These experiments are only regarded as preliminary to a thorough investigation of the subject, but the question is so important that I have ventured to record my results in the hope that other observers may be induced to experiment on the same lines. I think it will be found that lepers may be inoculated by infected bugs, and this point can be elicited by causing infected bugs to bite lepers on parts of the skin on which there are no leprosy lesions.

If my hypothesis is correct, a great many facts regarding the spread of leprosy which have hitherto been inexplicable would be made clear. Inquiries into the past history of certain lepers go to show that they could only have become infected with leprosy through some intermediate host.

The fact that plague is carried by fleas warrants, at any rate, the inference that leprosy may possibly be carried by bugs. Further, the fact that only a percentage of human beings are attacked by the bed-bug, or, for the matter of that, by the flea, would serve to explain why it is that only some of those people who live in close association with lepers become lepers also. All lepers that I have questioned admit that bugs bite them freely, and it is not unreasonable to assume that such a voracious feeder as the common bug must, in the course of his nightly meal, ingest a considerable number of leprosy bacilli if his bites are in the neighbourhood of leprosy nodules which are often swarming with the *Bacilli leprae*. If such infected bugs were thereafter to bite a non-leper, there would be a good chance of the bacillus being introduced into his system.

The following history of a recent case of leprosy is only explicable by assuming some such method of infection as suggested above:

A native, X., residing in a village about three miles from Maseru, presented himself as an out-patient about three months ago with some well-marked tubercular leprosy patches on the face. They had appeared about six weeks previously. There are no lepers in his village, and none of his relatives are lepers. Inquiries into how he had spent his time and where he had been during the preceding year elicited the fact that he had during that period visited on three or four occasions a village about fifty miles away, where there was one leper, who was, however, driven from the village during the period in question. X. had been in the leper's hut, but had never partaken of food there. After the leper had been driven away, X. spent one night in the hut, and was severely bitten by bugs there.

The closest questioning failed to elicit any further evidence of contact with lepers or their dwellings, and one is almost forced to the conclusion that X. was inoculated by leprosy-infected bugs or other parasites on the night he spent in the infected hut.

THE OPHTHALMO REACTION OF CALMETTE IN THE EARLY DIAGNOSIS OF PHTHISIS.

BY

A. STROUD HOSFORD, M.R.C.S., L.R.C.P.,

LATE SENIOR RESIDENT MEDICAL OFFICER TO THE ROYAL HOSPITAL
FOR DISEASES OF THE CHEST, LONDON.

WHILE Resident Medical Officer at the Royal Hospital for Diseases of the Chest I had the opportunity of studying the effects of Calmette's reaction on patients exhibiting various stages of pulmonary tuberculosis.

The solution of tuberculin employed consisted of glycerine-free desiccated tuberculin of strength 0.1 per cent. prepared from Koch's Old Tuberculin manufactured by Farbwerke Vorm Meister Lucius and Brüning.

One or two drops of this solution were dropped into one eye of the patient near the inner canthus, the lower lid being drawn down by means of the finger, which is kept there for a minute or so to ensure absorption, otherwise the fluid is apt to be squeezed out as the patient naturally closes his eye. In all cases before the drop is inserted the eye should be carefully examined for any sign of disease, old standing or recent, in order to avoid any risk of serious inflammation; unless the eye is to all appearances free from disease, no tuberculin should be placed in it.

The resulting inflammation differs in different individuals, both in time of onset and in the intensity, irrespective of the amount of the involvement of the lungs. In my experience some cases have shown definite reaction as early as three hours after the application of the test, while some have not shown any reaction until as late as thirty-six to forty hours after the test was applied; in the majority the maximum reaction was obtained in about twelve hours.

The reaction produced may consist of slight conjunctival injection, of marked injection of the whole conjunctiva, both ocular and palpebral, or of marked injection with a muco-purulent discharge, and the patient experiences the usual symptoms of simple conjunctivitis, which entirely clears up in the course of three or four days. In one case in which a stronger solution was used (1 per cent.), there was not only a marked conjunctival reaction, but also an inflammatory condition of the surrounding tissues closely resembling that produced by erysipelas. As a rule no treatment was required, but if the patient complained much of the irritability of his eye, the usual treatment for conjunctivitis was employed. Some observers have recorded bilateral results, but none of our cases showed this. If Calmette's test has been applied to the eye of a patient with pulmonary tuberculosis, and several weeks afterwards Koch's Old Tuberculin has been injected in the usual manner with a positive result, a secondary inflammatory reaction in the same eye has occurred in some but not all cases.

In some cases of early involvement of the lung, no physical signs whatsoever were discovered, and the disease was only suspected on a history of haemoptysis. It is in these cases especially that Calmette's reaction came to our aid, and proved to be of the greatest value, the diagnosis being confirmed later by the appearance of crepitations at one or other apex. A positive reaction may be said to carry great weight, and the patient would be wisely treated from the first as if physical signs had existed. One often sees a patient who complains of "bringing up blood," and in whom no physical signs can be found, hence it is difficult to say where the blood is coming from; but as I have just stated, if Calmette's test is positive, in such a case it throws a grave suspicion on one or other lung.

A negative reaction by no means excludes phthisis, as the test may fail in some early cases, but more especially in old-standing ones, and those who are moribund. If Calmette's test proved negative, and pulmonary tuberculosis was suspected, a second application was made in three to four weeks to the other eye. If a reaction now takes place, in my opinion the patient is undoubtedly tuberculous; this second application was found only to be required in a few cases. I have seen two cases in which a third application was necessary before a positive reaction was obtained. Patients that have had the test applied have been seen some considerable time after, even as late as a year, and I have never had a case which showed any bad results whatever.

SUMMARY.

Calmette's reaction was used in 225 cases with the following results: 100 were cases of pulmonary tuberculosis; all reacted with the exception of 7. These 7 were undoubted phthisis, the sputum containing tubercle bacilli. Five of these 7 were in an advanced condition, and two of them gave a reaction to a subcutaneous injection of Koch's old tuberculin. The remaining two cases were early, but, as I have stated above, their sputum contained tubercle bacilli.

Of the remaining 125 cases which were not phthisis and did not give the test—

- 25 were cardiac cases of all varieties.
- 31 were simple bronchitis which cleared up.
- 20 were chronic bronchitis and emphysema.
- 23 were of various kinds—for example, gastric ulcer, dyspepsia, enteric fever, erysipelas, neuroses.
- 8 were bronchiectases.
- 6 were simple pleuritic effusion of pneumococcal origin.
- 12 were cases of lobar pneumonia all of which resolved.

In all these 125 cases tubercle bacilli, although repeatedly looked for, were not found in the sputum.

CONCLUSIONS.

1. A negative result by no means excluded pulmonary tuberculosis; some very advanced cases failed to give a reaction.

2. I have never obtained a positive result except in true cases.

3. I never saw any bad results whatever from the use of the test as regards the eye.

4. If in a suspicious case the patient fails to give a reaction, then the test should be applied on three different occasions with an interval between each application of three to four weeks.

I am greatly indebted to the physicians of the hospital for their permission to publish these results. My thanks are also due to my colleague Dr. Leckie, the House-Physician, for his kind assistance in compiling the cases.