INDIAN SECTION.

Leprosy of the Lungs

E. MUIR.

(*Reprinted from "Leprosy in India," April,* 1933.)

THERE is considerable difference of opinion as to whether the lungs are affected by leprosy. Hansen and Looft (1895) write as follows : "According to our observation there exists a sharp anatomical distinction between leprosy and tuberculosis, and there is no such thing as leprosy of the lungs." The same authors, commenting on a case reported by Doutrelepont, suggest that the acid-fast bacilli found in the sputum were due to a bursting nodule in the larynx. Thay state that in order to establish a differential diagnosis in doubtful cases they recommend a thorough examination of the bronchial glands. They themselves have never failed to find tuberculous glands and have never seen anything resembling leprous affection of the glands. Wade (1927) who has perhaps conducted more leprosy autopsies than any other pathologist, states that "he has never seen a gross leprotic lesion of the lung, intestine, kidney, or central nervous system, though they have been reported."

On the other hand Babes (1906), states that in leprous patients all degrees of leprosy of the lung may be present from normal microscopic and macroscopic appearances, but with bacilli present, up to gangrenous bronchiectasis ; tubercle and leprosy may be present at the same time ; or tubercle present alone. He distinguished lepra bacilli from tubercle bacilli in the lungs by their arrangement and morphological appearance.

Sticker (1905) considers that leprous lesions are rare ; bacilli may be found in large numbers even when no microscopic changes are present ; leprosy may take the form of chronic peribronchitis, or a caseous pneumonia with destruction of lung tissue as in tuberculosis.

Sagai-Masaki (1914) mentions finding leprous nodules in the pleura. He considered that leprosy of the lung was generally secondary to tuberculosis of that organ. Scagliosi (1896), Brutser (1898), Nieser, Leloir, and Rikhi either deny that leprosy of the lungs occurs or express grave doubts of its existence.

Kobayashi (1929) examined at autopsies the lungs of 60 cases of leprosy. In 32 of these he found tubercle bacilli and pathological changes of a tubercular nature. He found

lepra bacilli in 19 of these 60 cases. In 8 out of the 32 tubercular lungs and in 11 out of the 28 non-tubercular lungs he found lepra bacilli. He therefore was unable to confirm Sagai-Masaki's (1914) finding that leprosy of the lung is generally secondary to tubercle. Apparently most or all of the above writers have relied upon macroscopic and microscopic appearances in distinguishing between tubercular and leprous lesions, and their work is open to the criticism that the lesions found may have been due to tuberculosis, though lepra bacilli may have been present in microscopic sections as the result of general bacillæmia.

This objection was realized by Wise (1912) who, in order to remove doubt in the matter, searched for acid-fast bacilli in all cases and pocketed a portion of lung tissue in the thigh of a guinea-pig, whenever he found them. In only two out of eleven cases examined did he find acid-fast bacilli. In the first of these, from the description apparently an advanced C_3 case, the lung showed petechial hæmorrhages, slight anthracosis, but no gross pathological lesion. Microscopic sections of the petechial hæmorrhagic spots " showed a diffuse round-cell infiltration with occasionally a giant cell, no fibrosis but a slight catarrhal cellular exfoliation in the surrounding alveoli ; the blood-vessels and capillaries were greatly congested ; no increase of leucocytes or inflamatory exudation ; there were numerous leprosy bacilli present, apparently all intracellular ; a piece of this lung including a petechial spot was pocketed in the thigh of a guinea-pig ; after six weeks there was no sign of tuberculosis." The second case was one of the same type. During life no acid-fast bacilli were found in the saliva, but in fæces lepra bacilli were found present in clumps on several occasions. Post-mortem " the lungs both showed small areas of bronchial consolidation ; many pin-head nodules of a whitish solid semi-transparent character were scattered through the substance of both lungs ; no caseation was observed ; the bronchial glands were swollen and hard but not confluent ; no nodules were found in the pleura." Post-mortem " the lung nodules were areas of necrosis surrounded with small round-celled infiltration in which was occasionally found a giant cell. In these necrotic areas lepra bacilli were readily found. Many smaller petechial areas containing lepra bacilli were also present, but invisible to the naked eye. The femoral, lumbar, and bronchial glands were all of similar construction. Extensive fibrosis was present, with scattered necrotic unstained areas. Many very large giant cells, with nuclei as a rule in the centre of the cell, were found

sometimes three or four in the field at once. These giant cells are not definitely related to the necrotic areas. Many eosinophilies were also noted. Lepra bacilli were found in all the necrotic patches, but not in the giant cells." Commenting on these cases Wise says " Both these cases were at the time of death in an advanced stage of the disease, and it is possible that the lesions in the lungs, which were certainly of a comparatively recent character, partook more of a final general dissemination than of a natural sequence of leprosy. From general clinical observations I am inclined to think that such cases as these do not occur until the disease is greatly advanced. The second case has many close resemblances to the general miliary tuberculosis in this country. Miliary tuberculosis in British Guiana often presents itself with miliary tubercle in the lungs and peritoneum and caseous nodules in the liver and spleen. Tuberculosis is, however, completely negatived by the experiments on guinea-pigs. Moreover, though the microscopic lesions have a superficial resemblance to those of tuberculosis, the arrangement of the cells, the central nucleated giant cells, the clumps of numerous bacilli instead of scattered single ones, all point definitely away from infection with the bacillus tuberculosis. It is important to recognize, however, that the miliary type of leprosy is not an acute early manifestation of the disease, but a late super-charging of the leprosy bacilli." It should be noted in passing that the giant cells referred to by Wise are obviously not of the nature of the bodies usually known as Langhans' giant cells, seeing he mentions that their nuclei are central, and uses their presence as a proof that the lesion containing them was *not* tubercular. Schaffer (1900, 1902) describes " leprous giant cells containing large masses of bacilli," and adds that " we also meet with Langhans' giant cells in pure lepromata."

Our present study is based upon clinical studies of ten patients. We shall first set forth notes from these cases and then discuss the various points which arise.

Case I. A. R. Type C_3. Age 50. Patient was admitted to hospital in May, 1930, with a running temperature. Various forms of treatment were tried to stop his reaction, the most effective of which was 5 min. of adrenaline solution injected daily. Though the reaction passed off, the patient still remained weak, and any attempt at special treatment brought on rises of temperature. On 15th November, 1931, the patient began to cough up large quantities of sputum in which abundant acid-fast organisms

were found. This sputum was inoculated into two guinea-pigs on 21st November, 1931 ; these were still living and healthy a year later. The patient died on 30th December, 1931. No autopsy was possible.

Case II. N. Type C_3. Age 16. Large quantities of sputum containing acid-fast bacilli were coughed up by this patient. The sputum was inoculated into two guinea-pigs on 2nd May, 1931 ; one of which survives 19 months later. The patient took his discharge from the hospital on 17th July, 1931. This patient showed a continuous temperature.

Case III. P. K. B. Type C_2. Age 38. This patient was first admitted on 10th November, 1930, in a very debilitated condition with running temperature and swollen and erythematous lesions all over the body. This condition failed to yield for 78 days to antimony, quinine, and alkalis, but yielded after nine injections of a mixed streptococcal and staphylococcal vaccine. Acid-fast organisms were found in the sputum which was copious and purulent. Moist râles heard on auscultation. The sputum was inoculated into two guinea-pigs on 31st January, 1931. One of these died on 14th September, 1931, but showed no signs of tuberculosis, the other was alive and healthy in the end of 1932. The patient recovered later and the disease became quiescent.

Case IV. P.S. Type C_2. Chinese shoe-maker. This patient at first improved under treatment and became almost a C_1 case. But his red cell sedimentation remained rapid (between 40—50), and his temperature varied between 97 deg.—99 deg. F. He developed a persistent dry cough which would not yield to treatment. Later the evening temperature rose to 100.2 deg. There was no sign of lepra reaction and the leprous lesion continued to clear up, although no special treatment was given. He had a hæmoptysis on 25th August, 1931, and sputum showed acid-fast bacilli ; guinea-pigs inoculated with the sputum on 31st August, 1931, died on 21st September, 1931, showing signs of general tuberculosis. Two other guinea-pigs were inoculated with sputum on 30th October, 1931, died on 16th January, 1932, and 30th January, 1932, both showing advanced signs of general tuberculosis. The patient took his discharge from hospital and we heard later that he had died.

Case V. R. N. Type C_1. Age 25. This patient showed a running temperature between 97 deg—100 deg. F. Cough was always present with moist râles on auscultation

and large quantities of sputum was coughed up, containing masses of acid-fast bacilli. Guinea-pigs were inoculated with the sputum on 4th September, 1930. One of these died on 16th September, 1930, and the other on 10th February, 1932, neither of them showing any signs of tuberculosis. The bacilli in the sputum were found singly and in bunches. The patient was in hospital from August, 1930, till October, 1931, during the whole of which time the raised temperature lasted. During that time his weight became reduced by 7 lbs. He left hospital without recovery.

Case VI. S. K. Type C_3. Age 30. During reaction coughed up large quantities of purulent sputum. Moist râles in chest. The sputum was inoculated into a guinea-pig on 10th September, 1931, which remains well more than a year later. The patient maintains good health and has improved considerably since his admission six years ago. Special treatment cannot be pressed as it produces reaction especially in the lympth nodes.

Case VII. S. I. Type C_3. Age 32. This patient after an attack of influenza showed acid-fast bacilli in his purulent sputum. Injection into guinea-pigs gave negative results. This patient had previously shown a prolonged febrile reaction which would not yield to the usual remedies but cleared up after two injections of novarsenobillon.

Case VIII. S. B. Type C_2. Age 30. Duration of disease about ten years. After an intravenous injection of 4 c.c. of a 1 per cent. solution of mercurochrome this patient showed a rise of temperature and began to cough up large quantities of purulent sputum. Moist râles were present on auscultation. The sputum contained large masses of acid-fast bacilli. Injection into guinea-pigs gave negative results. The patient has considerably improved on treatment with potassium antimony tartrate.

Case IX. B. H. Type C_2. Age 30. Has already been described by Chatterji (1931). When the writer was called in to see him this patient had already been under treatment for some time as a case of pulmonary tuberculosis, the diagnosis being made because of the clinical signs of the chest and the large quantity of purulent sputum full of clumps of acid-fast bacilli. Complete rest in bed had been prescribed, but the writer diagnosing pulmonary leprosy advised graduated exercises with the result that within a couple of weeks the patient was able to walk two or three miles without fatigue, his fever and other signs of reaction had disappeared and the cough and expectoration were almost entirely gone ; the general health of the patient had markedly improved. This

patient, three years later, is still progressing favourably towards recovery and has never again shown any pulmonary signs or symptoms. Guinea-pigs were not inoculated.

Case X. Type C_2. Age 25. This case is mentioned by Rogers and Muir (1925). On admission the patient showed pulmonary clinical signs and coughed up large quantities of purulent sputum full of acid-fast bacilli both singly and in bundles. After three weeks of treatment with small doses of hydnocarpus esters, the sputum became free of acid-fast bacilli, and after four more weeks had dried up altogether. Guinea-pigs were not inoculated. This patient has, with the exception of one slight relapse, remained free of lung symptoms for the last nine years, though due to certain adverse social circumstances she has not yet recovered from leprosy.

Discussion.—As I have mentioned above there is a variety of opinion regarding pulmonary leprosy. (*a*) Hansen and Looft and others deny that this condition exists. (*b*) Wade, though not denying its possibility, has not yet seen the condition. (*c*) Babes, Sticker, Sagai-Masaki, and Kobayashi mention pathological evidence in favour of its existence, though their evidence in favour of leprosy, as opposed to complicating tuberculosis, was largely dependant on the arrangement, number, and morphology of the organisms. (*d*) Wise alone found his differential diagnosis from tuberculosis on experimental evidence. But it will be noticed that the disease which he found present in his two cases was a terminal one in moribund cases.

In contradistinction to the above it will be noticed that our nine cases (excluding the obvious case of tuberculosis) were of quite a different type. Of the nine, four were of the C_3, four of the C_2, and one of the C_1 sub-type. In none of them was the disease terminal. The pulmonary signs and expectoration were associated with lepra reaction and passed off when the other signs of reaction disappeared. In all except the last two cases there was experimental evidence, based upon inoculation of guinea-pigs, regarding the presence or absence of tuberculosis. In the last two cases the clinical history made it clear that the disease was not tuberculosis because, had they been cases of tuberculosis at a stage indicated by the huge masses of acid-fast bacilli which they were expectorating, they would have certainly been bed-ridden and have shown much more emaciation and toxic symptoms, whereas both these patients benefited by ambulatory treatment.

The references we have quoted deal almost exclusively

with leprosy of the lungs from the evidence gained at autopsies. There are but few references in literature to clinical records of pulmonary leprosy. Leprosy is not often a fatal disease ; death is generally brought about by complicating diseases, and these have frequently the effect of changing to a considerable extent the pathological picture as found in post-mortem. As an example I may cite one case of a patient who was originally of an advanced cutaneous type with marked thickened nodules all over the body, smears from which showed huge masses of bacilli. This patient was attacked with exfoliative dermatitis and died after suffering from this condition for three months. At the autopsy septic pericarditis was found to have been the cause of death. But careful examination failed to reveal any acid-fast bacilli. Septic and other conditions have in this way the power to change profoundly the condition of leprosy, and the pathological picture found after death may be considerably different from the ordinary pathological condition which exists during life. This possibly accounts for the absence of pulmonary leprosy at autopsies.

Another possibility has to be excluded before making a diagnosis of pulmonary leprosy, viz., a septic lung abscess, without leprosy of the lungs, but accompanied by the bursting of a suppurating nodule of the laryngeal or pharyngeal mucosa. In this way lepra bacilli in fair numbers might be found mixed with pus expectorated from the lungs. It is difficult to give clinical evidence of the absence of such liquefying and bursting nodules in the above nine cases, seeing that laryngeal examination was not made. In none of the cases, however, was there marked nodulation of the pharyngeal mucosa, though there may have been slight diffuse leproma of the throat which is frequently present in C_2 and C_3 cases. In our opinion the condition was due to definite leprosy of the lungs in most, if not in all, of the nine cases.

Case No. 4 illustrates by contrast the course of a case of tuberculosis of the lungs complicating leprosy. Notice the effect of the more toxic on the less toxic disease, the leprous lesions tending to clear up as the tubercular lesions advance.

Case No. 10 shows especially the importance of an early diagnosis between leprosy and tuberculosis of the lungs. The absolute rest may be required in a tubercular lesion of the gravity indicated by the amount and microscopic appearance of the sputum, whereas the same degree of rest may be most harmful in a case of leprosy of the lungs given a same sputum examination ; while a greater degree

of physical exercise may hasten the patient's recovery.

On the other hand, injections of Chalmoogra and other preparations which would be beneficial in leprosy may be most harmful and dangerous in tuberculosis.

A careful diagnosis is therefore necessary especially with a view to excluding tuberculosis in all cases in which acid-fast bacilli are present in the sputum. This should, if possible, be made by experimental inoculation. Failing this, a provisional diagnosis of leprosy of the lungs may be made if (*a*) large clumps (cigar bundles) of acid-fast organisms are found in sputum, (*b*) there is no sign of leprous abscess or ulceration in the region of the throat, (*c*) there are clinical signs of disease of the lung and yet the patient is not as ill as it should be expected in a case of pulmonary tuberculosis discharging such large quantities of acid-fast organisms. This diagnosis is confirmed if the sputum and acid-fast organisms diminish rapidly as lepra reaction passes off.

REFERENCES.

(1) Hansen and Looft.—1895. "Leprosy in its Clinical and Pathological Aspects." John Wright & Co., Bristol.

(2) Wade and Rodriguez.—1927. "A Description of Leprosy, its Etiology, Pathology, Diagnosis, and Treatment." Bureau of Printing, Manila.

(3) Babes.—1906. "Kolle u Wassermann."

(4) Sticker.—1905. G. Handb. d. Tropenkr, Bd. ii, Art "Lepra," p. 189.

(5) Sagai-Masaki.—1914. "Lungen Lepra und ibre Haufigkeit Igaku-Chuo Zassi Nr." 188, S. 18.

(6) Scagliosi.—1896. "Anatomische Veranderungen bei Leprapolonum, Monatsheft f. pract. D. Bd. 23."

(7) Brutser.—1898. "Sektionsergebnisse aus dem Leprosorium bei Riga Dermat." Zeitschrift, Bd. 5, S. 750.

(8) Kobayashi.—1929. "Uber die viscerale Lepra," Universitas Imperialis in Kyoto.

(9) Wise, K. S.—1912. "Lung Lesions in Leprosy," Jnl. School, Trop. Med., Lond., Vol. I, p. 251.

(10) Schaffer.—1900, 1902. "Die Lepra," Vol. I, Fasc. 1, and Vol. II, Fasc. 2.

(11) Chatterji, S. N.—1931. "Pulmonary Leprosy, Antiseptic," Vol. 28, Aug.

(12) Rogers and Muir.—1925. "Leprosy." John Wright & Sons, Ltd., Bristol.