

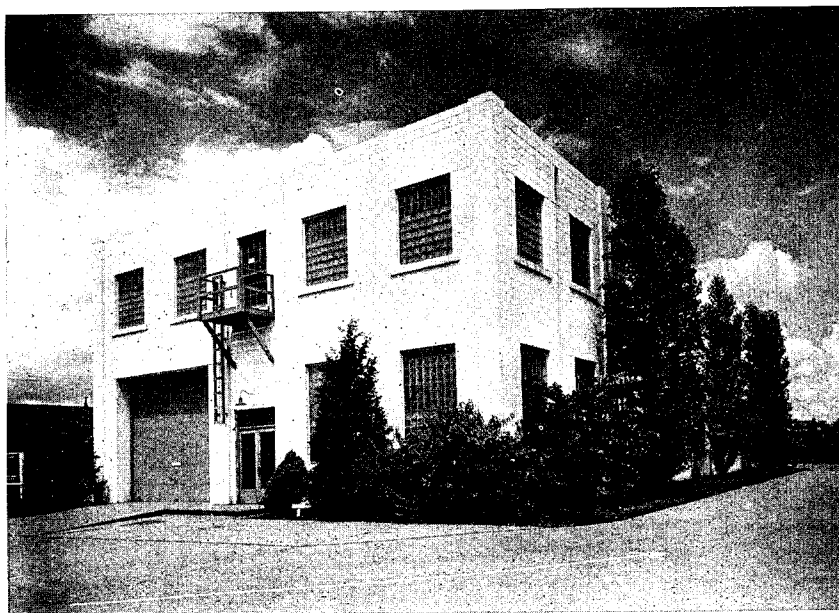


Figure 1.—Main Building, Medical Service Field Research Laboratory, Fort Knox, Ky.

smaller temperature rooms, located in the other buildings, are used mainly for animal experimentation. In addition to the normal laboratory equipment the Laboratory has the following special equipment: infra-red gas analyzer, dual beam infra-red spectrophotometer, large Littrow quartz spectrograph, spectrophotometer, quartz monochromator, precision polarimeter, ultracentrifuge, Tiselius electrophoresis apparatus, deep therapy X-ray, Cambridge research electrocardiograph, pulse recorder, several special cathode ray oscillographs, and special roentgenographic motion picture equipment.



The British Army Divisional Medical Organization

R. D. CAMERON, *Major General, R. A. M. C.*¹

THE medical organization within the division consists of (*a*) the Assistant Director of Medical Services (ADMS)² and his staff; (*b*) Field Ambulances,³ three in an infantry or airborne division and two in an armored division; (*c*) one field dressing station (FDS) per armored or infantry division, also allocated to an airborne division in a ground role; and (*d*) regimental medical establishments.

ASSISTANT DIRECTOR OF MEDICAL SERVICES

The ADMS, a colonel, is the advisor to the divisional commander on all matters which affect the health of the troops, and this includes advice on health discipline and the prevention of disease. He commands the medical units in the division and is responsible for formulating the medical plan for the collection and disposal of casualties. He is attached to the Adjutant General's branch of the staff and is located at main divisional headquarters. He has 2 medical officers on his staff: A Deputy Assistant Director of Medical Services (DADMS) and a Deputy Assistant Director of Army Health (DADAH). In addition there are 15 noncommissioned officers of the medical corps: 6 clerks, 1 orderly, and 8 sanitary assistants.

THE FIELD AMBULANCE

All Field Ambulances are standard and are similar in personnel. Field Ambulances with airborne divisions, in view of their special

¹ Inspector of Training of the British Army Medical Services at the time of writing this article and now Director of Medical Services (Theatre Surgeon), The British Army on the Rhine.

² Corresponds to our division surgeon.

³ Corresponds to our old collecting company or a combination of the collecting section of a regimental medical company and a section of an ambulance company under our new T/O.

employment, have different types and scales of equipment and a minor difference in transport. A Field Ambulance consists of an HQ, and HQ section, and one company, which is divisible into a small company HQ and three equal sections similar in every way to the HQ section. The sections form casualty clearing posts (CCP)⁴ for the evacuation of regimental aid posts (RAP)⁵ and are administered by the company HQ. The HQ of the Field Ambulance holds the bulk of the equipment and forms the advanced dressing station (ADS).⁶ The Headquarters section assists the ADS or is used for leapfrogging, augmenting, or relieving the company as required. The organization of the unit permits great flexibility.

The primary role of the Field Ambulance is the rapid collection of sick and wounded, the rendering of first aid to casualties, their preparation and classification for further disposal, and the completion of necessary documentation. It is a mobile unit and is not equipped to provide other than the simplest accommodation and essential treatment. When not engaged in active operations the Field Ambulance may hold patients with minor illnesses. This is a secondary role and cannot be undertaken in combat when casualties must be evacuated as soon as they are fit to travel. The Field Ambulances of airborne formations are specially trained and equipped for their special duties. When taking part in an airborne operation each Field Ambulance has two field surgical teams attached to enable the unit to operate independently when it is out of contact with ground forces. As soon as a link-up with the ground forces is made, the normal casualty evacuation procedure is reverted to.

Field Ambulances are divisional troops, and as such their disposition is controlled by the ADMS acting under authority of the divisional commander. One Field Ambulance is usually allotted in support of each infantry brigade⁷ and then becomes an element of the brigade group, in which case it conforms to the movements of the brigade, and collects the casualties occurring on the brigade front. The sitting, opening, and closing of the ADS's is controlled by the ADMS, except in the initial stages of a planned battle when he frequently delegates his authority to the Field Ambulance commander, in which case the latter will inform the ADMS in advance of any intention to move and at once report the location to the ADMS. In

⁴ Corresponds to our collecting post or point.

⁵ Corresponds to our battalion aid stations.

⁶ An intermediate unit corresponding to a combination of part of our collecting and clearing stations.

⁷ Corresponds to our regimental combat team.

certain operations the Field Ambulance is placed under the brigade commander, e. g., when the brigade is acting independently or in the early stages of an airborne operation. In this event the Field Ambulance commander, with the concurrence of the brigade commander, will locate and open the ADS. He should, if possible, intimate his intention to the ADMS and invariably report its location. An ADS may be opened for each brigade in action, or the ADMS may decide to open one, or possibly two, for the divisional front.

The Field Ambulance commander attends brigade operation conferences and maintains contact with brigade headquarters throughout operations in order to obtain up-to-date information which will enable him to arrange for the speedy evacuation of casualties. The Field Ambulance commander is the senior medical officer of the brigade, and as such is the advisor to the brigade commander in medical matters. He should frequently visit all units in the brigade area.

The guiding principles in the evacuation of casualties within the division are: (a) the maximum speed consistent with efficiency, limiting treatment to controlling shock and hemorrhage, relieving pain, and rendering the patient fit for evacuation; and (b) minimal handling of the patient such as transfers between ambulances and change of dressings.

Field Ambulance section.—The role of a Field Ambulance section is to collect casualties from RAP's and evacuate them without delay to the ADS. It can perform this function either by: (a) direct transportation of casualties from RAP to ADS, (b) establishing an ambulance post at an intermediate point, or (c) establishing a casualty collecting post (CCP),⁸ It is often convenient to use two or more sections together thus forming a combined CCP. Prior to an engagement it is usual to attach one or more stretcher-bearer squads from the section to the RAP. If the ground permits, one jeep or ambulance is also attached. Treatment in a CCP should be confined to such first-aid measures as the regimental medical officer (RMO) may have been unable to carry out, and first aid for cases which have not passed through an RAP. It is primarily a check point, and it is only necessary to ensure that hemorrhage is under control and that fractures and large flesh wounds are immobilized. Dressings and splints should not be removed unless such a procedure is essential before further evacuation. Hot sweet tea should be available. When there is an extended line of evacuation there may be occasions when it is necessary to assign to the CCP its additional role of a treatment center. These occasions should be rare. The main object is to transport casualties to the ADS as quickly as possible.

⁸ Corresponds to our collecting post or point.

Field Ambulance company headquarters.—The role of the company headquarters is to control, administer, and maintain the three company sections. In addition, the company commander controls and coordinates forward evacuation from RAP's and locates CCP's under the Field Ambulance commander's direction. The company commander frequently visits RMO's and maintains contact with the brigade headquarters staff. The company headquarters is located where it can best control evacuation from the brigade group. This is normally at the junction of the lines of evacuation from which all sections are operating. It is not intended to form a medical post but a small amount of medical equipment is carried for the treatment of local casualties and sick.

Field Ambulance headquarters.—The HQ of a Field Ambulance forms the ADS. It generally operates under the control of the ADMS division, but may occasionally be placed under the control of the brigade commander. In the former case, it will usually be possible for the ADMS to select the site of the ADS only at the commencement of an engagement, particularly in mobile warfare. It will usually be the task of the Field Ambulance commander to select any subsequent site and report this to the ADMS and the brigade commander or commanders concerned. When the ADS serves more than one brigade, the ADMS controls its movements and issues orders to the Field Ambulance commander accordingly giving the approximate area in which to open, and the time for opening. When the unit is under the control of a brigade commander, the Field Ambulance commander normally selects the site of the ADS in conjunction with the brigade staff.

Advanced dressing station.—The role of the ADS is to receive casualties from one or more brigade fronts, through the CCP's, or directly, and to provide essential treatment in order to render the casualties fit for evacuation as soon as possible. Speed in passing wounded through the ADS is essential. The ADS is the main medical center in the brigade or divisional area and is formed by the HQ of a Field Ambulance. It is equipped to provide only such surgical treatment as is essential to render casualties fit to travel to the casualty clearing station (CCS)⁹ where major surgical facilities are available. The ADS is equipped with shelters and tents for the accommodation of casualties. It can accommodate 150 patients. It may be wholly under canvas, but the use of buildings when suitable and available is a great advantage.

An ADS would be located on, or adjacent to, good roads and requires:

⁹ Corresponds to the patient-holding element of our clearing company.

(a) An adequate in- and out-circuit for ambulances.

(b) Accommodation (preferably in buildings) for casualties divided into reception, treatment, and evacuation zones. (For the purpose of evacuation to a CCS, walking patients are classified as "sitting." Certain casualties, initially sitting or walking wounded, become litter patients before they can be evacuated. When possible, separate accommodation should be allotted to litter and sitting patients.)

(c) Facilities for treatment and documentation.

(d) Water supply, cookhouse for patients and personnel, latrines, and mortuary (gas protection may have to be provided).

(e) Pack stores for equipment and arms.

(f) Reserve of splints, dressings, blankets, and stretchers.

(g) Accommodation for personnel.

(h) Natural protection against shelling and bombing. When time permits and particularly in position warfare, an ADS should be able to withstand direct hits from small projectiles, and slit-trench protection should be provided. The location of the ADS and all medical posts must be clearly shown by day and night signs. All road junctions in the neighborhood in all directions must be adequately signposted. All signposts must be removed on change of location. Specifically detailed NCO's will carry out signposting as a drill. The staff of an established ADS should be divided into teams so that rest periods can be arranged and additional staff are easily available to augment the ADS when required. The personnel of HQ section, when with the ADS should be incorporated in the teams.

Special care must be taken of the personal effects of casualties immediately on admission. This is the duty of the NCO in charge of the pack store, who will collect, list, pack, label, and seal these articles. Particular attention must be given to money, valuables, rings, watches, and any articles of sentimental value. Similar care must be taken of the personal effects of the dead. These effects are specially labeled and sent to the second echelon.

The detailed tasks of the ADS are:

(a) Treatment of the casualty: Wet and soiled clothing is removed and the patients are clad in pajamas. They are made as comfortable as possible and kept warm and dry. Hot sweet tea and a hot meal are given to all, except when medical reasons prohibit this. All previous treatment is checked and any omissions rectified. Tourniquets if previously applied are removed. If hemorrhage persists, other methods are adopted for its control, viz., ligature of the artery or the application of pressure forceps, failing which, the tourniquet is reapplied. Sucking chest wounds are closed by temporary means. If a limb is so shattered that it can be severed by a pair of scissors, it is removed to avoid continuance of shock. Pain is controlled by injection of mor-

phine; sedation of exhausted patients is undertaken. Shock is combated by the afore-mentioned methods and the use of plasma. As a rule it is better to avoid transfusion with whole blood at the ADS. If, however, the chances of survival are doubtful without blood transfusion it should be begun and continued as a drip in the ambulance on the journey to the CCS. The time and place for a blood transfusion is normally at the CCS prior to an operation. Every casualty to whom morphine has been administered is marked on the forehead with the letter "M" in grease pencil. Similarly the letter "T" is used when a tourniquet is employed.

(b) Documentation of the casualty: An accurate regimental and clinical record of casualties is a definite responsibility of all medical units through which casualties pass. This record consists of the number, rank, name, unit, and diagnosis of the casualty. It is required so that the next-of-kin can be informed of the casualty as soon as possible. General headquarters personnel, second echelon, are charged with this duty, and to carry it out they depend on the nominal rolls of casualties received from medical units. These rolls are an extract from the admission and discharge book kept by all medical units and are forwarded daily to GHQ, second echelon, by every medical unit in the force. A record of the clinical condition and treatment of casualties in their progress through medical units is necessary so that each succeeding medical unit can adopt the optimum treatment. The first place in the line of evacuation where a permanent record of the casualty can be undertaken is the ADS formed by the headquarters of the Field Ambulance. Documentation must not delay treatment or evacuation of the casualty.

(c) Classification of the casualty: The wounded are placed in one of three priorities according to their clinical condition. Priority 1 includes patients requiring resuscitation and/or urgent operations; e. g., penetrating abdominal wounds, open chest wounds, compound fractures of the femur, extensive lacerated muscle wounds, and severe shock. Priority 2 includes patients requiring early operation and possibly resuscitation; e. g., severe and multiple wounds, compound fractures, and head injuries. Priority 3 includes all other wounded. In general these will be sitting patients. Priority 1 and 2 casualties amount to 15 or 20 percent of the total.

(d) Evacuation of the casualty: Priority 1 and 2 casualties are evacuated to the CCS (or to the advanced surgical center if formed). Priority 3 casualties are also evacuated to the CCS except those whose injuries are so trivial that they will be fit to return to duty in a few days. They are sent to the divisional FDS. Patients with severe illness arriving at the ADS are evacuated to the CCS and patients with minor illness including exhaustion are transferred to the divi-

sional FDS. Patients transferred to the divisional FDS are moved by ambulances of the Field Ambulance. All other patients are evacuated by ambulances and troop-carrying vehicles of the motor ambulance company under arrangements made by the Deputy Director of Medical Service, Corps.¹⁰

FIELD DRESSING STATION

An FDS consists of a small administrative headquarters and two equal sections which can operate away from the unit HQ but are maintained by the HQ. The sections may operate together, separately, or be used for leapfrogging. An FDS is designed to hold 100 patients, 40 on beds and the remainder on stretchers. The primary role of the divisional FDS is to maintain the fighting strength of the division within the division by holding all minor sick, injured, and mildly exhausted patients. Normally only patients who are expected to be fit for return to duty in 7 days are held. This period may be altered according to the local or general situation. In special circumstances the FDS may be employed in the divisional evacuation plan. The FDS is sited by the ADMS in consultation with the divisional staff and is normally in the rear divisional area and away from gun positions. The FDS possesses shelters and tents, but should be in buildings if suitable and available. Adequate bathing, reading, and other amenities should be provided whenever possible. Evacuation from the FDS to the CCS is by ambulances of the motor ambulance company, and is the responsibility of the Deputy Director of Medical Service, Corps.

Intercommunication between RMO's, sections, and Field Ambulance HQ is normally by dispatch rider or returning ambulance. Between ADMS and medical units it is by dispatch rider, telephone, or radio. Brigade headquarters may also arrange to link up the affiliated Field Ambulance by radio.

REGIMENTAL MEDICAL ESTABLISHMENTS

In war, each battalion and similar units have a medical establishment consisting of one medical officer and one to six NCO's, according to the unit. One NCO is provided by the unit as the regimental medical officer's orderly. Regimental personnel are detailed as regimental stretcher bearers and are placed under the orders of the RMO. They are distinguished by a stretcher bearer's armband lettered "SB" worn on the left arm. In addition, personnel of the unit are specially trained in water and sanitary duties. A number of smaller units do not carry a medical officer on their establishment but on active service have personnel trained in water and sanitary duties and first aid. In

¹⁰ Corresponds to our Corps Surgeon.

such cases, a medical officer of a nearby unit is appointed as officer in medical charge, in addition to his other duties.

Regimental medical officer.—The officer in medical charge of a unit is directly under the control of the administrative medical officer of his formation in professional matters but in other respects he is under the orders of the unit commander. The regimental aid post should normally be in close proximity to the centrally placed unit headquarters to permit access to and from all parts of the unit front. The RAP should afford protection from rifle fire and machine-gun fire and mortar splinters. The exact site must depend on the tactical situation. If possible, the RAP should be accessible to the ambulances of the Field Ambulance. Unit RAP's should not be amalgamated.

In action, the RMO should locate himself at his RAP. It is rarely possible and indeed it is inadvisable for him to proceed further forward, since when he is separated from his medical equipment, he can do little more than a trained stretcher bearer; meanwhile, casualties requiring his expert aid would be accumulating in the RAP. During the battle an RMO can only carry out the essentials of first aid. This includes the control of hemorrhage, the immobilization of fractures and gaping flesh wounds by splints, the commencement of prophylactic treatment with sulfonamides or antibiotics, the applications of dressings, and the administration of morphine. Close liaison between the RMO and the Field Ambulance is essential. Although the RMO should inform the supporting section of any change of location of the RAP, it is the responsibility of the Field Ambulance commander to maintain touch with the RAP by means of his company and section commanders.



Female Staffing Program in an Army Hospital

JOHN T. GRAY, *Captain, MSC, U. S. A.*¹

THE Army Medical Service has been conducting an experiment in military hospital staffing since 1 June 1949. This staffing experiment was conducted at Murphy General Hospital, Waltham, Mass., until 30 April 1950 when the program was transferred to the U. S. Army Hospital, Fort Devens, Mass., because of the closure of the general hospital.

The idea for the female staffing program originated from experience gained in World War II and from the realization that in the event of another war, mobilization of national resources, including personnel, would most likely be on a greater scale than ever experienced by the United States in the past. Toward the close of World War II it became increasingly difficult to obtain male replacements in Army hospitals in the Zone of the Interior. This situation resulted in a progressively greater use of women in sub- or non-professional fields by the Army Medical Service. This utilization, however, was limited to assignments such as clerk, stenographer, chauffeur, and medical, surgical, and laboratory technicians. Their performance of duty was of such a high standard that it was deemed appropriate by the Surgeon General and the Director, Women's Army Corps to consider the possibility of maximum use of this source of labor in the event of an emergency. Before such a source could be fully exploited it was necessary to determine the extent to which an Army hospital could be staffed by female civilian and military personnel without deterioration in the standards of patient care and treatment. Other aims of the program are to develop female personnel requirements, formulate descriptions of those positions found suitable for occupancy by women, develop a training program which would train women as effective and qualified persons for hospital positions in the shortest possible time, determine the type of women which should be recruited for the staffing of Army hospitals, and to give the Medical Service experience, data, and plans for the use of women immediately available.

Murphy General Hospital was chosen as the site of the program because it was representative of all the activities found in an Army

¹ Medical Plans and Operations Division, Office of the Surgeon General, U. S. Army.

hospital and the personnel demands and requirements were closely in line with the personnel availabilities. The Women's Army Corps personnel allocations to the program were, because of the size of the Women's Army Corps, very limited; and had the test been assigned to a larger Army medical installation it would necessarily have had to be limited to certain activities because of the nonavailability of personnel. Further, it was possible through the selection of this hospital as a testing site, to extend the testing program to the U. S. Army Hospital, Fort Devens, Mass., because of the Area Medical Service Plan in effect in that area. Thus, the program covered not only an Army general hospital but a station hospital as well. During the period of the testing program at Murphy General Hospital, 715 beds for the care of general medical and general and orthopedic surgical patients were in use. The patient census during the period of the test at this hospital averaged 67 percent of the authorized beds.

Female military personnel were assigned to Murphy General Hospital as they became available by transfer from other stations or through training installation activities. Male military personnel were transferred from the installation as soon as the female replacements became proficient in their assigned duties. Because of Civil Service restrictions and regulations, male civilian personnel were not replaced but emphasis was placed on the recruitment of civilian women when civilian positions were being refilled. The high point in female assignments was reached in December 1949 when a total of 440 women were participating in the program. For the purposes of the program, the positions in the hospital were divided into those pertaining specifically to its functions as a hospital and those pertaining to its operation as a military post. Of the 301 types of jobs considered at Murphy General Hospital, 210 were in the class of hospital type of activity while the remaining 91 pertained to its operation as a military post.

Operation of the program for 11 months determined that of the 301 types of positions only 54 (24 hospital-type and 30 post-type activities) could *not* be filled successfully by women because (a) the rough and laborious demands of the work to be performed were an important consideration, (b) disciplinary or command jurisdiction over male personnel appeared to call for the ruling hand of a man or a man was required by directive and custom, (c) of duty at isolated or lonely locations, especially at night, or (d) the modesty of the average woman and the sense of delicacy of male patients would make the services of a man desirable.

Decisions as to whether women were qualified to perform satisfactorily the duties of the various positions were reached only after

individual and careful consideration of each position. In those positions actually tested, decisions were reached after consideration of reports from supervisors under whom the job was performed, supplemented by inspections and observations. If, after testing, there was doubt as to the suitability of the position for a woman, a board of officers made the decision. If there was no opportunity to test a position by reason of nonavailability of time or personnel, decisions were influenced by the knowledge that the same or a similar position had been successfully occupied by women elsewhere under comparable conditions. A job analysis was sometimes a deciding element when a position could not be tested and more positive evidence was lacking. Suitability of women in all the positions was estimated on the basis of attributes, traits, and capabilities common to the average, not the exceptional, woman. The usual degree of physical strength and sense of modesty was assumed to prevail in all instances.

A review of the available data concerning the female testing program indicates that 84 percent of the positions in a hospital comparable to Murphy General Hospital might be successfully filled by women. The female staffing of the hospital type of activity could be 92 percent female while that of the post type of activity could be 60 percent. These female staffing percentages can be considered sound and practical only when fully trained and qualified female personnel are available. The availability of qualified women will most likely depend on other military and civilian requirements, the location of the hospital, the activity of training installations, and the standards for female personnel recruitment.

The major problem which developed and was prevalent throughout the period of the testing program was that of training. It quickly became apparent that the preponderance of the positions in the hospital could be filled by women who were adequately oriented and trained. While female supervisors were hand-picked at the commencement of the female testing program in order to give it momentum, other women were obtained through normal personnel procurement channels in order to provide more realism and to create a true testing situation. Personnel training was accomplished mainly by "on-the-job" instruction and supervision backed up by periodic formal training. As the women became proficient in their administrative and technical duties, men were released for assignments to other stations. Although this method of training created an over-strength in some areas of the hospital staff, this over-strength was considered necessary in the interest of patient care during the training period.

The housing and welfare of the female personnel were carefully considered. These requirements are somewhat greater for women

than for men. Women seem to desire more privacy than is usually furnished to male personnel on a military post and will require maximum number of private rooms for quarters as well as added facilities for personal individual activities such as laundering, sewing, and entertaining guests. An active program of "on-the-post" entertainment is essential as women appear to be more reticent about searching for off-duty entertainment of any nature. It is expected that the female staffing program will continue at the U. S. Army Hospital, Fort Devens, Mass., until final and conclusive decisions relative to female staffing patterns are made. Although final conclusions may not yet be drawn, it would appear that the staff of an Army hospital operating in the continental United States can be made up predominantly of women when a proper state of training and job performance is reached. When a female staffing policy is to be followed, adequate consideration must be given by responsible authority to female personnel availabilities, the mission, capabilities, and physical resources of the hospital, and above all, the types of patients to be cared for.



About the Army Medical Service

I. Draft of Doctors of Medicine, Dentistry, and Veterinary Medicine

PAUL I. ROBINSON, *Brigadier General, MC, U. S. A.*¹

THE last 2 weeks in August 1950 marked a particular period in the history of the Medical Services of the Armed Forces; indeed, even in the history of the medical, dental, and veterinary professions. This was the period in which the Congress was faced with several bills providing for the registration of members of these professions and allied specialists and for their call to duty with the Armed Forces. Hearings were conducted rapidly but completely by the Armed Forces Committees of both the Senate and House of Representatives and a bill was agreed on, passed by both houses on 1 September 1950, and sent to the President for approval.

The bills considered were *not* originally introduced into the Congress by the Defense Department, although the Defense Department did have opportunity to comment on the bills and representatives of the Office of the Secretary of Defense and of the Secretaries of the Army, Navy, and Air Force were witnesses at the hearings. In further explanation, however, the Congress had previously authorized the Defense Department to bring Reserve officers of the Army, Navy, and Air Force to active duty involuntarily. Provision for registration and call to duty of members of the medical, dental, and veterinary professions was carried in the drafts of selective service legislation which were submitted to the Congress by the Department of Defense in 1948. The Selective Service bill passed by the Senate at that time contained provisions substantially similar to the bill just approved by Congress. The Selective Service Act of 1948 emerged from conference, however, without such provision.

The current bill was supported by the American Medical Association, the American Dental Association, the Association of American Veterinary Medicine, the Defense Department and its three components, the Departments of the Army, Navy, and Air Force. It provided for:

¹ Personnel Division, Office of the Surgeon General, Department of the Army.

- (a) Registration up to the fiftieth birthday.
- (b) Induction up to the fifty-first birthday.
- (c) Priorities for call substantially as follows:

1. Those who participated as students in the Army Specialized Training Program or similar programs administered by the Navy, and those who were deferred from service during World War II for the purpose of pursuing a course of instruction leading to education in medical, dental, or allied specialist categories, who have had less than 90 days of active duty in any of the Armed Forces or the Public Health Service subsequent to the completion of or release from the program or course of instruction (exclusive of time spent in postgraduate training).

2. The same group who have had 90 days or more but less than 21 months of active duty.

3. Those in the professions who have had no service in the Armed Forces or Public Health Service subsequent to 16 September 1940.

4. Those in the professions who did have service since 16 September 1940, and, in general, may be called to duty in inverse ratio to the length of their active service subsequent to 16 September 1940.

(d) Such rules and regulations as the President may prescribe, to permit the deferment of:

1. Persons in the national interest, for reasons of hardship or dependency, or in the maintenance of the national health, safety, or interest.

2. Preprofessional students for continuation in training.

(e) The establishment of a National Advisory Committee to the Selective Service System and the coordination by the Committee of the work of State and local volunteer advisory committees.

(f) Additional pay of \$100 per month for medical and dental officers "of the Reserve components called or ordered to active duty with or without their consent, if otherwise qualified, * * *," but "no person inducted (i. e., as an enlisted man) under the provisions of this Act shall be entitled to (these) benefits * * *."

(g) Transfer between the Armed Services of officers holding commissions in the Medical Services or Corps is authorized with:

1. The officer's consent.

2. The consent of the service from which the transfer is to be made.

3. The consent of the service to which the transfer is to be made.

The Act further states that "no officer upon transfer to any service from which previously transferred shall be given a higher grade or place on applicable promotion list, than that which he would have attained had he remained continuously in the service to which retransferred."

It is not possible at this writing to comment exhaustively on the potential ramifications of this bill. Some of the problems are foreseeable and these present a challenge to the Armed Forces, to the administration of the Selective Service System, and to the civilian professions in their functions as national and local advisors. Some of these problems which are now receiving the attention of the services are:

(a) Classification of professional qualifications. A method whereby members of the professions registered under this act can be classified as to specialty and as to proficiency within the specialty is prerequisite to proper use by the Armed Forces. Complete ground work was accomplished by the Army in the late years of the last war and in the postwar period which should make this task much easier.

(b) Commissioning in the Reserve components. Since those who do not have Reserve commissions are subject to induction as enlisted men and therefore would not be entitled to the additional pay of \$100 per month, it can be expected that every thinking man in the first, second, and third priorities will early seek Reserve commissions. In order to assure equitable distribution among the three services of these specialists, it would seem to be necessary that commissioning quotas be established which could be raised from time to time as the total is reached by the services.

(c) Call to active duty. If a large number of the registrants covered by this act apply for and obtain commissions in the Reserve components, it is conceivable that the Selective Service System and its advisory bodies will be involved only in registration and classification and that the call to active duty will be made by the Armed Forces in accordance with established procedures for calling Reserve officers to duty. On the other hand, if only a few apply for and obtain Reserve commissions, the Selective Service System may bring the large majority to duty through induction procedures. It is possible that both call to duty by the Armed Forces and induction by the Selective Service System will be required to function concurrently.

(d) Transfers between Armed Forces. On 26 July 1950 authority for transfer between Army and Air Force terminated. Authority for transfer between the Armed Forces has heretofore never included the Navy. With the reinstatement of authority for interservice transfers, the problem of preventing promotion advantage from accruing

to any retransferee (as prescribed in the Act) probably presents the greatest administrative problem.

(e) Integration of calls of Reserve officers involuntarily or with units within the spirit and intent of the Act. It has been necessary to bring a number of Reserve officers to duty with units and a few will have to be called to duty involuntarily before the Act can be implemented. Some of the officers will have had long service in the last war. There is much logic on the side of retention in the service of the officer who has consented to assignment with an organized Reserve unit because he has been drawing pay and gaining points toward an ultimate retirement carrying monetary value. Steps have been taken, however, to bring on duty as few officers with World War II service as is consistent with military necessity. Nevertheless, the intent of the special act for physicians and dentists and allied specialists is that those who have had World War II service should be required to serve last; thus, some sort of comparatively early separation criteria may be required.

In considering this new legal development, it is appropriate that those in the first priority of the bill should be called for service first because they were sent to professional school by the Army or Navy during the past war in order to assure that adequate numbers of doctors of medicine, dentistry, and veterinary medicine for the Armed Forces and the nation would be available. Thus, they were trained with the understanding that they would render service as might be necessary in their professions to further the war effort. When hostilities ceased, however, those in authority believed that they would not be needed within a reasonable time and they were forthwith released from obligation to service with the Armed Forces.

Now that authority exists to call these persons to active duty, it should be understood that they are the same as other members of their professions. They are patriotic. They desire to render service to the full extent of their capacities. They do not desire to be malassigned. They want to do professional work within the field for which they have been trained. They are individualists. They have pride in their profession and feel that it and they, as members thereof, should be respected by all. They have difficulty in adjusting to teamwork which includes the fundamental concepts of command and authority outside the professions. They are willing and glad to give service now that they know their compatriots will also be required to do so. All of this is understandable to any thinking person.

Improved career management policies of the Department of the Army have been developed over the past few years and are designed to insure full use of all officers. If properly executed, these policies

will be thoroughly satisfactory to both the service and the officer concerned. Commanders of all echelons will do well to look into the career management programs over which they have control.

In summary, the first priority professional man with whom we are to work for the next few years is an enthusiastic physician who is seeking mental stimulation and unlimited work in his chosen field. He must be considered in this light, helped to develop, and encouraged to fit into his new environment with the enthusiasm which he naturally possesses.

II. Medical Service in action

PAUL I. ROBINSON, *Brigadier General, MC, U. S. A.*

THE Far Eastern situation has given all of us an opportunity to view objectively the Service of which we are a part. Particularly has it given the Personnel Division an opportunity to adjudicate the work of the past 3 years. Career planning, procurement programs, and training programs, all have been combined in the production and excellence of the Army Medical Service.

On 27 July 1950, the one hundred and seventy-fifth anniversary of the founding of the Army Medical Service, the Army Medical Service was engaged, as on the day of its founding, in the care of United States soldiers in combat, but never before has it gone forth so quickly—and never before has it been so well qualified to perform its task.

Within days after the fighting in Korea started, requisition for a large number of medical officers was received. We were able, by the end of July, to make available to the Far East Command their requirements by specialty qualification. Many of those who were sent to the Far East had to be taken from the residency program, but the spirit with which these officers proceeded in record time probably has never been matched in the history of the Medical Service. The same fine spirit was shown by the Medical Service Corps officers who were alerted and sent to the Far East Command on short notice, and by the members of all corps who have subsequently been assigned to the Far East or to units destined for that command. In spirit and in fact, our Army Medical officers today are true descendants of the great men of our earlier years.

Anyone who chooses medicine as a career is an exceptional person. The long years of preparation, the exacting work, the disappointments and frustration do not appeal to a mediocre person. Only a superior

¹ Personnel Division, Office of the Surgeon General, Department of the Army.

person embraces the medical profession, and in the words of the Hippocratic Oath promises:

"* * * with purity and holiness I will pass my life and practice my art * * * Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption, * * *. Whatever, in connection with my professional practice, or not in connection with it, I see or hear, in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of the art, respected by all men, in all times, but should I trespass and violate this oath, may the reverse be my lot."

In short, doctors are an extraordinary group.

The same is true of men who choose the Army. An officer does not take a commission for financial gain, which is small; nor for an easy life, which is not the Army life; nor for glory, of which there is little. It is a sincere and able man or woman who qualifies for a commission, then takes the oath: "that I will support and defend the Constitution of the United States against all enemies, foreign and domestic, that I will bear true faith and allegiance to the same; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties of the office upon which I am about to enter."

It is such men and women who make up the Army Medical Service. To them, in the last several years, we have been able to offer excellent additional training. The residency training program in particular has been a boon to the members of the Medical Corps. The other corps also have benefited from the variety of intensive training programs that have been in effect.

When you take such a group and permit them to continue with graduate studies while they gain the experience that Army medicine offers, you cannot help getting a superior product. Such people work and study eagerly and get the fullest benefit from their experience. Good practitioners to begin with, they become better physicians, better nurses, better specialists, better members of our medical team. Thus, the spirit with which our officers are meeting the demands of the Far East emergency is no surprise to us. Nor are we surprised by the efficiency with which those in the Far East Command are handling the medical problems there. The Korean situation has demonstrated to all people the outstanding caliber of the personnel we have in the Medical Service.

Our training programs are now paying dividends, and we do not intend to abandon them. They must of necessity be curtailed during

this emergency, but the Surgeon General has stated that they will be continued at a reduced scale during the emergency period and will be reinstated as quickly as possible with those who have already been selected as the first to reenter the program. Meanwhile, each officer in the combat zone or in an emergency post here at home, will, we are confident, find such service a chance for still another experience, and benefit accordingly.



BOOKS RECEIVED

- BONE AND JOINT DISEASES, Pathology Correlated with Roentgenological and Clinical Features,** by J. Vernon Luck, M. S. (Ortho.), M. D., F. A. C. S., F. I. C. S., *Assistant Clinical Professor of Orthopedic Surgery, University of Southern California; Senior Attending Physician, Department of Orthopedic Surgery, and Consultant in Orthopedic Pathology, Los Angeles County Hospital; Member, Subcommittee in Orthopedic Surgery, National Research Council; Member, Board of Associate Editors, Journal of Bone and Joint Surgery.* 614 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$16.50.
- KINESIOLOGY,** by Laurence E. Morehouse, Ph. D., *Associate Professor of Physical Education, The University of Southern California; Interim Chief, Performance Physiology Section, United States Air Force School of Aviation Medicine; and Formerly Research Fellow, Harvard Fatigue Laboratory;* and John M. Cooper, Ed. D., *Associate Professor of Physical Education, The University of Southern California; Formerly Associate Director of Physical Training, Army Air Force Training Command; and Formerly Athletic Coach, University of Missouri.* 435 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1950. Price \$4.50.
- CLINICAL THERAPEUTIC RADIOLOGY,** U. V. Portmann, M. D., editor; *Head of Department of Therapeutic Radiology, Cleveland Clinic Foundation; Professor of Therapeutic Radiology, Bunts Educational Institute, Cleveland.* 748 pages; illustrated. Thomas Nelson & Sons, New York, N. Y., publisher, 1950. Price \$15.
- CRANIOPLASTY,** by David L. Reeves, A. B., M. D., *Consultant in Neurological Surgery, Santa Barbara Cottage Hospital, Saint Francis Hospital, Santa Barbara General Hospital, Santa Barbara, Calif.; formerly instructor in Neurological Surgery, University of Southern California School of Medicine; Colonel, Medical Corps, A. U. S.* 119 pages, illustrated. Publication Number 29, American Lecture Series. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$3.
- ENZYMES, GROWTH AND CANCER,** by Van R. Potter, Ph. D., *Professor of Oncology, University of Wisconsin Medical School, Madison, Wis.* Publication Number 75, American Lecture Series. 64 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$1.85.
- ESSENTIALS OF OPHTHALMOLOGY,** by Roland I. Pritikin, M.C., F. A. C. S., F. I. C. S., *Eye Surgeon, Rockford Memorial, Winnebago County and Swedish-American Hospitals; Consulting Ophthalmologist, St. Anthony Hospital, Rockford, Ill.* 561 pages; 215 illustrations including 18 subjects in color. The J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price \$7.50.
- PRACTICAL GYNECOLOGY,** by Walter J. Reich, M. D., F. A. C. S., F. I. C. S., *Attending Gynecologist, Cook County Hospital; Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Fantus Clinics, of the Cook County Hospital; Assistant Professor of Gynecology, Chicago Medical School; Attending Gynecologist and Obstetrician, Grant Hospital; Attending Gynecologist, Fox River Tuberculosis Sanatorium; Consulting Gynecologist, Hazelcrest General Hospital;* and Mitchell J. Nechtow, M. D., *Associate Attending Gynecologist, Cook County Hospital and the Fantus Gynecologic Clinic; Assistant Clinical Professor of Gynecology, Cook County Graduate School; Associate in Gynecology and Obstetrics, Chicago Medical School; Attending Gynecologist and Obstetrician, Norwegian-American Hospital.* 449 pages with 187 illustrations, including 55 subjects in color. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price \$10.
- DIAGNOSIS AND TREATMENT OF TUMORS OF THE HEAD AND NECK (Not including the Central Nervous System),** by Grant E. Ward, M. D., D. Sc., F. A. C. S., and James W. Hendrick, M. D., M. S., *From the Departments of Surgery of the School of Medicine, University of Maryland, and the Johns Hopkins University School of Medicine,*

- and the Oncology Clinic of the University Hospital and the Tumor Clinic of the Johns Hopkins Hospital. 842 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price \$15.
- PROJECTIVE PSYCHOLOGY, Clinical Approaches to the Total Personality, edited by Lawrence Edwin Abt and Leopold Bellak. 494 pages; illustrated. Alfred A. Knopf, New York, N. Y., publisher, 1950. Price \$6.
- A TEXTBOOK OF HISTOLOGY, Functional Significance of Cells and Intercellular Substances, by E. V. Cowdry, *Professor of Anatomy, The School of Medicine, Washington University, St. Louis, Mo.* 4th edition, thoroughly revised. 640 pages; revised. Lea & Febiger, Philadelphia, Pa., publishers, 1950. Price \$8.50.
- POST-GRADUATE LECTURES ON ORTHOPEDIC DIAGNOSIS AND INDICATIONS, Vol. I, by Arthur Steindler, M. D., F. A. C. S., *Professor of Orthopedic Surgery, State University of Iowa, Iowa City, Iowa.* 280 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$7.50.
- THE CLINICAL USE OF RADIOACTIVE ISOTOPES, by Bertram V. A. Low-Beer, M. D., *Associate Professor of Radiology, University of California Medical School, San Francisco, Calif.* Publication Number 54, American Lecture Series. 414 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$9.50.
- A TEXTBOOK OF CHEMISTRY, by Stella Goostray, R. N., B. S., M. Ed., *formerly Director, School of Nursing, The Children's Hospital, Boston; formerly Educational Director and Instructor in Chemistry, School of Nursing, Philadelphia General Hospital;* and J. Rae Schwencik, A. B., Ch. E., *Chairman, Chemistry Department, Sacramento Junior College; Lecturer in Organic Chemistry, Sacramento State College; formerly, Instructor in Nurses' Chemistry, Sacramento Junior College in cooperation with Sacramento County Hospital and Sister's Hospital.* 6th edition. 401 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$3.75.
- A LABORATORY MANUAL to accompany A TEXTBOOK OF CHEMISTRY, by Stella Goostray, R. N., B. S., M. Ed., *formerly Director, School of Nursing, The Children's Hospital, Boston; formerly, Educational Director and Instructor in Chemistry, School of Nursing, Philadelphia General Hospital;* and J. Rae Schwencik, A. B., Ch. E., *Chairman, Chemistry Department, Sacramento Junior College; Lecturer in Organic Chemistry, Sacramento State College; formerly Instructor in Nurses' Chemistry, Sacramento Junior College in cooperation with Sacramento County Hospital and Sister's Hospital.* 6th edition. 110 pages. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$2.
- AN ATLAS OF HUMAN ANATOMY, by Barry J. Anson, Ph. D., *Professor of Anatomy, Northwestern University Medical School.* 518 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price \$11.50.
- CARBON DIOXIDE THERAPY, A Neurophysiological Treatment of Nervous Disorders, by L. J. Meduna, M. D., *Professor of Psychiatry, University of Illinois College of Medicine, Chicago, Ill.* 236 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$5.
- PNEUMOCONIOSIS, Beryllium, Bauxite Fumes, Compensation, edited by Arthur J. Vorwald, M. D., *Director of The Trudeau Foundation and the Saranac Laboratory,* with the collaboration of Manfred Bowditch, A. B., Thomas M. Durkan, M. E., and Theodore C. Waters, L. L. B. Leroy U. Gardner Memorial Volume. 659 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price \$7.50.
- THE HINGE GRAFT or Ginglymus Implant, by Arnold K. Henry, M. B., *Dubl.; M. Ch. (Hon.), Cairo; F. R. C. S. L., Emeritus Professor of Clinical Surgery in the University of Egypt; Professor of Anatomy in the Royal College of Surgeons, Ireland.* 64 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price \$3.
- EYES AND INDUSTRY, formerly Industrial Ophthalmology, by Hedwig S. Kuhn, M. D., *Industrial Ophthalmologist, Hammond, Ind.* 2d edition. 377 pages; with 151 text illustrations including 3 color plates. The C. V. Mosby Co., St. Louis, Mo., publishers, 1950. Price \$8.50.
- IMMORTAL MAGYAR, Semmelweis, Conqueror of Childbed Fever, by Frank G. Slaughter, M. D. 211 pages; illustrated. Henry Schuman, New York, N. Y., publisher, 1950. Price \$3.50.

- ESSENTIALS OF MEDICINE, The Basis of Nursing Care, by Charles Phillips Emerson, Jr., A. B., M. D., *Associate Professor of Medicine, Boston University School of Medicine; Member, Robert Dawson Evans Memorial Laboratory; Visiting Physician and Physician in Charge of Clinical Laboratories, Massachusetts Memorial Hospitals; Attending Physician, Cushing Veterans Administration Hospital and Medical Consultant, American Red Cross*; and Jane Elizabeth Taylor, R. N., B. S., M. Ed., *Lecturer, Frances Payne Bolton School of Nursing, Western Reserve University; formerly Nursing Education Consultant, U. S. Public Health Service; formerly Assistant Professor of Medical Nursing, Yale University School of Nursing, and Assistant in Charge of Medical Nursing, New Haven Hospital*. 16th edition, revised and reset. 815 pages; 191 illustrations, including 5 subjects in full color. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price \$4.
- BIOLOGICAL STANDARDIZATION, by J. H. Burn, *Professor of Pharmacology in the University of Oxford*; D. J. Finney, *Lecturer in the Design and Analysis of Scientific Experiment in the University of Oxford*, and L. G. Goodwin, *Member of the Staff of the Wellcome Laboratories of Tropical Medicine*. 2d edition. 440 pages; illustrated. Oxford University Press, New York, N. Y., publishers, 1950. Price \$6.75.
- THE MEANING AND PRACTICE OF PSYCHOTHERAPY, by V. E. Fisher, Ph. D., *Psychologist and Psychotherapist. Formerly: Assistant Psychologist, Worcester State Hospital; Assistant Professor of Psychology and Director of the Mental Clinic, New York University, Washington Square College; Psychologist and Psychotherapist, Idaho State Hospital*. 411 pages. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$5.
- PRINCIPLES OF PUBLIC HEALTH ADMINISTRATION, by John J. Hanlon, M. S., M. D., M. P. H., *Associate Professor of Public Health Practice, School of Public Health, University of Michigan, and Chief Medical Officer and Associate Chief of Party, Bolivia, the Institute of Inter-American Affairs*. 506 pages, illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1950. Price \$6.
- TECHNIQUES IN BRITISH SURGERY, edited by Rodney Maingot, F. R. C. S. 733 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1950. Price \$15.
- SIGNIFICANCE OF THE BODY FLUIDS IN CLINICAL MEDICINE, by L. H. Newburgh, M. D., *Professor of Clinical Investigation, University of Michigan Medical School, Ann Arbor, Mich.*, assisted by Alexander Leaf, M. D., *Instructor in Internal Medicine, University of Michigan Medical School, Ann Arbor, Mich.* Publication Number 69, American Lecture Series. 76 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$2.
- A TEXTBOOK OF X-RAY DIAGNOSIS, by British authors, Vol. IV of four volumes. Edited by S. Cochrane Shanks, M. C., F. R. C. P., F. F. R., *Director, X-ray Diagnostic Department, University College Hospital, London*; and Peter Kerley, M. C., F. R. C. P., F. F. R., F. M. R. E., *Director, X-ray Department, Westminster Hospital; Radiologist, Royal Chest Hospital, London*. 592 pages; 553 illustrations. 2d edition. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price \$15.
- PLASTIC AND RECONSTRUCTIVE SURGERY, A Manual of Management, by Ferris Smith, M. D., F. A. C. S., *Consultant in Plastic Surgery, Blodgett Memorial Hospital, Grand Rapids, Mich.* 895 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price \$15.

BOOK REVIEWS

RADIOLOGIC EXPLORATION OF THE BRONCHUS, by S. di Rienzo, M. D., *Assistant Professor of Radiology and Physiotherapy, Chief of the Radiology Department of the Institute of Cancer, The University of Cordoba, Argentina.* Translated by Tomas A. Hughes, M. D., with a foreword by Richard H. Overholt, M. D. 332 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1949. Price \$10.75.

This book should be of value to the radiologist, physician, and surgeon because it stresses the assistance of good bronchography in both the diagnosis and precise localization of pathologic lung changes. The fact that the book contains numerous typographical errors and that some of the terminology is strange to the North American student should not detract from its over-all value. In the discussion of both normal and pathologic conditions, the dynamics of the respiratory tree as revealed by the bronchographic procedure are continually emphasized. The book is profusely illustrated.

The first few chapters review in some detail the embryology and anatomy of the pulmonary tree, the dynamic characteristics of the normal lung (and cough reflex), and the technic employed in radiographic exploration of the bronchi.

Bronchopulmonary malformations, bronchiectasis, emphysema, asthma, carcinoma, and hydatid cysts are extensively discussed. The value of bronchography is overemphasized in the detection of bronchogenic carcinoma; bronchoscopy appears recommended chiefly as a final confirmatory measure, and other diagnostic technics are glossed over. Bronchography is undoubtedly of value, however, in suppurative disease to (a) locate and outline small and otherwise obscure (cavitary) lesions, (b) detect pericavitary, concurrent disease (such as ectasia), and (c) check the results of treatment.

The book's greatest value is in stressing the versatility of bronchography alone or in conjunction with the usual diagnostic procedures.—*Lt. F. W. Meyer, Jr. (MC) U. S. N.*

ANUS, RECTUM, SIGMOID COLON. Diagnosis and Treatment, by Harry E. Bacon, B. S., M. D., F. A. C. S., F. A. P. S., F. I. C. S., F. R. S. M., *Professor and Head of Department of Proctology, Temple University Medical School and Hospital; Head of Department, St. Mary's Hospital; Formerly Associate Professor, Graduate School of Medicine, University of Pennsylvania; Consultant, Rush Hospital for Tuberculosis, National Stomach Hospital, Douglass Hospital, Mercy Hospital, Shriners Hospital for Crippled Children, Paul Kimball Hospital, St. Christopher's Hospital and Stetson Hospital; Honorary Fellow, Royal Society of Medicine (Lond.), Ambrose Pare Surgical Society (Paris), Piemontese Surgical Society (Turin, Italy), Venezuelan Surgical Society, Peruvian Surgical Society, Miembro Correspondiente Extranjero De Argentina, Sociedad Brasileira de Proctologia, Pan-American Gastroenterologic Society (Rosario), Detroit Academy of Surgery, Hollywood Academy of Medicine; Diplomat, American Board of Surgery; Surgery Qualification Board, International College of Surgeons; Member, American Board of Proctology; Director, American Cancer Society; President, American Proctologic Society.* 3d edition, in two volumes. Volumes I and II; 1,127 pages, entirely revised and reset, profusely illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1949. Price \$30 set.

This third edition includes new chapters on malformations of the colon, megarectum, diverticulosis and diverticulitis, actinomycosis, transplantation

of the transverse colon to the anus with colostomy and preservation of the sphincter musculature, volvulus, and anesthesia and analgesia.

Dr. Bacon's treatise on diseases of the anus, rectum, and sigmoid colon presents the past and current literature concerning the different aspects of this branch of surgery and incorporates his own ideas gained from vast experience. The bibliography is complete. His use of tables (98 numbered and many not numbered) is instructive and effective, particularly in showing differential diagnosis and in comparing results. Treatment, both medical and surgical, is well presented and inclusive.

Abdominoperineal proctosigmoidectomy without colostomy and with preservation of the anal sphincter muscles (the popularly termed "pull-through" operation) is extensively discussed. In presenting the operation, Dr. Bacon states " * * * it is the desire of the author to render an honest and unbiased opinion of his experience in a group of patients (undergoing 'proctosigmoidectomy') sufficiently large for the reader to judge the merit of such opinion and form his own conclusions therefrom." The author presents the operation only as a part of the armamentarium of the surgeon, and gives definite indications and contraindications for its use.

The Miles operation and seven other "standard" operations, including the Lahey, Mikulicz-Rankin, Lockhart-Mummery, and Hartman anterior resection operations are adequately described. Dr. Bacon gives unqualified approval of Dennis' employment of vagotomy in the treatment of ulcerative colitis; however, this procedure is considered experimental by many, including Dennis.

The detailed and complete chapters on anatomy with emphasis on clinical application and surgical significance show the author to be a master in this field of anatomy.

The numerous illustrations in black and white and in color are, for the most part, superb. Some of the plates would be of greater value if they were larger, especially plate 13, one of the key plates of proctosigmoidectomy. It is believed the illustrations would be more effective and of greater value if each were captioned so that they would be self-explanatory, and if the illustrated steps in operations were printed in closer correlation with the descriptive portion of the text. Figures 653 and 654 seem to be entirely adrift. Figures 636 and 637 are reversed in operative sequence.

All in all this work is a classic and is all that the author intends—a source book of operative procedures on the anus, rectum, and sigmoid colon. It should be in the library of all proctologists and general surgeons, and should be available to all residents and interns.—*Captain E. S. Lowe (MC) U. S. N.*

ESSENTIAL UROLOGY, by Fletcher H. Colby, M.D., *Chief of the Urological Service, Massachusetts General Hospital; Assistant Clinical Professor of Genito-Urinary Surgery, Harvard Medical School, Boston, Mass.; Urological Consultant, Lakeville State Sanatorium, Middleboro, Mass.* 580 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price \$8.

This book is a needed addition to our urologic texts in that it is brief, yet thorough, clearly written, and strongly supported by good illustrations. It also brings us up to date on the policies of modern therapy, giving basic principle rather than details. The first part deals with the embryology, physiology, and anatomy of the urinary tract from a clinical rather than from a basic science viewpoint. Residents and candidates for examinations will find it pleasant to read and informative. The second section emphasizes the importance of a well-conducted history and physical examination. A method is presented with pertinent comments. Retrograde and intravenous urography are discussed, present-

ing technic and risks. Part 3 takes up diseases of the genitourinary organs and is the major portion of the book. The anatomic structures are treated in order: kidney, ureter, bladder, et cetera. The general plan is the presentation of an introduction, the pathology, symptoms, diagnosis, and treatment of each disease. These are modified when indicated. The discussion of each disease or subject is followed by a well-written summary of facts and has been condensed beautifully for easy reading. It has an extensive bibliography.—*Col. E. C. Lowry, MC, U. S. A.*

THE MANAGEMENT OF THE PATIENT WITH SEVERE BRONCHIAL ASTHMA, by Maurice S. Segal, M.D., *Assistant Professor in Medicine, Tufts College Medical School; Director, Department of Inhalational Therapy, Boston City Hospital, Boston, Mass.* (Publication No. 76, American Lecture Series.) 158 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$3.50.

This small volume is No. 76 in the American Lectures in Chest Diseases edited by J. Arthur Meyers, University of Minnesota Medical School. It is devoted entirely to a discussion of severe bronchial asthma, and the recommendations for treatment are based on the author's series of over 500 patients. The book begins with a discussion of the clinical concept of bronchial asthma, followed by an explanation of the allergic concept. The author stresses the fact that there is no clear-cut division between extrinsic and intrinsic asthma and emphasizes that most patients can fall in either category. He proposes a classification based on the age of the patient, phase of the disease (whether acute, recurrent, or chronic), responsible factors, and complications. From a clinical viewpoint this is most valuable.

The book consists of 10 chapters followed by a bibliography and index. Individual chapters are devoted to the management of infection; bronchial evacuation; therapeutic use of gases, epinephrine, sedatives, and supportive therapy. The importance of the immediate nonspecific treatment during the acute attack is emphasized with little discussion of long-term allergic management. The author points out the danger of giving morphine in severe bronchial asthma and describes the death of 3 of his patients following the use of this drug. He recommends use of demerol hydrochloride in place of morphine; the reviewer believes that demerol also has little place in treatment of asthma because of the possibility of addiction when used in any chronic or recurrent condition. Chloral hydrate and sodium bromide as recommended for sedation by the author are most effective.

In the management of status asthmaticus the author emphasizes that intake and output should be measured and recorded in all these patients. Clinicians will recognize the excellence of this advice and its aid in treatment. Of interest was the author's opinion that self-medication with epinephrine should be avoided because patients with asthma tend to become dependent on this drug. This monograph includes a comprehensive discussion of all phases of the treatment of asthma and will prove of great value to general practitioners and specialists alike.—*Col. W. H. Diessner, MC, U. S. A.*

MEDICAL GYNECOLOGY, by James C. Jamney, M. D., F. A. C. S., *Associate Professor of Gynecology, Boston University School of Medicine; Associate Visiting Gynecologist, Massachusetts Memorial Hospitals.* 2d edition. 454 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price \$6.50.

This is a book for the general practitioner and describes office diagnosis and treatment in gynecology. Only operative procedures simply enough to be performed in the office are discussed. The author stresses the patient's complaints and the importance of the gynecologic history in diagnosis; discusses examina-

tion of the patient, including the difficulties to be met and overcome; gives his procedures in differential diagnosis and treatment. He also includes a section on sociomedical care for which the gynecologist and the general practitioner are often consulted. In this section Dr. Janney shares his long experience in the care of such problems as premarital care, marital maladjustment, sterility, and fertility.—*Commander M. A. Godinez, MC, U. S. N. and Lt. (jg) R. L. Stout, MC, U. S. N. R.*

LIPIDOSES, Diseases of the Cellular Lipid Metabolism, by Siegfried J. Thannhauser, M. D., Ph. D., *Associate Professor of Medicine, Tufts College Medical School; Associate Physician-in-Chief, Joseph H. Pratt Diagnostic Hospital, Boston, Mass.*, edited by Henry A. Christian, A. M., M. D., LL. D., Sc. D. (Hon.), M. A. C. P., Hon. F. R. C. P. (Can.), D. S. M. (A. M. A.), *Hershey Professor of the Theory and Practice of Physic, Emeritus, Harvard University; Sometime Clinical Professor of Medicine, Tufts Medical School; Sometime Physician-in-Chief, Carney Hospital; Sometime Visiting Physician, Beth Israel Hospital; Physician-in-Chief, Emeritus, Peter Bent Brigham Hospital, Boston, Mass.* (Reprinted from Oxford Loose-Leaf Medicine with the same page numbers as in that work.) 605 pages; illustrated. Oxford University Press, New York, N. Y., publishers, 1950. Price \$12.

This book represents an excellent detailed summary of lipid and allied metabolic disorders. Supporting this is a good discussion of both diagnostic and laboratory procedures as each pertain to the recognizable lipidoses and pathologic syndromes, plus a chapter on the physiology and chemistry of fat. The previously established clinical syndromes in this field are used as divisions for discussion but in several instances (essential xanthomatosis) further differentiation has been offered (xanthomatous biliary cirrhosis). More recent ideas on the enzymatic disintegration of fats and the interrelationships with protein and carbohydrate metabolism are well discussed. This book is a valuable contribution to the library of internists, clinical physiologists, and pathologists who may from time to time have occasion for reference to an authoritative work on lipidoses.—*Lt. Col. F. L. Bauer, MC, U. S. A.*

GUIDING LEARNING EXPERIENCE, Principles of Progressive Education Applied to Nursing Education, by Maude B. Muse, R. N., A. M., *formerly, Associate Professor of Nursing Education, Teachers College, Columbia University.* 617 pages. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$4.50.

This book is written primarily for the experienced and the prospective nurse educator. The author, who has written other books on this subject, is a recognized authority. After many years of teaching and nursing, and continued study of educational theories, she became a professor in nursing. She encourages the nurse educator to adopt modern methods of teaching.

The book is divided into four parts. The first discusses and compares three educational philosophies: The traditional, the free school, and modern progressive education. The advantages and benefits derived from the progressive system in general and professional education are enumerated. The second part explains the nature and source of the principles of education and the purpose and role they play in learning. The chapters in this unit are devoted chiefly to the teaching-learning principles. They familiarize the teacher who seeks the goals of progressive education with the learning processes and other interrelated factors which constitute a sound teaching program for the learner. The third part applies these principles to clinical instructions. The last part discusses the

various methods used in planning a teaching program. The suggested activities at the end of each chapter are especially helpful in organizing a teaching program.—*Lt. M. J. Topceer, NC, U. S. N.*

ANTIBIOTICS. A Survey of Penicillin, Streptomycin, and Other Antimicrobial Substances from Fungi, Actinomycetes, Bacteria, and Plants, by H. S. Florey, M. A., M. B., Ph. D., F. R. S.; E. Chain, M. A., Ph. D., FRS.; N. G. Heatley, M. A., Ph. D.; M. A. Jennings, M. A., B. M.; A. G. Sanders, M. A., M. B., Ph. D.; E. P. Abraham, M. A., Ph. D.; and M. E. Florey, M. B., B. S. In two volumes; 1774 pages, illustrated. Oxford University Press, New York, N. Y., publishers, 1949. Price \$29.75 (not sold separately).

This set of books is a virtual encyclopedia on penicillin and streptomycin. Volume I is devoted entirely to those considerations applicable to all antibiotics, i. e., methods of detection, isolation, identification, assay, and methods of purification. This volume also contains an exhaustive history of antibiotics. It is of interest that the first reference to the use of specific micro-organisms to combat other micro-organisms was published in 1852. Yet in December 1940, Waksman and Dubos were unsuccessful in an attempt to hold a round-table discussion on "the production of antibacterial substances by micro-organisms" because not enough scientists were interested.

Volume II is devoted almost exclusively to penicillin and streptomycin. The first few chapters give detailed information on the known sources of penicillin, its production, chemical and physical properties, and synthesis. Following this are several chapters dealing with the susceptibility of micro-organisms to penicillin, their acquired resistance, the production of penicillinase, and the mode of action of penicillin on micro-organisms. This section closes with several chapters on the pharmacology of penicillin. Streptomycin and dihydrostreptomycin are handled in much the same fashion as penicillin except in somewhat less detail.

A comprehensive appendix contains information on the more recently discovered antibiotics as well as new knowledge of the older ones. At the end of this appendix a table lists most of the known antibiotics along with their important properties. This set of books is extremely valuable to the research workers and as a reference work in medical libraries. Its size, comprehensive detail, and cost will limit its value to the practicing physician.—*Lt. Col. R. P. Mason, MC, U.S.A.*

1949 YEAR BOOK OF ENDOCRINOLOGY, METABOLISM AND NUTRITION (December 1948–January 1949). Endocrinology edited by Willard O. Thompson, M. D., *Clinical Professor of Medicine, University of Illinois College of Medicine; Attending Physician (Senior Staff), Henrotin Hospital; Attending Physician, Grant Hospital of Chicago.* Metabolism and Nutrition edited by Tom D. Spies, M. D., *Chairman, Department of Nutrition and Metabolism, Northwestern University School of Medicine; Director, Nutrition Clinic, Hillman Hospital, Birmingham, Ala.* 545 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price \$4.75.

This is an excellent reference for the busy physician who wants to keep abreast of the recent advances in clinical endocrinology, diseases of metabolism, and nutritional therapy. The book is in two sections. The first section devoted to endocrinology is edited by Dr. Thompson. Particular emphasis is put on adrenocorticotrophic hormones and 17-hydroxy-11-dehydrocorticosterone (compound E or cortisone). The second section, devoted to metabolism and nutrition and

edited by Dr. Spies, is a concise résumé of the diseases of metabolism and their treatment. Pancreatic and liver function are discussed in detail. The physician may use the book as a ready reference, but with more leisure, he will want to read it all. A valuable feature is the Year Book Quiz of 20 questions that appears on the cover.—*Commander J. B. Barger, MC, U.S.N.*

A TEXTBOOK OF DENTAL ANATOMY AND PHYSIOLOGY by Russell C. Wheeler, D. D. S., F. A. C. D., *Associate Professor of Anatomy at Washington University School of Dentistry, Saint Louis*. 2d edition. 422 pages, illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price \$6.75.

This is the second edition of a textbook on the fundamental forms, alignment, and occlusion of human teeth. The material covered serves as a background for all phases of dental practice. The 16 chapters comprising this text include the gross anatomy of the individual teeth, their anatomy on cross section, their occlusion during various jaw relations, and the significance of the foregoing during function. The illustrations are excellent. This book is recommended as a text for dental students.—*Capt. W. J. Marias, U.S.A.F.R. (DC)*

MODERN PRACTICE IN DERMATOLOGY, edited by G. B. Mitchell-Heggs, O. B. E., M. D., F. R. C. P., *Physician-in-Charge, Skin Department, St. Mary's Hospital and Medical School, London; Physician, St. John's Hospital for Diseases of the Skin and Institute of Dermatology, University of London; Member Advisory Panel on Dermatitis, Ministry of Labour and National Service*. 836 pages; illustrated. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price \$12.50.

This most recent compilation of correlated monographs by British dermatologists contains fresh and timely material presented in an arresting fashion. It is offered to senior students of dermatology and general practitioners. The fully qualified dermatologist can also find much of interest and value in this symposium. The editor and his 40 contributors in 50 chapters treat the subject of dermatology not only along the conventional lines of morphology and systems, but discuss the topographic, climatic, and social aspects as well. Such duplication as has resulted from these different approaches is advantageous from the standpoint of teaching. Of special interest are sections on psychosomatic aspects, the role of insects and parasites, the relationship to internal medicine, rehabilitation, technic of biopsy, and social aspects. The timeliness of the book is demonstrated by the inclusion of radiation blast injuries. Although little space is devoted to syphilis the subject is adequately covered. The illustrations are admirable and the subjects of the color plates well chosen. Unlike many British texts this volume is readily adaptable to the conditions of American dermatology.—*Capt. R. L. Gilman, MC, U. S. N.*

PRINCIPLES AND PRACTICE OF PLASTIC SURGERY, by Arthur Joseph Barsky, M. D., D. D. S., *Attending Plastic Surgeon, Beth Israel Hospital, New York City; Attending Plastic Surgeon, Morrisania City Hospital, New York City; Attending Plastic Surgeon, Bronx Hospital, New York; Attending Plastic Surgeon, Beth-El Hospital, Brooklyn, N. Y.; Attending Plastic Surgeon, New York State Rehabilitation Hospital, West Haverstraw, N. Y.; Clinical Professor of Surgery and Associate Surgeon, New York Polyclinic Medical School and Hospital; American Board of Plastic Surgery; American Society of Plastic and Reconstructive Surgery; American Association of Military Surgeons; Associate Member of British Association of Plastic Surgeons; Associate Member of Mexican Association of Plastic Surgery;*

formerly *Lieutenant Colonel, M. C., A. U. S.* 499 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price \$10.

The first six chapters of this book outline the fundamentals of plastic surgery. The final chapters deal with the practice of plastic surgery, especially emphasizing the author's own technic. An alternate plan as suggested by other plastic surgeons is also presented in most cases. The book is well written and well illustrated. The author has presented broad subjects concisely, thereby tending to oversimplification. Variations are not so well covered. An interesting chapter presenting the author's plan of excision, repair, and x-ray and radiation treatment of keloids and hyperplastic scars is included. Very little material is presented, however, to show the postoperative course and results in these cases. The chapter on prostheses describes various ways of preparing casts and masks which would be of special interest to any one primarily interested in oral surgery and restorative prostheses.—*Lt. Comdr. J. T. Giannini, MC, U. S. N.*

MARRIAGE IS WHAT YOU MAKE IT, by Paul Popenoe, Sc. D., *General Director, The American Institute of Family Relations, Los Angeles, Calif.* 221 pages. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$3.

Dr. Popenoe points out in this compact volume that most of the failures in marriage are unnecessary and could have been prevented by proper education before marriage. He demonstrates convincingly and interestingly, by many brief case studies, how competent marriage counseling can be an effective means of helping a person to understand his marital problems by giving him a mature insight into his own personality structure as well as that of his partner. The author's technic is based on sound and accepted psychologic principles. He discusses practical methods of helping people whose marriage is threatened from every conceivable direction, such as by jealousy, nagging, so-called sexual incompatibility, quarrels over finances, in-laws, the arrival of children, and all the usual causes of tension in any family. Although this book would be of great value to any lay reader interested in insuring a happy marriage for himself, it is also an invaluable contribution to the libraries of psychiatrists, psychologists, and social workers who engage in the practice of marriage counseling.—*Lt. Col. F. R. Drake, MC, U. S. A.*

THE CEREBRAL CORTEX OF MAN, A Clinical Study of Localization of Function, by Wilder Penfield, C. M. G., M. D. (Johns Hopkins), B. Sc. and D. Sc. (Oxon.), Hon. F. R. C. S. (Lond.), F. R. S. *Professor of Neurology and Neurosurgery, McGill University; Director, Montreal Neurological Institute; and Theodore Rasmussen, M. D., Professor of Neurological Surgery, The University of Chicago; formerly Lecturer in Neurosurgery, McGill University; Assistant Surgeon, Montreal Neurological Institute.* 248 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1950. Price \$6.50.

This excellent study reports the results of cortical stimulation of over 500 craniotomized patients under local anesthesia. It contributes significantly to our understanding of cortical function. There is an excellent historic discussion of the subject. The data and conclusions are presented clearly. The book should be read by all neurologists, neurosurgeons, and psychiatrists.—*Lt. Col. S. W. Ranson, MC, U. S. A.*

HANDBOOK OF PHYSICAL MEDICINE AND REHABILITATION, Selections Authorized for Publication by the Council on Physical Medicine and Rehabilitation, American Medical Association. 573 pages; illustrated. Published for

the American Medical Association by The Blakiston Co., Philadelphia, Pa., 1950. Price \$4.25.

This well-known handbook appears as a first edition at this time because of a change in title and the inclusion of "Rehabilitation" not included in the previous editions, the first of which appeared in 1932 as "The Handbook of Physical Therapy" and later editions appeared as "The Handbook of Physical Medicine." The addition of "Rehabilitation" broadens the scope of this edition to include all the medical, psychologic, and social services whereby a person recovering from disease or disability is taught to live and work. This required the marshaling of physical medicine, psychosocial adjustment, and vocational training to achieve maximal function of the individual and to prepare him completely for the fullest possible life compatible with his abilities and disabilities. The book is composed of a series of monographs on special subjects, some revised and rewritten, and some, such as those on the physiologic effects of heat, the physiologic aspects of therapeutic exercise, the basic principles of therapeutic exercise, problems in hearing, physical medicine in ophthalmology, occupational therapy, and rehabilitation, entirely new. The new chapter on physical medicine in psychiatric practice is especially appropriate and adds to the value of this book. An effort is made to separate the useful from the useless among existing devices and procedures as well as to bring about a closer union between general medicine and surgery on the one hand and physical medicine and rehabilitation on the other. The book is attractive in appearance, logical in arrangement, and has an excellent index. An appendix presents a complete list of motion-picture films and lantern slides on physical medicine and rehabilitation.—*Lt. Col. J. H. Kuitert, MC, U. S. A.*

LIGHT THERAPY, by Richard Kovacs, M. D., *Professor of Physical Medicine, New York Polyclinic Medical School and Hospital*. Publication Number 57, American Lecture Series. 112 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price \$2.25.

This interesting monograph covers in lucid detail the story and present status of light therapy. It briefly outlines the advantages of radiant energy in the various phases of the medical spectrum, indications for clinical use are clearly outlined, and physiologic effects to be anticipated are tabulated. Contraindications and dangers of the various forms of treatment are mentioned. A short chapter on the physics of radiant energy gives a clear and concise understanding of light therapy fundamentals. This handbook is highly recommended to the busy practitioner who uses any form of light therapy. It also will be found valuable in the training of medical students, interns, nurses, and physical therapy students.—*Lt. Col. R. J. Healy, Jr., MC, U. S. A.*

GENITO-URINARY SURGERY, by Sir John Thomson-Walker, D. L., M. B., C. M. Ed., F. R. C. S. Eng., *Consulting Urologist and Emeritus Lecturer on Urology, King's College Hospital; Consulting Surgeon, St. Peter's Hospital; President V Congress of Société Internationale d'Urologie; Hunterian Professor Royal College of Surgeons 1907, Lettsomian Lecturer, 1930; President Medical Society of London, 1933*. Edited and revised by Kenneth Walker, M. A., M. B., B. C. (Cantab.), F. R. C. S. Eng., T. I. C. S., *Jacksonian Prize-man and Hunterian Professor, Royal College of Surgeons, 1911, 1922, 1924, 1933; Emeritus Surgeon to the Genito-Urinary Department, Royal Northern Hospital; Urologist, Hornsey Central and Dartford County Hospitals; Member of La Société Internationale d'Urologie; Fellow of International College of Surgeons*, 3d edition. 956 pages; with 25 color

and 33 black-and-white plates, and 282 illustrations in the text. Paul B. Hoeber, Inc., New York, N. Y., publisher, 1950. Price \$15.

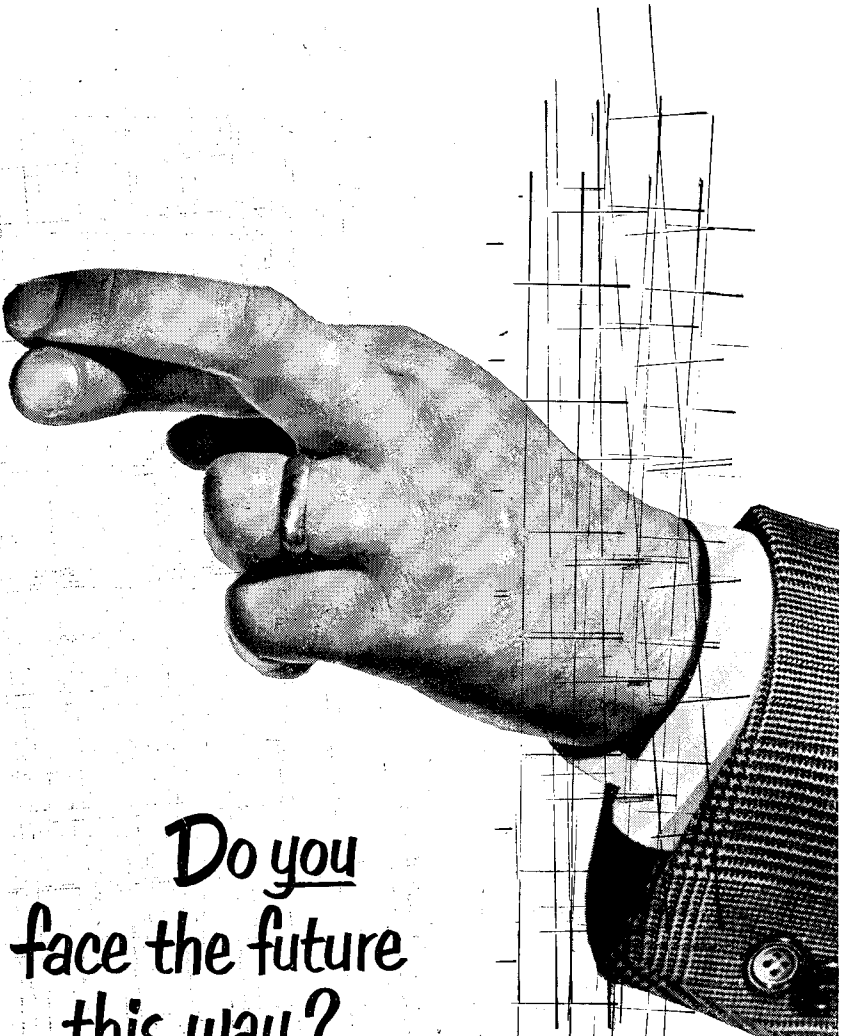
This book of English publication is a thorough and complete treatise on genitourinary surgery. With the exception of the antibiotics that have been developed subsequent to penicillin it is entirely up to date. The sections, including excellent illustrations, on surgical anatomy and technic are of particular excellence and make this book a valuable addition to the urologist's library. Because of its highly technical nature, however, it is not deemed suitable as a textbook for use in the training of medical students and physicians not specializing in urology.—*Commander M. S. Curtis, MC, U. S. N.*

WORLD SURGERY, 1950, by Stephen A. Ziemann, M. A., M. D., F. A. C. S., F. I. C. S., *Abstract and News Editor, Journal of the International College of Surgeons, Abstractor for International Abstracts of Surgery and Surgery, Gynecology and Obstetrics; formerly Assistant Chief, Bureau of Publications, Bureau of Medicine and Surgery, U. S. Navy, and Assistant Editor, U. S. Naval Medical Bulletin.* 177 pages; 53 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price \$6.

This selection of abstracts from the world's surgical literature is exceptionally readable. The list of contents is so arranged that almost any abstract can be located at a glance without consulting the more complete subject index in the back. Reader interest is further enhanced by the quality of the paper, type, and spacing used. Although it would appear impossible to abstract the many journals and subjects that flood the surgical literature today in a single volume of 177 pages, as the individual abstracts are read the reader begins to realize that the author has picked out articles that are interesting as well as practical. The choice of articles abstracted is well-balanced and includes rarities and more universal problems. Dr. Ziemann does not comment on the articles abstracted but his manner of writing imparts a definite feeling of confidence in certain of the articles, while in others the reader is left to consider several different approaches to the problem involved.

The book is divided into 10 sections; gastrointestinal surgery, cardiovascular-respiratory surgery, gynecology, obstetrics, orthopedics, genitourinary surgery, neurosurgery and psychosurgery, ophthalmology and otolaryngology, surgery of the head and neck, and a miscellaneous section dealing with anesthesiology, radiology, preoperative and postoperative care, and antibiotics. General interest, abundance of material, new ideas, and new technics have been used as a guide in allotting space to the various sections of the book. The sections on gastrointestinal surgery and cardiovascular-respiratory surgery are especially complete. Although certain chapters, such as those on neurosurgery and psychosurgery, and ophthalmology and otolaryngology may be of little interest to many general surgeons, they provide a pleasant and easy way of forming a speaking acquaintance with the newer trends in these specialties.

The references cited seem reasonably complete and they are conveniently located at the end of each abstract. In compiling the book, Dr. Ziemann has made good use of his known ability as an abstractor, linguist, author, and practical surgeon. To quote from the foreword by Dr. Max Thorek "World Surgery, 1950, meets a need not filled by the conventional textbook, the historical essay, or the specialized manual of surgical technic. Yet it contains elements that appear in them all, plus a certain literary prospective and sense of proportion that lifts it beyond the usual in its field."—*Capt. W. S. Lawler, MC, U. S. N.*



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