

**Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota**

**Student
Tuberculosis**

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume X

Friday, November 18, 1938

Number 7

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published for the General Staff Meeting each week
during the school year, October to May, inclusive.

Financed by the Citizens Aid Society

William A. O'Brien, M.D.

I. LAST WEEK

Date: November 4, 1938

Place: Recreation Room
Powell Hall

Time: 12:15 to 1:15 P.M.

Program: Movie: "Reproduction
Among Mammals"

Announcements

The Common Bile Duct
G. S. Bergh

Discussion
Edward A. Boyden
John A. Layne
Owen H. Wangenstein
G. S. Bergh

Present: 129

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Date: November 11, 1938

Armistice Day - Holiday
No Meeting

Gertrude Gunn,
Record Librarian

II. MOVIE

Title: "Let My People Live"

Released by: Hennepin County
Tuberculosis Association

TODAY is our annual attempt to cooperate in the campaign against tuberculosis. Program will include showing of special movie, a report of tuberculin testing in University students and hospital patients.

III. ANNOUNCEMENTSGUESTS TODAY

Reuben Stiehm, University of Wisconsin.

Horton C. Hinshaw, Mayo Foundation.

Harold F. Buckstein, Mayo Foundation.

Members of Course in Tuberculosis at Center for Continuation Study.

DINNER TONIGHT

At 6:30 P.M., Nicollet Hotel, the Minnesota Public Health Association Annual Meeting, at which time pioneer workers in field will be honored, American Medical Association representative - Bauer - will speak, and playlet on Tuberculin Testing will be given by group from audience. This playlet concerns difficulties encountered by visiting school nurse in trying to convince Scandinavian woman that her children should be tested with tuberculin. As you might suspect, the story has great dialect possibilities. The ending is a very happy one, and naturally teaches a good lesson. Wherever this playlet has been offered the audience has enjoyed it immensely. It was written and first produced in Hennepin County.

NEXT WEEK

Will be the annual party of the Staff Meeting series, when the football pictures will be shown. There will be highlights from each game of the season and commentator will point out certain features. Meeting will be same time, same place.

IV. STUDENT TUBERCULOSIS

J. A. Myers

Until the organization of the Students' Health Service at the University of Minnesota, the tuberculosis problem which existed here was undiscovered. Students who fell ill probably consulted their family physicians if they lived in the Twin Cities, and, if not, they cancelled their registration and returned to their homes. No physician would see more than a few such cases; therefore, to him, there would be no special problem on the campus. Many students who cancelled their registration did so on account of illness, and the university authorities did not realize that the problem existed. It is only when an organization is established where students, who fall ill, can come to one center for diagnosis and where investigations can be carried on as to the disease situation among the student body that one is able to get an idea of the true disease situation. The Students Health Services are performing a most unusual function in the field of health. Not only do they aid the individual student, but they instruct the student body regarding health so that many of the graduates of our colleges and universities go out as influential citizens with the proper attitude toward the importance of health and its maintenance to the individual, the community and the nation. In the campaign against tuberculosis, there is no greater potentiality than that which exists in the Student Health Services of America.

In the fall of 1920, a special chest clinic was established in the Students' Health Service at the University of Minnesota, under the direction of Dr. John Sundwall, where students with definite or suspected chest disease could be referred for diagnosis and treatment. During the first years of the existence of the chest clinic an average of forty students per year was found to have frank pulmonary tuberculosis. Nothing was known about the existence of their disease until definite symptoms such as pulmonary hemorrhage, rapid weight loss, and persistent cough

caused them to report for examination. Usually the disease was found to be moderate or far advanced and they were already disseminating tubercle bacilli. Most of these students were sent to sanatoriums or were treated in their homes by their family physicians. All were required to cancel their registration in the university. It was not unusual to learn of deaths from tuberculosis among our recent graduates and on inquiry we found that such persons had not been examined at the Health Service and, therefore, their disease was not known to exist by the university authorities while they were in school.

In the earlier years of the work of this clinic, we were of the opinion that all persons with pulmonary tuberculosis had definite symptoms even when the disease was in the minimal stage and, therefore, an educational campaign on the campus with reference to symptoms should suffice; that is all students who had such symptoms would report to the Health Service while the disease was minimal. As the years passed, however, information concerning this disease was accumulating not only here but elsewhere and we came to recognize the fact that the majority of persons who develop pulmonary tuberculosis pass through the minimal stage and sometimes even the moderately advanced stage without any significant symptoms. In fact, we now know that when symptoms are sufficiently marked to bring the patient to a physician the disease is in the moderately or far advanced stage in approximately 80 per cent of the cases of pulmonary tuberculosis. Usually by the time the disease has reached these stages bacilli are being disseminated and the patient's best chances of good recovery are lost. On the other hand, we now know that a period of two or three years exists after pulmonary tuberculosis can be detected by modern methods before any significant symptoms make their appearance in the majority of cases.

After a few years of observation, it became obvious to us that we would never control tuberculosis on the campus by waiting for students to fall ill before being examined. Although in the earlier

years of our work the specificity of the tuberculin test was recognized, we did not employ it routinely. We were laboring under the impression that nearly all young adults had been infected and, therefore, would react to the test. However, we began to wonder if all the effort that had been put forth in this country to prevent infection of children and young adults through isolation and treatment of contagious cases of tuberculosis might not be reflected among the young adults. Therefore, in 1928 the Health Service administered the tuberculin test to the students entering the university. Very much to our surprise only approximately 33 per cent reacted to the test. This finding caused considerable discussion in some parts of the country where it was claimed that our tuberculin may not have been potent, the test may not have been properly administered, or that the epidermal method (Pirquet) of administration which we used was not as satisfactory as the intradermal test (Mantoux). Therefore, in the fall of 1929 we used the intradermal test and again found that approximately one-third of the entering students reacted.

We were thoroughly cognizant of the fact that the administration of the tuberculin test alone was of no value in solving our problem although it gave us extremely valuable information as to the incidence of infection. We were so convinced of the specificity of this test that we were of the opinion that more complete examination for tuberculosis was necessary only for those who reacted to tuberculin. Such examination appeared to be in the realm of physical possibility as we could immediately exclude approximately two-thirds of our students. Dr. Diehl, who was then director of the Students Health Service and had always manifested a keen interest and had supported the tuberculosis program, made an arrangement in the fall of 1929 to have x-ray films made of the chests of all entering students in the schools of medicine and nursing. These were to be done annually regardless of tuberculin reaction. He later provided for x-ray film examinations of the chests of all students who entered the entire university with tuberculin reactions.

This became effective in the fall of 1931. That year about 30 per cent of the entering students reacted to tuberculin, among whom x-ray films revealed no evidence of disease in the majority. In the minority, evidence of various conditions was revealed, such as pleural adhesions, Ghon tubercle formation, calcium deposits in the hilum region which, of course, for the moment were of no clinical significance. In this minority group, however, twenty showed shadows which represented parenchymal pulmonary disease. These were subjects for more elaborate examinations to determine the cause of the shadows. In none of these cases was there a history of significant symptoms. In a small number the shadows apparently were due to non-tuberculous infections, as they promptly disappeared. In the majority, however, the final diagnosis was pulmonary tuberculosis. The most striking case in that particular year was a boy who had been a star high school athlete the year before. He weighed 198 pounds and appeared to be in excellent health. Even with careful questioning he insisted that he had no symptoms. This boy actually had advanced disease. Three others had moderately advanced pulmonary tuberculosis and in the remainder the disease was in the minimal stage. We are of the opinion that these represented the types of students who had previously entered the university without any knowledge of the presence of tuberculosis, fell ill, while on the campus or after graduation, and had much to do with the perpetuation of tuberculosis on the campus as well as among their associates elsewhere. Criticism of this procedure might be ventured on the ground of its cost and such criticism probably would be justified if it were not for the fact that pulmonary tuberculosis is often a contagious disease. We were strongly of the opinion that if only one case was found each year the entire cost and more was justified. We now believe that even if not a single case of pulmonary tuberculosis is found among the entering students the procedure is greatly worth while from the standpoint of knowing that no student is endangering his health and life and that no one is jeopardizing the health of the student body by disseminating this contagious disease.

Therefore, the administration of the tuberculin test to all entering students, x-ray film examination of all reactors, careful clinical and laboratory examinations of those who have shadows which might be due to tuberculosis, has been continued and we believe it should be a permanent procedure on the campus.

In the present program the tuberculin test is the first consideration in determining the presence or absence of tuberculosis in the student's body. Therefore, the test is administered to practically all entering students. We now see an increasing number who have previously had the test administered as a part of their high school tuberculosis control program or by their private physicians. Thus, we immediately divide the entering students into two groups: The larger (70 per cent or more) who do not react to tuberculin, and the smaller remaining group who present characteristic reactions. We look upon a tuberculin reaction as diagnostic of the presence of at least one primary tuberculosis complex somewhere in the body and are of the opinion that almost as long as the tissues react to tuberculin, living tubercle bacilli are present. Probably the development of a single complex is rare following infection with tubercle bacilli.

When a primary complex is found in a lung, it does not preclude the existence of similar complexes in other parts of the body, such as the brain, liver, and spleen. Therefore, with no other phase of an examination but a positive tuberculin reaction, we arrive at a diagnosis of at least primary or first infection type of tuberculosis.

We no longer see any justification for drawing a dividing line between tuberculous infection and tuberculous disease, since any infection that has caused a characteristic tuberculin reaction has resulted in tuberculous lesions. The tubercle bacillus, like the spirocheta pallida, incapacitates slightly or not at all when the primary lesions develop, but both micro-organisms are capable of living in the human body over long periods of time. Although in a majority of persons, they do not attack vital organs so as to cause significant symptoms

of disease at any time during the individual's life span, it now appears that approximately one in three who develop primary syphilitic lesions, and one in four or five who develop primary tuberculous lesions, have incapacitating disease in one or more parts of the body at some subsequent time. The development of incapacitating disease cannot be determined in advance; it may be within a few months after the primary lesions are laid down, or it may be in senility, or at any intervening time. Therefore, we must look upon our diagnosis of the first infection type of tuberculosis, made solely through the characteristic reaction to tuberculin, as a serious matter for approximately one in four or five of our students. Inasmuch as we have no way of determining who will later fall ill, we must treat the four or five alike. By treatment we do not refer to cancellation from school, hospitalization, or any other active procedure unless lesions of clinical significance are found to co-exist. The student who reacts to tuberculin but has no clinical manifestations of disease probably has as much tuberculosis as the individual who reacts to the Wassermann test with no clinical manifestations has syphilis. The Wassermann reactors are immediately treated because we have preparations which we believe act as disinfectants when introduced into the blood stream. If we had similar preparations for disinfecting the body with reference to tubercle bacilli, we would strongly recommend that they be administered to every student who reacts to tuberculin. Therefore, we must inform every tuberculin reactor of the potentialities and inasmuch as no specific therapy is available we attempt to train him in the procedures which should be practiced throughout the remainder of his life: First, to avoid every possible source of further contamination with tubercle bacilli; second, if he does not now have progressive disease to let no year pass, even though he lives to ninety, without an adequate examination for clinical tuberculosis.

X-ray film examination of the chest is made of those students who react to tuberculin on admission to the university. The x-ray film is of little value in detecting the location of the primary complex, as

only a small percentage is located in this manner. Even though films are made in various diameters of the chests of positive reactors, they do not demonstrate the location of the lesions in more than 25 per cent and usually in a much smaller number. Therefore, they fail in 75 per cent or more. Among the 4,372 students who entered the University of Minnesota in the fall of 1936, all but 7 were tested with tuberculin. Of the remaining 4,365, positive tuberculin reactions were recorded for 1,004, all of whom had x-ray films with the exception of twenty-two. Of the remaining 982 x-rayed only 140 or 14.2 per cent, showed evidence of the primary complex by presence of calcium deposits, etc., in the parenchyma, hilum, or both. Arguments have been offered for the x-ray film examination of the chest of all entering students and the elimination of the tuberculin test. Where all phases of the tuberculosis problem are under consideration, the x-ray film alone is inadequate, since any program which does not include the tuberculin test misses 75 per cent or more of the potential cases of clinical tuberculosis.

When the x-ray film is negative, we have failed to locate the primary complexes; they are present somewhere in the body and the examiner must guard against the student's receiving a false sense of security because the x-ray film is clear. Such students may be classified as having the first infection type of tuberculosis with the location of the lesion not determined by x-ray film.

The group of students, who react to tuberculin on admission and whose x-ray films show evidence of primary complexes, are classified as having the first infection type of tuberculosis with the location of at least one of the lesions determined by x-ray film examination. If calcium has been laid down in or around the lesion so as to be demonstrated by the x-ray film and there is no other evidence of the disease, we are justified in stating that the lesion probably is well under control. For such lesions the word "healed" should never be used during the life of the individual, since frequently there is pathological activity in and around them and virulent tubercle

bacilli are present. From these lesions, as well as those which cannot be located by x-ray films, tubercle bacilli may escape, find lodgment in allergic tissues and set up the reinfection or destructive form of disease.

Some students may have been infected shortly before entering school and some will become infected while in school. On a few x-ray films of students with recent infection, evidence of the primary complex will be seen in the form of a homogeneous parenchymal shadow which may be small or large. When one can be certain through previous periodic tuberculin testing that the infection is recent and, therefore, the lesion is of the primary type, no immediate active treatment is necessary. However, the possibility of acute reinfection forms of disease caused by tubercle bacilli from the primary complex, such as pleurisy with effusion, tuberculous pneumonia, meningitis, and miliary tuberculosis must not be overlooked. Therefore, we make x-ray films of the chest primarily to detect shadows which may represent chronic reinfection type of pulmonary tuberculosis. Thus, this procedure serves to weed out those who require most careful and complete examinations to determine etiology of lesions and necessary treatment. Among the tuberculin reactors, the x-ray film is our most valuable agent for this selective process. It detects the presence of lesions long before abnormal physical signs and symptoms are present. The number found to have lesions which require further study at any one time is small. For example, of the 982 tuberculin reactors who had x-ray films made of the chest in the fall of 1936, only thirteen presented evidence of parenchymal lesions which might be due to tuberculosis.

The finding of this small number of pulmonary lesions on one examination is not an argument against the administration of the tuberculin test for all, since all the tuberculin reactors are potential cases of clinical tuberculosis and the incidence of this disease increases with the decades. We are firmly convinced that as time passes a good many more of them will develop lesions

which can be demonstrated by x-ray film. If one were to observe 982 apparently healthy students in the same age period who react to the Wassermann or an equally good test for syphilis, it is doubtful whether as many as thirteen would be found to have evidence of clinically significant lesions in the central nervous system, the aorta, etc. However, we have excellent reason to believe that if they are untreated, approximately one-third of them, years or decades later, will develop tertiary lesions. Apparently the two diseases are very similar with reference to remote developments. Inasmuch as we have no method of disinfecting the body with reference to tubercle bacilli, we should inform all potential cases of the possibilities, in order that periodic examinations will be made so that if and when clinically significant lesions begin to make their appearance, treatment can be instituted at once.

Complete Examination

When a student is found to have a shadow on an x-ray film, cast by a lesion in the lung parenchyma, an attempt is made to determine etiology through laboratory examinations, etc. Such persons may have no cough. They may produce no sputum or only a small amount by clearing their throats, but this should be carefully examined. The recent work of Stiehm has shown that students with such lesions may have tubercle bacilli revealed in the gastric contents. If the etiology cannot be determined by finding tubercle bacilli either in the sputum or gastric contents, it may be necessary to keep the student under observation and make serial x-ray films. A shadow that persists more than a month usually is not caused by pneumonia. When due to tuberculosis, the shadow may remain unchanged in extent or nature; on the other hand, it may slowly decrease in size; again, it may increase in extent or evidence of excavation may appear.

Treatment

All students, who are under observation because of the presence of x-ray shadows, should be instructed to reduce

their outside activities to a minimum, and, if the shadow decreases in size, this may suffice. If, on the other hand, the shadow increases in size or cavitation appears, one can be reasonably safe in diagnosing the lesion as tuberculous, even though tubercle bacilli have not been recovered. The following illustrates this point. In the spring of 1935, at the age of eighteen years, a student reacted to the tuberculin test in high school. X-ray film of the chest showed evidence of a small area of disease in the left upper lung field. She entered the University of Minnesota in the fall of 1935. X-ray film revealed evidence of a small area of disease in the left upper lung field. When compared with the film made the previous spring, no change was revealed. Subsequent films in 1936 showed no change. On October 12, 1937, there was evidence of definite increase in extent of disease, with a possible small cavity developing.

On the entrance examination, unmistakable cases of moderate or far advanced pulmonary tuberculosis may be found among healthy appearing students. For them, treatment should be instituted at once, even though symptoms are absent. Here we sometimes encounter an extremely difficult problem in convincing the entering student that significant disease exists. This probably is due to the fact that the public considers tuberculosis synonymous with consumption; that is, no one is thought to have the disease unless such symptoms as marked loss of weight and cough are present. A good example is that of a student who had no symptoms, but on the admission examination was found to have definite evidence of advanced disease. He and his family refused to accept the diagnosis and five years later we saw him in a tuberculosis clinic after symptoms had appeared, his disease had increased in extent, and his sputum was teeming with tubercle bacilli. It was not until he had fallen ill that he or the family could be convinced of the presence of tuberculosis. However, the health service staff succeeds in convincing the majority of such students of the presence of disease.

Those students who are found to have frank pulmonary tuberculosis and those

whose lesions with undetermined etiology are proved to be due to tuberculosis of a progressive nature on admission, should have treatment instituted, in keeping with extent of disease, etc. The student who has bilateral disease or sizable cavities with positive sputum should not be permitted to continue in school, but should be given careful advice with reference to adequate treatment. Here the family physician's cooperation is essential. The student is instructed to report to him at once and carry out every procedure recommended. If the physician does not treat tuberculosis, the health service staff may aid him in arranging the proper location for the patient. As long as adequate care is provided, the place of treatment is extraneous. Many will do well to enter a hospital or sanatorium and remain in the institution until the disease is under control. Throughout the course of treatment the health service staff attempts to keep in contact with the patient and the family physician.

For some students who have progressive minimal or moderately advanced disease and have no sputum or that which does not contain tubercle bacilli, ambulatory artificial pneumothorax is instituted, and they are permitted to continue in school. When such treatment is begun, we try to make it clear to the student that if adequate collapse cannot be obtained or if significant complications develop, the registration must be cancelled and more drastic treatment instituted. At the University of Minnesota, several such students with ambulatory artificial pneumothorax are in school, in fact, this procedure has been practiced since 1926. Some have completed their courses without significant handicap and are now engaged in the usual activities of life. For some students we have insisted upon a period of strict bed rest while artificial pneumothorax was being instituted. The duration of this period depends upon the degree of collapse, general well-being of the patient, and presence or absence of complicating factors. Three months or less has usually sufficed. However, in some cases a much longer period was found necessary. In an occasional

student for whom ambulatory artificial pneumothorax was recommended, an adequate collapse of the lung was found impossible because of adhesions. Such students have always been referred to their family physicians for whatever treatment seemed indicated. Artificial pneumothorax is rarely discontinued, on advice, in less than three years, no matter how small the lesion when the treatment is instituted. For those who have cavitation of the lung, we do not feel that even three years is a sufficient period of time to insure permanent obliteration of cavities and satisfactory control of the disease.

Subsequent Periodic Examinations and Treatment

The student health service staff has a significant responsibility in tuberculosis control among all the students who are admitted. Having completed the weeding-out process of the tuberculin reactors among the entering students and having excluded those who should be on strict bed rest, plus collapse therapy when indicated, and having placed on treatment, such as ambulatory artificial pneumothorax, those for whom it is indicated, a careful program must be outlined for the remainder who constitute the great majority.

Just as there can be no primary tuberculosis complex in the absence of tubercle bacilli, so there can be no reinfection type of clinical tuberculosis in the absence of the primary complex. Therefore, students whose tuberculin tests were positive on the entrance examination, regardless of whether the x-ray film revealed any evidence of the location of the primary complex, such as Ghon tubercles or calcium deposits in the hilum region, should be re-examined, at least, annually. This annual examination is made to bring to light at the earliest possible time any evidence of the reinfection type of disease that may appear in the lung. While such reinfection foci probably exist a long time before they cast shadows on the x-ray films which can be visualized, the film will reveal their presence a long time, usually years, before any serious symptoms are present or any abnormal physical signs

can be elicited. Therefore, annual examination should consist of an x-ray film of the chest and, if any shadows appear which were not previously present, a complete examination should be made to determine the etiology. The following cases illustrate this.

A student of twenty-two years, in September 1934, reacted to the tuberculin test. X-ray film in January 1935, was reported to reveal no evidence of disease. In 1937, he was found to have unmistakable pulmonary tuberculosis involving the left lung. He was admitted to a sanatorium, where artificial pneumothorax was attempted. Adhesions prevented the complete closure of a large cavity. However, intrapleural pneumonolysis was successfully performed, and the cavity is now well collapsed. Although this former student has been on strict bed rest in an institution since his disease was detected, definite lesions have made their appearance in the right lung.

Another student who entered the School of Engineering at the age of twenty years on September 27, 1932, reacted to the tuberculin test, but the x-ray film of the chest made on January 23, 1933, showed no evidence of disease. On May 17, 1937, he was admitted to the hospital. Previous to admission, he had a daily chill for five days. He complained of non-productive cough, heaviness in the chest, and pain between the shoulders. Death occurred on August 3, 1937. Post-mortem examination revealed military tuberculosis, involving lungs, liver, spleen, kidneys, thymus, lymph nodes, and left seminal vesicle. The hilum and peritracheal lymph nodes and a mediastinal mass were large and caseous.

Another student of twenty-two years reacted to the tuberculin test in 1930. The x-ray films appeared entirely clear. In 1935, she was found to have extensive disease with cavitation in the left lung. Adhesions prevented adequate collapse by artificial pneumothorax and extrapleural thoracoplasty was necessary to control her disease.

In October 1932, an entering student

reacted to the tuberculin test, but the x-ray film revealed only evidence of calcium deposits in the right lung and hilum region on January 29, 1935. He was apparently in good health. However, on December 30, 1935, he was found to have frank pulmonary tuberculosis involving the right lung. Artificial pneumothorax was successfully instituted, and his disease is now apparently well under control.

All students who on the entrance examination fail to react to tuberculin should have the test repeated annually and every three to six months in case of any known exposure. In the University of Minnesota the number of reactors among the students in the College of Education has been found to increase about 1 per cent each year. This apparently is the approximate infection attack rate in the general community.

In our schools of nursing and medicine the infection attack rate among the students is increased many times.

Students who on re-testing become tuberculin reactors are immediately grouped with those who reacted to the test on admission and treated in the same manner; that is, have an x-ray film examination of the chest at once and annually thereafter.

Following the development of the primary complex, clinical tuberculosis develops slowly and after various periods of latency. The period of latency may be one year or fifty years; therefore, one must not expect to see a high percentage of the students who react to tuberculin on admission, or subsequently, present clinical lesions while in school. Indeed, only a small group will develop such lesions in the brief period of four years. However, if only a fraction of one per cent manifest such lesions all of the effort and expense to the institution in detecting these lesions long before symptoms appear or the disease becomes communicable, is well worth while. To fail to detect them is poor economy for the supporters of the institution. Moreover, they may be dangerous to the student body and the faculty and may even

result in untimely death of the individuals.

Such students may develop shadows on x-ray films due to non-tuberculous lesions, such as small areas of pneumonia. Again, small soft-appearing shadows may appear and persist. When these are due to tuberculosis, one has to determine whether the lesion is of the first infection or reinfection type of disease. If the tuberculin test has only recently become positive, that is, within a period of three or four months, they are most likely due to primary foci which usually prove to be of no clinical significance. However, students who develop them should be kept under close observation, but should not be required to cancel their registration. Procedures like strict bed rest and artificial pneumothorax are not indicated. When such shadows appear on the x-ray films of the chests of students who have been known to be tuberculin reactors for a period of six months or longer, they must be given serious consideration. However, if they are small and the student reduces his outside activities, many will slowly recede. If they continue to increase or evidence of excavation appears, there is no time to temporize. Although lesions may slowly increase and cause no symptoms over a period of two or three years, the sooner the spread of the disease can be stopped, the better; in other words, we should not wait for symptoms or the presence of tubercle bacilli in the sputum. For this group of students, we have found ambulatory artificial pneumothorax very satisfactory, since the collapse of the diseased area inhibits the proliferation of tubercle bacilli and stimulates the formation of scar tissue.

Pleurisy with effusion occasionally develops among our students. Although tuberculosis is not the only cause of this condition, it must be strongly suspected in every case not immediately preceded by or accompanied by acute respiratory infection such as pneumonia. At one time, tuberculous pleurisy with effusion was considered a primary condition, since it was often the first external manifestation of tuberculosis.

We now know that this condition is a reinfection form of disease. The primary focus in the lung is usually located immediately subjacent to the visceral pleura. From this area, lymph flows from the lung into the lymph channels of the visceral pleura, and from there to the hilum region. Bacilli liberated from a primary focus may be carried into the lymph channels of the visceral pleura and the pleura being highly sensitized, intense reactions occur which result in an over-production of serous fluid which accumulates in the pleural cavity. In most cases of pleurisy with effusion, the x-ray film does not locate the primary focus in the lung or present any other evidence of parenchymal disease. One aspirates, except for diagnostic purposes, only in cases with severe toxic manifestations or when fluid is present in such volume as to cause pressure which embarrasses cardiac and respiratory functions. Usually, the fluid absorbs in a few weeks to two or three months; but evidence of adhesions manifested by the obliteration of the costo-phrenic angle may remain. Again, there may be no evidence whatsoever of the previous existence of effusion. If, when the fluid is present, there exists evidence of reinfection type of pulmonary tuberculosis, removal of the fluid and continuation of the collapse of the lung by artificial pneumothorax is indicated. If this is not done, the visceral and parietal layers of pleura usually become adherent after the fluid absorbs, thus obliterating the pleural space and precluding subsequent treatment of the pulmonary disease by artificial pneumothorax.

All students who give histories of having had tuberculous pleurisy with effusion and those who develop the condition in the institution should be informed of the potentialities of this condition. Despite apparent good health at present, they are in considerable danger of falling ill at some subsequent time from clinical tuberculosis of other organs of the body, particularly the lungs. Therefore, not only during their stay in the institution but also throughout life, they should have careful periodical examinations.

The health service staff constantly keeps in mind that not all clinical lesions which develop in the bodies of tuberculin reactors are in the lungs and pleura. The bones and joints, the kidneys, and other organs may be involved with progressive tuberculosis, while the lungs remain clear.

For instance, a student who reacted to the tuberculin test on entrance to the university, gave a history of having the right index finger operated on for tuberculosis of the bone twenty years before, at the age of seven years. While in school he reported with symptoms referable to the urinary tract. Careful examination revealed extensive tuberculosis of one kidney. Since nephrectomy was performed, he apparently has been in excellent health, and the x-ray films of his chest have remained clear.

When the original infection occurs, primary foci are often laid down in various parts of the body. All such foci may remain under control throughout the lifetime of the individual. Again, a single clinical lesion may appear at any time in life and there may be a sequence of events manifested by clinical lesions in various parts of the body. The citation of the following exemplifies this:

In 1925, a woman had a diagnosis of tuberculosis involving the upper lobe of each lung. She was treated over a considerable period of time, and finally the phrenic nerve was interrupted on the right side. The pulmonary disease was controlled and she was restored to normal life. However, in 1937 she developed a small but definite tuberculous lesion in the right kidney, which required nephrectomy.

Another case is that of a student who had been tested on numerous occasions but never had a tuberculin reaction until April 1931. The same month, he had tuberculosis revealed by biopsy of the left supra-clavicular lymph node. A little later, a lesion was found in the apex of the left lung. There was evidence of disease in the apex of the right lung in June 1931, and tuberculous epididymitis appeared in August 1931,

which required surgery. In February 1932, a diagnosis of extensive tuberculous peritonitis was made and in April 1937, tuberculosis was found in the right cuboid bone and adjacent structures which required surgery.

The acute and highly fatal forms of tuberculosis, which may involve other parts than the lung, particularly meningitis and generalized military disease, may appear at any time in tuberculin reactors. Meningitis is the result of a focus in or adjacent to the central nervous system which discharges large numbers of tubercle bacilli into the sub-arachnoid space or the ventricles of the brain. Generalized military tuberculosis is often caused by a lesion of the primary complex which ruptures directly into a lymphatic duct or a blood vessel so that large numbers of tubercle bacilli are disseminated throughout the body.

We have recently seen a woman of forty years, who twenty-three years ago during college age, had pleurisy with effusion. After a brief illness from the effusion, she was apparently well, except for a mild attack of dry pleurisy, for twenty-three years, when she suddenly fell acutely ill and was found to have generalized military tuberculosis.

Treatment of Tuberculous Students Who Re-enter Schools

Some of the students who bring their disease under control later re-apply for admission to school. If at the time, they have no cough and negative sputum so that they are safe associates for students on the campus, they may be admitted. However, at this time the health service staff tries to make entirely clear to them that tuberculosis is a relapsing disease, so that there is considerable danger of reactivation of the old lesions or the development of new lesions in one or both lungs or in other parts of the body. Therefore, such students must cooperate in reporting to the health service staff periodically. This is important not only from the standpoint of the individual's health, but also from the standpoint of contagion on the campus.

At the University of Minnesota, many students have entered or re-entered after periods of treatment which were adequate to bring the lesions under control for the time being. Most of them have been cooperative to the nth degree, but for the occasional one who refused or neglected to report for periodic examinations a provision has been made which practically guarantees periodic examinations. When such examinations are due, the health service sends the student a notice. If he fails to report, another is sent; next a letter is mailed to his parents; and finally, the dean of his school is notified, which usually results in exclusion from all classes until the health service requirement is fulfilled.

A few students who after diagnoses of tuberculosis, were required to cancel their registration, re-registered a few months later, but without having their disease adequately treated. Inasmuch as they had previously passed the students' health service entrance requirements, the health service staff had no knowledge of their re-entrance to the school, and they continued over long periods of time with no examination, since the original admission health examination had been made. Such hazards on the campus have been overcome, for the most part, by a letter from the director of the health service to the registrar when any student leaves school because of tuberculosis, to the effect that that student is not to re-register until he has been adequately examined and recommended by the health service staff.

We have seen some most encouraging results among students who have been treated for tuberculosis and who re-entered the University. For instance, a student who was found to have pulmonary tuberculosis with a positive sputum in the fall of 1920 was sent to a sanatorium. Subsequently, while still in the institution, he developed tuberculosis of one knee joint. This, together with other complications, necessitated an eight-year period of hospitalization, following which he spent two years convalescing at home. Ten years to the month from the time he cancelled his registration, he re-entered, reported at once to

the health service, and was most cooperative until he was graduated. He then procured a good position where he did excellent work. At present he is taking graduate instruction but continues to have frequent periodic examinations.

Another student who fell ill from tuberculosis in 1927 was sent to a sanatorium. Her disease was limited to the right lung as far as could be determined by examination. While in the institution, the right phrenic nerve was evulsed. She later re-entered the university and reported periodically for examination. The disease remained under control throughout the remainder of her course. However, after she had entered the teaching profession, reactivation occurred and ambulatory artificial pneumothorax was instituted. This treatment has been continued, and she has lost no time as a teacher.

Some students who seek admission or re-admission to school have already had artificial pneumothorax instituted by their physicians. If the student lives in close proximity to the physician, we prefer that he continue the treatments with him but always require periodic examinations at the health service or reports from his physician. If the student is located remotely from his physician, treatments may be administered at the health service, provided this is the physician's desire. During vacations and upon graduation students are advised to return to their physicians. In fact, throughout the entire residence of the student who develops tuberculosis, an attempt is made to cooperate with the family physician. Such a case is that of a student who was found to have progressive pulmonary tuberculosis in the fall of 1937. She had practically no symptoms, and her sputum had not yet become positive. She was told that there were two courses which she might take, either one of which we could recommend: the first was to cancel her registration, become a strict bed patient at home under the care of her physician, or, if he desired, that she enter a hospital or a sanatorium; the second, that she remain in school and an attempt be made to institute artificial pneumothorax. She

was asked to consult with her family and her physician before making a final decision. The next day this student, her mother and father, and the family physician who lived a hundred miles away, arrived at the health service. The situation was discussed in detail and all agreed to have artificial pneumothorax instituted while she remained in school. Since that time, reports have been sent to the doctor, and she has been advised to see him during each vacation period. In this manner, the family physician keeps in close touch with his patient, and, when she graduates, he will continue with her treatment and periodic examinations.

The entire program of diagnosis, observation, and treatment of tuberculosis in our institution should be aimed at, first, keeping the environment of the institution free from liberated tubercle bacilli; second, control of the disease of the individual so he can then or later pursue his educational activities. After all, the responsibility of the health service staff does not end when the student is graduated and the success of the staff should be determined, in some degree, by the subsequent developments among the alumni whom they have treated. In rehabilitation of the tuberculous, the student health service staff has an opportunity to play an active role. Since we have very little scientific data on the cause of subsequent reactivation of lesions and the appearance of new lesions, avoidance of physical and mental strain is advised for the student who has had clinical tuberculosis. Therefore, if the student is contemplating a course or is already pursuing a course of study which leads into a field where there is a health hazard, the medical staff recommends a change of course.

As the tuberculosis work in the Students' Health Service progressed, a number of situations demanding special attention appeared. For example, in 1924 a senior student reported to the Health Service just after the winter quarter examinations; he was desperately ill but this was his first examination. He had such extensive tuberculosis that he died in approximately three weeks. Within

about a year six of his fraternity brothers, who had lived in the house with him, were ill from tuberculosis. Here was a lesson on the contagiousness of tuberculosis. Another year an employee in one of the dormitories was found to have advanced tuberculosis with tubercle bacilli in the sputum. Obviously, it was of little avail to control tuberculosis in the students, themselves, and permit university employees to transmit tubercle bacilli to them.

When routine tuberculin testing of entering students was begun, those in the Graduate School were not included. At that time considerable emphasis was being placed on tuberculosis in the teen age period. However, on several occasions students in the Graduate School report to the Health Service of their own accord because of symptoms and were found to have extensive pulmonary disease. Following such experiences, the students in the Graduate School were included in the routine entrance examinations for tuberculosis. It has now become generally known that reinfection type of pulmonary tuberculosis which reaches clinical proportions increases in incidence each decade of life after adolescence; that is, there are more clinical lesions among those persons in the twenties than among those in the teens; there are more lesions among those in the thirties than in the twenties; and after the age of fifty for the number of persons living the incidence of reinfection type of pulmonary tuberculosis is higher than at any other age period in life. Therefore, because of the older age of the students in the Graduate School, one would expect to find more pulmonary tuberculosis among the students than among those in undergraduate schools.

Not long ago, we believed that persons who would eventually fall ill from clinical tuberculosis had lesions in their lungs which could be demonstrated by the time they had reached the age of sixteen years. Later this age limit was extended to twenty-four; now we know there is no age limit when tuberculosis may develop in the human lung. Persons who have been infected

as children may reach adult life with no abnormal shadows on the x-ray film. Re-infection type of lesions may make their appearance in any decade of life. Again, persons who have escaped infection in infancy, childhood, or young adult life may at any subsequent decade develop primary tuberculosis complexes and later fall ill from the reinfection type of the disease. The establishment of such facts as this has thrown an entirely new light on tuberculosis.

Special problems have arisen which were not even suspected when the Health Service tuberculosis program was begun. When there was so much tuberculosis on the campus, there did not appear to be a greater number of cases from the schools of nursing and medicine than in other schools. However, as the disease decreased in the general population, the number of cases from the schools of nursing and medicine stood out in bold relief. This led to the recognition of a serious problem. What really had happened was that successful attempts had been made in the general population to break contact between contagious cases of tuberculosis and the uninfected children and adults; in other words, to prevent exposure, whereas in the schools of nursing and medicine, contact between contagious cases of tuberculosis and the students continued. Often these contacts were more intimate than those which might exist in the home. The result was that the tuberculosis campaign on and off the campus had done nothing for these students in professional schools. This called for special observation: First, we must determine the incidence of tuberculin reactors among the students in these schools on admission; next, non-reactors must be re-tested periodically to determine the infection attack rate while in school in order to determine whether our students were actually being infected in large numbers while in school.

In the School of Education we found that in the classes which entered in 1929-1930, 24.8 per cent reacted to tuberculin; after four years in school 28.5 per cent were reactors. Thus, only approximately 1 per cent be-

came infected each year. In the School of Medicine of those students who entered in 1929-32 inclusive, an average of 35.4 per cent reacted to tuberculin. At the end of the junior year 40.8 per cent; and at the end of the senior year 67 per cent. In the School of Nursing an average of 27.2 per cent reacted to tuberculin among those who entered in 1929-35 inclusive, and an average of 67.8 per cent reacted to tuberculin in the senior year. Thus, it was obvious that many more students in the Schools of Medicine and Nursing were being infected with tubercle bacilli while in school than in the School of Education.

In addition to our Schools of Nursing and Medicine, since 1929 we have made similar tests on students of nursing in three private hospital schools. We now have a total of 565 young adults whom we first saw as non-reactors but who under our observation became definite tuberculin reactors. In this group we have had an opportunity to observe the complete evolution of tuberculosis in the human body from the time exposure occurs until the disease results in death. From this study some new facts were established with reference to first infection type of tuberculosis as it occurs in adult life. For example, among the 565 students who became tuberculin reactors under our observation only 3 at the time presented any external manifestations that might be attributed to tuberculosis. All others tolerated the development of the primary complex and would not even have known of its presence had it not been for the routine administration of the tuberculin test. The number is sufficiently large to lead us to believe that the opinion of a few years ago was false, namely, that if first infection with tubercle bacilli is postponed to adult life, the disease takes a rapid course and terminates fatally in a high percentage of the infected. This was often spoken of as the infantile type of tuberculosis, which so far as our experience is concerned is a myth. We are strongly of the opinion that the infantile type of tuberculosis, as it was applied to highly fatal forms of tuberculosis in infants and adults, was meningitis,

miliary disease, and tuberculous pneumonia, which because they were first clinical manifestations of tuberculosis were thought to be primary. We now know that there are endogenous reinfection forms of the disease.

If one infects for the first time a large group of human beings in any age period, there will be some whose primary lesions can be detected by x-ray film but who have no symptoms. There is likely to be a small group who will soon have manifestations of the acute reinfection forms of disease, such as pleurisy with effusion, meningitis, miliary tuberculosis, and pneumonia. We have not yet seen a single case of meningitis or miliary tuberculosis and only a few cases of tuberculous pneumonia. However, there have been several cases of pleurisy with effusion among our students within a few weeks or months after their primary complexes developed. We have also seen a considerable number of those who entered as reactors as well as those who later became reactors develop chronic tuberculosis.

While large numbers of our students have become infected with tubercle bacilli and have, thus, become potential cases of clinical tuberculosis, several have fallen ill and have been incapacitated over long periods of time and a few have sacrificed their lives, we have learned from this experience certain facts which should be of value in the protection of all future students of nursing and medicine, not only at Minnesota but everywhere.

From this experience has come an attempt to protect these students and all members of the personnel of this hospital against contagious cases of tuberculosis. In 1936 the Administrative Board of the Medical School voted unanimously to examine the entire hospital personnel in order to detect any unknown cases of tuberculosis and, thus, prevent them from spreading tubercle bacilli to others. At the same time to examine adequately for tuberculosis all entering patients regardless of the admitting diagnosis. Previous to that time we had seen on a number of occas-

ions patients with advanced contagious tuberculosis who had been admitted to the hospital for other conditions and who remained here for weeks at a time spreading their disease. Dr. Kernan's report reveals the fact that there has been a failure on the part of the hospital to examine about one-half of the patients admitted during the past year, yet of the other half who were examined, 12 moderate or far advanced contagious cases were detected. It seems probable that among the 50 per cent who were not examined there were contagious cases who were allowed to spread their tubercle bacilli to our students and other members of the personnel. Therefore, a serious effort should be put forth to insure an adequate examination for contagious tuberculosis of every patient who enters this hospital in the future.

Only those who have seen the complete evolution of the program can appreciate the contrast in the tuberculosis situation on this campus. In 1920 and for a few succeeding years, we were working with consumption, that is, the disease had often passed through all of its phases and stages to its final consumptive stage before we manifested any interest in it. Now we are working at the opposite extreme, that is, the beginning of tuberculosis, and still better, its prevention on the campus. With the fine vision of tuberculosis control which Dr. Ruth Boynton, present Director of the Students' Health Service, manifests, together with her full cooperation and actual participation in the program, the tuberculosis situation on this campus should improve from year to year.

V. HOSPITAL REPORT

Phil D. Kernan
Health Officer, Hospital.

As a corollary to the presentation it was thought that a survey of our case-finding program in this institution might be of interest. The appended figures are for the year July 1, 1937 to June 30, 1938.

Total admissions	9186
<u>Less</u>	
Health Service & staff admissions	1046
Private patients	894
Newborns	438
	<u>2423</u>
Charts not available	138
	<u>2561</u>
Total cases used in study	6625

Mantoux applied	3908	59.0%
Mantoux not applied	2717	41.0%

Mantoux read	2010	51.4%
Mantoux not read	1898	48.6%

Mantoux positive	650	32.3%
Mantoux negative	1360	67.6%

X-rays ordered (Pos. Mantoux)	505	77.6%
X-rays not ordered (Pos. Mantoux)	123	18.9%
X-rays ordered but no report found	21	3.5%
X-rays ordered independently of Mantoux reaction	842	12.7%
X-rays negative (Mantoux Pos.)	516	79.4%

Of 1347 chest x-ray reports studied the following information was procured:

Far advanced, previously diagnosed	31	2.37%
Far advanced, previously undiagnosed	8	.58%
Moderately advanced, previously diagnosed	3	.22%
Moderately advanced, previously undiagnosed	4	.29%
Moderately advanced, inactive	2	.14%
Minimal, inactive	13	.96%
Minimal, active	5	.37%
Tuberculous pleurisy with effusion	3	.22%
Miliary tuberculosis	2	.14%
Tuberculous empyema	4	.29%
Tuberculous osteomyelitis of ribs	1	.07%
Tuberculous pericarditis	2	.14%
Artificial pneumothorax (state of lesion undetermined)	7	.52%
Old fibroid tuberculosis (inactive)	43	3.19%
Thickened pleura and old diaphragmatic pleurisy	70	5.20%
Calcified glands	112	8.30%
Ghon's tubercles	127	9.40%
Calcification in lungs	18	1.33%

In interpreting the x-ray reports all cases having reports relative to tuberculosis were studied on both positive and negative Mantoux reactors. Special attention should be called to the fact that 8 far advanced cases of tuberculosis were first diagnosed in this hospital. It would be interesting to know how many more might have been found had our original aims of testing each admission and x-raying all positive reactors been more efficiently carried out.

The number of our minimal cases, 5 is small, but compare favorably with the average sanatorium's minimal admissions. When this is used as an index of the effectiveness of our case finding program, however, our figures are much too low. The chief weaknesses in our program are:

1. Only a little more than half of our admissions receive a Mantoux test.
2. Half of those are read.
3. Of those read positive, about one-fifth do not have chest x-rays ordered.

VI. GOSSIP

Intimate glimpses into the lives of our fellow workers create greater group solidarity. Our elaborate welcome to new members is in part an expression of our desire to know them better. In any member's achievement we become group proud, and in sorrow we are one. We enjoy weddings and babies best because we find the "business curtains" flung wide open and everyone can sit in the front row. All of which is preliminary to a home-town version of Charlie Rea's and Mary Laughlin's wedding which took place at high noon, November 5, at Incarnation Church. When we arrived at the church, it was evident that this popular young couple had done the nice thing in inviting many friends to be with them at the big moment. Inside the church the usual division of support was being made. The feminine delegation on Charlie's side did my old heart proud as I realized that our girls were good losers. I expected one of them to lead a cheer. "The queen is dead; long live the queen," but nothing happened. The organist played a little of this and a little of that as the women anxiously waited for the hour of noon. In the meantime, the men stole stolid glances at the little door out of which the groom would soon be led. Before we realized it, the mighty organ had sounded the triumphant note for the bride, and out popped Charlie with his brother looking like the cat that had just swallowed the canary (I mean his brother). Charlie looked over the house, gulped, and took a deep breath -- one of the deepest I have ever seen -- A little old lady sitting in the front row observing the performance bowed her head quickly, but the buttons on Charlie's suit held, said suit not being as tight as some of the others. The six ushers who had been very busy up to a short time before this suddenly disappeared only to reappear walking solemnly up the aisle to the front of the church. The bridal attendants, dressed in the color of the martyrs, finally arrived, and then the bride in white gown, veil and train, looking as lovely as a black Irish bride can look, which is really lovely. Charlie Craft's collar showed signs of strain, as he had done a land-office business escorting the ladies in his

gallant southern manner. George Bergh, with his air of startled innocence had also done a good business drawing mainly from the younger group. More of John Paine later. I must admit that the other three ushers were also busy. In fact, all of them did a very fine job in getting the people seated in time for the spectacle. The colorful ceremony held the attention of the crowd which completely filled the center section of the large church. Soon it was all over and the gay wedding party departed for the reception. The football crowd had apparently not heard that the Iowa team was nothing to get excited about, so the reception guests arrived at the same time as the wedding party. This created a good deal of congestion in the home, so up sprang John Paine, in his most solemn manner, to direct the crowd upstairs to see the presents. Many of them, not hearing clearly what had been said, expected to find the body up there. The presents overflowed one of the upstairs rooms. In addition, there were other over-flowing things to be found. Downstairs the bride and groom and the parents were busy greeting the guests. Charlie in his best fettle distributed his benediction right and left with a "God bless one and all." By this time the tables in the dining room were groaning with the repast, which the crowd immediately surged in to get. If I may be pardoned a pun, a large delegation from the surgical department was there to see the knot tied. The Rea's did very well by themselves in the way of presents, which should surely help as they are furnishing a home on the River Road. They have asked me to extend an invitation to all to drop in to see them, especially at meal time. As this was an Irish wedding, there were many of the guests who went home and marked the calendars for a year hence so they would not miss the christening. The happily wedded pair are now in Bermuda on their honeymoon, but will soon be back, and before long Charlie will be down to earth sweating over the bills. In the meantime, happy days from the group, and thank you....

..Postgraduate Medical Education descended on the American Medical scene so swiftly it left most of us struggling with the technique and objectives of the

program. Two visitors this week emphasized the interest which the Foundations are taking in the movement. The first was Samuel Proger from Bingham Associates at Tufts University, Boston, and the second our own M. H. Manson of the Commonwealth Fund. The Bingham Associates are working in Maine with The Commonwealth Fund under the direction of Dr. Proger. They have organized community hospitals about 3 centers -- Lewiston, Bangor, and Portland, to aid them with diagnostic services in electrocardiography, laboratory technique, roentgen diagnosis, and staff organization. The centers in the 3 aforementioned places are in direct communication with the headquarters at Tufts. The technical assistants are being trained by sending them through the Boston setup, and instructors are going out to the groups to help them with their program of medical education and staff organization. In addition, all who desire may come to Boston and spend a month at the fund's expense, each man receiving \$250 and free tuition. In the Commonwealth plan community hospitals are built in certain states. The fund supplies \$250,000, the local community \$50,000. In addition, the hospital is also given a resident physician for 3 years to help in staff organization, a director of the out-patient department, and money for an educational and library program. The fund also sends to medical centers any physician who desires further postgraduate training, paying him \$250.00 a month and tuition expense. They stay 4 months under this plan rotating through a survey of the commoner conditions encountered in general practice. No attempt at specialization is made. The plan has already been in operation for some years and they have built hospitals in Mississippi, Maine, Kansas, Ohio, Tennessee, Kentucky, Virginia, Oklahoma and Utah. They will go to South Carolina for their experiment next year. "Doc" Manson never looked better. He is thoroughly enjoying his work as he applies his surgical knowledge in a very practical way to the solution of a difficult social problem. Just another illustration of how men find themselves when the opportunity knocks. Both visitors contributed a great deal in the way of practi-

cal solutions to many of our problems. Postgraduate medical education is here to stay, but it has a long way to go before we can get our bearings.....
 ...The men responsible for the program of tuberculin testing represent a type of idealism which is very necessary in medicine. Much of the difficulty in application of medical knowledge to practice, is due to apathy, indifference, and physical limitation of certain practitioners. Tuberculin testing was known for a long time before it was applied in a practical way in case finding. The President of the Minnesota Public Health Association, Dr. Slater, of Worthington, really started the ball rolling when he did a small county survey. He learned that only a small percentage of children were positive reactors until children from tuberculous homes were tested, when the percentages were practically 100. The program carried to its logical conclusion means that all reactors become foci for epidemiologic study. In certain sections of Hennepin County such programs have been carried through to completion. A recent visit to Dr. Slater at Werthington revealed that he is very much pleased with the result of his small beginning in case finding, but more pleased with matrimonial bliss, which he is now enjoying. Dr. Slater waited a long time before making the break, but his patience was rewarded by getting a ready-made family and a charming, helpful wife. She studied him for a long time before finally deciding to marry him, so that much of the groundwork had already been laid before the knot was tied. They have a beautiful new home on the hospital grounds. It is furnished very attractively and the welcome sign is out. This will be quite a change for those who used to visit Slater in his severe sanitarium quarters. The only note which enlivened his monastic setting was a rack filled with air-guns which he used to shoot sparrows which infested the vines and disturbed his patients' rest. So far as I could tell, the guns had not been moved from the old quarters.....