

GENERAL STAFF MEETING  
MINNESOTA GENERAL HOSPITAL  
UNIVERSITY OF MINNESOTA

CONTENTS

	PAGE
I. ANNOUNCEMENTS	
1. SPECIAL BACTERIOLOGY SERVICE . . . . .	87
2. EMERGENCY REQUESTS ONLY . . . . .	87
3. REPORT OF COMMITTEE ON THE COST OF MEDICAL CARE . . . . .	87
II. CASE REPORT	
BILATERAL PULMONARY TUBERCULOSIS; RIGHT TUBERCULOUS EMPYEMA; THORACOPLASTY . . . . . . . . Path. Pearson . . .	88 - 91
III. CASE REPORT	
PULMONARY TUBERCULOSIS; MENINGITIS MENINGITIS . . . . . Path. Pearson . . .	89 - 91
IV. ABSTRACT	
THE CHILD AND THE TUBERCULOUS PLEURA . . . . . . . . Abstr. Hendry . . .	87 - 91
V. MEETING: Dec. 2, 1932	91 - 92

## I. ANNOUNCEMENTS:

### 1. Special Bacteriological Service:

Through an arrangement with W. P. Larson, head of Department of Bacteriology, E. J. Olson, senior graduate student in bacteriology and immunology, has been assigned to the hospital for bacteriological problems. Anyone desiring this service, should either bring the specimen to the laboratory with a request blank properly filled out or put in a consultation slip for Dr. Olson and leave it on the desk in the laboratory on M4. No routine examinations will be done without going through these channels. Dr. Olson desires to talk over the problems with the clinicians in charge of the case before starting any investigations. This does not in any way interfere with other bacteriological arrangements now in force but does take the place of the service formerly rendered by the fourth floor laboratory. We are fortunate to be able to get this service which will be continued on trial until July 1st. Your cooperation will be appreciated.

### 2. Emergency requests only:

will be honored by day technicians on night, Sunday and holiday services. Plan your procedures as far in advance as possible. This service recently organized is proving very successful. It is apparent that some of the hospital divisions do not appreciate the emergency character of night, Sunday and holiday assignments of the day technicians who voluntarily took on this additional duty at the interest of better laboratory service.

### 3. Report of committee on the Cost of Medical Care: is now out.

It may be obtained from your book dealer for \$1.50, from the University of Chicago Press \$1.60. Coming at this time it is receiving unusual attention. The indictment is obvious. We, the people, including the medical profession, have not kept pace with scientific progress in the wise and useful expenditure of our health budgets. Preventive medicine has not received the support it should from practicing physicians and has gone by default to public health agencies and the public. According to a recent visitor, "in good times, the majority of physicians are

disease-minded." Today, we are conducting an interest test. The first part of our program is concerned with tuberculosis as a "disease": The last part tuberculosis as a problem in "preventive" medicine. There is no criticism for maintaining interest in the first part. But to do so at the expense of the second part is an admission of "social" guilt. We are proud to report that Minnesota graduates Simons and Hilleboe (latter now with our pediatric group) have blazed the trail in showing how practicing physicians can be equally interested in "disease" medicine and "preventive" medicine. In these troubled times, security of the individual is the paramount consideration from his standpoint according to Director H. L. Dunn (Medical Six O'Clock Meeting, December 5, 1932). He is still looking to us for aid and assistance and we must not fail him.

BUY CHRISTMAS SEALS  
FIGHT TUBERCULOSIS

## II. CASE REPORT:

BILATERAL PULMONARY TUBERCULOSIS: RIGHT TUBERCULOUS EMPYEMA: THORACOPLASTY.

Path. Pearson.

Case that of white female, age 30, admitted to the University Hospitals 11/17/31 and discharged 12/4/31 (17 days); readmitted 2/11/32 and died 2/15/32 (4 days). Total hospital stay 21 days.

### Nursing

1923 - While in training to be a nurse, became ill for two weeks. There was a question of pulmonary tuberculosis, but she went back to duty and finished training. One uncle died of tuberculosis. No known exposure however.

1924 - Graduated and worked until March, 1925, doing private duty nursing.

### Tuberculosis

March, 1925 - Developed erythema

nodosum, examined by physician, who diagnosed pulmonary tuberculosis at this time. Had slight morning expectoration, felt tired, and lost some weight. No bloody sputum or night sweats. Went home and stayed in bed for about a month; then began graduated exercises; improved until spring of 1928.

Spring 1928 - Increased expectoration.

#### Hemoptysis (3-yr)

August, 1928 - Small hemorrhage. Went to bed, but was up for meals and bath room during winter of 1928 and 1929.

March, 1929 - Another hemorrhage of six to eight ounces. Strict bed rest advised also sanitarium care.

#### Sanatorium (4-yr.)

Oct. 6, 1929 - Admitted to Ottertail County Sanatorium. Diagnosis on admission pulmonary tuberculosis, bilateral, far advanced stage.

Jan. 1930 - Slight hemorrhage. Some improvement in February and March of same year. Decreased moisture in left chest. Sputum blood streaked latter part of March.

#### Pneumothorax (5-yr.)

Apr. 7, 1930 - Pneumothorax started. Pneumothorax result favorable until November, 1930, when effusion developed. Aspirated monthly with replacement of air.

May, 1931 - Fluid became cloudy.

#### Empyema (6-yr.)

August, 1931 - Pus developed, which has been difficult to aspirate. Last three attempts to drain (before leaving sanatorium) failed because of repeated plugging of needle with fibrin.

X-ray examination Oct. 1929, bilateral far advanced tuberculosis. Observations since that time at sanatorium show that lesion on left side remained entirely stationary. Sputum remained positive throughout this time. Had very slight daily rise of temperature during stay in sanatoria. Weight remained about stationary. No symptoms indicating any involvement of other systems.

#### Surgical service

11/17/31 - Admitted to University Hospitals to study advisability of thoracoplasty and evacuation of pus. Physical examination: very good nutritional state.

Somewhat short of breath on mild exertion. Marked sinking of entire right chest. Heart retracted to right. Definite rales in left apex (on several examinations). Examination of right side somewhat confusing. Rales present, considerable dullness, and signs of cavitation. Dullness, however, could be due to markedly thickened pleura, and signs of cavitation by encapsulated pneumothorax. Laboratory examinations: Urine negative. Hemoglobin 84%, white blood cells 6,100, polymorphonuclears 78%, lymphocytes 22%. Sputum positive for tubercle bacilli. Put on a general diet and strict bed rest. Temperature 101; pulse 80.

#### X-ray

11/18/31 - X-ray of chest: Left diaphragm moves fairly normally although it is somewhat restricted. Right diaphragm cannot be made out. Marked fibrosis on right side with retraction of whole heart and trachea well over to right. This appears to have occurred within past year as previous films do not show this displacement. There are several pockets of fluid and gas which may represent pockets of hydro-pneumothorax or may also represent cavities. Considerable fibrotic infiltration in left upper lobe at level of second and third interspace with a little extending into the apex. This appears to be a rather old process, probably healed. Conclusions: (1) Chronic lung fibrosis, right; (2) hydro-pneumothorax, right; (3) possible cavitation, right lung; (4) old fibrotic nodular tuberculosis, left upper.

11/19/31 - Thoracentesis done, and 5 cc. of pus withdrawn. Exudate rather thin. Second insertion in post-axillary line in fifth interspace, but no exudate obtained.

#### Against operation

11/25/31 - Medical consultation stated that consultant believed that indefinite postponement would be advisable and that value of thoracoplasty in presence of so much thickened pleura was questionable. Advised postponement of thoracoplasty until further observation. Vital capacity 700 cc. Conso red test 75% retained in blood.

Skiodan

11/30/31 - X-ray of chest: Films taken following attempted injection of skiodan into empyema cavity shows a considerable accumulation of skiodan in soft tissues just external to ribs. Appears to be some admixture of skiodan with fluid in empyema cavity. Appears to be very large size although definitely encapsulated and contains air at upper end. Vital capacity 700 cc (same).

Wait

12/2/31 - Further medical consultation: It is the final opinion that the risk for thoracoplasty at this time would be quite definite and risk would be lessened if patient is allowed to continue with sanatorium care for two months more with repeated aspirations of pleural cavity. At same time allowed some mild privileges. It is also thought that later a complete graded deribbing would be necessary. During stay in hospital, daily sputum averaged about 50 cc.

12-4-31 - Discharged and sent back to sanatorium.

Back (2 mo.)

2/11/32 - Brought into hospital in wheel chair. Considerable dyspnea. Vital capacity 725 cc. Laboratory examinations: Urine negative. Hemoglobin 90%, white blood cells 6,600, pmns. 69, lymphocytes 22, monocytes 9. She raised about 60 cc. of sputum. Pulse 102; temperature 99.

2/12/32 - Very cheerful. Raises about 50 cc. of sputum (same). Pulse 90, temperature normal.

X-ray

2/13/32 - Cod-liver oil, three times daily. X-ray - chest made in right decubitus position shows a large accumulation of free fluid in right thoracic cavity. Conclusions: Large pleural effusion, right. Very cheerful; raises 60 cc. of sputum.

Operation

2/15/32 - 11:00 A.M. local novocaine infiltration supplemented by gas. Upper stage thoracoplasty done. Ribs from one to seven inclusive removed. Very little bleeding. Blood pressure on return to floor at 12:00 M. was 68/40; pulse 156. Skin somewhat dry and cyanotic. 12:40, pulse 152; blood pressure 82/55. Intravenous acacia 500 cc. given. Ephedrine,

gr. 3/4. 1:30 P.M., intravenous acacia, 500 cc., was given. 2:30 P.M. intravenous 1,000 cc. of glucose (10%). Pulse 160; respirations 20. Taking fluids well. Morphine sulphate, gr. 1/4. Blood pressure 84/55. 3:17 P.M., condition changed. Systolic pressure 86. Caffeine sodium benzoate, gr. 7-1/2. Medical note: Blood pressure checked every one-half hour was between 96 and 88. Color, respiration, pulse remained poor. Suddenly became comatose, stopped breathing, and expired. Restorative measures applied. Intracardiac adrenalin, etc., but of no avail. 3:18 P.M. exitus.

Autopsy:Operation Wound

Body is well developed and nourished white female, measuring 176 cm. in length, weighing approximately 120 lbs. Very slight rigor. Slight hypostasis, purplish and posterior. No edema, cyanosis, or jaundice. Pupils 3 mm. each and regular. First stage thoracoplasty incision on right side, measuring 21 cm. in length. Multiple puncture wounds in both antecubital spaces.

Appendix?

Peritoneal cavity, no fluid. No evidence of infection. Normal and glistening. Appendix rather long, measuring about 14 cm. in length, and about 3/4 cm. in diameter. Very injected on peritoneal surface and looked as if there might be acute process present.

Pus adhesions

Pleural cavities : Diaphragm fourth rib on right and fifth on left. Left lung emphysematous and free from adhesions except at apex, which was adherent to old fibrotic lesion present in this place. Mediastinal structures quite fixed, and heart pulled over to right side. Trachea very markedly pulled over to right. Trachea lying almost in midline of right chest. Empyema cavity on lateral and posterior aspects of chest. Contained about 200 cc. of thick, cheesy, greenish material. Visceral and parietal pleurae very much thickened at this point. Also adhesions to diaphragm. Lung smaller

than normal.

### Tuberculosis

Heart 225 grams. Valve edges normal. Chambers normal. Coronaries normal. Left lung 475 grams. When cut across, there is an old healed? fibrotic tuberculous process in apex, measuring about 2 cm. in diameter, surrounded by a fibrous tissue with center somewhat necrotic. Otherwise lung was free of any involvement. Right lung, 475 grams. Great difficulty encountered in removing this lung as it was very adherent to diaphragm and chest wall, especially posteriorly and medially and also at apex. When bisected lung seemed very fibrotic. Large cavity in upper lobe, measuring about 3-1/2 cm. in diameter containing caseous material. Wall of bronchi very thick and show bronchiectatic dilatations. Bronchial system filled throughout with very thick greenish, tenacious, mucopurulent sputum.

### Spleen

190 grams. Capsule grayish and wrinkled. Pulp light red. Trabeculae prominent.

### Liver

1000 grams. Cut surface, showed moderate amount of cloudy swelling. No evidence of amyloid disease on gross test.

Gallbladder and ducts normal.

### Tuberculosis

Gastrointestinal tract in lower portion of cecum showed beginning tuberculous ulceration, also in middle portion of the transverse colon.

Pancreas and adrenals normal.

Kidneys 150 grams each. Capsules stripped easily revealing smooth surfaces and cloudy swelling. No evidence of any tuberculous process.

### Diagnosis:

1. Old healed fibrotic tuberculosis, left apex.
2. Tuberculous empyema, right.
3. Far advanced tuberculosis, right, with cavity (fibrotic).
4. Bronchiectatic dilatation (right).
5. Tuberculosis of cecum and transverse colon.
6. Cloudy swelling, liver and kidneys.
7. Recent first stage thoracoplasty

incisions (right).

8. Puncture wounds.

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### III. CASE REPORT

#### PULMONARY TUBERCULOSIS: TUBERCULOUS MENINGITIS.

Path. Pearson.

Case is of white female, 1 year old, admitted to University Hospitals, 5-16-32, expired 5-30-32 (14 days).

#### Fever, attacks

5-13-32 - Parents noticed child had fever and an attack of some sort in which eyes turned to right and right side of mouth twitched. Physician called. Temperature 102. At 6 o'clock another attack occurred followed by series of similar attacks at 3 or 4 minute intervals. Mother noted child was not using right arm or leg.

5-14-32 - Temperature 101.

#### Spinal tap

5-15-32 - Temperature down to normal but attacks coming more frequently. Spinal tap done. Cell count 30, fluid under pressure, excess of sugar, Nonne trace, no bacteria found. Physician described attacks as Jacksonian in character. Left cheek twitches, eyes turn to right.

#### Admitted

5-16-32 - Admitted to University Hospitals. Physical examination shows well-developed, well-nourished, white, female child having some difficulty with respiration. Turgor - good. Extremities - right leg and arm spastic. Reflexes - patellars accentuated bilaterally. Lungs - respirations difficult, pulse rate 154.

#### Exposure?

Additional note: Grandmother and grandfather had tuberculosis, father's sister died of tuberculosis. Laboratory: Urine - negative. Blood - Hb. 56%, rbc's 3,980,000, wbc's 9,000, Pmn's 64%, L 34%,

M 2.

Tuberculosis

5-17-32 - Spinal fluid - clear, colorless, normal pressure, Noguchi negative, cell count 3 to 5. Mantoux test - strongly positive in 24 hours. X-ray of chest and wrists - Area of increased density in left lower lobe which is strongly suggestive of primary tuberculosis. Possibility of early pneumonia must also be considered. Some flaring and cupping of distal ends of both ulnae and to a lesser extent of radii, indicating mild degree of rickets. Conclusions: Mild rickets. Probable primary tuberculosis, left lower. Possible pneumonia, left lower. Nasal oil with ephedrine 3 times daily. Continuous steam. Temperature 100.1. Pulse 140. Respirations 44. Breathing somewhat labored.

Convulsions

5-18-32 - X-ray of chest - Reexamination of chest shows definite shadow in left base just beyond margin of heart. This may represent primary tuberculous focus or bronchopneumonia, probably the former. Conclusions: Probable primary tuberculous focus, left base. Very restless. Medical note: 4:45 A.M. - Convulsions for past half hour. Seizures decreased in severity after administration of 10 grams of chloral hydrate. Assumed characteristic appearance of carpopedal spasm during attacks.

Worse (10th day)

5-23-32 - X-ray of abdomen - Owing to marked distension of stomach and bowel, examination of abdomen unsatisfactory. No definite evidence of calcification. Spinal tap - 89 cells, 87% L, 13% Pmn's. Condition very poor. Convulsions at times. Chloral hydrate necessary. Urine - negative. Blood calcium - 10.701. Boric acid irrigations to both eyes, 4 times daily. Cries very much. Twitching of right side of face.

5-27-32 - Very active with left arm and leg. Chloral gr. x (R) given times 3. X-ray of chest - Infiltration again shown in left base, and has not changed since the last examination.

Exitus (17th day)

5-30-32 - Respirations very rapid and shallow, 60 to 65 per minute. Rigid and unable to bend right arm. Temperature

105.6. Unable to swallow. 12:50 P.M. - Temperature 108. Abdomen very distended. Cheyne-Stokes respirations. Gradually becoming weaker. 1:35 P.M. - Patient expired.

AutopsyWell Nourished

Body is well-developed, well-nourished white, female child, about one year of age, measuring 68 cm. in length, weighing approximately 20 lbs. Rigor present. Hypostasis is purplish and posterior. No edema, cyanosis or jaundice. Pupils regular, each measuring 3 mm. in diameter.

Nothing of note found in Peritoneal Cavity. Peritoneum free and glistening. Appendix retrocecal and free.

Pleural Cavities contain no fluid or adhesions. Pericardial Sac minimal amount of fluid.

Heart weighs 70 grams. Valve edges are free and normal. Chambers are normal. Myocardium quite firm. Root of the Aorta and coronaries normal.

Tuberculosis

Right Lung weighs 110 grams, Left 75 grams. Nothing in right lung except congestion at base. On left side, however, there is a strip along cardiac portion of lower lobe which is quite firm, and on cut section shows small conglomerations of tubercles. These are quite recent and are not calcified.

Spleen 50 grams. Capsule grayish and wrinkled. On cut section, pulp is dark red.

Liver weighs 400 grams and shows a slight amount of cloudy swelling.

Gall-bladder, Gastro-Intestinal Tract, Pancreas and Adrenals normal.

Kidneys 50 grams each. Capsules strip easily revealing lobulated surface (fetal lobulations). On section, there is cloudy swelling. The Bladder seems normal.

Head. Calvarium and dura appear quite normal. When brain is removed, however, some turbid fluid is found in cisternae. When base of brain is inspected, the surface of pia arachnoid is studded with small, whitish nodules; some of these are larger and extend into fissures at base, the largest measuring about .5 cm. in diameter. Most of

this process is present at the base of the brain but some extends into other portions of the brain also.

#### Diagnoses:

1. Pulmonary tuberculosis, left lower.
2. Tuberculous meningitis.
3. Cloudy swelling of liver and kidneys.
4. Fetal lobulations of kidneys.

distinct races.

17. 1898 First tuberculosis clinic established (New York City).
18. 1900 Nageli showed that most adults have healed tuberculosis.
19. 1903 Osler introduced first tuberculosis nurse (Baltimore).
20. 1903 Rollier opened his first heliotherapy clinic (Leysin).
21. 1904 Holboell introduced Christmas seal in Denmark.

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#### IV. ABSTRACT:

##### THE CHILD AND THE TUBERCULOSIS PROBLEM.

Abstr. Koucky.

C.C. Thomas, Springfield, Ill.  
 (Oct.) 1932.

#### Landmarks of Progress:

1. Evidence of tuberculosis can be found in mummies.
2. 400 B.C. Hippocrates first described phthisis.
3. 1689 Morton found that phthisis is preceded by tubercles.
4. 1819 Laennec invented stethoscope and developed diagnostic methods.
5. 1859 Brehmer established first sanatorium for tuberculosis.
6. 1865 Villemin proved disease due to some specific virus.
7. 1855 Pasteur laid foundation for science of bacteriology.
8. 1882 Koch discovered tubercle bacillus.
9. 1882 Forlanini first practiced artificial pneumothorax.
10. 1885 Trudeau established first sanatorium in U. S.
11. 1887 Biggs published first circular.
12. 1888 Cornet showed that tubercle bacilli are spread by expectoration of careless consumptives.
13. 1892 Flick organized first tuberculosis Association (Pennsylvania).
14. 1895 Roentgen discovered x-ray.
15. 1897 Biggs, N.Y.C. Department of Health required reporting of tuberculosis.
16. 1898 Theobald Smith showed that bovine bacillus and human bacillus are

22. 1904 National Tuberculosis Association organized (Atlantic City).
23. 1907 Pirquet perfected tuberculin test.
24. 1907 Miss Bissel introduced Christmas seal in America.
25. 1908 First open air school (Providence, R.I.).
26. 1908 Sixth International Congress on Tuberculosis (Washington) gave direction to movement.
27. 1909 First preventorium (Farmingdale, N.J.)

Titles from Chart - Tuberculosis Landmarks of Progress - Courtesy National Tuberculosis Association.

#### Communicability vs. Inheritance of Tuberculosis:

Ancient belief - Some indications that people prior to Greeks considered tuberculosis communicable (apparently abandoned later). Greeks - consumption is universal disease due to heredity and non-preventable. Romans - somewhat communicable. Galen (131-201 A.D.) - danger in being extremely intimate with those who suffered from tuberculosis. Sylvius (1614-1672) - air expired by consumptives was carried to others especially relatives; they were finally infected and also fell into phthisis.

Early Spanish Law: 1751, Imposed fine for failure to report cases of tuberculosis.

Italian laws (30 years later) im-

posed similar fine, and in addition required destruction of contaminated material, tearing out and replastering infected house from cellar to garret, carrying away and burning wooden doors and windows and putting in new ones, and provided that these newly rebuilt houses not be inhabited within one year afterward.

#### Early proofs of communicable nature:

1789, Kortum injected pus from scrofulous patient into neck of boy but failed to introduce disease. 1843, Klencke reproduced disease in rabbit. 1865, Villemin confirmed this work and carried it out further. 1882, Koch proved beyond doubt that tuberculosis was germ disease.

Belief in inheritance: In spite of complete proof of infectious communicable nature of tuberculosis, idea is still prevalent, particularly among laymen, that tuberculosis can be inherited. Experimental work in animals shows that this belief is obsolete. A few cases of congenital tuberculosis are on record, bacilli gaining entrance into the body of the unborn child through tuberculous disease of the placenta.

#### How Tubercle Bacilli Enter Bodies of Children:

##### Types of tubercle bacilli:

Human - most commonly found in human beings but is capable of producing disease in lower animals. Bovine - most commonly found in cattle but also in swine and other domesticated animals, and can definitely produce disease in human beings. Avian - most frequently found in birds, domestic fowls, English sparrow and birds around barnyards. Can be transmitted to cattle, and particularly swine. In Europe, avian bacillus has been believed to produce disease in men. Recent evidence does not confirm this belief. Note: Recent experiments try to connect avian bacilli with Hodgkins??

##### Source: Tuberculosis carriers:

While infant in first years of life has only few associates, they are usually very close. If one of these intimates is suffering from tuberculosis, there is usually massive transmission of germs from patient to infant. Not all persons with tubercle bacilli in sputa are ill

themselves. In other words, they are tuberculosis carriers (in broad sense). Such carriers may be in perfect health and the fact that they do have tubercle bacilli in their sputum has been brought to light through the death from tuberculosis of the infant. Active tuberculous individuals: includes groups of older children or adults who have either not taken time to be examined or are under impression that they are only suffering with such a disease as cold or bronchitis. These two groups of patients include parents, other children in family, grandparents, other relatives, nurses and other individuals.

Sputum contacts: Infected sputum from street may be brought into the house from the soles of shoes, flies.

Food infection: Milk because it is chief food supply of young infant becomes greatest source of tubercle bacilli. Milk may be infected not only from tuberculous cattle from which it is obtained but also subsequently by tuberculosis carriers or open cases of tuberculosis. Later in infant's life, raw foods such as vegetables may have been contaminated by tuberculosis carriers or patients. As the child becomes older, all above possibilities of contact increase because of increased range in child's activities. In school, contacts become much more numerous.

Portals of entry: Numberless possibilities of contaminated food, childhood habits of placing foreign bodies, fingers, and various other articles into mouth, kissing and fondling infants, etc. make most common portal of entry during infancy and childhood probably than through the alimentary tract.

Respiratory Tract: Obviously tubercle bacilli are taken into body by way of air passages in infants but since this tract is so constructed foreign material is deposited in upper air passages and only small percentage enters lung directly, this mode of entry is probably not as prominent as above. Possible portals of entry are also mucous membranes, eyes and skin.

Attack upon Body: (Calmette's theory)

Most tubercle bacilli are taken into body by way of digestive tract, pass through mucous membrane, are ingested by white blood cells. These cells circulate in blood stream for a while and lose their vitality in short time because of tubercle bacillus within it, and are surrounded by clumps of other white blood cells. This small clump of white blood cells eventually lodge in capillary in some portion of body.

Site of lodgment - Usually in capillary of lung because it is most efficient in filtering out such small emboli but it may lodge in any other part of the body, such as bones, lymph nodes or meninges.

Nature of first infection:

Probably at no time in entire span of human life is the body better able to control germs of tuberculosis than during infancy and childhood. Filtered out tubercle bacilli cause formation of tubercles without necessarily producing any manifestation of disease. This theory is markedly in contrast with teaching of quite recent times that tuberculous disease in infancy is highly fatal. Physical examination or x-ray examination frequently cannot detect first infection. Biological phenomena of allergy is only test delicate enough to indicate presence of first infection. Tuberculin test is one of the most accurate tests ever discovered by man may be truthfully said.

Incidence of infection:

<u>Inves- tigator</u>	<u>No. of exams.</u>	<u>Location of work done</u>	<u>% of Positives</u>
Barchetti (?)	?	Europe (11-14) Vienna (11-14)	58 94
<u>Armstrong</u> (1919)	?	Mass. (6-7)	33
<u>Ferguson</u> (1922)	?	Canada (6-14)	56
<u>Peiser (?)</u>	?	German cities (school age)	65

Veeder (1915)	?	St. Louis (children)	50 (less)
Myers	10,000	Minneapolis (school age)	50 (slight- ly less)
Slater (1924)	1,654	Rural commun- ities of Minnesota	10
Chadwick (1930)	42,000	School child- ren of Minn.	28
McCain (1929)	25,000	" " "	23 (white 22% ) (colored 27%)
Rathbun (1927)		Cities -Minn. Country - Minn.	41 25
Broker (1931?)	160	Minnesota	.6 (country)

Statistics vary great deal depending upon locality. In Philadelphia, 73% positives found in one section of city and 90% in other. In Massachusetts 11% found in one section of a city and 60% in another. Variation depends entirely upon the number of exposures which in turn depends upon sanitation, crowding, etc. in particular areas tested. These statistics show marked variation from the ideas of childhood infection formed largely between the years 1910 and 1915. At that time, it was standard impression that 100% of all children between 10 or 12 had been exposed to tuberculosis. Recent statistics indicate that less than 50% of the children at the present have such infection. In certain isolated areas, the percentage is less than 1.

Tuberculosis in Infants and Children:

Pathogenesis: As stated above, after tubercle bacilli enter body of infant, they find lodgment in any portion, but particularly in the lungs, lymph nodes, bones, joints in that order of frequency. In lung where course of disease in the infant may best be studied, tubercle may be so

small that none of usual methods of examination may detect it. On other hand, bacilli may multiply and produce inflammatory changes in tissue so definite that they cast shadows on x-ray film. These shadows may be found in any area of lung. Soon thereafter, tubercle bacilli are carried from the inflammatory area in lung to lymph nodes in region of root. Nodes then become infected. This constitutes usual childhood type of tuberculosis in active stage but these lesions usually undergo retrogression. Fibrosis and calcification occur (Ghon tubercle) in lung parenchyma and calcification of hilum nodes. These fibrous or calcified lesions, however, are not healed lesions. Very many of these show some activity histologically and constitute menace of renewed activity as long as patient may live. Throughout entire course of development, there may be no symptoms that can be attributed to tuberculosis.

#### Result of childhood infection:

Childhood infection may not be demonstrable by any of methods of physical examination but is always demonstrable by biological means, i.e., tuberculin reaction. Patient has therefore acquired allergy. This allergy is not protective. It bestows no immunity. On the other hand, infant has acquired a sensitivity to tuberculosis.

#### Reinfection:

Subsequent introduction of tubercle bacilli into body takes same course as bacilli first introduced. May lodge in lungs, lymph nodes, bones, joints, etc. Patient now however has sensitivity to tuberculosis and reinfection, providing it is massive enough, produces a grave and destructive type of disease in area where bacilli have lodged. This is known as adult type of tuberculosis, involving lungs, bones, lymph nodes, meninges, etc. The secondary infection may occur also from breaking down of primary focus which constitutes endogenous reinfection. Primary infection or childhood type of infection may occur at any age, i.e., an individual of 20 who has previously had a negative tuberculin resection and receives dose of tubercle bacilli will have same form of disease as infant. The adult or destructive form of tuberculosis are considered to be always a reinfection in individuals who have already had the pri-

mary or childhood type of infection.

#### Tuberculosis in Teen Age and Boys:

Studies of this type over long periods of time in same individual appeared to lead conclusively to belief that it is destructive type of tuberculosis resultant from a reinfection in patients who have already been made sensitive and susceptible by a previous childhood type. Studies by Rathbun and those at the Lymannhurst School indicate that 50 to 75% of tuberculous teen age individuals show evidence of childhood infection in lungs alone. In remaining group primary focus probably is extrapulmonary in lymph nodes or other parts of the body or else is so small that it cannot be detected by x-ray at the time the secondary or adult form develops. Whereas infant with primary infection nearly always heals without symptoms, the adult form or secondary type presents a different picture. It frequently causes symptoms, such as fever, etc. and has stronger tendency to progress than to heal. Onset, however, may be very insidious and the course may be extremely rapid and fatal. In 1000 New York City school children (13 to 14 years) study by Bernard and Amberson conducted with idea of showing what type of child may be considered as susceptible to this adult type of tuberculosis. The following conclusions were drawn:

1. There was no one sex, age, ratio or economic group that could be separated out. The customary indices of economic and social status gave us no reliable clue.
2. No prediction from the state of general health could be made.
3. Only 12% of those infected fell in the class of children 10% or more under weight.
4. Contact exposure is difficult to trace because of the large number of contacts.
5. The only conclusion which could be drawn was that the tuberculin test was the only method available to separate out the possible susceptible cases.

In this group of 1000 children, there were 489 who had positive tuberculin tests. Of these, 184 had demonstrable lesions by physical examination and an additional search uncovered 107 other cases that were in need of supervision. Therefore using the tuberculin test as criterion for the necessity of continuous observation, 107 additional cases were discovered. In the 178 cases which were uncovered by physical examination, 71% were so far advanced that they had already lost their best chance for recovery. (physical examination including x-ray studies).

Treatment of tuberculosis in the teen age: Emphasis is laid on the general feeling which has developed among the profession that pneumothorax should be carried out at once. Mortality in this teen age group is much higher among girls. Of 178 cases, 6.2% of deaths were boys, 18.5% were girls. In review from 1870 to 1920, a similar higher rate among girls has been present, indicating that the higher girl mortality is not due to present fashions of dress, diet, etc.

#### Control of Tuberculosis in the Teen Ages:

Two factors are necessary for the control of tuberculosis in children:

1. Recognition of communicable nature of disease.
2. Changes in attitude of institutions toward tuberculosis.

The idea that there is nothing to be done about the control of tuberculosis among children and that a certain number will be stricken each year is obsolete. Tuberculosis may require repeated re-infection, and intimate contact with source and sometimes several years or months for the development of the disease after the contact but it is nevertheless as communicable as typhoid, diphtheria or syphilis. Opie studied disease in husband and wife and approximately 50% of consorts develop it later.

Schools, colleges, factories, etc. are in the most ideal position to contribute to the control of tuberculosis. The old attitude has been to take care of such patients as had fallen ill with tuberculosis. Each year in such institutions enough money is expended for the care

of tuberculous patients who had fallen during that year to provide adequate funds to bring the disease under control. At University of Minnesota (current year), 7 cases of active tuberculosis have been diagnosed. The approximate cost to the state for the care of these patients is \$7280. If in contrast to this system, money is expended to examine all individuals completely on their first admission to the institution and discovering by this method such cases as are either developing tuberculosis or are susceptible to it, and placing them under observation, the saving is much greater than under the previous method. If only one case is discovered in 500, the economy of the method is sound. In addition, economy of preventing such individuals becoming in the future sources of contamination to others is inestimable.

#### Finding Tuberculous Children:

It is the belief that every case of tuberculosis results from exposure to another case. The work of Drolet (N.Y.C. Dept. of Health) is presented. His work consists of the examination of 50,000 individuals who have had contact with certain cases of tuberculosis and who therefore were possible sources of infection to others. N. Y. City 14,000 examination, 5% were found to have tuberculosis. In Chicago in 10,000 examinations, 5.6% were positive. In London in 26,000 examinations, 5% were positive.

To find all children infected with tuberculosis in any community and to properly follow-up the cases for sources of exposure, a certain program is necessary:

1. Interest and cooperation of the medical profession must be secured.
2. The nurses of the community must be interested.
3. Cooperation of public must be obtained. Prejudices and misinformation must be overcome.
4. Intracutaneous tuberculin test is applied to every child whenever permission is obtained.
5. Those children reacting positively must have x-ray examinations.

6. The results must be classified according to negative tuberculin, positive tuberculin with no x-ray findings, positive tuberculin with x-ray findings. This last group can be subdivided into those showing the first infection or childhood type and those with adult type.

7. The source of exposure in every case must be followed through so that these sources of infection are removed to prevent further spread of the disease.

8. Proper disposal and treatment of cases with positive tuberculin reaction and demonstrable tuberculous disease.

9. In 6 months, or not later than one year, a resurvey is done and this includes all those who have reacted negatively and those born since the last examination and those who have recently moved into the community, in addition to those who had positive tuberculin previously.

This type of survey as outlined above is considerably different from the tuberculosis clinic to which large numbers of patients came on appointed days for physical examinations. The number of examinations done during these clinics was so great that the examination necessarily had to be very brief. Evils resulting from this clinic were that a great many cases were undiagnosed, and the laymen received the impression that very brief examination without the aid of tuberculin testing or x-ray examination was all that was necessary for accurate diagnosis.

#### Disposal of Cases Examined for Tuberculosis.

Child with positive tuberculin and no demonstrable finding: The question that arises is "What shall be told to parents?" The child may never develop clinical disease at any time. "Should the parents be made to worry?" The answer suggested is that all the contacts of this child should be examined to remove the source of the infection if possible and explain to parents the value of the warning signal. In the treatment of the active childhood type or in the treatment of the adult type in addition to the usual measures of treatment, 2 things are emphasized:

1. The isolation of the patient whenever he is giving off tubercle

bacilli in the same manner that every communicable disease is isolated.

2. The tracing of the source of infection and removal and isolation to prevent further spread or further reinfection.

#### Some Strongholds of Tuberculosis:

By strongholds of tuberculosis are meant groups of individuals in whom a high percentage of tuberculosis is found. A few groups of this type are taken as examples to emphasize the communicable nature of tuberculosis.

1. Recently civilized people, natives of South Sea Islands, Indians, Africans and negroes are given as examples of individuals in whom a high percentage of tuberculosis exists. These people originally had no tuberculosis and the disease spread in proportion to spread of civilization. I It had been belief that this spread of tuberculosis indicated the lack of resistance on part of aborigines. It appears however that the habits of these people, i.e., their intimate contact with each other, the habits of living in crowded quarters, absence of all hygiene and sanitation, ignorance of communicability of disease, provides true explanation for the rapid spread of the illness among these groups. Resistance of these types of people probably no less than that of any other group.

2. Nurses. Heimbock in Oslo showed that approximately 12% of the student nurses developed clinical tuberculosis. Whitney in 1928 showed that the incidence of tuberculosis among nurses in training is approximately 1/3 higher than among women the same age in general population. He also pointed out that 54% of all nurses aided by relief fund of American Nurses' Association have tuberculosis. In nurses between 21 and 30, 3/4 of the disabilities are due to tuberculosis. Other statistics: Britton showed 2.2%, Shipman 2.1%, Geer 5.5%, Meulengracht 5 or 6%. Braeuning showed 53% of nurses with tuberculosis had previously nursed tuberculous patients. Conclusions to be drawn are that nursing of tuberculous patients is distinctly

dangerous occupation. It illustrates again the communicable nature of the disease.

### Controlling Animal Tuberculosis:

History: Koch 1890 used tuberculin as test for tuberculosis of guinea pigs. Gutman 1891 of Russia used this test to determine disease in cattle. In same year, Pearson (University of Pennsylvania) introduced tuberculin for animal testing in America. 1892 report from this institution advocated use of tuberculin as diagnostic agent in cattle. 1916, National Campaign begun. An attempt was made to control animal tuberculosis. 1918, Congress appropriated \$500,000.

The appropriations have gradually increased so that in 1930 \$6,361,000 had been appropriated which was increased by state and county appropriations to over \$12,000,000. The program of animal control as it exists at the present time consists of 100% tuberculin testing of cattle where legal permission is obtained with destruction of all the positive reactors.

Results: Minnesota - The reduction of positive reactors has been from 6% to .38%. Wisconsin - on first test, there were 2.8% positive reactors, three years later .4%, third retest only .15%. Avian tuberculosis - Van Ess and Martin (University of Nebraska) give following conclusions:

1. The avian strain of bacillus tuberculosis may be a cause of tuberculous disease in cattle.
2. Avian tuberculosis of bovine animals is found only in solitary lymph node group.
3. All generalized tuberculosis in bovines is due to the bovine type.
4. The avian strain infection may confuse the interpretation of tuberculin test results in cattle.
5. In 227 cases of human tuberculosis no evidence was encountered which would tend to implicate the bacillus of avian tuberculosis as a cause of the disease in man.
6. It is not apparent that avian tuberculosis is important as a menace to public health.

The veterinarian is able to demonstrate the accuracy of the tuberculin test since he conducts postmortem

examinations on the reacting cattle, and confirm the presence of tubercles.

### Driving Tuberculosis from its Stronghold among Families:

Communicability of tuberculosis is best demonstrated by infection within family. Lampson found 67% infected individuals in families where open cases of tuberculosis existed, in contrast to 2.5% incidence in families where there is no tuberculosis. Slater's figures show 5% infection where there was no history of exposure in contrast to 80% with definite history of exposure was present. Opie found practically 100% members of family who are exposed over considerable periods of time have tuberculosis. In the study of family histories, it has been shown that close association and not blood relationship is the controlling factor. Members of family who have spent little time in home group usually escape infection. In some family histories, the possible source of exposure appears somewhat remote. For instance, the relative ill with tuberculosis may have died before the patient's birth. On investigation, however, there has been an intervening case of tuberculosis which was unsuspected.

City of Minneapolis, Department of Health tires to make a survey within the family of every reported case of tuberculosis. This for the purpose of bringing to light and isolating all the sources of the disease and preventing further spread. In the first 3 months of 1931 by such studies, 50 unsuspected cases of tuberculosis were brought to light. It has been found that tuberculosis among elderly people runs a particularly mild course and often does not arouse any suspicion of the disease but may be a source of exposure over long period of time.

### Driving Tuberculosis from its Stronghold among Nurses:

It has been shown by Heimbock's work in a group of 400 student nurses that 52% on admission to the training

were negative but thereafter practically all became positive to the tuberculin test. They were infected with tubercle bacilli during hospital residence. It is thought that if the hours are not too long then the work itself is not a significant factor. Poor ventilation and overcrowded living quarters are important only in so far as they result in close contact with contagious individuals. Entrance examinations including x-ray and tuberculin tests should be done on admission. Re-examination should be done every 6 months. Those cases reacting positive to tuberculin should be examined much oftener and followed and classified according to the standards previously described. These statistics indicate that the technique of isolation as usually carried out in regard to tuberculous patients is inadequate and that the disease must be considered as fully communicable as typhoid or diphtheria. The recommendation is made that routine examinations of every patient applying for admission to a hospital should be made. This should include, in addition to the ordinary physical examination of the chest, an x-ray film. This will usually reveal lesions which are extensive enough to be of danger to others. This practice has already been put into effect in certain institutions and more than justifies the additional effort and expense on the part of the hospital.

#### An Outstanding Example of Attempts at Control in a Rural Community.

The work of Drs. E. J. Simons and H. E. Hilleboe (our staff) has demonstrated that the principle as outlined above can be applied in a rural community by industrious physicians. In the village of Swanville, there was a sharp increase in incidence of tuberculosis following epidemic of measles. By putting into practice the methods of control which have been recommended, these 2 physicians uncovered 19 cases of tuberculosis within a small country community. Isolation of these patients in a sanatorium or at home was possible. In addition, a survey of all the cattle in the county was made and tuberculin testing of the grade and high school students was done. 20% of reactors to tuberculin were found. These were x-rayed and 11% of these patients

were found to have demonstrable lesions and were placed under observation. A total of 18 infected cows was found which were supplying cream and other dairy products to the community. This work is an example of what can be done in a rural community.

#### Prevention of Tuberculosis among Non-Tuberculous Children:

All individuals, in light of the classification of tuberculosis as outlined above, can be put into 3 groups, i. e., the clinical tuberculosis, the cases of positive tuberculin but no clinical tuberculosis, and those with negative tuberculin. It is known that in the first group, those with clinical tuberculosis, over 3/4 of the cases are so far-advanced that they have lost their best chance for cure (see first case). In the group with positive tuberculin but without clinical tuberculosis, the work is already handicapped because these individuals at any time may develop the adult form which is destructive and often fatal. The last group, those without positive tuberculin, presents the most hopeful group of children in which prophylactic work may be done. School teachers should have a compulsory periodic health examination. Maintenance of health of non-infected cases is essential and based on an adequate and proper food supply. School feeding not only supplements the child's diet but teaches the children the fundamentals of a proper diet. Health fads which frequently produce an inadequate diet will be overcome in this manner. Teaching should be done regarding the excesses of so-called fresh air. Fresh air is like fresh milk and fresh water, neither of which are fit for human consumption unless properly safeguarded. Smoke, pollens, excessive cold, excessively dry or humid air, etc. may be harmful. In the future, buildings should be constructed with non-adjustable windows and provided with mechanical ventilators which heat, moisten or dry and cleanse the air and keep it in circulation. In the same manner, excesses of exercise must be conditioned. Energy

conservation is as significant as proper exercise. Rest periods must be given whenever they are indicated.

Vaccine BCG (bacillus Calmette-Guerin). The result of this vaccination is being investigated. The League of Nation Health Committee has appointed 3 commissions to study the effect of the vaccine. The results of these commissions so far is the report that some immunity is established by the use Calmette's vaccine but they state that the remote effect and result can be estimated only through careful observation of as many cases as possible in those treated over a long period of time. It would appear that there is nothing of a specific nature in the vaccine and the results are questionable and that the dangers which may result are important. It appears that the defense of the BCG vaccination rests upon frail and insecure basis.

#### The Program for the Future:

The solution of the problem in the future lies in the understanding and application of the present knowledge, namely:

1. Infection can be detected by the tuberculin test (like the Wassermann reaction for syphilis).
2. Infection always exists before clinical disease appears.
3. Childhood type of tuberculosis develops from first infection.
4. This type is generally well controlled in childhood.
5. Yet this type prepares the way for adult disease.
6. The adult is the highly destructive type of tuberculosis. Therefore proper treatment of first infection of childhood tuberculosis must be instituted.

Comment: We point with pride to the work of Arthur Jay Myers and his associates. The University of Minnesota unusually forceful in leadership truly represents our great state. No university is so willing to test knowledge, draw conclusions, bring to its people the results of its investigations. Minnesota graduates everywhere and those who join us from time to time in our work should remember this remarkable spirit of

Minnesota which is our heritage. Minnesota graduates at all times should be conscious of their obligation to the social order so well emphasized by the work of Arthur Jay Myers in the problem we have reviewed today.

#### V. MEETING:

Date: December 1, 1932.

Place: Interns' Lounge, 6th Floor, West Building.

Time: 12:15 to 1:30.

Program: Carcinoma of Stomach,  
Spontaneous Perforation,  
Peritonitis:  
Pneumonia, Lung Abscess.

Present: 91

Discussion: Leo G. Rigler  
Henry L. Ulrich  
Jacob Sagel  
Owen H. Wangensteen

Theme: First Case: First examination 7/31/32. Stomach shows a very large irregular filling defect involving between 1/2 and 1/3 the distal portion. Trace of barium goes through involved portion. Stomach above this point appears normal. Chest films taken to demonstrate possible metastasis but none found. Next examination of stomach done in August shows resection of distal half. Anastomosis functioning very well. October, 1930 (14 months later) after he had started to have recurrent symptoms. At this time again demonstrated gastric resection with anastomosis functioning very well; however, there is some irregularity in region of anastomosis with some areas of defect which we interpreted as recurrence of carcinoma. Last film chest after second operation, at which time he shows signs of pneumonia at both bases. J.S.

Long histories of carcinoma of the stomach generally accepted. Whether patient has ulcer or carcinoma through this period is difficult to determine as they may have something

else (gastritis?). I don't think that long histories of patients suggesting an ulcer necessarily mean degeneration into cancer. Wish to emphasize again value of examining stool. Blood in stool is always alarming symptom. Question of cause of ulcerative lesions is very important. Our error here is from the opposite side, i.e., interpreting benign ulcers as malignant ones. Adequate x-ray examinations, and putting patient to bed with rest and rigid diet for two weeks should always be done in gastric ulcer thought to be benign.

L.G.R.

Many years ago the statement was made that by time clinicians made a diagnosis of carcinoma it was too late, and so far as the x-ray examination is concerned it did not make any difference. Carcinoma of the stomach is such an insidious thing that I wish to emphasize that even a physician working with x-ray overlooked carcinoma of the stomach in himself. One can get ulcer pictures with healing and still have carcinoma. There will always be a small percentage that slip by no matter how accurate our roentgenologists and clinicians are.

H.L.U.

Wish to comment on a few of the points brought up here. Discussion of relationship between ulcer and carcinoma started many years ago. Prominent pathologist made the statement that about 68% of carcinomas were associated with ulcer. That statement was interpreted in various ways. Since then additional studies made at Mayo Clinic. No more than 3% show definite relationship between ulcer and carcinoma. Just because patient has a "history" of ulcer does not prove relationship. No one today makes diagnosis of ulcer on basis of history alone. In many reports this is only evidence of previously existing ulcer (our reports from literature today). Putting a patient on a period of trial for two or three weeks for ulcer are advised. 23% of the cases came to autopsy without any visible

metastasis (see note). More important to try to diagnose condition at time when patient can still be operated upon. In our group of 140 cases average age (60 years). Length of history has been divided roughly into two periods: long and short. By the short history, most mean under one year; long history, one year or more. Carcinoma of the stomach is curable by radical surgical operation with high but justifiable surgical mortality. Early diagnosis and prompt recourse to treatment important. We should be less pessimistic about the condition and make an effort for earlier diagnosis.

J.S.

Complimented Dr. Koucky on manner in which he assembled this material. Attended a meeting in St. Louis recently. Men came to report five year results in cancers of all sorts. Interesting that many who are very well known in surgery had few cases of carcinoma of the stomach who survived five years. 1891 first successful case reported. Improved methods of diagnosis mean surgery can cure more cases. No classical picture which points to carcinoma of the stomach. Believe we should demand a diagnosis rather than treat dyspepsia, and have our patients examined by good x-ray man. Surgical mortality undoubtedly represents in a measure the training of surgeon.

Gertrude Gunn  
Record Librarian

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BUY

CHRISTMAS

SEALS

- - -

NIGHT

TUBERCULOSIS