

without delay, because if any buildings are erected on the spaces referred to, any such Science Museum as the Commissioners have had in contemplation during the last thirty years, for which they have freely given their land and offered money, will be impossible of realisation, to say nothing of future extension.

"I have reason to think that if the Commissioners would again take up the question, remind the Government of their continuous action and appeal to the Government to consider the matter, such an appeal would be received sympathetically. If such an appeal could be accompanied by the renewal of the offer, already twice made, to provide a money contribution towards the building, the matter would, of course, become still more hopeful.

"The last Annual Report shows that the Commissioners have in hand funds available for such a purpose, and, speaking as a Commissioner, I can conceive no more worthy expenditure, as it will give full effect to the great purposes the Commissioners have had in view during the whole time they have been engaged in carrying out the late Prince Consort's wise advice as to the best use of their property in the nation's interest."

In 1910 the Commissioners took action in the matter. In the "Further Correspondence" already referred to [Cd. 5673] is given a letter (June 25, 1910) from the Secretary:—

"The Board of Management of the Royal Commission for the Exhibition of 1851 have recently had before them a proposal to establish at South Kensington a permanent building for the accommodation of the National Science Collections. . . .

"Believing that the application to such an object of a portion of their surplus funds would be consistent with the declared policy of the Commissioners, they have resolved to recommend to the Commissioners a repetition of their former offer of 100,000*l.* towards the expense of providing a Museum, subject to their being satisfied that his Majesty's Government are prepared to make provision, so as to secure the erection of an adequate building."

On August 25, 1910, the Treasury accepted this offer. While this correspondence was going on the Office of Works was writing to the Trustees of the British Museum with regard to the Northern Boundary, a subject dealt with in the previous notes.

We now learn from *The Times* report of Mr. Runciman's speech on the Education vote (July 13, 1911) that at last some compromise has been arrived at.

"Since the first announcement was made about the site of the Science Museum I have entered into negotiations with the Trustees of the British Museum, and we have now arrived at an agreement which will give us the land we require for the Science Museum and will not interfere with the development of the Natural History Museum, so that we shall have in South Kensington a group of museums which will be the envy of foreign nations." NORMAN LOCKYER.

#### THE ROYAL COMMISSION ON TUBERCULOSIS.

THE Reports of Royal Commissions are as a rule based almost entirely on summaries of oral evidence submitted by authorities, expert or otherwise, on the subjects with which these Commissioners have been called together to deal. Such Commissions can be expected to give little more than a *résumé* of what is already known.

In the Final Report of the Royal Commission on Tuberculosis (Cd. 5761; price 6*d.*) it is soon made manifest that here something more than personal opinions of even the most eminent authorities have

been brought together. The very genesis of the Commission made this necessary. The greatest living authority on the subject of tuberculosis, Robert Koch, had for long taught that tuberculosis was a disease common to animals and man, a disease induced by a specific micro-organism, the tubercle bacillus. Of this micro-organism there might be varieties in which the virulence or disease-producing activity might be higher in one and lower in another, but they were still essentially and specifically the same wherever they were found in the tuberculous lesions, whether of man or of animals.

At the International Congress held in London in July, 1891, Koch had turned round (perhaps not suddenly, though the announcement of the *volte face* had come with startling suddenness) and had announced that the tuberculous disease of cattle was not the same thing as tuberculosis of the human subject, and that the tubercle bacillus found in the tuberculosis of cattle was non-virulent for man.

The experimental work on which this statement was based was considered by many of the scientific men who heard the pronouncement to be totally inadequate to bear the wide generalisations founded upon it.

Lord Lister, the late Prof. Nocard, Prof. Bang, Sir John McFadyean, Dr. Sims Woodhead, and others were in agreement that the statement, if true, would revolutionise our whole attitude to the tuberculous problem, and that before it could be accepted independent and corroborative evidence must be obtained.

Sanitarians in the United States appreciated the importance of this to the full, and the morning after Koch's address was given a telegram was received in London from Washington stating that the tenor of the address had been noted, and that arrangements, financial and otherwise, had been made to carry out experiments to test the trustworthiness of Koch's thesis.

Although a resolution asking the British Government to appoint a Royal Commission had been carried at the meeting of the Executive Committee, the business of the closing meeting of the Congress had been practically concluded, and no resolution asking for this Commission had been brought forward, and none could be found. One or two members of the Executive Committee, however, had carried the terms of the Resolution in their memories, they were hurriedly committed to paper, and the matter was placed before the meeting. Lord (at that time Sir James) Blyth had made a most generous offer to place a farm or farms at the disposal of any Committee or Royal Commission appointed, and it was evident that any such Commission set to work to inquire into the question would be able to carry on its investigations under most satisfactory conditions.

In these circumstances the Right Honourable Walter Long, M.P., then President of the Local Government Board, advised her Majesty Queen Victoria to appoint a Royal Commission with instructions to inquire and report with reference to tuberculosis:—

1. Whether the disease in animals and man is one and the same.
2. Whether animals and man can be reciprocally infected with it.
3. Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favourable and unfavourable to such transmission.

The Commission appear to have laid down a very definite plan, from which there has been no deviation. It was asked to inquire and report on the above questions. No inquiry except an actual experimental investigation seemed to give promise of any trustworthy results, and the scheme of work did not include the taking of oral evidence.



The answers to the questions, though very guarded in many directions, are, where the Commissioners have made up their minds, clean cut and definite. No pretence is made to answer any questions but those contained in the reference, and anyone going to this Report for general information on the subject of tuberculosis generally will come away greatly disappointed, but on the questions the Commission was asked to answer the expert will find ample material for thought.

Is the disease in animals and man one and the same?

Before this question could be answered the Commissioners had apparently to satisfy themselves that the tubercle bacilli found in animals (especially bovine) and man (*a*) were the same, morphologically, culturally, and pathogenetically; or (*b*) they differed in one or other or all of these aspects, and, if they differed, whether any modification of these aspects ever occurred under either natural or artificially produced conditions.

The conclusion at which the Commissioners arrive is that it is practically impossible to differentiate the bacillus found in the bovine animal suffering from tuberculosis from that found in certain cases of tuberculosis in the human subject. The bacilli are alike in every respect—morphology, cultural characters, and virulence. In the human subject, however, especially in cases of pulmonary tuberculosis, a type of tubercle bacillus occurs which, though resembling morphologically that found in bovines suffering from tuberculosis, differs considerably in cultural characters—*e.g.*, rate of growth on artificial media and in virulence. Both types produce rapidly progressive tuberculosis in the human subject and certain other animals, but only one, the bovine type, is specially active when introduced into the bovine animal. It is obvious, then, that wherever a tubercle bacillus is found, it may set up tuberculosis in the human subject, whatever it may be able to do in the cow. Moreover, the disease, when set up in the human subject, always runs much the same course, whether the exciting agent in its production is the one form of the bacillus or the other.

The answer to the second term of reference—"Whether animals and man can be reciprocally infected with it"—follows as a kind of corollary. There is ample evidence put forward to prove that many cases of fatal tuberculosis in the human animal (usually in children) have been set up by the bacillus proved to have been the cause of the disease in bovines. On the other hand, the type found naturally only in the human subject appears to set up in the bovine merely a non-progressive tuberculosis. It was found, however, that adult human beings are sometimes infected by the tubercle bacillus of bovine type, even the lungs becoming involved, whilst it is evident from recorded experiments that cattle have not by any means complete insusceptibility to the attacks of the tubercle bacillus of human type. These facts are of primary importance when, as is evident from the work recorded, there are such gradations in all the differentiating characters in many of the strains of bacilli separated from ordinary cases of tuberculosis in the human subject—a gradation that becomes even more marked and important in the groups of bacilli isolated (*a*) from the lesions in cases of lupus and (*b*) from the tuberculous in the horse.

Granting that the foregoing may be accepted, it follows that the third term of reference concerning the conditions under which transmission of the disease from animals to man takes place can only be answered through a study of the susceptibility (*a*) of the animal and (*b*) of man. The susceptible individual, whether brute or human, will be most affected, and by the widest range of tubercle bacilli as regards gradations

of virulence. Each individual affected will constitute a centre of infection, and the greater the number of these susceptible individuals exposed even to "weak infections," the greater the chance of further transmission of the disease. It would appear that residence of a tubercle bacillus in any animal or series of animals for a considerable length of time may increase the virulence of that bacillus for the special species in which it is "cultivated." This certainly occurs in connection with other micro-organisms—*e.g.*, the pyogenic streptococci and certain forms of micro-organisms giving rise to septicæmic processes—still no direct evidence is adduced by the Commissioners that this takes place in connection with the tubercle bacilli, though in the course of their work they came across an enormous variety of grades of virulence in the tubercle bacilli from various sources in man and the lower animals. The bovine type of bacillus occurs with such frequency in children, especially in sites connected with the alimentary canal, that it seems impossible to ignore the causal relationship between tubercle bacilli found so frequently in the milk given by tuberculous cows and the tubercle in the child; whilst, on the other hand, the tubercle bacilli usually associated with pulmonary tuberculosis in the adult human subject being of the human type, have probably passed through a number of men and women, one transmitting it to the other in direct succession.

During the few days that have elapsed since the appearance of the Report some criticism has been directed against it on the ground that all the moot questions concerning tuberculosis have not been answered. This is surely unreasonable, as it cannot be too clearly recognised that the reference to the Commissioners was exceedingly closely defined. They had no authority or power to go beyond this reference. Indeed, the time—ten years—required for the elucidation of the special questions referred to them gives a definite indication of the propriety of the limitations imposed upon and accepted by the Commission.

Many and most important questions bearing on the cause and cure of tuberculosis have still to be answered. This can be done only by well-trained men working on an organised plan, co-operating wholeheartedly for a considerable period, and well supplied with financial means, facilities, accommodation, and equipment. That some organised scheme of work will be devised can now scarcely be doubted, and it is to be hoped that it will be adequately supported by Government. Such legislation has long been under consideration, and it may be that it has been held back until the appearance of this Report. Now, *bis dat qui cito dat*.

Although the Commissioners make no direct recommendation as to legislation, anyone who reads their Report can have little doubt as to their opinion on this matter, and we feel satisfied that those in high places will realise that in bringing forward such legislation as may be necessary to ensure a pure milk supply, their hands are greatly strengthened by the findings here recorded.

The Commissioners were evidently splendidly served by the Secretary and by their staff of scientific assistants, as they insist very strongly on the value of the services rendered by these gentlemen in the carrying out of the scheme of work planned at the outset.

In conclusion, it may be pointed out that one name not hitherto mentioned in connection with the formation of this Commission is that of Sir Herbert Maxwell, who, during the Congress and until the completion of the arrangements for the Commission, planned carefully and worked indefatigably to get together a thoroughly representative Commission.