

REPORT ON THE KOCH TREATMENT IN TUBERCULOSIS.

The fluid was received from Dr. J. S. Billings on the evening of the 11th of December. Dr. Welch gave the necessary directions concerning the preparation of the 1 per cent. solution, and, in the afternoon of the 12th, the first injections were made in the presence of the consulting staff and the class of graduate students.

A uniform plan of procedure has since been followed. The injections are given in the morning and observations are taken of pulse, respiration, and temperature, every two hours, day and night. In the pulmonary cases the daily amount of sputum is estimated and cover-slips made each day to examine for bacilli.

REPORT FROM THE MEDICAL CLINIC (PROFESSOR OSLER).

(a) *Pulmonary Tuberculosis.*

As far as possible, cases were selected which we had had under observation for some time, and which presented well defined but limited lesions, without extensive cavity formation, septic fever, night sweats or other evidences of advanced disease. No case has been treated out of the Hospital wards.

At present 11 cases are under treatment and 7 are undergoing the preliminary study of a week or ten days before beginning the injections.

We propose, from time to time, to report in full the progress of the cases in such a way that readers can draw their own conclusions as to the value of the method in pulmonary tuberculosis. The cases have been under the daily supervision of Dr. Lafleur, and Drs. Reese and Hoch have made the observations on the secretions. Miss Richart and Miss Miller, the head nurses of wards F and G, are responsible for the careful temperature records.

CASE 1.—Andrew D., aged 31, was admitted to Hospital on the 21st of June, 1890, with a history of acute illness lasting for three weeks. He had dullness in the left mammary region and signs of rapid breaking down of the lung tissue. The case was believed to be one of abscess, and portions of the third and fourth ribs were excised and an attempt made to reach the cavity. The lung, however, collapsed and a pleurisy followed. The patient made a satisfactory convalescence, but when he was transferred to the medical wards, it was found that he had tubercle bacilli in his sputum, and the signs of softening were well marked at the left upper lobe. His general condition, however, was good. He gained in strength and he left the Hospital Sept. 27th. He was readmitted October 25th, suffering with shortness of breath, and a pain in the left side. The operation wound had healed entirely and left a depression between the second and fifth ribs, at the lower edge of which, the cardiac impulse could be plainly seen. Weight on admission 140 pounds. He has had at intervals chills and fever. T. on admission 99°.

Physical Signs.—On the right side, no adventitious sounds. Left, impaired resonance in infra-scapular region; dullness from second to fourth rib. Lower axillary region clear; upper, resonance defective; behind, defective resonance to spine of scapula; clear at base. Above left clavicle, feeble tubular breathing with moist râles. Infra-clavicular region; feeble breath sounds with sharp crackling râles; pectoriloquy marked. Loud, almost cavernous breathing in third interspace, with resonant râles. Moist sounds, in upper axilla. Moist sounds, with feeble breathing, at left apex, behind.

Sputum purulent, inclined to become nummular; tubercle bacilli in moderate numbers, and elastic tissue. During his stay in Hospital throughout November and early part of December, his T. range was from normal to 101° and 102°. He had several chills, in which his temperature rose to 102° or 103°. From the eighth to the thirteenth his T. ranged from 98° to 100°.

Injections were begun on Dec. 12th at 4 p. m. 1 mgr. ($\frac{1}{10}$ cc. of a 1 per cent. solution). No reaction followed; the T. did not rise above 99° until early next morning, and at 10 a. m. was only 101°.

13th. 2 mgr. At 6 p. m. he had a temperature of 103°, and at 2 a. m. he complained of feeling a little chilly and was nauseated; T. by midnight had fallen to 100°. He slept quietly and soundly, perspiring less than usual.

14th. 3 mgr. At 2 p. m. he was restless and coughing; T. rose to 102° by 8 p. m. He slept comfortably through the night. Sputum: 30 cc., greenish-yellow, tenacious, muco-purulent, not nummular. Bacilli, about 14 to a field; usual arrangement, normal appearance.

15th, 10 a. m. 3 mgr. Very slight reaction. T. rose in the afternoon to nearly 101°; no special increase of the cough.

16th. He complained so much of pains in the chest and abdomen that the injection was not repeated to-day. Sputum: 30 cc., somewhat nummular. Bacilli, same.

17th. 4 mgr. at 2.40 p. m. T. rose by midnight to nearly 103°, and he had a good deal of pain in the side and abdomen. His cough has not been much increased. His sputum has not changed in its general appearance. Tubercle bacilli about the same in number and appearance.

18th. Patient complained so much of nausea, acute pain in right shoulder and through thoracic region, pain in abdomen, with diarrhoea, that no injection was given. T. remained at and slightly below normal. Pulse ranged from 96 to 60. Amount of sputum, 35 cc.; same character. Bacilli increasing in number. They are beaded and many look fragmentary.

19th. 5 mgr. T. rose at 10 p. m. to 100°; no other symptoms; amount of sputum, 40 cc. Pulse from 72 to 100. Sputum somewhat increased; same in appearance. Tubercle bacilli, still more increased; more than 50 to a field.

20th. 6 mgr. T. rose to 99.8° at 6 p. m., then fell to normal; no general symptoms. Pulse from 80 to 100; amount of sputum, 100 cc. Tubercle bacilli more arranged in clumps.

21st. 7 mgr. T. rose to 100.2° at 2 p. m. Pulse from 90 to 100; no general symptoms; amount of sputum, 50 cc.; same character.

22d. 8 mgr. T. rose to 100.3° at 6 p. m., then fell to below normal at 12 p. m. Pulse from 90 to 104; no general symptoms; amount of sputum, 50 cc.; character, same.

23d. 9 mgr. Highest T., 99.7° at 8 p. m. Pulse from 92 to 102; no general symptoms; amount of sputum, 60 cc.; character, greenish, slimy, muco-purulent.

24th. 10 mgr. T. rose to 100.8° at 8 p. m.; slight chilliness in afternoon; had taken a bath about an hour before. Pulse, 88 to 102; no general symptoms; amount of sputum, 75 cc.; character, mucoid, with much purulent matter.

25th. No inoculation. T. rose to 100.4° at 10 a. m., then fell to 99° at 6 p. m., and again rose to 104° at 12 p. m., falling to 99.4° next morning. (Patient was out of bed in the afternoon

attending the Christmas entertainment.) Pulse, 92 to 104. Amount of sputum, 30 cc.; character, glairy, mucoid, tenacious, much purulent matter.

26th. 8 mgr. T. at 8 p. m. 104.3°, then fell. Pulse 72 to 100. Slight chill at 2.30, with rise of T.; coughed once or twice; at 6 p. m. had severe chill lasting 10 minutes; no sweating; nausea and vomiting, with severe cough; complained of thumping pain in left axilla, headache, no thirst, very uncomfortable until 10 o'clock p. m. Amount of sputum, 30 cc.; character, same.

27th, 10 a. m. 9 mgr. T. at 6 p. m. was 102°, at 2 a. m. reached 103.2°, then fell. No chill but chilly; headache, nausea, slept very little during night; coughing, with some nausea; intense thirst during night; some soreness through chest. Sputum, same.

28th. No inoculation. T. ranged between 102.5° and 98°. Pulse, between 92 and 100. Sputum, same.

29th. 10 mgr. T. at the time 101°, rose by 8 p. m. to 104°, fell next morning to 100°. Sputum, 30 cc.; light, brownish, liquid, flocculent; necrosis of pus, some streaks of blood. Bacilli increased, *i. e.*, about 20 to 30 to field. There are fewer beaded forms.

30th. No inoculation. At 2 p. m. T. 104.5°, fell by 6 p. m. to 100°. Pulse, 72 to 104. Albumen in urine and moderate number of casts.

On the 31st, Jan. 1st, and Jan. 3rd, he had high fever in the afternoon, rising to 103° and 104°, so that the injections have not been given. The albumen in urine persists.

Jan. 4th. The physical signs are unchanged.

CASE 2.—Ernest L., aged 19, admitted December 5th, complaining of chills and fever and of pains in the feet. His mother died of phthisis. In the spring of this year he had influenza and has had cough and expectoration ever since. He has also lost flesh. He has weighed 165 but his present weight is 125. He has had pains in the chest, sometimes of a severe character.

For the past six weeks he has had repeated chills, which were believed to be malarial, and for which he has taken large doses of quinine. For the past two weeks his feet have been swollen and very tender, and they have become very dark and black in spots. The patient looked a florid healthy fellow and without trace of malarial cachexia and no malarial organisms were found in his blood. He had Raynaud's disease in the feet, with superficial, gangrenous blebs, and intense lividity of the toes. The T. was 104° on admission. The feet were kept elevated and he improved rapidly. The T. fell through the 7th and 8th and on the morning of the 9th was normal. The feet got well rapidly, with only a superficial spot of necrosis on the left big toe. The history of chills without any evidence of malaria caused us to make a careful examination of his lungs and signs were found of local disease at left apex.

Physical Signs.—The chest is symmetrical; costal angle good; expansion better at right than at left apex. Resonance defective at left infra-clavicular and mammary regions and in the supra-scapular region; clear in axilla and at the base. Right lung clear. Feeble tubular breathing in left infra-clavicular; prolonged expiration, large resonant moist sounds. The breathing is not cavernous, the fremitus not increased, and there is no pectoriloquy; moist sounds in supra-scapular region.

The sputum is muco-purulent, and contains elastic tissue and tubercle bacilli in moderate numbers, and alveolar epithelium. The T. in this patient was normal from the 9th to the 12th.

Dec. 12th. First injection, 1 mgr. No reaction followed; spu-

tum, small in amount, muco-purulent, tenacious; bacilli, 10 to 15 to field.

13th. 2 mgr. Very slight reaction. T. rose to about 101°; no special aggravation of cough or of the pulmonary symptoms.

14th. 3 mgr. By 8 p. m. the T. had risen to 101.5°. He complained of an increase of the pain of the feet; no pain in the back or any constitutional distress; sputum the same.

15th. 3 mgr. No febrile reaction followed.

16th, 4 mgr. 17th, 5 mgr. No febrile reaction followed either of these injections. His general condition remains the same. The appetite is good and he does not appear to have suffered the slightest inconvenience.

18th. 6 mgr. T. rose to 100.6° at 6 p. m. Pulse, 84 to 100; no general symptoms; perspired freely, 2 p. m.; no sputum; coughs very little.

19th. 7 mgr. T. rose to 100.8°. Pulse, 80 to 90; no general symptoms; says he feels well; amount of sputum, 35 cc.; very little cough.

20th. 8 mgr. T. rose to 101° at 6 p. m. Pulse, 60 to 100; no general symptoms; no sputum; very little cough.

21st. 9 mgr. T. 100° at 6 p. m.; no reaction; 30 cc. of sputum, with much coughing; no increase in bacilli.

22d. 10 mgr. T. 100° at 6 p. m. Pulse, 72 to 92; no general symptoms; no sputum; slight cough at 6 p. m.

23d. 11 mgr. T. 99.8° at 6 p. m.; no other reaction. Pulse, 72 to 96; no sputum.

24th. 12 mgr. T. 100.2° at 8 p. m.; no sputum. Pulse, 72 to 88; slight cough at 8 p. m.; no other reaction.

25th. No inoculation.

26th. 13 mgr. No reaction whatever; no sputum.

27th. No inoculation; no rise of T. or general disturbance.

28th. No inoculation. T. did not rise; cough little; no sputum; feels comfortable.

29th. No inoculation. T. normal; sleeps well; feels well; no cough; no sputum.

30th. No inoculation. T. rose at noon to 101.1°; feels well; no sputum; no cough.

Jan. 2d. 14 mgr. T. rose to 101° by 12 midnight; no special disturbance.

3d. 18 mgr. T. rose to 100.5°.

The physical signs persist as at previous note, possibly the râles are larger and louder.

4th. By mistake this patient received two injections to-day of 20 mgr., at interval of four hours, *i. e.*, 4 cc. of the 1 per cent. solution. He had no constitutional reaction, but by 6 p. m. the T. was 100°, and by 8 p. m. 102°. He felt quite comfortable; pulse, 100.

Remarks.—A slight reaction with constitutional disturbance followed the second injection. The subsequent injections up to 18 mgrs. have not been followed by any special symptoms, the last two have produced somewhat more fever.

CASE 3.—Wm. L., aged 50, machinist, applied at the dispensary July 14th, 1890. A sister died of chronic lung trouble. He has always been healthy. Early in the spring, about four months before application at the hospital, he began to have cough and fever and to lose in weight. Examination at that time showed localized disease at both apices, and the sputa contained tubercle bacilli and elastic tissue. He was admitted to hospital December

13th. On admission he weighed 114 pounds. In the early spring of this year he weighed 145 pounds. He has not had much fever of late, and on admission his temperature was only 100°. Patient looks well in the face, color good, does not look much emaciated. The chest is large, total girth 85 cm., expansion 5 cm., equal on both sides. The resonance is high pitched as low as third rib on right side, clear elsewhere. Defective resonance in left infra-clavicular and in supra-scapular regions behind. On auscultation there are crackling râles at the right apex. At the left apex, both inspiration and expiration are distinctly cavernous, accompanied with loud large râles. Expiration is prolonged on both sides, râles are distinct at the apices behind; those on the left side larger. The sputum is muco-purulent, somewhat thin, moderately abundant, and contains tubercle bacilli, no elastic tissue.

Dec. 12th. First injection, 1 mgr. No reaction followed; sputum mucoid with purulent flocculi, 15 cc.; tubercle bacilli, about 25 to 30 to field; no elastic tissue.

13th. 2 mgr. Slight rise in temperature, to 102°, but no special constitutional disturbance. Sputum same.

14th. 3 mgr. No reaction. 15th, fourth injection. 3 mgr. Following these last injections there has been slight nausea, darting pains in the limbs and back, and great thirst. Sputum, amount about the same, appearance same; fifty bacilli to field, long and short; all are beaded, some have as many as twelve beads.

16th, 4 mgr. 17th, 5 mgr. With these increasing doses the symptoms have not materially changed. He has had practically no febrile reaction, the temperature only once in the past forty-eight hours having risen to 100°. The cough continues and he complains of thirst; no pains. The sputum shows a marked change in the enormous increase of bacilli. The cover-slips look like pure cultures; bacilli are scattered and in clumps; all are beaded, and very many are quite short, fragment-like; some look very long. In other preparations they are not in clumps, but the number is also very large.

18th. 10 a. m., 6 mgr. T. 100.4° at 6 p. m.; pulse 64 to 84. Increasing cough is the only symptom; this occurs in paroxysms. About 200 bacilli to field (one-twelfth), scattered and in small clumps, fragmentary appearance.

19th. 7 mgr. Highest T. 99.4°, at 10 p. m.; no other symptom; cough still in paroxysms; amount of sputum, 25 cc.; character, watery, mucoid, flocculent purulent matter; microscopically, same as previous day.

20th. 8 mgr. No reaction; cough still severe; amount of sputum, 50 cc.; character same, macroscopically and microscopically.

21st. 9 mgr. No reaction; sputum, 150 cc.

22d. 10 mgr. No reaction; cough as before; amount of sputum, 150 cc.; character same; still many tubercle bacilli.

23d. 11 mgr. No reaction; amount of sputum, 100 cc.; cough still troublesome.

24th. 12 mgr. No reaction; amount of sputum, 75 cc.; cough severe at times; character of sputum, watery, mucoid, with greenish yellow purulent flocculi patches; number of bacilli is extraordinary; they are not in clumps; of all sizes; the small ones not prevailing.

25th. No injection. No rise of T.; amount of sputum about 50 cc.; character is the same macroscopically.

26th. 13 mgr. No reaction; coughed a good deal; amount of sputum, 15 cc.; character, glairy mucoid more consistent than the last; small purulent streaks; bacilli about 15 to field, they all are beaded.

27th. 14 mgr. No rise of T.; nothing but slight headache and numbness in left arm and leg, with much coughing and tightness in chest; amount of sputum, 5 cc.; character, clear, watery, a few flocculent masses of purulent matter.

28th. No inoculation. Coughs much; sputum 30 cc.; no fever.

29th, 30th, 31st. No injections; T. quite uniform; sputum daily about 30 cc.; it is watery, mucoid with some purulent flocculent masses, sometimes looking like casts of bronchi; tubercle bacilli are very numerous; they are of normal size and appearance; general condition good; patient was weighed on the 11th of December; 114½ pounds; again on the 29th, 108½ pounds; January 3d, 109½ pounds.

Jan. 2d. 14 mgr. No reaction; T. remained normal.

3d. 18 mgr. T. rose to 100° by 6 p. m., and did not go higher. Had a violent cough, and the sputum was a little increased. Elastic tissue has been found lately, and to-day there are many pieces in the slides.

4th. Physical signs. The râles at left apex are not so loud and large; otherwise no change.

CASE 4.—Kate K., aged 30, was first admitted July 2d, 1890. There is no consumption in her family. Since February, 1890, she has had cough, with fever and sweating. Has lost in weight for the past six months. When admitted she was a fairly well-nourished woman, slightly anaemic, had very little fever, the T. rarely rising above 100°. She remained in hospital until the 25th of October, and improved very much under guaiacol and went out having gained 9 pounds in weight. There were signs of local disease at the right apex; the infra-clavicular space was more marked, the resonance was higher in pitch, the fremitus was increased; the expiration was prolonged, bronchial in character, and there were râles in front and behind. The sputum was muco-purulent, somewhat nummular, and contained tubercle bacilli. The patient was readmitted December 12th. She had improved during the past seven weeks and had been at work. Had very slight cough and not much fever. The physical signs were as follows: Expansion defective in right infra-clavicular space; resonance higher in pitch, as low as 3d rib; feeble breath sounds, expiration somewhat tubular. Moist râles, large and medium sized, as low as 4th rib. Behind, defective resonance in supra-scapular region; moist sounds as low as middle of scapula. Left lung is uninvolved.

Her T. was 98.2° on admission. Weight 111½ lbs.

Dec. 12th. First injection, 1 mgr. No reaction; few tubercle bacilli, 2 to 3 to field. Sputum, 100 cc., muco-purulent, greenish-yellow, not nummular.

13th. Second injection, 2 mgr. T. rose by 8 p. m., to 102.4°. She complained of headache and heavy feelings in the limbs and head and had several severe coughing spells. Sputum, 100 cc.

14th. Third injection, 2 mgr. No rise in T.; cough increased considerably, and sputum was tinged with blood. Sputum, 160 cc.; character and bacilli same.

15th. Fourth injection, 3 mgr. Practically no febrile reaction. Sputum, 140 cc.; character same; bacilli increased.

16th. Fifth injection, 3 mgr. 17th, sixth injection, 4 mgr. Yesterday she had a slight papular eruption on the legs which still is present to-day. The sputum is not so profuse, only 99 cc. instead of 140, as yesterday. There has been no febrile reaction after the last three injections.

18th. 5 mgr. Practically no febrile reaction; severe cough;

amount of sputum, 30 cc.; thick, dark green, purulent; tubercle bacilli few in number; one or two to field.

19th. 6 mgr. No febrile reaction. Sputum, 100 cc.

20th. 7 mgr. No febrile reaction. Sputum, 20 cc.; bacilli same.

21st. 8 mgr. No reaction; amount of sputum, 40 cc.; characters and bacilli same.

22d. 9 mgr. No reaction. Sputum, 10 cc.; otherwise same.

23d. 10 mgr. at 10 a. m. No reaction; cough increased; sputum, 3 cc.; tubercle bacilli seem less in number; character of sputum same.

24th. No inoculation. T. fell at 4 a. m. to 97°. Sputum, 20 cc., thinner, more watery; bacilli same.

25th. No inoculation. Sputum, 10 cc.; character and bacilli same.

26th. No inoculation. Sputum, 10 cc.; character and bacilli same.

27th. No inoculation. Sputum, 10 cc.; character and bacilli same.

28th. No inoculation. Sputum, 10 cc.; sputum, glairy mucoid, with muco-purulent sputa.

29th. No inoculation. Sputum, 5 cc. Large numbers of bacilli, 200 to 300 in some fields; others are without any; thick muco-purulent sputum, greenish-yellow.

30th. No inoculation. Sputum, 10 cc.; character, thick muco-purulent; slight, streaked with blood; bacilli same.

31st. No inoculation. Sputum, 15 cc.; character and bacilli same.

Jan. 1st. No inoculation. Sputum, 24 cc.; character same.

2d. No inoculation. Sputum, 12 cc.; character, glairy muco-purulent, tenacious.

3d. 12 mgr. at 12 m. At 6 p. m., T. 99.8°; at 10 p. m., 101.6°, and then fell. Felt comfortable.

4th. Elastic tissue found to-day for the first time. General condition is good; she sits up for the greater part of each day. The appetite is good, and she looks well. The weight has risen from 111 to 112.

The physical signs do not so far show any appreciable change.

Remarks.—This patient received within two weeks twelve injections, gradually rising from $\frac{1}{10}$ of a cc. of the 1 per cent. solution to 1 cc. After the second injection (2 mgr.) the T. rose above 102°, and there was a decided constitutional reaction. With the subsequent injections there has been no rise in fever. No special change has as yet occurred in the general or local condition. The sputum has lessened, but shows no change in character.

CASE 5.—Kate J., aged 32, applied at the dispensary November 11th. Father died of phthisis. Patient has had a cough for four years in the winter, once or twice the sputum has been tinged with blood. Her cough has usually disappeared in the summer, but this year it has persisted and she has lost flesh. She has had no night sweats. Local disease was detected at the right apex, and the examination of the sputum, in November, showed numerous tubercle bacilli with elastic tissue. Her weight on November 2nd was 104 lbs. She was admitted to hospital December 12th. Her T. was normal. She says that she has not of late had any fever. She is thin, but looks well in the face; her appetite is good; her present weight is 91 lbs. Pulse is 80, respirations 20. Chest is thin; there is a little flattening at left apex and expansion is less here. Percussion note is high-pitched above clavicle, and

in infra-clavicular region on the left side as low as third rib. The breath sounds are feeble, and expiration is somewhat tubular, only an occasional râle is heard on quiet breathing. On deep inspiration there are many râles of medium size, larger and louder when she coughs, but they have not a resonant quality. Behind, the percussion note is flatter at the apex, and there are râles as low as the middle of spine of scapula. Tactile fremitus is equal on both sides. There are a few râles in front, at the right apex.

Dec. 13th. First injection, at 10 a. m., 1 mgr. Slight rise in T., reaching 101° at midnight; no special constitutional symptoms. Sputum, very small in amount, muco-purulent. Bacilli, 5 to 10 to field.

14th. 2 mgr. She had slight nausea in the afternoon and complained of headache; the T. rose to 102° by 8 p. m.

15th. 3 mgr. No febrile reaction followed; very comfortable; expectoration is scanty; shows no change.

16th. 4 mgr. No febrile reaction; sputum shows same characters.

17th. 5 mgr. No febrile reaction; no constitutional disturbance; sputum, 25 cm. in amount.

18th. 6 mgr. No reaction; no general disturbance; sputum, 22 cc. Bacilli 4 to 8 to the field; normal appearance; a few are small and many beaded. There are fields of the $\frac{1}{4}$ th with 20.

19th. 7 mgr. No febrile reaction; sputum, 20 cc.; character and bacilli, same.

20th. 8 mgr. No febrile reaction; no general disturbance; sputum, 20 cc.; tenacious, muco-purulent; bacilli, same.

21st. 9 mgr. No reaction; sputum, 25 cc.; character, same.

22d. 10 mgr. No reaction; sputum very small in amount; marked increased in bacilli, sometimes 50 to a field, or more; they do not seem altered.

23d. 11 mgr. No reaction; sputum, 16 cc.; character, same.

Jan. 2d. She has had very little cough, sleeps well, and feels generally better. The sputum is greatly reduced, sometimes not more than 2 cc. in the 24 hours. Bacilli from 4 to 8 in the field of the $\frac{1}{4}$ th.

3d. 13 mgr., at 12 a. m. By 8 p. m. T. rose to 103.6°. Had a chill of 10 minutes duration; vomited. T. fell to 99° by 8 a. m. This is the most intense reaction she has had. After the second injection alone did the T. rise.

4th. Elastic tissue found to-day in sputum. She has gained one pound in weight. The physical signs show no special change.

CASE 6.—A. B., aged 29, admitted December 15th.

Family history good. Father died from phthisis following an empyema from fracture of ribs. Enjoyed good health until autumn 1888, when cough developed with loss of flesh, and tubercle bacilli were found in the sputum. Spent winter of 1888–89, in Davos, with benefit. Exacerbation of lung trouble following severe illness, in the course of which an acute nephritis developed with well marked hematuria following carbolic acid poisoning. Albumen in urine for some time after, but this was fully recovered from. Spent winter of 1889–90, at Davos, and gained in weight and strength.

In January 1890, after a severe attack of influenza and bronchitis, first evidence of cavity formation was discovered in left lung; was much improved by spring, and since has enjoyed fairly good health; cough slight; expectoration muco-purulent. Slight dyspnoea on exertion. No gastric symptoms. Gaining in weight and strength. No diarrhoea; appetite good.

Present Condition.—No fever; pulse, 98; general condition very good, has gained five pounds in the past three weeks. Appetite is good, sleeps well, is able to get about and take exercise.

Physical Signs.—Expansion is less at the right than at left apex, but the expansion of the thorax, as a whole, is very good, particularly at the bases. Note is higher pitched at right infra-clavicular space to the lower margin of the second rib, clear on the left side. Behind, the percussion is also higher pitched at right apex.

Auscultation.—At right apex in front, expiration is prolonged, hollow in character and accompanied with a few râles not of a resonant character, but rather dry. They are more abundant on coughing. The breathing is certainly not cavernous and does not suggest cavity. Behind, on the right side, expiration is prolonged; no râles except on coughing. On the left side, at apex, inspiratory murmur very loud but breezy; expiration somewhat tubular, approaching cavernous in character. Râles are heard as low as the third rib. Behind, at the left apex, râles are heard on quiet breathing. Nowhere, at either apex, is there evidence of large excavation, but the disease is undoubtedly bilateral. The sputum is muco-purulent, nummular, and contains numerous tubercle bacilli and small pieces of elastic tissue. Urine, amber color, acid, clear, sp. gr. 1.018; no albumen or casts. No symptoms pointing to affection of abdominal organs. The T., from the 15th to the 18th, did not rise above 99°.

Dec. 18th, 10.30 a. m. First injection 1 mgr. Between five and six in the afternoon the T. began to rise, and she had uneasy feelings in the chest and a sense of tightness and pains over the eyes. The T. rose to 101.5° at 8 p. m., and at 9.30 to 102°. It sank through the morning and 8 a. m. was 98°. There was slight increase in the cough.

19th. 1 mgr. No febrile reaction.

20th. No inoculation.

21st. No inoculation; comfortable all day.

22d. 2 mgr. at 10 a. m. At 11 a. m. complained of dizziness and slight nausea. At 2 p. m. T. began to rise, and at 8 p. m. was 101.4°. At 4 p. m. tight feeling in right chest. At 7 p. m. breathing somewhat asthmatic. Sputum still muco-purulent, quantity slightly increased. T. fell to 99° at 9.30 a. m. next morning.

23d. 3 mgr. at noon. Rather drowsy at 3 p. m. T. rose from 98.8° at 6 p. m., to 102.3° at 10 p. m., then fell to normal by 4 a. m. next morning; no other reaction.

24th. No inoculation. Nauseated at 6 p. m. No fever, except T. 99.8° at 7 p. m., being the highest for the day.

25th. No inoculation. Nauseated at 9 a. m.; complained of pain in chest. T. 99.6° at 6 p. m. Sputum, same character as last note; urine, normal.

26th. 3 mgr. at 10 a. m. T. at 4 p. m. was 99.8°; at 9.30 was 101.6°; it then fell to normal by 9 a. m. of next day; at 7 p. m. had burning sensation in right arm; no other reaction.

27th. No inoculation. T. 99.4° at 5 p. m.; then fell to 98° at 9 a. m., following day; no general symptoms.

28th. 4 mgr. at 10.15 a. m. T. began to rise at 5 p. m., when it was 100°, reaching 101.6° at 9 p. m.; slight nausea at 1 p. m.; no other reaction; sputum, muco-purulent; slightly blood tinged; tubercle bacilli not so numerous as at first examination; character and arrangement the same; urine, normal.

29th. No inoculation. T. rose to 99.8° at 8.30 p. m., fell to 98° at 8.30 a. m., following day.

30th. No inoculation. No rise above normal; patient very comfortable.

31st. 4 mgr. at 10.30 a. m. T. 101.4° at 5 p. m.; a sense of constriction in both lungs, across chest, and pain in left shoulder at noon. T. rose to 102.2° at 9 p. m., fell to 98° on the following morning.

Jan. 1st. No inoculation; feeling comfortable; slight headache; urine, normal. T. 100° at 6 p. m., then fell to 98° at 9 a. m.; appetite not so good. Weight 98½ lbs.

The pulse has ranged from 88 to 120—never falling as low as in some of the cases.

CASE 7.—James S., aged 45, shoemaker, admitted Nov. 26th, 1890. No history of consumption in his family. He has usually had very good health; has had purulent otitis media for 20 years and attributes all of his trouble to this. For at least a year he has had cough with profuse expectoration. He has lost flesh, having weighed a year ago 125 pounds and now only 82 pounds. He never has any pain; has had no diarrhoea. He is emaciated, temperature usually not above 100°, and since his admission there have been many low morning temperatures, even to 96°. The chest is long, flat and narrow. On the right side there is flattening in the infra-clavicular and mammary regions, and the expansion is much less than on the left side. At right apex the resonance is impaired as far as the lower border of third rib; on the left side it is clear in front. Behind, on the right side, there is dullness extending to below the spine of scapula; left side clear. On auscultation, cavernous breathing with loud bubbling râles at right apex in front. Bronchophony, marked. In outer mammary, high pitched breath sounds and fine crepitant râles. At right apex, behind, breathing is tubular with fine crackling râles. On scapula, the breath sounds are feeble with occasional râles. On the left side the breathing is vesicular throughout, no adventitious sounds. The sputum is muco-purulent, moderately abundant; neither tubercle bacilli, nor elastic tissue have been found in it at any time. Examinations were repeatedly made, once by Dr. Welch, with negative results, and we began to suspect that the cavity was bronchiectatic. The injections were begun with a view of settling the diagnosis.

Dec. 15th. First injection, 1 mgr. No reaction followed.

16th. 2 mgr. Fever rose by 8 p. m. to 100° and 101°; no constitutional disturbance.

17th. 2 mgr. No change or acceleration of pulse; T. not above 100°. No special change in sputum; no tubercle bacilli found.

18th. 3 mgr. T. 101.4° at 6 p. m. Pulse, 90 to 124. Complains of no symptoms. Amount of sputum, 250 cc.; character, same. No bacilli; no elastic tissue.

19th. 4 mgr. T. 101.2° at 6 p. m. Pulse, 90 to 108; no reaction otherwise; sputum, 200 cc.; character, same.

20th, 12 a. m. 5 mgr. T. 101.8° at 4 p. m. Pulse, 90 to 120; no symptoms; sputum, 200 cc.

21st. 6 mgr. T. 100.4° at 10 p. m. Pulse 84 to 108; sputum, 100 cc.; no reaction; character, watery, greenish, muco-purulent necrosis. Tubercle bacilli found for the first time this morning, about one or two to field, generally beaded, short and long.

22d. No inoculation; no reaction. T. normal during day; sputum, 100 cc.; pulse, 96 to 116; character, same; bacilli present.

23d. 7 mgr. T. 101.1° at 6 p. m. No other symptoms. Pulse, 80 to 112. Amount of sputum, 75 cc.; character, glairy, mucoid, purulent matter, with some streaks of blood. Bacilli.

24th. 8 mgr. T. 99.6° at 6 p. m. No other reaction. Sputum, 70 cc.

25th. No inoculation. Pulse, 80 to 112; sputum, 50 cc.

26th. 9 mgr. No reaction. Sputum, 130 cc.; character, macroscopically same; bacilli, about 1 to 2 to field, mostly beaded.

27th. 10 mgr. No reaction; felt very well; comfortable night. Sputum, 50 cc.; frothy, greenish-yellow, muco-purulent.

28th. No inoculation; general condition fair; no rise of T. Pulse, 90 to 112. Sputum, 40 cc., frothy, watery, with nummular, greenish-yellow sputa.

29th, 30th, 31st. No inoculation; general condition fair; no rise in T. Sputum every day, about 80 to 100 cc., on 31st 200 cc.; greenish-yellow, thick, muco-purulent. In number or appearance of bacilli there is no change. Pulse, 70 to 104. Patient was weighed on Nov. 26, 82 pounds; on Dec. 19, 78½ pounds; on Dec. 27, 80 pounds.

Jan. 3rd. 12 mgr. No rise of temperature followed.

CASE 8.—E. S. D., cigar maker, aged 26, admitted December 23d. An aunt on the mother's side died of consumption. Patient has had good health as a rule. In 1884 had a fistula in ano, which was cut. Six months ago he began to have cough and fever; was not confined to bed; had cough, and on several occasions spat up blood; weighed 136 pounds; now only weighs 113½. He has had night sweats; the loss of strength has not been great. He is emaciated and slightly anæmic; T. on admission 100°, but on the 23d it did not rise above 99°; pulse 72; circumference of chest 77 cm.; expansion 4 cm.; equal on both sides; high pitched note at right apex in front, extending to second interspace and behind to the spine of the scapula; elsewhere good resonance; percussion clear over left lung; the fremitus is increased at right apex; distant tubular breathing at extreme right apex, with bubbling râles, which are splashing on coughing; below this, breezy inspiration, with fine crepitant râles. In the left lung, in first and second interspaces, there are crackling râles at the end of inspiration, but the breathing is not tubular; there are a few râles also at the apex behind; heart sounds are clear; no albumen in the urine; no casts.

Dec. 24th. First inoculation at 12 a. m., 1 mgr. No febrile reaction; no general disturbance; sputum, greenish yellow, muco-purulent; tubercle bacilli in clumps, and scattered; mostly rod forms; few beaded; no elastic tissue.

26th. 2 mgr. No febrile reaction; low pulse was noticeable, going down to 60 two hours after the injection; had moderate coughing spell at 7 p. m.

27th. 3 mgr. T. at time of inoculation was 100.4°; rose to 100.5° at 6 p. m. No general reaction; weight 112 lbs.

28th. 4 mgr. No febrile reaction; complained of fatigue and of soreness in back (not at seat of inoculation); T. normal; sputum 5 cc.; muco-purulent; tubercle bacilli same.

29th. 5 mgr. T. at time of inoculation 101°, then fell to 99.7° at 6 p. m.; again rose to 100.8° at 10 p. m., then fell to 98° by 2 a. m.; no general reaction; sputum, 10 cc.

30th. 6 mgr. No febrile reaction; slight, sharp pain in chest; slight sweating at midnight; sputum, 25 cc.; same character.

31st, 2 p. m. 7 mgr. T. fell after injection to 98.3° at 10 p. m.; no rise after that until 10 a. m. next morning. It has been very noticeable that in this case there has been a reverse in the general character in morning and evening T. The T. rises highest at 10 a. m., instead of at night; sputum, 10 cc.

Jan. 1st. No inoculation. Severe cramps in abdomen; T. fell steadily from 10 a. m., 100.4° to 96.8° at 6 a. m., January 2; sputum, 25 cc.

2d. 2 p. m. No febrile reaction. 3d. No inoculation.

4th. 8 mgr. No febrile reaction; sputum for past three days, 10 cc.

CASE 9.—George S., aged 23, baker, admitted December 22d, 1890. Father died of phthisis. He had good health until three years ago, when he had an attack of hæmoptysis. Two years ago he began to have cough, which was not, however, severe, and he did not spit up much until about a year ago. Four months ago he had a good deal of blood spitting. He has lost flesh. Last year he weighed 135 pounds; present weight 111. He has had night sweats; his appetite is good; bowels regular; no shortness of breath. He has had no chills. Three or four months ago he began to get a little hoarse.

He is somewhat emaciated; cheeks flushed; T. 103°; pulse 84. Chest is long, measures at nipple line 79 cm.; total expansion 3½ cm., equal on both sides. The right clavicular spaces are more pronounced than the left; no appreciable difference in percussion note in the two sides in front. Behind, at right apex, the note is not quite so resonant. At right apex, in front, as low as the second interspace, the breath sounds are higher in pitch and accompanied by a few râles. At the apex, behind, a few crackling râles on deep inspiration. The remainder of the lung is clear. At the left apex, in front, inspiration is feeble; expiration tubular and accompanied with very liquid râles. Just outside nipple line, in third and fourth interspaces, expiration is intensely tubular, and there are crackling râles. Behind, there is cavernous respiration in supra-spinatus fossa, with large crackling râles. There is feeble breathing in the scapular and infra-scapular regions, with numerous râles. Heart sounds are clear. The urine contains a trace of albumen; no casts.

Dec. 22d, 23d, 24th, 25th. T. ranged from 101° to 103° in evening, and from 99° to 100.4° in morning; generally comfortable. Pulse range, 88 to 116; respiration, 20 to 36; weight on admission, 111 lbs.; sputum, 10 cc.; 10 cc.; 25 cc.; 25 cc.; character muco-purulent; rounded sputa floated in a mucoid transparent fluid; tubercle bacilli about 20 to 30 in a field, rod and beaded forms, arranged in groups of 2 or 3; elastic tissue found also in small bits.

26th. 1 mgr. T. 100.8°, then fell to 97.8° at 12 p. m.; no other reaction; sputum, 25 cc.; same character.

27th. 2 mgr. T. rose from 100.4° to 101° at 12 a. m., then rose to 102.7° at 10 p. m.; had distress in left side of chest; no change in the pulse; sputum, 30 cc.; same character; weight 109½.

28th. 2 mgr. T. rose to 101.3° at 12 p. m.; no general reaction; sputum, 40 cc.; watery, with much muco-purulent matter; tubercle bacilli, very numerous, 500 to field; all sizes, from very small dots to tiny bacilli—all beaded with few exceptions; no large clumps.

29th. 3 mgr. No febrile reaction. Pulse, 72 to 108; respiration quiet, 24 to 28; comfortable; sputum, 40 cc.

30th. 4 mgr. T. fell to 98° at 4 p. m., then rose to 101.4° at 10 p. m.; restless all night; no pain or aches; sputum, 20 cc.; watery, with thick, tenacious, muco-purulent matter, as sediment; otherwise same.

31st. 5 mgr. T. 102° at 10 p. m.; no other reaction; sputum same, 20 cc.

Jan. 1st. No inoculation. T. rose to 102.3° at 12 noon, then fell to 99° at 6 p. m., and again rose to 102° at 12 p. m.; coughing increased; pain in left side, front and behind; unable to lie on left side; sputum, 15 cc.; same character.

2d. 6 mgr., 2 p. m. T. 101.7°, then fell to 100.4° at 6 p. m.; again rose to 102.3° at 10 p. m., then fell to 99.3° at 8 a. m. next morning; pulse, 64 to 112; respiration, 24 to 32; dull pain in left side; otherwise comfortable; sputum, 15 cc.

3d. 9 mgr. T. fell to 99.5°, and then steadily rose to 103° at 10 p. m.; again falling to 97.6° at 6 a. m.; pulse, 88 to 104; respiration, 20 to 32; headache; pain in left side; much coughing, with little sputum; otherwise comfortable during night; sputum, 10 cc.; same character.

4th. 10 mgr. T. rose to 105.2° by 8 p. m.; face flushed; vomiting; nausea; headache; pains in legs and joints, and in back; pulse, 144 at 8 p. m.; good volume; regular.

CASE 10.—Charles R., aged 27, admitted December 19th. No history of tuberculosis in family. He began to cough in April last, and has ever since lost flesh, having weighed, at that time, 163 pounds; present weight 123½ pounds. Three months ago he spat a little blood. He has had occasional night sweats, and there has been, at times, fever. His appetite is good, and bowels regular.

Patient is very well nourished, color is good, T. on admission 100°. The chest is well formed, costal angle good, expansion a little less at right than at left apex, and there is slight flattening at the right apex in front. Chest measurement 61 cm. Upon right clavicle the percussion note is flat, and it is higher in pitch in right infra-clavicular space, as low as second rib. Defective resonance also at right apex, behind; elsewhere over the lung, clear. At right apex inspiration and expiration of equal length, somewhat cavernous in quality but on quiet breathing there are no râles. On full breathing the cavernous quality is still more marked, and at the end of expiration there are dry piping râles, which on coughing become loud, liquid and resonant. These signs are limited to the infra-clavicular space, proper. There are moist sounds along the anterior margin of the upper lobe. Behind, the cavernous signs are well marked in supra-scapular region. There are very fine crackling râles in the scapular and infra-scapular regions. No adventitious sounds in the other lung.

The heart sounds are normal; urine is clear, no albumen. The sputum is muco-purulent, greenish-yellow in color; bacilli abundant.

Dec. 21st. 1 mgr. No reaction.

22d. 2 mgr. No reaction.

23d. 3 mgr. T. by 6 p. m. had risen to 101.5°; fell to normal by 2 p. m. Amount of sputum, from 25 cc. to 40 cc.

24th. 4 mgr. No reaction.

26th. 5 mgr. No reaction.

27th. 6 mgr. T. was above 100° at the time of injection, did not rise throughout the day. Sputum is not changed in quality, is about the same in amount.

28th. 7 mgr. Sputum to-day is blood-stained, not increased, 25 cc.

29th. 8 mgr. Slight reaction, T. rose, by 6 p. m., to 101°.

30th. 9 mgr. No reaction.

31st. 10 mgr. No reaction. On January 1st and 2nd the T. did not rise above 99.5°.

Jan. 3rd. 14 mgr. No reaction; no change in the character of the sputum; bacilli about the same as in the first examination,

no special changes in the physical signs. Patient feels comfortable and well. His appetite is good. There is no essential change since admission.

CASE 11.—Thomas C., aged 33, admitted December 31st. Mother died of some pulmonary trouble. Patient has always had good health. In the winter of 1889 he caught cold, and had a cough continuously until May, 1890. Last summer he was better. Since October the cough has become worse, and he spits up a great deal, and has much pain in the left side. Two years ago he weighed 170 pounds; at present he weighs 125. He has had night sweats; appetite is variable; bowels regular. He has been hoarse at times for the past year and a half.

The patient is moderately emaciated, somewhat anæmic; T. 101.5°, pulse 85, respirations 20. The chest is 79 cm. in circumference, expansion 3.5 cm. The clavicles are prominent. There is flattening in left infra-clavicular and upper mammary regions. Dullness on percussion at left apex, and impaired resonance to the third rib. Behind there is impaired resonance to the mid-scapula. Right side is clear. On auscultation, tubular breathing with sharp crackling at left apex as low as third rib. On coughing, the râles are larger and louder. In upper axillary region there is normal vesicular murmur; friction sounds in lower axilla. Behind there is tubular breathing at apex, with numerous moist sounds. Breath sounds are normal at the base. At the right apex behind there is distant tubular breathing, with sharp râles on coughing. The heart sounds are clear. Pleuro-pericardial friction at apex. The sputum is thick, tenacious, muco-purulent; 50 cc. in quantity, and contains many tubercle bacilli and also elastic tissue. The urine is clear; no albumen, no casts. Examination of the larynx shows thickening of the ventricular bands and of the mucous membrane; the cords are injected and thickened.

Dec. 31st. T. 98.6° at 8 a. m., 101.3° at 8 p. m.; the highest and lowest T. in 24 hours; cough moderate; sputum of a very thick, exceedingly tenacious, greenish-yellow, muco-purulent, 50 cc. in 24 hours; tubercle bacilli exceedingly numerous, scattered over the field, in character and arrangement; rod and beaded forms of usual length and size; pulse range from 88 to 100; respiration, 18 to 36; no pains; quite comfortable; weight on admission, 125 pounds.

Jan. 1st. 10 a. m., 1 mgr. T. 99.5° at 10; rose to 101.8° at 10 p. m.; fell to 99.3° by 8 a. m. next day; no general reaction; comfortable; sputum, 50 cc., 24 hours; same character.

2d. 2 p. m., 2 mgr. T. rose to 101.2° at 10 p. m.; no general reaction; sputum same, except that it separated into two layers on standing, a lower watery mucoid, greenish liquid, and an upper thick muco-purulent, greenish-yellow layer, 40 cc.

3d. 12 noon, 4 mgr. T. rose to 100.6° at 10 p. m.; no other reaction; sputum same; weight, 122½.

4th. 2 p. m., 5 mgr. T. 100.6° at time of inoculation.

(b) Pleurisy Cases.

CASE 1.—Anna S., aged 18, admitted December 9th, complaining of shortness of breath, and pain in the right side of chest. No family history of consumption. She has been subject to coughs and colds, and for several winters has had a hacking cough without sputum. Her present trouble began three months ago with headache, chills and fever, loss of appetite, and pains in the lower part of the right chest. She was in bed at this time for two

weeks and had several chills. It hurt her to draw a long breath. About November 10th she came to the dispensary and it was found that she had a pleural effusion on the right side. On admission she was pale, not emaciated; T. normal. She complained of pains in the side; no cough. The chest was fairly well formed; expansion was less on the right than on the left side. Percussion was clear over the left lung. Right side was resonant in front to upper border of fourth rib, and on the right side, behind, there was dullness from the middle of the scapula. Tactile fremitus was not much diminished in the dull areas. Breath sounds were feeble, distant, somewhat tubular, and there were a few râles on coughing. The apex beat was in the fifth, in about the normal position. The urine was clear; no albumen; sp. gr. 1.024. As this case was thought possibly to be tuberculous, the injections were given.

Dec. 15th. First injection, 1 mgr. No reaction. Sputum, mucoid, here and there purulent, flocculent masses; amount slight. No tubercle bacilli.

16th. Second injection, 2 mgr. Marked reaction; T. rose to 103°, within 8 hours. She felt chilly and nauseated and there were pains in the legs and abdomen. Sputum, same.

17th. Third injection, 2 mgr. She had pains in the back and limbs and the amount of sputum increased.

18th. 3 mgr. No febrile reaction. T. 100.5° at 10 p. m.; sputum same; small amount, but increasing; no tubercle bacilli; during night complained of pain in epigastric region.

19th. 4 mgr. No reaction; sputum increasing.

20th. 5 mgr. No reaction; slight pain in back; complains of headache.

21st. No inoculation; sputum, watery, flocculent, and with streaks of blood, 100 cc.; no tubercle bacilli.

22d. 6 mgr. at 10 a. m. T. 100° at 6 p. m.; no general disturbance; sputum, 50 cc.; same character.

23d. 6 mgr. at 12 m. T. rose to 101° at 2 p. m.; at 10 p. m. was 98°; no general reaction; sputum, 20 cc.; no tubercle bacilli.

24th. No inoculation.

25th. No inoculation; looks better; not so pale.

26th. No inoculation; sputum, very small in amount.

27th. No inoculation; sputum, 10 cc.; very characteristically mucoid and glairy; no tubercle bacilli.

28th. No inoculation; sputum, 45 cc.; thin, mucoid, whitish purulent streaks; no tubercle bacilli.

29th. No inoculation; vomited several times; nauseated; headache.

30th. No inoculation. She has gained 4 lbs. since admission. T. normal, since day after 24th.

31st. No inoculation; sputum, 25 cc.; patient coughed all night; no tubercle bacilli.

Jan. 1st. No inoculation; sputum, 20 cc.; thick, muco-purulent; some brownish-red colored streaks; no tubercle bacilli or elastic tissue found.

3d. Physical examination shows dulness at right base from middle of scapula, feeble breathing and a few râles—no essential change from the time of admission. At 12 m., 8 mgr.; by 6 p. m. T. rose to 102°, by 8 p. m. nearly to 104°; fell gradually after 12 midnight. Slight chill at outset; had nausea; red rash on body, particularly about joints; pains in limbs; cough not increased.

Remarks.—From the history of this case and her appearance a tuberculous pleurisy was suspected and the injections were made

for the purpose of diagnosis. The reaction after the second injection, 2 mgr., was pretty intense, but six subsequent ones were not followed by any fever. She has improved and gained 4 lbs. in weight. The ninth injection was followed by the most intense reaction.

CASE 2.—J. M., aged 38. Patient was admitted to hospital on November 19th. He was found to have flattening of the left side of the chest, defective expansion, dullness, with feeble, distant breath sounds. He was a Pole, and it was impossible to get from him a definite history, except that he had been ill for several months. He looked pale and anæmic. His weight was 163 pounds. He had no sputum, and very slight cough. Physical signs were briefly as follows: Dullness on left side from second interspace into mammary and axillary regions and over lower half of left back; tactile fremitus to be felt in dull areas. Breath sounds feeble; no râles, except in coughing and deep inspiration. Suspecting a tuberculous pleurisy, he was given the injections.

Dec. 12th. First injection, 1 mgr. No reaction; sputum 15 cc.; watery, slightly muco-purulent; no tubercle bacilli.

13th. 2 mgr. No febrile reaction; sputum, 30 cc.

14th. 3 mgr. He complained much of headache, pains in the limbs, and perspired freely.

15th. 3 mgr. Patient became drowsy, complained of pains on shoulders and back, was nauseated and restless. There has been a distinct increase in the cough. The temperature rose to 102° eight hours after the injection. This is the highest T. he has had since his admission. Sputum increasing; same character all along; no tubercle bacilli.

On the 16th he looked so dull and depressed that the injection was not given. Sputum same.

17th. 3 mgr. at 2 p. m. T. at 12 p. m., 100.8°; pulse, 72 to 100; still has headache; nauseated and restless; 150 cc. of sputum; character same; no tubercle bacilli.

18th, 10 a. m. T. 101.3°. Given 4 mgr. and T. rose to 101.6°. Pulse, 66 to 92. Symptoms as in last note. Sputum, 150 cc.; character same.

19th, 12 a. m. T. 101.4°. 5 mgr. T. rose 104.6°. Pulse, 96 to 104. Complained of severe pains in back and head and legs; nauseated; sweated profusely; did not complain of chilliness. T. fell to 98° at 2 p. m. 140 cc. of sputum; character same.

20th. No inoculation. T. rose to 102.8° at 10 a. m., then fell to 100.6° at 2 p. m., and again rose to 102.4° at 6 p. m., then it fell to normal. Symptoms less severe than on 19th. Pulse, 80 to 100. 40 cc. of sputum.

21st. No inoculation. T. rose to 100.6° at 6 p. m. Pulse, 96 to 60. Complained of very little pain anywhere; seemed much better. Patient has had no inoculation since 20th and T. has been normal and patient seems very well. Sputum, 21st, 70 cc.; 22d, 40 cc.; 23d, 15 cc.; 24th, none.

25th. No inoculation; no symptoms. Sputum, 10 cc.; glairy, mucoid.

26th, 10 a. m. 5 mgr. No reaction in T.; uncomfortable during night; no headache or pains. 10 cc. of sputum; character the same. From 27th to 30th no inoculation. T. normal.

31st, 2 p. m. 6 mgr. T. reached at midnight, 103.6°. Pulse, 104. Small amount of sputum; character same. Patient was weighed on Nov. 18, 155 pounds; Dec. 1, 161½ pounds; Dec. 20, 161½; Dec. 27, 159 pounds; a loss of 2½ pounds during the treatment. Physical signs remain the same.