

THE ROMANCE OF QUININE*

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I EXPECT that most of you know that quinine is extracted from the bark of a tree, and that it is extensively produced in India and Java. There is nothing very romantic about that. But perhaps you do not know how it came to the East, for its home is in the mountainous regions of South America, where our romance begins.

In 1638, the Countess of Chinchon, wife of the Viceroy of Peru, lay sick of an intermittent fever in the palace of Lima, which was the capital of His Spanish Majesty's possessions in South America. The news of her illness reached the ears of the local Governor at Loxa, some 600 miles away to the south; some years previously, he had been cured of a similar fever by the use of the bark of a tree, called quina-quina by the Indians. He sent a parcel of the powdered bark to the Countess' physician, who, having first tried its effect on a number of presumably less-valuable patients, administered it to her ladyship, who was soon completely cured.

No one knows how the properties of the bark as a febrifuge were discovered. It is certain that the Indians knew of its medicinal value, but it is almost equally certain that they did use it in the treatment of fever, and it seems likely that its properties were discovered by the Jesuit Fathers who invariably accompanied the Spanish armies of conquest. Be that as it may, it soon received wide publicity, for the Countess returned to Spain in 1640, and took with her a quantity of the bark, with which to treat the sick on her husband's estates. The news of its wonderful properties soon spread, and further supplies were brought by Jesuit Fathers to Rome, whence it was distributed to members of the fraternity throughout Europe. It was known as Countess' powder, and later as Jesuits' powder, and when the tree was eventually described, Linnaeus called it *Cinchona*, after the lady who had made it so widely known. It is probably the only plant in the British Pharmacopoeia named after a patient that it has cured.

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It was not until a hundred years later that the plant was described, although the bark was being regularly collected from forest trees and shipped to Europe. In 1735, an astronomical expedition went from France to South America, and among its members was La Condamine, who travelled in the neighbourhood of Loxa after the expedition had done its work, and sent a descriptive memoir to France, describing three different kinds of bark—white, red, and yellow—from otherwise similar trees. In 1742, Linnaeus established the genus *Cinchona*, largely from La Condamine's drawings.

The need for supplies of bark, and the destruction of trees in the neighbourhood of Loxa, led to explorations which extended the area in which *Cinchona* was found as far north as Columbia and south into Chile. Many species were discovered and were described either on the spot or from dried specimens sent to Europe, and it was not until another hundred years had elapsed that the living plant was seen outside South America. In 1840, seeds were brought to France from Bolivia; seedlings were raised in the Jardin des Plantes in Paris, and some were sent to the garden of the Horticultural Society in London.

During the two hundred years since the discovery of the properties of *Cinchona* bark, large supplies were being sent annually to Europe, which had been obtained by searching out and stripping forest trees, and good bark was becoming more and more difficult to get. The South American authorities made feeble efforts to control the export trade; ostensibly to allow the forest trees to recover, but actually to keep up prices. They made no attempt however, either to prevent the wholesale destruction of trees (which often died as the result of careless stripping) or to plant nurseries to replace them. The impetus to grow *Cinchona*, instead of being content to exploit it, came from Europe, and the Dutch were the first to take active steps. In 1852, Justus Charles Hasskarl was appointed to visit South America and collect seeds and plants. He found it necessary to work under an assumed name, in order to allay the mistrust of the inhabitants, but he succeeded in his quest, and returned to Java in 1854 with 20 Wardian cases of plants. They were planted, but under unfavourable condition, and all but two of them died. Hasskarl was relieved of his post and was replaced by Dr. Junghuhn, who brought out with him seedlings that had been raised in Holland, established a new plantation under more suitable conditions, and soon had a flourishing collection of trees of various species.

About the same time, the British Government was being urged to introduce *Cinchona* into India. Efforts were made to obtain plants through the agency of British Consuls in

South America, but without success; either they did not succeed in getting planting material, or if they did, it failed to grow. Finally, in 1860, an expedition was sent, under the control of Clements Markham, who knew South America well through having made extensive archaeological explorations. He arranged for three expeditions to search for different species; he himself went to Peru and Bolivia; Spruce, a botanist and explorer, collected in Ecuador, and Pritchett searched the forest on the borders of Ecuador and Peru. They experienced great difficulties, and the story of their adventures, published by Markham under the title "Peruvian Bark" makes as exciting reading as a novel. The plants that they collected, together with some that had been obtained from the Dutch plantations in Java, were established in the Nilghiri Hills in South India, on a site that had been very carefully prepared—the British authorities were determined that the unfortunate experience of the Dutch should not be repeated. The plantations were a success, and in the following year, Cinchona was introduced into Ceylon; what is now the Botanic Gardens at Hakgala was opened as a Cinchona plantation with plants and seed brought from India.

The history of Cinchona in Ceylon was brief, if exciting. The first plantations were a success, the price of bark was high, and a new "get-rich-quick" method appeared to have been found. You have probably read in the newspapers of the rapid spread of Cinchona cultivation, accelerated as it was by the coffee crash; in 1872 there were only 500 acres of Cinchona, in 1883 there were 65,000; in 1876 Ceylon exported £1,300 worth of bark; in 1883 it had risen to £365,000 worth; in 1878 the price of quinine was 12 shillings an ounce; four years later it was down to one shilling. This tremendous drop in price was a boon to the sufferer from malaria, but it was ruinous to planters, and it killed the Cinchona industry in Ceylon and paved the way for the introduction of tea.

The Dutch were more circumspect. It had been determined in 1820, that quinine was perhaps the most valuable constituent of Cinchona bark, and coincident with the establishment of their plantations in Java, a chemist was appointed to analyse the barks of the many varieties being grown. The results were disappointing; none of them had more than one per cent. of quinine. Then in 1865, seed of a new variety was received. It had been given to Charles Ledger, a traveller, by an Indian servant in South America, and was sent to Ledger's brother in London, with instructions to offer it for sale to the British Government. The negotiations failed, the seed was offered to the Dutch Government, who bought a pound of it, and sent it immediately to Java. It was planted there in 1865, and

in 1872 when the first analyses were made, it was obvious that the new material was of the greatest value—it contained as much as 8 per cent. of quinine. Further examination discovered even better trees, and regulations were at once made, prohibiting the collection of seeds or cuttings from any but the best plants. In 1873 the minimum standard was 5 per cent. quinine; in 1879 it had risen to $13\frac{1}{2}$ per cent. The reward of twenty years of experimentation was now reaped; the criticism of the planters, who had complained frequently of the amount of money wasted on useless experiments, was replaced by a desire to share in the profits of the new enterprise, and many plantations were established, all with the new material. The same care is still shown in the selection of planting material, and the Dutch industry is firmly established as the most important source of quinine in the world's markets.

The outlook of the Indian authorities was some what different; the object of the introduction of *Cinchona* cultivation into India was not to produce the best barks for the European markets, nor to ensure commercial profit, nor to increase the revenue, nor to benefit the planting interests; but to provide an abundant and cheap supply of the febrifuge, so as to bring the remedy within the reach of all classes of the people. To that end, undue importance was not paid to the yield of quinine, for *Cinchona* bark contains three other alkaloids, all of which have febrifugal properties; instead, those species were sought which had the greatest quantity of total alkaloids. Thus the Indian work has been concentrated on the development of other species, like *officinalis* and *Calisaya* and *succirubra* and their hybrids, which have the advantage of being more hardy and more easily propagated than the Ledger bark grown in Java. *Cinchona* is still cultivated in the Nilghiris, but the chief centre of the Indian industry is in Bengal. The plantations there were established shortly after those in Southern India and are worked by the Bengal Government. The same care is shown in the analysis of bark and the selection of seed as in Java, and the plants are being constantly improved. The febrifuge is manufactured on the spot, and can be bought in any Post Office in India for a few cents.

The Ministry of Agriculture is now investigating the possibility of re-establishing a *Cinchona* industry in Ceylon. It is proposed to open trial areas in all the likely districts and to try out all the available varieties. We may find that here, as in India, it will be easier to grow the more hardy species, but we are hoping to be able to produce quinine for local consumption, and to make it as easily available to the villager as it is in India.