

"3. Moreover, like the 'discomyces,' the tubercular filaments are easily disaggregated in small rods and in grains.

"4. These grains are often disposed of in the form of chaplets in the prolongation of a filament or of a rod, and very likely correspond to the 'oospore' form of reproduction of the parasite.

"5. These spores are destroyed in a temperature below 100°, like those of the 'discomyces' or the moulds.

"6. Contrary to the bacteria, which thrive best in an alkaline surrounding, the tubercular bacillus, like the fungus, thrives best in an acid surrounding.

"7. The tubercular bacillus is not the specific agent of the tubercle which is found also in actinomycosis, as pergillus and mucovmycosis.

"8. In tubercular lesions radiated formations may be found with peripheric 'massues' simulating absolutely actinomycosis granulations—a fact which was discovered in 1893 by Coppen-Jones.

"9. Moreover, identical formations can be obtained experimentally by the intravenous inoculation of the rabbit with slightly virulent tubercular bacilli; actinomycotic grains develop in the lungs, the brain, and especially in the kidneys (loins).

"10. The lesions are identical if, instead of tubercular bacilli, inoculations of cultures of *Aspergillus fumigatus* or of *Mucor* are made under the same conditions.

"11. Finally, actinomycosies would react strongly under the action of Koch's tuberculin (Poncet).

"From all these considerations the almost evident conclusion seems to be that the tubercular bacillus is a filamentous fungus akin to that of actinomycosis, which must be comprised in the same species under the name of *Discomyces tuberculosus*. It is probable that it exists as a saprophyte in the exterior surrounding."

Further, Dr. Foulerton, in the Milroy Lectures, reported fully in the *Lancet* (Vol. i, 1910, p. 551), definitely expressed the same opinion, and, further, gave detailed information regarding his own work, in which he had proved to his own satisfaction that the specific organism of tuberculosis was a streptothrix and not a bacillus. My own field observations in connection with the lower animals support this view, as there is clear evidence to show that tubercular infection can remain virulent on a pasture for a considerable time. It is a very common thing in New Zealand to find cattle which have never been under a roof in their lives showing more or less extensive tuberculosis. This being the case, it is extremely difficult to realize how they could possibly have become affected by inhalation, while there is every reason to believe that infection entered the body through the medium of the digestive track. A large number of these cattle are station-bred animals, and consequently were not exposed to infection through the medium of factory by-products, hence they must have become either infected through suckling station cows yielding tubercular milk, or through grazing upon pastures contaminated by the fæces of tubercular cattle. I do not believe that tubercular mother's milk is responsible to any marked extent for the spread of the disease among station cattle. That pastures can retain infection for some time is shown by an experiment I carried out at Wallaceville some time since.

I have on the Laboratory farm a small grass paddock of some 3 acres, which had been for some two years kept for the purpose of from time to time holding cows known to be tubercular. After it had on one occasion been unoccupied for at least four weeks a nine-months-old calf was placed in it. This animal was first subjected to the tuberculin test, to which it gave no reaction whatever. It remained in the paddock for three months, and was then again tested, this time giving a decided reaction. It was some weeks afterwards slaughtered for *post mortem* examination, which disclosed the presence of some well-marked tubercular lesions in the mesenteric glands, the fact being proved by microscopical examination. It should be noted that in this paddock the herbage was very short and not of dense growth, and that sunny days predominated during the period it was vacant before the calf was placed in it. It contained no trees or shrubs save one small dense clump of shrubs, hence good opportunity was offered for the exercise of the germicidal action of the sun's rays. No other cattle were in this or the adjoining paddock during this calf's occupation of it, and the animal remained in it right up to the time of slaughter.

Further, in the "Report of the Department of Agriculture" for 1899 Gilruth records an instance having a bearing on the question which occurred on a property in the South Island. In this case he applied the tuberculin test to nineteen stud bull calves, the test being carried out in July, 1897. Two only of these animals reacted, and were slaughtered. In June, 1898, the seventeen bulls which had not reacted were again tested, and on this occasion five out of the seventeen gave a definite reaction. In the intervening period between the two tests these animals had not been housed, and had not been in contact with any known tubercular animals, but had run out in an open paddock the whole period. The following remarks made by Gilruth are worthy of reproduction:—

"A number of stud bull calves, nineteen in all, were tested in July, 1897; two reacted and were slaughtered. In June, 1898, the seventeen bulls, rising two years old, were again tested by me. Since the last testing they had not been housed, nor in contact with any known tubercular animals. The rainfall on the property averaged per month meanwhile 1·2 in., and day had followed day with perfect sunshine. *A priori*, it might be asserted that those animals could not possibly have contracted the disease even though a tuberculous animal or two had been mixed with them; yet on the second testing no less than five out of the seventeen reacted. It may be said they were tubercular, but did not react the previous year. That may be so; the contrary cannot be proved. Yet the test was conducted with all possible care."

Further instances of infection from the pasture were furnished by the pasteurization experiments carried out at the Glen Oroua Factory. In these experiments all pigs fed from the time