Cinchona in the British Empire.

THE value of the cinchona tree (*Cinchona Ledgeriana*) as a source of quinine is common knowledge, but the considerable work undertaken by British medical officers in the past in making use of the product of this tree as a preventive against malaria is not so well known. The cinchona tree was introduced into both India and Java between the years 1854 and 1864. Prior to about 1880, the world's supply of cinchona bark was obtained from the native forests in Ecuador, Bolivia, and Peru. It was only after the export of bark from these regions could no longer be relied upon that attempts were made to grow cinchona elsewhere. The British were amongst the first to succeed in bringing the tree under cultivation. The pioneers were such men as Weddell, Hasskarl, Markham, Ledger, and others, and it was by their efforts that the establishment of important supplies of the drug became a practical proposition.

The early attempts to cultivate the cinchona tree met with considerable success, and private persons took up the business as a commercial proposition. In the early days of cultivation, experiments were made in India, Burma, Ceylon, Malaya, the Sudan, Jamaica, Trinidad, St. Helena, Mauritius, Australia, and New Zealand; but these experiments were not always followed up to a definite conclusion. In Ceylon and India the efforts were successful, but private planting was soon given up and the Government has been mainly responsible for the supplies. Within the Empire, therefore, at the present day, India is the only country where cinchona is grown on a large scale. There are Government plantations in the Nilghiris in the south, in the Darjiling district in Bengal (perhaps the best known), and a more recently developed one in Burma. There are also quinine factories both in the Bengal and Madras Provinces.

A recent paper by Dr. J. M. Cowan, of the Indian Forest Service and officiating Director, Botanical Survey of India, and Superintendent of Cinchona Cultivation in Bengal, entitled "Cinchona in the Empire: Progress and Prospects of its Cultivation" (*Empire For. Jour.*, vol. 8, No. 1 (1929)), discusses the present position of the cinchona and the future prospects of its cultivation.

The enormous importance to the human race within the Empire of the perpetuation of supplies of quinine will become evident when the question of malaria prevention is considered. We have within the Empire a large proportion of the malarial tracts of the world. Prof. Müller of Cologne estimates that some 800,000,000 people suffer from malaria; and according to Sir Ronald Ross there are 2,000,000 fatal cases every year. It is further estimated by Dr. Andrew Balfour that the direct loss sustained by the British Empire due to sickness and death caused by malaria is in the neighbourhood of between £52,000,000 and £62,000,000 per annum.

Apart from financial considerations, it will be apparent that the responsibilities of the British Empire in this question of malaria prevention or reduction are heavy. The question has become an international one, and an organisation for anti-malarial work has been set up by the League of Nations. The policy of this organisation is primarily the quinisation of affected populations. Hence the cultivation of the cinchona tree becomes a question of first importance. It is to a consideration of this matter that Dr. Cowan's paper is devoted.

In India, then, the cultivation of cinchona is confined to Government activities. It was not until 1910–11 that a similar problem had to be faced in Java. Conferences were held, and manufacturers in Holland and growers in Java came to an agreement by which profits were to be shared and by which prices could be maintained at a level which would show satisfactory returns. The disaster which threatened the Java plantations was averted to a great extent by the adoption of this policy; and supplies are now available for the world demands. That the action taken in Java was thoroughly practical, a comparison between the two countries readily demonstrates. They commenced to give attention to the question about the same time and the facilities in both regions were abundant. Yet Java now produces well over 90 per cent of the world's supply of cinchona bark and India only 4 per cent. A very small percentage of the bark utilised comes from South American forests. The production in India represents only about one-third of the amount actually consumed in the country itself. She is therefore at present not only unable to supply her own demands but also, in common with the rest of the world, is dependent upon the Dutch plantations in Java.

Dr. Cowan explains one of the problems which has so far guided the cultivation of cinchona. "It is a well-known fact that to grow cinchona on the same land for a considerable number of years is a difficult and hazardous undertaking, for the first crop, in some manner not altogether understood, renders the soil, at least temporarily, incapable of producing a satisfactory second crop. As long as there is an unrestricted area of forest land the above factor seems of little consequence, but it makes itself felt more and more as the years go on and there is an increasing shortage of land carrying virgin forest."

Dr. Cowan discusses the methods of growing the crop, for details of which the inquirer is referred to his paper. Harvesting the bark commences in a block from about the fourth year, the material consisting of prunings and thinnings. The crop is reaped, the trees being uprooted so as to obtain the maximum of bark, in about the tenth year. The bark is removed, dried, stored, and then passed on to the quinine factory.

Two problems, in the author's opinion, demand urgent solution: the first is to find additional suitable land, an investigation in which other parts of the Empire should join; and the second is to enhance the output per unit of area. Research work is also

necessary with regard to particular strains which yield high percentages of quinine.

The price of quinine at present is very high—£1 9*s*. 6*d*. per lb.—so high as practically to prohibit extensive anti-malarial measures. On this subject the Royal Commission on Agriculture in India in its report (1928) stated: "If India is to embark on any large campaign for fighting malaria, we are convinced that it will be first necessary to reduce considerably the price of quinine within India, and this can only be effected if India is self-supporting in production. To achieve this self-sufficiency a considerable extension to the present area under cinchona will be required. . . . We are satisfied that, in view of the great importance of extending cinchona cultivation and cheapening quinine, much more scientific investigation is called for than has been undertaken in the past."

Dr. Cowan has done well in summarising the present position and in pointing out the great importance to a large section of the human race of the development of quinine production.

Obituary.

Sir Archdall Reid, K.B.E.

SIR ARCHDALL REID, whose writings on heredity aroused considerable interest among the medical and general public between 1900 and the outbreak of the War, died suddenly on Nov. 18, at Southsea, at sixty-nine years of age.

Sir Archdall Reid was born at Roorki, N.W. Provinces, India, on April 7, 1860, and was the only son of Capt. C. A. Reid of the 20th Bengal Native Infantry, and therefore originally in the service of the Hon. East India Co. He was in his earlier years educated privately, and then studied medicine in the University of Edinburgh, where he took the degree of M.B. For some years after that he led a roving and adventurous life in India, New Zealand, the Pacific, and America, before settling down to general practice at Southsea. He there devoted most of the hard-earned leisure which his professional work left him to the study of heredity, and published several volumes of considerable length on the subject, as well as articles and communications to NATURE. The books are: "The Present Evolution of Man", 1896; "Alcoholism, a Study in Heredity", 1901; "Principles of Heredity", 1905; and "Laws of Heredity", 1910. These writings show that their author possessed an active, independent, and original mind and much ingenuity, but unfortunately the want of a first-hand practical and experimental knowledge in biology prevented him from fully appreciating the technical points of his subject. His point of view was that of the medical man, and he based his arguments chiefly on his knowledge of human disease and immunity.

Sir Archdall's general views of heredity and evolution were adopted from Weismann. He assumed that the differences between organisms were in general adaptive, and that evolution was due to natural selection acting on spontaneous variations, the effects of external stimuli never being inherited. He relied too much on verbal subtleties, which when carefully examined only put what was described before in other words; for example, his distinction between characters developed under the stimulus of nutrition, and those developed under the stimuli of use and injury, which comes ultimately to the same thing as inherited characters and acquired characters. He waged hopeless warfare against the facts and conclusions of Mendelism, which were then arousing enthusiasm among many biologists. One of his attempts to explain away the importance of the Mendelian results was obviously unreasonable. Mendelism was just beginning to consider whether the differentiation of sex was not a Mendelian segregation, when Sir Archdall maintained that "Mendelian inheritance is a human creation, and the right interpretation appears to be that nature treats mutations, when man interferes and presents them to her, as sexual characters". The excuse for this is of course that the genetics of sex and the relation of sex-limited characters to hormones were not then understood as they are now.

Many biologists, however, who reject the possibility of the effects of external conditions being inherited, would probably accept Sir Archdall's facts and conclusions concerning alcoholism and disease as perfectly sound. His view was that "susceptibility to the charm of alcohol" was an innate character and tends as such to be inherited in the same sense as the shape of a person's head; that, as in all innate characters, variation occurs in the tendency to intemperance in drinking alcohol, so that all degrees of it may be said to occur in any population. As in other cases, these variations are subject to natural selection, which means in this case that the worst drunkards are killed off or leave fewer children. The consequence is that peoples which have been exposed to the temptations of alcohol for the longest time are the most naturally temperate, while peoples who have had little or no experience of alcohol, when it is first introduced among them, drink without restraint. This, according to Sir Archdall Reid, is the explanation of the facts that in southern Europe, where the vine has been cultivated from early times, the people are temperate, and that northern peoples, such as Russians, Germans, and English, are more given to drunkenness. Similar arguments and conclusions were maintained by Sir Archdall with much ability and command of language with regard to resistance to disease. "Every race", he wrote, "is resistant to lethal disease in proportion to its past experience of it, but the resisting power is such that it can only have been evolved through Natural Selection."

Throughout the War, Sir Archdall served as medical officer and was made a K.B.E. in 1919.

J. T. CUNNINGHAM.