The Importance of Research in Tropical Diseases as Affecting Plants, Animals and Men within the British Empire.

The age in which we now live is essentially one of imperialism. We are now beginning to think less about England and more about the British Empire, with the result that increasing interest is being taken in all the problems connected with our overseas possessions, and it is one of the chief of these problems that we are now about to discuss.

It was in the 15th and 16th centuries that the foundations of our Empire were laid. During the succeeding centuries new territory was acquired until the Empire now comprises a quarter of the globe. It was, however, not until the eighteenth century that the British Empire extended to any large degree into the tropical regions, but during that century we acquired India, Ceylon and a large portion of the West Indies. In the 19th century the extent of our dominion was again considerably increased within the Tropics, notably by the acquisition of British Guiana, parts of the Straits Settlements and Malaya, Nigeria, British East Africa and Rhodesia. Lastly, as a result of the Great World War we have acquired what was formerly German East Africa.

The result of this vast increase in the size of our Empire has been that we are faced with a number of problems concerning the lands which we control, and that fresh responsibilities are placed upon our shoulders. One of the most important of these problems concerns the prevention and cure of...
the diseases which cause untold deaths
and untold suffering not only to Europeans
but also to natives who inhabit the tropical
regions of our Empire. This was one of the
most potent factors in hindering the development
of a large part of the Empire, but now, thanks
to the work of numerous men of science, who have
examined these diseases and discovered their causes,
the terrible suffering and mortality has been lessened, with the result that the rich
tropical regions, whose enormous possibilities we are beginning to realise, are now gradually
increasing in commercial importance. Not
must we forget the triumphs of scientific
agriculture, which has enabled us to
discover the causes of, and thus prevent to a large
extent, the diseases which attack plants, the
terrible fungus which destroyed whole
coffee plantations in Ceylon, for instance, or the
sixty odd diseases to which the tea plant
is liable. Finally we have learnt something about the diseases which attack animals, and of
which we shall give examples later on.

All this must be
remembered as due to research. For
a long time the whole question of tropical
disease was a matter of speculation and
guesswork, mixed as was inevitable under such
circumstances with a considerable amount of
quackery. In the latter half of the 19th
century however, the subject became one
for organised scientific research, and owing to
the dogged and self-denying efforts of
men whose names will be written large
in the book of the world’s heroes and
benefactors, we have been able to prevent and
cure these scourges of humanity. The point to remember is that nothing short of organised research work can enable us to conquer disease, and that mere speculation can achieve nothing.

Now why is it so incumbent upon us to undertake this work? In the first place it is because we are the protectors of every native within our Empire, and therefore we are responsible for his or her physical welfare. This responsibility is I think often forgotten and instead we regard our work as solely one of exercising dominion over races unfit to govern themselves. Secondly, it is because in so doing we are benefiting all humanity. Is it not fitting that such a great and noble task as this should be in the hands of the world's greatest Empire?

For we must remember that it is only by her resources to the world at large that our Empire will be judged; not by size, not by resources, not by population but by the amount of good which she did in the world. Lastly and I think I may say least, the prevention of disease is necessary for the development of the resources of our Empire as we shall see when we come to deal with each disease separately and note its effects upon the inhabitants.

Of all the diseases of the Tropics, malaria is the most widespread and the most pernicious in its effects. In some of the richest and most fertile parts of the globe all development has been impossible owing to this disease, since it attacks both white men and natives. This renders production well nigh impossible, for tropical jungle grows rapidly.
and unless great efforts are made to keep it in check, it will ruin a whole plantation. The jungle was therefore bound to be victorious as long as malaria attacked the workers. Sir Ronald Ross summed up the matter when he said that malaria was “the enemy of the pioneer, the traveller, the planter, the engineer, and the soldier.” The figures which the same scientist gives show the enormous suffering caused by malaria. Before anti-malarial operations were begun the death roll due to the disease was officially estimated at 1,300,000 per annum—an appalling total. Then again, one third of the men in the Indian army were even admitted every year into hospital suffering from malaria. It was malaria that so long retarded the development of Africa, since it infected the children, causing thereby a great infantile mortality and ruining the health for life of those that survived. Apart from the actual mortality, one of the chief vices of malaria from an economic point of view is the resulting apathy and listlessness which render industrial development impossible. This shows the great need for research. Much has been done in the past, Ross and other workers have shown the causes of the disease, but much yet remains to be done, and it is our duty to help in every way to complete the conquest of the “million-murdering death.”

I have said above that it is only organised research which can overcome the diseases of the tropics. Of this the early history of the fight against malaria is a good example. For a long time, malaria was looked upon as merely the result of heat and moisture, aided by the presence of decaying vegetable matter. A mosquito was considered a favorable place for the disease, which was hence called...
“paludal fever”. It was however only as the result of research that we learnt that the mosquito was the cause of the disease, and it was the work of Laveran and Ross which dispelled the former erroneous notion. It is not the province of this essay to deal in detail with the history of the conquest of malaria, but it would not be out of place to run up the work of the above scientists in a few words. Laveran discovered the living malarial parasite by means of a microscope on the slide of which he placed blood from a patient suffering from the disease. After some time his work was continued by men in England and Italy, and Ross, as a result of Sir Patrick Manson's discovery of the part played by vectorial insects in the spread of filariasis, suspected the mosquito as the cause of malaria. Research proved the theory true, and a firm basis for the prevention and cure of the disease was established. The success of the anti-malarial operations since carried out has been most encouraging.

Yellow Fever occurs in the British Empire in West Africa and the West Indies, and until the beginning of the present century it struck terror into the hearts of those visiting the regions where it was endemic. In 1840 for instance 69 per cent of the white troops stationed in Georgetown, British Guiana, perished within a few months from the disease. Like malaria it has not only caused untold suffering but has kept back all industrial and commercial development. It had long been suspected that the disease was due to a certain mosquito known as the Stegomyia Fasciata, and this was confirmed when in 1900 four American surgeons went to Cuba, and in order to test the theory which had been advanced, they allowed themselves to be bitten by mosquitoes.
Three of them contracted yellow fever and of these, one Dr. Lazear died. The work was taken up also by English and French doctors with the result that it was proved beyond doubt that the Stegomyia was the carrier of the disease. It was however not until 1918 that the microorganism of yellow fever was discovered, but in that year the Leishmania bicolor was isolated from the blood of a yellow fever patient. The methods of prevention which are similar to those adopted for malaria, have proved most successful as was demonstrated during the building of the Panama Canal and another mighty triumph for scientific research has been gained.

A parasitical disease which is prevalent in India is hookworm. The worm enters the body and fastening itself on the walls of the stomach, it cuts the blood vessels, which produces anaemia and predisposes other infections. It has been estimated that about 70% of the rural population of India is infected, as well as forty-five million wage-earners. The hookworm is responsible for much of the listlessness and want of stamina found in the Indian coolie, and moreover is the cause of numerous other disorders. Thus, when an anti-hookworm campaign was undertaken there was a marked decrease in the prevalence of other diseases. Medicine and above all sanitation have almost conquered the hookworm with gratifying economic results. In Darjeeling an increase in the efficiency of the workers amounting in some cases to 50% has been noted in the workers on the tea plantations. That suffices to show the enormous economic importance of research in tropical diseases, and Major White Stenbury
Commissioner to the Indian Government says:

"The human being remains the most important machine in the production of wealth and in industrial development. Viewed thus, all measures designed to improve the efficiency of the human machine are matters of economic importance. Which modern industry cannot afford to overlook. The question of man-force is fundamentally a health question. Space will not permit me more.

than to mention some of the other diseases of the tropics. Kala-azar or black fever, is rampant in the rich and populous districts of Bengal and Assam, and kills 90% in many cases of those it attacks. It is suspected that the cause of the disease is a bug or sand-fly, but up to now the real cause of the disease is unknown. A commission however is enquiring into the disease and it may not be long ere another victory is added to the list of the triumphs of research.

Dysentery is another disease which is prevalent in India and is due largely to impure drinking-water. This will naturally decrease as sanitation and water-supply are improved. Similar in its causes to dysentery is the scourge of Bengal, namely cholera. It is one of the most infectious of diseases and is due to a bacillus which gains admission to the alimentary canal. One of the most potent factors in the spread of cholera is the large number of religious festivals which take place on the Ganges and at which numerous devotees mostly oblivious ignorant of the rules of cleanliness assemble.

The tsetse fly diseases affect both animals and men alike. This fly is the cause of sleeping-sickness, a disease which still is baffling. The doctors who seek to
prevent it. For many years the scourge had been confined to the west coast of Africa, and owing to the fact that there was but very little intercommunication between the various districts, its progress was almost impossible. Then, however, after the middle of the last century, trade routes were opened the disease had every facility for spreading. Military movements were also responsible for the spread of the disease, and indeed, it was not likely by soldiers that sleeping-sickness was introduced into Uganda. By 1898 the disease had reached such an appalling extent that a commission under Sir David Bruce was set up to make an enquiry. Sir David, who had previously studied the effect of the tsetse fly upon animals, succeeded in proving that the same insect was also the cause of sleeping-sickness. However, to kill the tsetse fly was a different matter from killing the mosquito, since the former infected animals, game and even crocodiles, so that to rid the land of the fly a wholesale slaughter of creatures, in many cases useful to man, would have been necessary. These animals were, of course, almost inexhaustible reservoirs of infective material, but the government was unwilling to authorise their being killed. Many commissions were established but for a long time they saw no way to the solution of the problem. Owing to the labours of the Rockefeller Institute a cure, known as Tryparosamide, was found for the disease, and several French physicians have discovered drugs which act as cures. The prevention of the disease remains a problem to this very day.
but we have every hope that the work of the League of Nations in the matter will add another triumph to science by conquering the disease which, killing men and animals alike in appalling numbers, is retarding the development of our Empire in Central Africa.

The commission appointed by the League of Nations conference on Sleeping-Sickness began work in 1926, and both by research and by administrative measures it is seeking to gain the necessary over the scourge which has slain millions.

The tsetse fly is also the cause of the disease known as "nagana" in animals. This disease attacks all beasts of burden, and until the building of railways, it prohibited all transport except by slaves, and indeed made railway building difficult, owing to the difficulty of carrying supplies. Cattle and indeed all domestic animals are liable to this disease, which can of course only be stamped out when the tsetse fly has been exterminated. Nagana is most prevalent in Central and South Africa.

Central Africa is also the home of what are known as "tick-borne" diseases, which are due to certain species of parasitic ticks. Of these maladies there are many varieties, but the chief are redwater and East African coast fever. Cattle sometimes recover from the former but the latter is invariably fatal. Against redwater a preventive vaccine has been devised but the stamping out of the coast fever can only be accomplished by the eradication of the tick, a disease which has attacked
animals not only in the tropics but also in temperate climates is anthrax. The disease is due to the ingestion of the anthrax bacilli with the animal's food. Its approach is marked by the appearance of carbuncles on the body of the creature, and bleeding takes place at the mouth and nose. Rapid breathing and profuse sweating then take place and after a few hours death supervenes. Pasteur studied the disease and succeeded in isolating the micro-organism and preparing preventive inoculations.

Rinderpest is found in central Africa and to a certain extent in India. The disease which is a gastric disturbance within the animal is infectious and proves fatal after about five days. Research work was undertaken by Koch, and although the infective agent has not yet with certainty been identified, he was able to render animals immune by inoculating them with the bile taken from cattle dead of the disease.

Plant diseases have contributed to the backwardness of many tropical regions. A notable example is the Hemileia vastatrix, a fungoid disease which attacked the coffee plant in Ceylon in 1876 and utterly ruined the industry which has never recovered. That is sufficient to show the need for research work. The conquest of canker in the cocoa plantations of Ceylon is a triumph of research. In 1902 98 percent of the trees were diseased and the yield was 56 lb. to the acre. Then mycologists were called in and the disease was dealt with scientifically. The result was that in 1907 only 3 percent of the trees were affected.
and that the production was increased to 440 lb. per acre. Similar victories have been achieved by dint of organised research over the several pests of climate which attack the tea-plant, and the diseases of the palm, the acoea nut, the potato crop at Patna and the quinine bark have been overcome.

The work of research in plant disease was hindered at first by the fact that the planters would keep an outbreak of disease secret for fear lest prices and shares should fall. Now, however, they are turning to the scientific agriculturalist for advice and, indeed, the planters of the West Indies have agreed to an increase in export duties in order to provide funds for research. Work still remains to be done in the matter of insect pests such as the boll-weevil, but these do not come under the heading of diseases.

We have now surveyed the problem of research in tropical diseases, and have both seen the magnitude of the question and also the triumphs achieved by research in the past. We must not however lose sight of the fact that much remains to be done. The British have not been slack in the past to do their duty as the possessors of a vast empire, and to shoulder their responsibilities, and we, remembering what our citizenship in the Empire implies, must continue the work of conquering disease so that the name of the British Empire will ever be regarded as one of the world's greatest benefactors. We have a goodly heritage - let us be worthy of it.