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The Empire of Man.

THE note of international welfare sounded by the King and the Prince of Wales at the opening of the British Empire Exhibition at Wembley on April 23 was an appropriate mark of a notable event. The Empire itself is a brotherhood of free peoples of many races and social codes, widely distributed over the earth and subject to diverse geographical influences, but with powers of expansion under their own control. Each group of cells in this organism performs its particular functions independently, yet all are correlated in the scheme of growth, and their activities affect not alone the vitality of the corporate whole but all other human communities. Though the Exhibition is primarily devoted to the display of the natural resources and products of our Commonwealth of nations, it represents also many impressive achievements available for the service of mankind in general. It should conduce, therefore, in the words of the King, to "the peace and well-being of the world," as well as to the unity and prosperity of the Empire.

In so far as science is concerned with the advancement of knowledge, its aims and results are international; and when its discoveries are converted into industrial processes or mechanical inventions, all progressive communities are influenced by them. We may on this occasion be pardoned pride in British contributions of this kind to modern civilisation. Every steam engine, locomotive, and dynamo in the world owes its origin to Watt, Stephenson, and Faraday; and it is through the genius and ingenuity of these pioneers that the time factor in geographical space is continually being reduced, and peoples widely separated are being brought into contact in increasing numbers. Pioneers, it has been said, cannot stop to work out details; and that perhaps is one reason why, though many of the greatest electrical inventions originated in Great Britain, their earliest successful development was left to other countries. This, however, as the Exhibition shows, is not the condition to-day. Science and industry have entered into an alliance which should go on increasing in strength for the benefit of each and the promotion of human progress.

It is to be hoped that the invocation addressed to his people by the King—"to think of the scientific work accomplished in recent years for the prevention and treatment of tropical diseases"—together with the fine illustration of that work and its methods displayed in an appropriate section of the Exhibition itself, may bring home to those who live in the old, long-settled parts of the Empire some lasting understanding of what scientific medicine can do for the good settlement of its vast outlying undeveloped parts.

It would be impossible in a few paragraphs to set down even a summary account of the work for which the King bespoke this particular consideration. It must be enough to say that, starting pertinently from 1880—a year after the publication of the pregnant discovery that filariasis is maintained and disseminated by the sole agency of certain common mosquitoes, and a year before the illuminating discovery of the malaria parasite—such a summary would include the discoveries of the modes of causation, and in most cases also of the morbidic agents, of most of the diseases that had invested the tropics with their traditional terror; it would include, among many less impressive achievements in the prevention of tropical disease, the long-sustained labours that made the construction of the Panama Canal possible; and it would also include all the clinical and pharmacological research that has brought success in the treatment of “incurable” diseases such as kala-azar and schistosome disease, hope in the dumb desponding despair of leprosy and sleeping-sickness, and precision and promptitude in the cure of loitering diseases like dysentery and malaria. More feasible is it, and perhaps also more in keeping with the spirit of the King’s words, to follow the work in its general purport and in its lessons, as exemplified in some particular examples.

If an educated layman were asked to name offhand some of the most ominous tropical diseases, he probably would begin with malaria and dysentery. Malarial fevers have been talked about since the days of Hippocrates; their precise cause as an effect of the invasion of the red blood corpuscles by parasitic animalcules was discovered in 1881, and all the wonderful details of the process by which the parasites are extracted from the blood of the sick man and carefully injected into the blood of healthy men by *Anopheles* mosquitoes was discovered in 1899. The parasites and the *Anopheles* are not restricted to the torrid zone: they may be found producing malarial fevers in any inhabited part of the globe under certain suitable conditions, and malarial fevers were common in Britain not many generations ago. But in Britain malarial fevers have gradually become practically extinct: it is in the tropics that they still cause thousands of deaths annually. What is the reason of this difference? It is that in Britain people do not now live in insanitary villages, in clustered hovels attractive to *Anopheles* mosquitoes, whereas the rural populations of the tropics do live so: in Britain human beings and *Anopheles* live apart, in the tropics (except in big Europeanised cities) they live together. It has been one of the main preoccupations of tropical medicine during the last twenty years everywhere to impress this lesson upon civil administrations, that the surest way to keep

malaria in permanent check is to keep *Anopheles* permanently distant from human habitations.

A lesson of much the same character is implied in work done on amœbic dysentery—another very common tropical disease, caused by specific parasites that feed upon the intestinal and other visceral tissues. The sick man passes encysted amœbæ from his bowel, and the cysts are spread abroad in water and in other ways, possibly to be swallowed eventually and give rise to other cases of the disease. Recent research has demonstrated that the dysentery amœbæ may be found in home-staying inhabitants of temperate lands, including Britain, where, however, they seldom make their presence felt. How is it that the infection is so dormant in Britain, for example, and so easily acquired and so vivid in its effects in the tropics? A considerable part of the answer must lie in the fact that in Britain any conditions that permitted everyday contamination of drinking-water by human excreta would be regarded as a national reproach, whereas among most tropical populations such conditions cause no solicitude at all.

Malaria and dysentery are but familiar examples of one of the most significant lessons demonstrated by workers in tropical medicine during the last twenty-five years—the lesson that the greater part of the diseases traditionally known as “tropical” are not in any exclusive or explanatory sense attributable to the effects of a hot and humid climate, but are diseases caused very largely by animal parasites and vital inter-associations of parasites, and are particularly prevalent in tropical countries mainly because the native inhabitants there have no conception of protective sanitation.

Only when that lesson is learnt by civil administrations in the tropics, and experienced medical officers really initiate and direct the sanitary policy of the administration, can the knowledge acquired in recent years for the prevention of tropical disease be applied to full advantage. But taking the practical achievements of tropical medicine in recent years, it can be said that they have made the tropics infinitely healthier for the European settler and sojourner as well as for the native inhabitants of large towns and the native workers in European enterprises, and also have brought about great precision in the treatment of tropical disease. Another great practical achievement has been to stimulate medical education, and remarkably to influence the attitude of the entire medical profession with regard to research upon the ætiology of disease. So beneficial has been its influence in this direction that one is almost inclined to think that a course of study in the methods of tropical medicine might be introduced with advantage into the ordinary medical curriculum.

Increased recognition of the scientific and administrative significance of knowledge relating to tropical diseases, on account of the words spoken by the King at the opening of the Exhibition, may well lead to developments which in due time will stamp the Exhibition as a landmark in the economic history of the Empire. This great display is of manifold significance. It demonstrates, with a degree of completeness never before attained, the remarkable variety of the human and material resources of the Empire; it is a "symbol of unity" with local freedom; and affords to the world clear evidence of the spirit of confidence which animates the British people, still slowly recovering from a devastating war.

In his speech the King said: "This Exhibition will enable us to take stock of the resources, actual and potential, of the Empire as a whole; to consider where they exist and how they can best be developed and utilised; to take counsel together how the peoples can co-operate to supply one another's needs, and to promote national well-being." This statement goes to the root of the matter and defines the material objects of the Exhibition. But it implies and invites consequent action, without which this fine imperial effort cannot, in any case, justify the expenditure of wealth and thought which has been lavished upon it. Such action to be effective must be organised. Much may be accomplished by devoting to the overseas countries a larger share of that business genius and commercial acumen in which the British race is not lacking, but the fundamental condition for success is a systematic investigation, on scientific lines, of the natural resources of the countries concerned.

In the case of the Dominions it may be said that, with adequate development of the agricultural and scientific departments which they already possess, machinery should be available to enable the necessary research to be carried out with comparatively little direct assistance from the mother country; but for many years to come a very different situation must remain in the case of the colonies, which will need all the assistance they can obtain from home in investigating and developing their natural resources. Fortunately, there are in Britain organisations expressly designed, and admirably adapted, to carry out such work. Little is needed but skilful and statesman-like co-ordination of their varying activities, combined with proper financial endowment to allow of the necessary reorganisation and expansion—including as an essential feature the development of a central clearing-house of imperial economic information—to put into commission the action implied by the words of the King. The British Empire Exhibition will not have failed if it achieves this result.

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The Protection of Scientific Discovery.¹

IN our last issue, we alluded to the extent to which judge-made law had advanced towards conferring protection upon discoveries. We shall now consider at closer quarters the draft convention which was communicated to the League of Nations by its Committee on Intellectual Co-operation.

So far as public opinion in Great Britain can be judged, we think that—to borrow the Committee's statement when referring to the "complex problem of factory inventions"—an attempt at unification by means of international agreements would be altogether premature. Local law must precede international agreement if success is to be obtained. To adopt a phrase in the Report: "Reform has been preceded in every country by experiment and trial."

The draft convention is seemingly based upon data furnished by experience in protecting industrial, artistic, and literary property. It attempts to bridge the gap which extends from inventions on one hand to artistic and literary productions on the other. Article 3 runs as follows:

The purpose of the present Convention is to protect discoveries, that is to say, expositions and demonstrations of the existence, previously unknown, of laws, principles, bodies, agents, or properties of living beings or of matter and inventions, that is to say, creations of the mind (consisting of methods, appliances, products, the composition of products previously unknown, and, in general, all new applications of discoveries and inventions), the specifically scientific character of which deprives them of the protection granted to works of industry, art, and literature.

This Article is subject to the qualification that the right of protection is not to be conferred if the discoveries "only give a scientific demonstration of a result or of a process already known, that is to say, already applied beforehand in industry or commerce." By Article 4 the duration of protection is to continue during the lifetime of the author and fifty years after his death, in this respect following the precedent set by copyright in literary productions.

In the other of the 23 articles of the Convention, what most concern men of science are the proposals for securing the recompense arising out of the exploitation of a discovery by another. From Article 5 we learn that the discoverer "shall have the right to exact a royalty on a scale to be determined by agreement between the parties or, in default thereof, by the tribunal," tribunal meaning apparently the Courts of Law before which inventions are brought for adjudication.

On turning to the Report to discover the real significance of this Article 5, and to obtain some indication of the nature of the reward which shall be

¹ Continued from p. 595.