SOME ASPECTS
OF
PULMONARY TUBERCULOSIS.

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THIS disease, at once the most insidious, and on that account the most serious which affects the human race, claims at least one-tenth of the population of this country as its victims. It is serious, not only on account of its mortality, but also on account if its disabling effects, which render the sufferer, often in the prime of manhood, incapable of supporting himself, or those dependent on him, thus bringing in its wake poverty, hunger, and social degradation, increasing the burden on the community, and immensely increasing human suffering generally.

Pulmonary tuberculosis is a disease which was apparently known to the Egyptian physicians who flourished about B.C. 1500, and according to them Moses declared that this disease should come upon mankind as a punishment for disobedience.

Bovine tuberculosis is also a disease of antiquity, as it is mentioned in the Talmud, and therein it is forbidden that animals suffering from it should be eaten, at once indicating that even at that early age it was recognised as a disease which could be transmitted from cattle to human beings.

Hippocrates described the condition and believed it to be a curable disease in all its stages; and at that time phthisis was recognised as a contagious disease, and sea voyages, country air, and the environment of pine forests were all considered to be beneficial in the treatment of it.

Eighteen centuries elapsed before any progress was made in the study of tuberculosis. Bayle (1810) is the founder of the modern pathology of tuberculosis. He described the mode of its development, starting from miliary tubercles which softened and suppurated, and he recognised that this tubercle formation was identical in whatever part of the body it was found, and that it was a disease of a specific nature and was not necessarily the result of inflammation of glands, or of the lymphatic system; the caseous material he recognised as being characteristic of the process. He saw that tuberculosis was not due to simple inflammation, and that haemoptysis was the result and not the cause of pulmonary phthisis; but though Bayle did so much to elucidate the pathology of tuberculosis, he failed to distinguish from it pulmonary gangrene and carcinoma. Bayle's description of the origin and course of tubercle was perfected by Laennec, who went further and separated carcinoma and pulmonary gangrene as being distinct entities. In the middle of the nineteenth century Virchow tried to disprove the specific nature of caseous tubercle and declared that caseation of the lungs could be due to other causes than tubercle, and that the miliary tubercles belonged to the group of lymphomata. Definite conclusions regarding tuberculosis were published by Villemin in 1865, embodying the result of his researches concerning the disease, and the results at which he arrived were as follows:

I. That tuberculosis is a specific affection having as its origin an inoculable agent.
II. That inoculation from man to rabbit easily occurs.
III. That tuberculosis is one of the virulent diseases to be classified with syphilis and glanders.
As the result of this publication the whole scientific world was stirred to discover the
inoculable agent, and every known method of investigation was pursued.

Cohnheim⁶ (1877), by adopting scrupulous means of eliminating possible error, proved
by inoculating tuberculous matter into the anterior chamber of a rabbit's eye—

1. That the matter was inoculable.
2. That it was specific.

The actual discovery of the tubercle bacillus was due to the genius of Koch who, in 1882,
found the bacillus in all kinds of tuberculous lesions in man and animals, and proved that
cultures, after re-inoculation caused similar lesions, from which again the bacillus could be
recovered. Since the discovery of the tubercle bacillus the hereditary transmission of tubercu-
losis, which was formerly believed to occur, has had to be abandoned, as it is impossible for
the tubercle bacillus, which is a distinct entity, to be an intrinsic part of either the sperm or
the germ. That tubercle bacilli do reach the foetus in utero has been proved by the existence
in a few cases of tuberculosis in the new born child, but this is due to an ante-natal infection
taking place through the placenta.

Heredity plays its part, inasmuch as the offspring of tuberculous patients are frequently
weaklings who are less able to withstand the infection, and so readily become the victims of
tuberculosis.

Since the discovery of the bacillus much controversy has arisen concerning the mode of
entrance of the bacilli into the body.

Koch's original view supported by inhalation experiments, that the lungs always become
affected by inhalation of bacilli in dust, has been denied by Von Behring⁶ who advocates the
extreme view that the bowel of the infant is the chief portal of infection, and that adult
tuberculosis is usually due to old tubercular lesions becoming active.

Pottinger's⁷ view is that phthisis is primarily a glandular disease, the bacilli gaining
entrance through the mucous membrane or being deposited in the lymphatic glands, and may
either remain there quiescent or pass to the lung directly in childhood, or having lain
dormant, may pass to the lung in adolescent or adult life, and even then may remain dormant
throughout life, or may produce an active tuberculosis.

He points out that there is grave risk of a child crawling about on the floor of a room
occupied by a phthisical patient, having his hands infected and putting them in his mouth
whence the bacilli pass via the tonsils to the glands in the neck and thence to the lungs and
pleurae.

Flugge has proved by experiment that pulmonary phthisis can be induced by inhalation.

Vansteengehe⁸ has proved that tubercle bacilli readily pass through the intestinal mucous
membrane without any lesion being present, and that in young animals the glands filter off
the bacteria and prevent them from going to the lungs, whereas in old animals the glands do
not act as such efficient filters and the bacteria pass to the lungs.

It is thus clear that infection of the lungs may occur in all three ways, and if the infec-
tion is to be avoided the individual must be prevented from swallowing contaminated food
or drink, or from inhaling an atmosphere laden with germs.

Milk, which is the staple food of the infant, is derived from cows which have been proved
to be tuberculous in the proportion of one in three,⁹ and if ever justice is to be done to suffer-
ing humanity, the population at large must be made to realise the gravity of milk infection, and a demand must be made that only milk derived from non-tuberculous cows should be supplied as an article of diet.

In 1901 Koch declared that the human tubercle bacillus was not identical with the bovine tubercle bacillus, and that the bovine bacillus was innocuous to man.

The Royal Commission on tuberculosis has shown that calves can readily be infected by human tubercle bacilli, and Osler instances a case where a man has been accidently infected with bovine tubercle bacilli.

The German Commission on Tuberculosis came to the conclusion that bovine bacilli cause human tubercular lesions.

Klebs points out that milk heated for an hour to 66°C. may contain in the pellicle that forms on the top living tubercle bacilli, thus showing that home pasteurisation of milk may fail to destroy the tubercle bacilli, thus making it all the more important that only milk from non-tuberculous cows should be used.

CAUSES OF PULMONARY TUBERCULOSIS.

The causes of pulmonary tuberculosis may be divided into:—

I. Pre-disposing.

II. Exciting.

The pre-disposing causes of tuberculosis may be again grouped as follows:—

1. Means whereby the entrance of the tubercle bacilli into the body are facilitated.

(a) Ante-natal infection.

(b) Post-natal infection—from other human beings; lower animals (meat and milk).


(a) Ante-natal infection occurs through the placenta.

(b) Post-natal infection occurs from persons using the same room as those suffering from open pulmonary tuberculosis, and exhaling the bacilli in their breath, cough, and sputum. It may be acquired from drinking tuberculous milk or eating infected food.

Heredity.—This has been already discussed.

Age.—Children are more liable to bone, joint, glandular and meningeal forms of tuberculosis, whereas pulmonary consumption is more common after puberty.

Sex.—Menstruation and lactation render women more susceptible to the development of the disease, especially if it is latent within them.

Habits.—Riotous living, hardship or privation lower the resisting power of the individual, thereby increasing the susceptibility to infection.

Occupation.—Any occupation involving exposure to extremes of temperature, and wet, thereby lowering the vitality of the patient, give the tubercle bacilli the opportunity to flourish.
Dust disease, as in stonemasons and steel grinders, favours the development of tubercle bacilli by diminishing the vitality of the lung tissue.

Climate.—Any climatic condition which lowers the vitality of the individual renders him susceptible to infection.

Dwellings.—Houses which are insanitary, damp, overcrowded, badly ventilated, and insufficiently lighted are favourable to the tubercle bacilli.

Debilitating Diseases.—Diabetes, anaemia, enlarged tonsils or adenoids, influenza, pneumonia and pleurisy predispose the individual to phthisis.

The Exciting Cause.—The tubercle bacillus was definitely proved by Koch to be the exciting cause of pulmonary tuberculosis. Outside the body tubercle bacilli are found in the dust of infected rooms, on the floors, walls, and furnishings of such rooms, and in the streets, also in the milk of tuberculous cows.

The bacilli retain their vitality (if damp) for at least 6 months, they are not killed by cold, but are killed by moist heat, in a closed vessel in twenty minutes at 65°C.

THE DIAGNOSIS OF PULMONARY TUBERCULOSIS.

In dealing with the diagnosis of this affection, the following varieties are recognised.

1. Chronic Fibrocaseous Variety.
2. Acute Tuberculous Broncho-Pneumonia.
3. Acute Lobar Tuberculous Pneumonia.
4. Acute Miliary Tuberculosis.

It must be our earnest endeavour to discover the earliest manifestations of tuberculosis as it affects the lung, because it is in the earliest stages that the disease is most amenable to treatment.

The definite diagnosis used to depend upon the demonstration of the tubercle bacilli in the sputum, but if we are to derive the best results from treatment, it is absolutely necessary that we should endeavour to diagnose the disease before the bacilli can be demonstrated in the sputum; as in the majority of such cases an ulcerated lesion or cavity formation must have taken place, with on the one hand the probability of a mixed infection which adds seriously to the danger of the disease, and to the difficulty of treatment. On the other hand with cavity formation, it is impossible to repair the tissue which has been destroyed in the formation of the cavity. It is also most important that the diagnosis should be accurate, as by a careless diagnosis a patient's whole career might be spoiled, either by pronouncing him tuberculous when the disease is non-existent, or by failing to recognise the presence of the disease, and thereby failing to treat it in its most amenable stage.

In the early stage when there are no physical signs, or practically none, the following methods of investigation may be pursued.

1. The Conjunctival Tuberculin Test.
2. The Cutaneous Tuberculin Test.
3. The Percutaneous Tuberculin Test.
4. The Intra-dermo Test.
5. The Subcutaneous Tuberculin Test.
6. The Opsonic Index Method.
7. The Use of Iodide of Potassium.
8. The Examination of the Sputum.
9. The Agglutination Test.
10. The X-Rays.

I.—THE CONJUNCTIVAL TEST.

This consists in instilling into the lower conjunctival sac a drop of 1% tuberculin, or as recommended by some a drop of 1% tuberculin.

This tuberculin is purified by a complicated process to avoid irritation; tuberculin vaseline ointment of the same strength may be used.

After from 6 to 24 hours the reaction shows itself by reddening of the caruncle and palpebral conjunctiva, which remains from 3 to 8 days, or a more intense conjunctivitis which may in bad cases lead to corneal ulceration or even complete destruction of the eyeball.

The drawbacks to the reaction are—
1. Uncertainty of the reaction with dilutions which are otherwise safe.
2. The danger of the reaction with stronger solutions.
3. The fact that if tuberculin treatment has to be adopted later the conjunctival reaction may occur and render treatment impossible.
4. It cannot be used in the presence of ocular disease.
5. It is not safe for infants on account of the danger of ocular disease.

On the whole, therefore, this is not a method to be recommended.

II.—THE CUTANEOUS TUBERCULIN TEST. (Von Pirquet).

The forearm of the patient is disinfected with 1:20 carbolic acid and then with methylated spirit or ether to dissolve the fat in the skin. On the right forearm is placed a drop of Koch's old tuberculin, and by means of a vaccinating lancet the skin is gently scratched so as to cause a slight abrasion of the superficial layers of the epidermis, or to open the lymphatic channels, avoiding the effusion of blood; about three inches from that spot a drop of sterilized water is applied and with a clean, sterile, vaccinating lancet a similar process is gone through; this spot is used as a control. On the inner side of the left forearm a similar process is followed, using Koch's bovine tuberculin undiluted. The arms are then left exposed until the fluids dry up, and sterile, dry dressing is applied.

In order to avoid confusion three lancets are used.
1. For Human Tuberculin
2. For Bovine Tuberculin.
3. For Control.

And these are stored in separate glass boxes, which are airtight, and are sterilized before and after use, and replaced in their own boxes which are labelled according to the purpose for which they are used. For children under five a 25% dilution of tuberculin would be sufficient.
The arms should be inspected after 24 and 48 and 72 hours. A traumatic reaction begins within a few minutes and consists of a small raised area, in the middle of which, later, a scab forms when the epidermis has been damaged. A slight redness may still be visible after 24 hours, and a small scab remains during the next few days. In tubercular subjects a specific reaction occurs due to the coming together of tuberculin and anti-body. The positive cutaneous reaction begins in about three hours and lasts for from 24 to 48 hours, and appears as hyperaemia, with exudation and slightly raised reddening of the part inoculated. It begins to fade in 48 hours, leaving a brownish pigmentation for several weeks. The reaction may fail—

I. In the presence of demonstrable tuberculosis, on account of some peculiar local or constitutional condition, e.g., cachexia.

II. In patients treated by tuberculin.

III. In the presence of some specific fevers, e.g., measles.

The knowledge of the non-appearance of the reaction prevents us from making diagnostic errors.

It is positive in 97% of adult tubercular patients (Bandalier and Roepke).

III.—THE PERCUTANEOUS TEST.

In patients who have an objection to vaccination, an ointment consisting of equal parts of anhydrous lanoline and Koch’s old tuberculin may be used, a piece the size of a pea being rubbed into the inner side of the forearm with a firm pressure (the skin having been previously rubbed with ether to remove the fat and allow the ointment to penetrate). The reaction is similar to the cutaneous but not so satisfactory.

IV.—THE INTRA-DERMO REACTION.

Dr. C. Mantoux (La Semaine Medicale, September 16th, 1908,) has brought out a new tuberculin test which he calls the intra-dermo reaction. The reaction is produced by the injection of a small quantity of tuberculin into the deeper layers of the skin. The technique is very simple. A small quantity of tuberculin varying from 1/5000 to 1/100 mgm. is injected by a hypodermic syringe into the skin on the inner side of the thigh. The needle should be kept parallel to the surface of the skin during the injection.

The reaction when positive is very distinct, and appears within a few hours as an infiltration, which can only be recognised by the touch, or it is sometimes visible as an area of white or pinkish colour. It reaches the maximum intensity after 48 hours.

An infiltrated area is then seen about the size of a two-franc piece, which is surrounded by a fainter area, the two occupying an area about the size of the palm of the hand. At the site of the infiltration the skin is hot and sensitive to pressure. The general symptoms are usually slight and unimportant, and the condition disappears on the second day. When the test is negative some signs of vaso-dilatation and slight induration may occur at the site of the puncture, which can be felt after a few hours, but these signs almost always disappear within 48 hours after the injection, at which time the positive reaction is most marked. It is therefore hardly possible to mistake one for the other.

Dr. Mantoux tried the test on 62 children of ages varying from five months to 15 years, and compared it with the cutaneous reaction (Von Pirquet).
All the children that had reacted to the latter—27 cases—reacted equally well to the intra-dermo reaction, and in eight cases in which the cutaneous reaction was doubtful or negative, the intra-dermo reaction was positive. Both methods, however, failed in two cases of pulmonary tuberculosis.

Dr. Mantoux claims for the reaction greater simplicity, more delicate sensibility, and better results than those obtained by the cutaneous reaction.

V.—THE SUBCUTANEOUS TUBERCULIN TEST.

Koch’s old tuberculin and the analogous preparation of bovine tuberculin are used. The stock solution of old tuberculin contains the equivalent of 1000 mg. of tubercol bacilli in 1 cc.

Each 1 cc. = 100 mg.; this keeps indefinitely. One-half per cent. phenol in normal saline solution is used as the diluting agent; wide necked stoppered bottles of brown glass of 15 cc. capacity are used to contain the dilutions, and are sterilized by boiling; a 1 cc. syringe is used for diluting.

Dilution No. I.—Take 5 cc. pure tuberculin and 4·5 cc. of the diluent and mix. In 1 cc. there is 10 mg.

Dilution No. II.—5 cc. of No. 1 is taken and 4·5 of the diluent. 1 cc. contains 1 mg. of tuberculin.

Dilution No. III.—5 cc. of No. II. and 4·5 cc. of the diluent are mixed. 1 cc. contains 1/10 mg. of tuberculin.

Dilution No. IV.—5 cc. of No. III. is mixed with 4·5 cc. of the diluent. 1 cc. = 1/100 mg. of tuberculin.

TIME OF INJECTION.

The best time for injection is between 9 and 10 a.m. If injected in the evening slight or even moderate reactions may pass unnoticed during the night, and too large a dose given next time, 48 hours should elapse between successive injections as febrile reactions may not occur before 30 hours. Before injections are commenced the temperature of the patient should be normal for at least three days. In the female injections should not be given immediately before or during menstruation.

DOSAGE.

Before the existence of tubercular lesions can be excluded, four injections are necessary, as follows:

For Adults.

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<th>Dose</th>
<th>mg.</th>
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<tr>
<td>1st</td>
<td>2/10</td>
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<td>2nd</td>
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For Children.

<table>
<thead>
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<th>Dose</th>
<th>mg.</th>
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<td>1st</td>
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A 1 cc. syringe divided into tenths is used for the injections.

The next dose may be increased when the previous one has induced no rise of temperature, and a second injection must only be given after the temperature has reached the normal.

Koch regards the subcutaneous reaction as an infallible indication of the presence of tuberculosis, and he repeats the 10 mg. dose twice for greater certainty.
In young adults, weakly persons, and excitable neurasthenics the 3rd dose should be 2-5 and the final dose 5 mgr.

The reaction is of a twofold nature.
1. General and febrile.
2. Local and specific.

The General Reaction.

If the dose is too large toxic symptoms appear. In the doses already mentioned the temperature goes up in about 6 hours, or it may be as late as 30 hours, but usually reaches its acme in 9 to 12 hours. The diagnosis is positive when the temperature rises to 100° F.

If the temperature rises only 1°, wait until it has returned to normal and repeat the same dose.

A severe reaction begins with a rigor and shivering followed by a feeling of warmth, malaise, nausea or vomiting, severe headache. The severest reactions pass off rapidly and the patient is left with a sense of well-being.

The Local Reaction.

The tuberculous focus, if in the lungs, is affected so that it shows itself by increased and irritable cough and increased sputum. At the site of injection the part swells and is painful.

Contra-indications to the use of the subcutaneous tuberculin test.
1. A temperature constantly above the normal.
2. When the diagnosis is perfectly clear from the clinical history, physical signs, and the presence of tubercle bacilli in the sputum.
3. The presence of haemoptysis, because of the reaction caused by the tuberculin in the lung increasing the blood supply round the affected part and thereby increasing the risk of haemorrhage.
4. Heart disease, on account of the risk of acute dilatation.
5. Renal disease of non-tubercular origin.
6. Epilepsy, on account of the risk of increasing the fits.
7. Acute miliary tuberculosis.
8. Diabetes.
9. Arteriosclerosis, on account of the liability to apoplexy in this condition.
10. Pleurisy, with exudation, the amount of fluid would be increased thereby.

Subcutaneous injection of tuberculin may be required to give the differential diagnosis between early consumption without tubercle bacilli in the sputum, and carcinoma, sarcoma, echinococcus, actinomycosis, or syphilis, which may all occur with haemoptysis, impaired percussion, wasting, and night sweats.

More frequently it is required to decide between pulmonary tuberculosis and simple bronchitis, bronchiectasis, pneumo-koniosis, collapse and induration of the apex of the lung, due to obstructed nasal breathing.
VI.—THE OPSONIC INDEX.

This method depends on the power of the leucocytes to take up tubercle bacilli, owing to the action of opsonins contained in the serum.

The method of diagnosis is to take a series of observations of the opsonic index to tubercle bacilli. When tuberculosis is present the index will fluctuate much more than normal. It is a complicated process in which there is a large amount of error.

It requires an amount of time which it is impossible to devote to it by anyone but a bacteriologist, and even in such hands the results are neither conclusive nor eminently satisfactory. This method, therefore, is absolutely out of the question for the busy general practitioner.

VII.—THE USE OF POTASSIUM IODIDE.

This drug has been recommended as it increases secretion from the bronchi and makes tubercular lesions more easily diagnosed by physical signs, and increases the sputum, in which may be found the bacilli. I only mention this method to condemn it, as it is undesirable to increase the bronchial secretion to such an extent in early cases without physical signs, that physical signs may become obvious, and it is also undesirable to awaken the tubercle bacilli from a quiescent lesion in the lung, and to induce them to appear in the sputum, as in this way they may spread to and infect other parts of the lungs, and so render the disease more active and more dangerous.

VIII.—EXAMINATION OF THE SPUTUM.

In those cases in which there is sputum, the patient must be instructed to use a receptacle which can be disinfected. The sputum so collected should be examined for tubercle bacilli by appropriate staining methods; when the bacilli are found and there is no tubercular lesion of the mouth, tonsils, pharynx or larynx tuberculosis of the lungs must be diagnosed.

IX.—THE AGGLUTINATION TEST.

The serum of the human being when affected by tuberculosis agglutinates tubercle bacilli, and this may be used as a test.

X.—X-RAY TEST.

X-rays may be used to localise the distribution of tubercle and cavities in the lungs.

Having exhausted the specific means of diagnosis of pulmonary tuberculosis, we must next come to the symptoms of which the patient may complain. These are as follows:

1. Cough.
2. Expectoration.
3. Haemoptysis.
5. Dyspnoea.
6. Palpitation.
7. Loss of appetite and weight.
8. Pains in the chest.
9. Lassitude.
10. Constipation.
11. Fever.
In the stage before there are any physical signs, there is frequently loss of appetite, constipation, a feeling of lassitude, and shortness of breath on exertion indicating that the vitality of the patient has been lowered and that his nutrition has been impaired, and with these signs we find loss of weight and loss of capacity for work. This is the stage at which we may expect the best results from treatment, as there is no open lesion and therefore there is no mixed infection.

In the next stage we find the patient commences to have a hacking cough and it may be no expectoration, there are night sweats, all the previous symptoms are aggravated and the patient is unfit for work.

In a still more advanced stage there is a chronic cough with expectoration of yellow sputum, there may be haemoptysis; there is falling off in weight and general condition, and well marked night sweats. When this combination of symptoms occur it is practically diagnostic of phthisis, as they are never found in combination in bronchitis.

The cough in consumption is due to the reflex irritation by the inflammatory process in the bronchi, or to the reflex irritation of accumulated secretion, or thirdly to the excitability of the vagus, and may be due to the irritation in the stomach, and is thus frequently accompanied by vomiting.

Expectoration only accompanies the cough when bronchitis is caused by the irritation of the tubercle bacilli or tubercular lesion, or when the tubercular lesion has progressed to ulceration, abscess, or cavity formation.

The expectoration in the early stages may be tough mucus, or it may be more profuse; in the most acute cases there is frothy sputum, and later in the disease when there is cavity formation the characteristic nummular sputum appears.

Haemoptysis, which can be definitely traced to the lungs as its origin, in a patient who is not suffering from cardiac or vascular disease, is almost certainly due to pulmonary tuberculosis.

This serious and dangerous symptom is frequently the means of bringing the consumptive patient in the first instance to seek medical advice.

In cases of haemoptysis without any physical signs of tuberculosis of the lung, the cutaneous reaction should be used as a means of diagnosis, and after the patient has sufficiently recovered from the haemorrhage, the subcutaneous tuberculin test should be employed as a positive means of diagnosis.

Night Sweats.

These are particularly common when the disease has advanced to the stage of open lesions. They are due to paralysis of the autonomic nervous system, which is due to the action of the toxin of the tubercle bacillus, or of other bacteria.

Dyspnoea.

This occurs in advanced chronic cases, or in rapidly progressing and acute cases.

Palpitation.

This frequently occurs in the very early stages, before there are any physical signs.
Loss of Appetite.

This is very common in the early stages before treatment has been adopted, and leads to a gradual loss of strength, vigour, and weight. In advanced cases signs are often present of chronic gastritis with fermentation of the stomach contents.

Pains in the Chest.

Irregular pain of a dull, aching character is frequently complained of on the side of the lesion, and is often present before any physical signs. Pain on the other hand may be due to pleurisy, or pneumothorax, which may or may not be due to tubercle.

Lassitude.

Persistent weariness, and inability to work, is one of the earliest symptoms of which the patient complains.

Constipation.

This is a common complaint and is apt to increase the dyspepsia and loss of appetite and toxaemia.

Fever.

In the very early cases there is no fever, but when the lesion becomes open, and mixed infection occurs, fever is present, and in the advanced stages the patient has a hectic temperature.

Anæmia.

This is particularly common in young girls, in association with pulmonary tuberculosis, and in all cases of anæmia in such patients the tuberculin tests should be employed, if no physical signs of phthisis are present.

Physical Examination.

In the early stages of the invasion of the lungs by the tubercle bacilli no physical signs may be evident, later the tubercular lesion causes bronchitis, and harsh vesicular sounds are heard accompanied by crepitations. If these sounds are limited to one apex, the chances are 100 to 1 that the patient has phthisis; if they are limited to both apices the chances are 50 to 1 that the patient has phthisis. Occasionally, instead of the breathing being harsh vesicular, it is very feeble or wavy in character. Up to this point in the disease no other physical signs may be evident.

In still more advanced cases the chest becomes flattened, the inter spaces indrawn, movement restricted, myoidema is present, dulness on percussion, vocal fremitus increased, the breathing becomes bronchial in character, with coarser crepitations and increased vocal resonance, and all the signs of consolidation and later of cavity formation become evident.
TREATMENT OF TUBERCULOSIS.

Modern treatment of tuberculosis is divided into—

1. Prophylactic.

2. Curative
   
   a. Specific.
   
   b. General.
   
   c. Symptomatic.

The prophylactic treatment aims at the prevention of the entrance of the tubercle bacilli into human beings.

I am convinced that if compulsory notification of every case of tuberculosis in man and animals were adopted throughout the country, and if this were followed up by prohibition of the sale of milk from tuberculous cows, and the prohibition of the sale of tuberculous meat, and by the periodical disinfection of all houses inhabited by tuberculous patients, and by the isolation of those who suffer from the disease, also by constant observation of contact cases, the mortality from this disease would practically vanish in the course of the next generation. In this way the nation would be enriched by the diminution of its invalid population, and the taxation required to maintain those incapacitated by this disease would ultimately vanish.

By these means there would be alleviated or removed an enormous amount of human suffering which could and should be prevented, and which undoubtedly will be one day, when the nation at large awakes to the gravity and enormity of the existing condition, and the possibility of eradicating the disease.

2.—CURATIVE.

(a) Specific treatment is divided into—

1. The production of active immunity by injecting into the patient dead tubercle bacilli, or their products.

2. The production of passive immunity by injecting into the patient the serum of an animal immunized against tubercle bacilli.

3. Introduction into the patient of substances which it is hoped will kill the bacilli without injuring the patient, e.g., formalin or creosote.

In 1890 Koch was led to the discovery of tuberculin by his observations on the question of immunity, particularly in relation to guinea pigs. He observed that in a healthy guinea pig, inoculated with tubercle bacilli, the wound closed and appeared to have healed in a few days, but that in 10 to 14 days a hard nodule appeared which broke down, and remained as an open sore until the animal's death, and that in a tubercular guinea pig, after inoculation, the wound closed, no nodule formed, but the part became hard and dark in colour, and that the altered skin became necrotic and was finally thrown off, leaving a flat ulcer which quickly and permanently healed.

From this Koch was led to the injection of minute quantities of bacilli frequently repeated, and found that in this way he could produce immunity from tuberculosis. When he introduced old tuberculin, its use was commenced both in this country and on the Continent, and it was tried in large doses, particularly for hopeless cases and those in an advanced stage.
It is no wonder that success was not obtained, and that Koch's hopes for the benefit of mankind were not at that time fulfilled, as the dosage used was inappropriate and the cases treated were often unsuitable and hopeless from the commencement of the treatment.

Virchow led the attack against the use of tuberculin and said that it was a dangerous remedy, as it led to the destruction of the tissues around the tuberculous foci, that it liberated the bacilli from those tuberculous centres and caused dissemination of the disease throughout the body.

The poor results which were obtained were due to neglect in following Koch's directions for its use, and have been responsible for the delay in adopting specific treatment in this disease. It is fortunate, however, that with the wave of enthusiasm which has followed the introduction of the opsonic index method for the control of the introduction of vaccines by Wright, the question of immunity by tuberculin has again been revived in England, and the safety and efficiency of small doses of tuberculin has been proved, and Koch's original directions have been shown to be safe and trustworthy, and have been placed on a satisfactory basis, and Tuberculin Therapy has taken its rightful place in the treatment of tuberculous disease.

I have been particularly impressed by the utility and brilliant success of Koch's method in tubercular ulceration of the urinary bladder, which formerly was one of the most intractable and distressing diseases which the surgeon was called upon to treat.

Although we cannot hope to cure all tuberculous affections by this method, we can look forward to the time when more active preventive measures, combined with the early use of tuberculin, will make tuberculous disease as rare a condition as leprosy or small pox.

The various forms of tuberculin, their preparation and mode of employment:


This is made from pure cultures of tubercle bacilli, grown on 5% glycerine broth from four to six weeks, then filtered and concentrated to 1/10 of the volume of the filtrate, thus obtaining a 50% glycerine medium containing the soluble bodies secreted by the tubercle bacilli.

The dilutions are made in the same manner as those for the subcutaneous test and have already been described under that heading.

In the first and second stages (Turban) when the general condition of the patient is good, and when there is no rise of temperature, a dose of 1/10 mg. may be used to begin with. If reaction follows this, or if the temperature is above normal, 1/100 mg. should be the dose.

In cases which are less favourable the initial dose should be 1/1000 mg.

The increase in the dose should be as follows:—1/100 mg., 3/100 mg., 6/100 mg., 1/10 mg., 2/10 mg., 3/10 mg., 5/10 mg., 7/10 mg., 1 mg., 1/5 mg., 2 mg., 3 mg., 5 mg., 7 mg., 10 mg.

If a reaction occurs the dose is not to be increased, but the same dose to be repeated after a longer interval, or a smaller dose given.

After 10 mg. has been reached, the dose may be increased to 15 mg., 20 mg., 30 mg., 50 mg., 70 mg., 100 mg., 150 mg., 200 mg., 300 mg., 450 mg., 600 mg., 750 mg., 1000 mg.
INTERVAL BETWEEN SUCCESSIVE DOSES.

In the case of tenths and hundredths of an mg., the interval may be one day, above this dosage, twice a week, up to 10 mg., and above this at least three clear days must elapse between successive doses up to 100 mg., and above that at least four to seven days.

Whenever possible an attempt should be made to arrive at a dose of 1000 mg., and reaction should be avoided, and a second course should be given six months afterwards. The maximum dose may be repeated several times at increased intervals.

In treatment with old tuberculin, immunity is obtained against the toxins but not against the bacilli themselves.

II.—NEW TUBERCULIN. T.R.

Koch’s aim in introducing new tuberculin was to obtain immunity both to the bacilli and to the toxins. He prepared it by grinding a well-dried culture of bacilli into a powdered mass, stirring this up with normal salt solutions, and separating it into two layers by a centrifuge, and pouring off the upper layer, and retaining the lower which he designated T.R. It should not be used in advanced cases of phthisis with mixed infection and high fever.

One cc. of T.R. contains the active principles of 10 mg. of dried tubercle bacilli. Therefore of undiluted T.R. •1 cc. = 1 mg.

20% glycerine is used as a diluent.

Dilution No. I.

•5 cc. T.R. + 4-5 cc. diluent makes a solution of which •1 cc. = 1/10 mg.

Dilution No. II.

•5 cc. of No. I. + 4-5 cc. diluent makes a solution of which •1 cc. = 1/100 mg.

Dilution No. III.

•5 cc. of No. II. + 4-5 diluent makes a solution of which •1 cc. = 1/1000 mg.

Koch uses as an initial dose 2/1000 mg.

If this should cause a reaction a fourth solution is made 1/10 the strength of No. III., and a dose of 2/10000 mg. is given, or even less. After the initial dose the dose is doubled each time up to 1 mg., and is otherwise similar to the dosage of old tuberculin.

Interval.

Injections may be made every other day up to •5 mg., above that twice weekly up to 5 mg., after that the interval must be increased; the maximum dose should be 20 mg.

This may be repeated after 2, 4, 6 and 8 weeks.

NEW TUBERCULIN (BACILLARY EMULSION).

This consists of bacilli ground and suspended in normal saline, with the addition of 50% glycerine. It contains T.R. as well as the supernatant fluid which was separated by means of the centrifuge in the preparation of T.R.

One cc. of the stock solution contains 5 mg. of solid residue. The diluting fluid consists of normal saline solution + ⅛% phenol.

No. I. Dilution consists of 1 cc. stock solution + 4 cc.’s diluent. •1 cc. = 1/10 mg.

No. II. Dilution.— •5 cc. of No. I. dilution + 4-5 cc.’s diluent. •1 cc. = 1/100 mg.
No. III. Dilution.—5 cc.'s of No. II. + 4·5 cc.'s diluent. ·1 cc. = 1/1000 mg.

No. IV. Dilution.—5 cc.'s of No. III. + 4·5 cc.'s diluent. ·1 cc. = 1/10000 mg.

N.B.—The bottles must be well shaken before making dilutions and before use.

In Stages I. or II. with good general health 1/1000 mg. may be commenced with.

If reaction occurs, or in severe cases, 1/10000 mg. should be commenced with.

Reactions must be avoided in the treatment.

The dosage of bacillary emulsion is as follows:—

1/1000, 2/1000, 3/1000, 5/1000, 7/1000, 10/1000, 15/1000, 2/100, 3/100, 5/100, 7/100, 10/100 mg., with intervals of one to two days.

15/100, 2/10, 3/10, 5/10, 7/10, 10/10 mg., with intervals of two or three days.

12/10, 15/10, 2, 2·5, 3 mg., with intervals of three to four days.

4, 5, 6, 7, 8, 9, 10 mg., with intervals of four to ten days; with susceptible people increase the dose at the time of the larger dose by 5·5 mg. at a time; 10 mg. is the maximum dose and may be repeated at an interval of 10 to 14 days.

All cases who have undergone the treatment by means of tuberculin should, after a varying period, be again tested with tuberculin, and if this produces a reaction another course of treatment should be adopted.

Oral administration may be employed, but as a rule is unsatisfactory, as in the process of digestion the preparation may be altered, and the amount actually absorbed is variable.

Carl Spengler (Bandelier and Roepke) believes that he can get better results by injecting tuberculin made from the bovine bacillus into a patient suffering from infection with the human tubercle bacilli; or that by injecting human tuberculin into a person suffering from infection with the bovine bacillus. He believes that the infection caused by human bacilli stands in the same relation to that caused by bovine bacilli as smallpox to cowpox.

There seems no reason to believe that this view is correct, but it is well known that the reaction to bovine tuberculin when injected is not so great as the reaction to human tuberculin. In the treatment with tuberculin it is essential that rise of temperature should be avoided, as it has been found that when this happens, the negative phase appears in the opsonic index, or when the temperature is persistently high the index is persistently low.

It is unnecessary to estimate the opsonic index during treatment, as the temperature is a sufficient guide. This is most fortunate as it brings treatment with tuberculin within the range of out-patient and general practice.

Other forms of tuberculin have been recommended, e.g., that of Deny's and Béraneck, but these offer no advantage over that of Koch.

THE PRODUCTION OF PASSIVE IMMUNITY.

Maragliano and Marmorek have each produced an anti-tubercular serum. These, however, have not supplanted nor achieved greater success than Koch's tuberculin.

GENERAL TREATMENT.

Under the heading of general treatment is included diet, general hygienic and special hygienic measures.
So far as diet is concerned the phthisical patient should be encouraged to consume large quantities of food, in order to increase his vitality and render him more capable of resisting the tubercle bacilli and their toxins.

As has already been pointed out, it should be carefully ascertained that milk consumed is non-tuberculous. Cod-liver oil, or the various preparations of it combined with malt or hypophosphites may be useful in supplying fat and energy for the body; general tonic drugs, such as iron, strychnine, arsenic, are useful in increasing the appetite and power of resistance.

Under general hygienic measures the patient must be instructed to be the sole occupant of his bedroom, to keep the windows widely open at night, and whenever possible to adopt an open-air shelter.

He must be instructed to use a spittoon containing an antiseptic solution, the pocket in which his handkerchief is kept should be lined with jacomet, which can be removed and boiled. It should be clearly understood by the patient that he is suffering from a contagious disease, and that he is a source of danger to those with whom he associates, and more particularly to his own family.

I do not think that the extreme gravity of the contagious nature of the disease has as yet been recognised by the public at large, or sufficiently impressed upon it by the general practitioner.

In treatment of this disease the medical officer of health should co-operate with the physician in charge of the case, and use such means as are necessary to protect healthy individuals from being attacked. Until this co-operation is effected, the sad and distressing accidents which we so often see in practice, of whole families being mown down by the disease, cannot be brought to an end.

Special Hygienic Measures.

Special hygienic measures have been adopted by sanatoria for the treatment of this disease, but sanatoria generally are not within reach of the lower classes, who are the chief sufferers from the disease; and sanatoria never will be within the reach of such, until the Government is prepared to take the question up as a national affair and provide for those dependent on the sufferers, as it so frequently happens that the head of a family is attacked and is compelled to continue working when he is incapable of performing it satisfactorily and without detriment to himself.

Camac Wilkinson,14 in Australia, has demonstrated that general hygienic treatment carried out at home in the early stages of the disease, combined with tuberculin treatment, is more efficient than sanatorium treatment, and enables the workman to continue his work and provide for his family whilst his disease is being cured.

Since this is possible in the early stages it diminishes the necessity for advocating sanatorium treatment for those cases who are most suitable for that treatment. It remains, therefore, for the nation to adopt preventive measures, and to assist cases who cannot be treated satisfactorily while carrying out their work, or who through unemployment are unable to provide suitable nourishment for themselves in order to fight the disease.

Camac Wilkinson has proved that those advanced cases can be greatly improved, and frequently cured by sanatorium treatment, combined with tuberculin.
If compulsory notification, with isolation and tuberculin treatment were adopted, it would not be long before advanced cases would be rare, so that the necessity for sanitoria would diminish, and ultimately, with the extinction of the disease, they would cease to be required, then the nation would be happier and richer, precious lives, and much suffering would be spared.

THE ANTISEPTIC TREATMENT.

The treatment of phthisis, by means of inhalations of creosote, has some enthusiastic advocates. I have tried it on several occasions with no benefit. Creosote administered internally enjoys a reputation in the treatment of the disease. I have not been able to satisfy myself that it has had beneficial results, and frequently it has caused nausea and diminished the patient’s appetite.

SYMPTOMATIC TREATMENT.

1. Haemoptysis.

Whenever this occurs the patient must be put to bed and kept perfectly quiet, no conversation being allowed.

An attempt must be made to diagnose the seat of haemorrhage by listening for crepitations.

I have found this condition most intractable and have on various occasions tried every drug that is reputed to check haemorrhage, but in many instances with indifferent results.

The patient should be kept on milk diet and no stimulants allowed. An ice bag may be applied over the area where crepitations are heard.

I have seen apparently marked benefit result, and I have seen it absolutely fail to give any relief. Calcium chloride in XV. gr. doses every four hours should be given to encourage the coagulation of the blood.

Theoretically amyl nitrite, which dilates all the capillaries of the body, except those of the brain and lungs, should have a marked influence in checking haemoptysis, and is said to do so. I have never seen any benefit from the drug, though I have frequently used it in this condition.

Liquid extract of ergot, which theoretically should raise the blood pressure, by causing the blood vessels of the rest of the body to contract, should force the blood from any vessel which is ruptured and thereby increase the haemoptysis, has in my experience frequently proved itself to be of the utmost value in checking haemoptysis.

2. Cough.

This is best controlled by plenty of fresh air and by encouraging the patient not to cough. In the advanced stages, however, chlorodyne, nepenthe, or heroin may be given in appropriate doses when the cough is very harassing, and prevents the patient from sleeping.

3. Expectoration.

This is due to the bronchitis set up by the tubercle bacilli, or to the destructive change in the lungs.

It is best treated by plenty of fresh air and good food. Creosote, by inhalation and internally, is said to render it less offensive.

4. Vomiting.

This is due to the irritation of the vagus, and may be present with or without cough. Dilute hydrocyanic acid or chlorodyne in appropriate doses are the most useful drugs.
5. **Fever.**
This is best treated by absolute rest in bed, with plenty of fresh air.

6. **Night Sweats.**
These yield to the fresh air treatment and plenty of food, also tonics of nux vomica and hydrochloric acid.

**CONCLUSIONS.**

I. Pulmonary tuberculosis is not an hereditary disease.

II. It usually arises from drinking milk infected with tubercle bacilli, or as the result of contagion from persons suffering from the disease.

III. It can be diagnosed by means of tuberculin before the tubercle bacilli appear in the sputum.

IV. The conjunctival test is unjustifiable.

V. The cutaneous tuberculin test is safe and reliable, but patients, especially children, have an objection to it.

VI. The subcutaneous tuberculin test is the most accurate test in the early stages of the disease before the bacilli are present.

VII. Pulmonary tuberculosis is a preventable disease.

VIII. In the early stages it is a curable disease, especially by means of tuberculin.

IX. In the later stages amelioration of the condition can frequently be obtained by means of tuberculin and sometimes a cure may result.

**REFERENCES.**

1 Osler and Macrae’s System of Medicine, vol. iii. p. 137.
2 Klebs’ Tuberculosis, p. 5.
3 Klebs’ Tuberculosis, p. 5.
4 Osler and Macrae’s System of Medicine, vol. iii. p. 141.
5 Klebs’ Tuberculosis, p. 6.
6 Allbutt and Rolleston’s System of Medicine, vol. v. p. 302.
7 Vaccine Therapy, R. W. Allen, p. 97.
8 Vaccine Therapy, R. W. Allen, p. 97.
10 Klebs’ Tuberculosis, p. 24.
11 Bandelier and Roepke, Tuberculin in Diagnosis and Treatment, p. 42.
12 Bandelier and Roepke, p. 81.
13 Arthur Latham, Pulmonary Consumption, p. 170.
14 Camac Wilkinson, Treatment of Consumption.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>State of Disease</th>
<th>Duration</th>
<th>General Condition</th>
<th>Temperature</th>
<th>Tubercle Bacilli in Sputum</th>
<th>Conjunctival Reaction</th>
<th>Cutaneous Reaction</th>
<th>Sub-cutaneous Reaction</th>
<th>Treatment</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>W. Wenn</td>
<td>27</td>
<td>m.</td>
<td>Active in both upper lobes</td>
<td>2 years</td>
<td>Unfit for work before treatment commenced</td>
<td>Raised in evenings</td>
<td>Yes</td>
<td>Positive to human and bovine tuberculin</td>
<td></td>
<td>Bacillary emulsion</td>
<td>Improved markedly in general condition. Fit for light work. Cough and expectoration diminished, appetite improved, feels much better</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A. Rush</td>
<td>26</td>
<td>f.</td>
<td>Active in both apices, left wrist and bladder</td>
<td>1 year</td>
<td>Unfit for work</td>
<td>Not raised</td>
<td>Yes</td>
<td>Positive to human tuberculin</td>
<td>Positive</td>
<td>Bacillary emulsion</td>
<td>Improvement of bladder irritability. Diminution of cough and expectoration and gradual improvement of general condition</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A. Mole</td>
<td>19</td>
<td>m.</td>
<td>Active in both lungs</td>
<td>1 1/2 years</td>
<td>Unfit for work</td>
<td>Raised in evenings</td>
<td>Yes</td>
<td>Positive to human and bovine tuberculin</td>
<td></td>
<td>Bacillary emulsion</td>
<td>Considerable improvement has taken place in the general condition and appetite. Cough and expectoration are diminishing and he feels much stronger and better</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>J. Maddeys</td>
<td>50</td>
<td>m.</td>
<td>Active in both apices</td>
<td>4 years</td>
<td>Unfit for work</td>
<td>Not raised</td>
<td>Yes</td>
<td>Not definite to human, negative to bovine</td>
<td></td>
<td>Bacillary emulsion</td>
<td>Gradual improvement in weight and general condition. Cough and expectoration diminishing, and is feeling better</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Age</td>
<td>Sex</td>
<td>State of Disease</td>
<td>Duration</td>
<td>General Condition</td>
<td>Temperature</td>
<td>Tubercle Bacilli in Sputum</td>
<td>Conjunctival Reaction</td>
<td>Cutaneous Reaction</td>
<td>Subcutaneous Reaction</td>
<td>Treatment</td>
<td>Remarks</td>
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<tr>
<td>5</td>
<td>F. Mole</td>
<td>22</td>
<td>m.</td>
<td>Active in left apex</td>
<td>2 years</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>...</td>
<td>...</td>
<td>Positive</td>
<td>Bacillary emulsion</td>
<td>This patient is a brother of No. 3, and wanted a definite diagnosis as to whether he was or was not tuberculous. There was harsh vesicular breathing at left apex behind. His general condition has improved under treatment and he feels fitter and better</td>
</tr>
<tr>
<td>6</td>
<td>M. Hart</td>
<td>6 f.</td>
<td></td>
<td>Active in both apices</td>
<td>3 years</td>
<td>Fair</td>
<td>Not raised</td>
<td>No</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Bacillary emulsion</td>
<td>Cough has diminished, general condition and appetite improved</td>
</tr>
<tr>
<td>7</td>
<td>A. Crowe</td>
<td>25</td>
<td>f.</td>
<td>..</td>
<td>..</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>..</td>
<td>..</td>
<td>Negative</td>
<td>..</td>
<td>This was a contact case with persistent cough lasting for two months and requiring a definite diagnosis</td>
</tr>
<tr>
<td>8</td>
<td>F. Partridge</td>
<td>12</td>
<td>m.</td>
<td>Active in both lungs</td>
<td>3 years</td>
<td>Fair</td>
<td>Not raised</td>
<td>No</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>Bacillary emulsion</td>
<td>This patient began to improve, but objected to continuing the injections</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Age</td>
<td>State of Disease</td>
<td>Duration</td>
<td>General Condition</td>
<td>Temperature</td>
<td>Tubercle Bacilli in Sputum</td>
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<td>Subcutaneous Reaction</td>
<td>Treatment</td>
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<tr>
<td>9</td>
<td>B. Thomas</td>
<td>7 f.</td>
<td>Active in upper lobes of both lungs</td>
<td>12 years</td>
<td>Good</td>
<td>Not raised</td>
<td>No</td>
<td>Negative</td>
<td>..</td>
<td>..</td>
<td></td>
<td>She was sent for diagnosis on account of night sweats, cough and expectoration lasting three months</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>C. D. Armes</td>
<td>7 m.</td>
<td>Active in upper lobes of both lungs</td>
<td>1 year</td>
<td>Fair</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>Positive</td>
<td>Positive to human and bovine tuberculin</td>
<td>Positive Bacillary emulsion</td>
<td>He has gradually improved in weight and general condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>L. Bridges</td>
<td>17 f.</td>
<td>Active in left apex</td>
<td>12 years</td>
<td>Unfit for work</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>Negative</td>
<td>Positive to human and bovine tuberculin</td>
<td>Positive Old tuberculin</td>
<td>Considerable improvement in general condition, appetite and cough, and condition of lung</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>E. T. King</td>
<td>11 m.</td>
<td>Active in left apex</td>
<td>1 year</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>Slight</td>
<td>Positive to human and bovine tuberculin</td>
<td>Positive Bacillary emulsion</td>
<td>His cough has ceased, he has gained in weight and appetite, he feels fitter and stronger, the lung has improved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Age</td>
<td>Sex</td>
<td>State of Disease</td>
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<tr>
<td>13</td>
<td>W. M. Mays</td>
<td>8</td>
<td>f.</td>
<td>Good</td>
<td>..</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Treatment not given</td>
<td>This was a case where enlarged tonsils and adenoids were present with bronchitis in both lungs and slight impairment of the percussion note above the clavicle on the left side</td>
</tr>
<tr>
<td>14</td>
<td>R. Coleman</td>
<td>12</td>
<td>m.</td>
<td>Good</td>
<td>..</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Treatment not given</td>
<td>This was a case for diagnosis on account of frequently recurring attacks of bronchitis</td>
</tr>
<tr>
<td>15</td>
<td>W. Nutman</td>
<td>5</td>
<td>m.</td>
<td>Active in left lower lobe</td>
<td>1 year</td>
<td>Fair</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>..</td>
<td>Positive</td>
<td>Bacillary emulsion</td>
<td>Treatment not given</td>
<td>His father's father died of Phthisis, his father suffers from the disease, his mother's mother died of it. He has improved slightly in general condition</td>
</tr>
<tr>
<td>16</td>
<td>R. Chandler</td>
<td>8</td>
<td>m.</td>
<td>Good</td>
<td>..</td>
<td>Good</td>
<td>Not raised</td>
<td>No sputum obtainable</td>
<td>..</td>
<td>..</td>
<td>Negative</td>
<td>Treatment not given</td>
<td>This was a case of cough lasting intermittently for two years and requiring definite diagnosis</td>
</tr>
</tbody>
</table>