

SOME OBSERVATIONS OF A PLANT COLLECTOR ON THE ISLAND OF HAINAN.*

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The island Hainan lies just off the coast of Kwangtung, the southermost province of China, in about the latitude of Porto Rico. It is about four times as large as that island, being roughly 150 miles long by 90 miles wide.

It has been a center of interest to the Chinese since early times, having furnished an important source of incense wood and drugs, two products traditionally very essential to the life of the Chinese people. Situated as it is just within the tropics and in close proximity to China, Indo-China, Formosa and the Philippines, and having high, densely wooded mountain ranges, Hainan has long been an inviting field to botanists. From time to time Western naturalists have visited the island. Few, however, have done more than briefly to skim the coastal plain for plant novelties.

Misfortune has so often been the lot of those who have attempted to penetrate to the interior of the island that a tradition of extreme inaccessibility has grown up around it. Started first by the Chinese soldiers whose comrades died by the hundreds of fevers and unfamiliar diseases when expeditions were sent to suppress the wild people in the interior, the stories of the unhealthfulness of the climate were confirmed by the westerners who have traveled there.

Of particular interest and fascination is the Five Finger Range of mountains which, being the highest and occupying a central location, offers a fruitful field to both the geographer and the botanist. Spurred by the unsuccessful and, in two instances, fatal attempts to reach the summit of this range, the late Mr. G. W. Pearson, then British Consul at Hoihow, set out on a journey in 1910 for the purpose of accomplishing that feat. He was well equipped in every way and was ac-

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accompanied by a British lieutenant and Mr. Newton of the American Presbyterian Mission. They spent a month in the interior but returned baffled in their attempt, due to constant rain, fever and the reluctance of the natives to lend a hand. Mr. Pearson in his diary wrote very eloquently of the difficulties involved, and prophesied most interesting botanical and other discoveries for anyone who should overcome the obstacles that had so far proved insurmountable. It gave me therefore something of a thrill when the Canton Christian College sent me to Hainan, first in September, 1921, for the purpose of exploring its plant resources and of reaching, if possible, the summit of the Five Finger Range.

As to the topography of the island, the northern third is level or gently rolling, with an occasional extinct volcanic crater. The soil of the northeastern portion is obviously of volcanic origin. The southern two-thirds of the island is very mountainous, but I saw no craters there.

The inhabitants of the island comprise three distinct groups: the Chinese, the Miao and the Loi. The Chinese occupy all the farming lands which are most desirable from the point of view of fertility and accessibility. The Miao, an aboriginal people in the island, are still in a very primitive state, living by migratory agriculture and by hunting with bows and arrows. They live in the mountains and resist Chinese authority. The Loi are related to the Shans and Laos of Indo-China, and are thought to have come to Hainan in prehistoric times in search of the incense woods for which the island is famous. They are for the most part wild, resisting government by the Chinese. These primitive peoples of the interior have some intercourse with the Chinese as they come out on certain days to the border market towns to exchange their rattan and crop surplus for salt, colored yarn and a few other Chinese articles of trade. During the four months I spent on the Island I was mostly among the Loi aborigines near the Five Finger mountains.

Proceeding in a southwesterly direction from Hoihow, the chief seaport of the island, one passes thru fertile farming country, the soil of which is largely of volcanic origin. This region is occupied by Chinese and civilized Loi. The chief crops noted are: rice, both upland and irrigated, sugar cane, beans, indigo, peanuts, and here and there a field of scraggly

cotton. The Litchi thrives wonderfully in the stony country around the extinct volcanic craters. Coconut palms are very common. I saw one fine orchard of tea oil trees (*Thea Oleosa* Lour). The betel nut palm (*Areca catechu* L) is grown extensively in the eastern portion of the island along the Kachek River. At about 75 miles southwest of Hoihow one reaches Nam Fung, the last Chinese outpost on the northern edge of the interior country inhabited by the wild Loi.

The agriculture of the Loi is exceedingly primitive, and being semimigratory in part, results in the complete desruction of the virgin forests everywhere except on the upper slopes of the mountains. Where wet rice culture is practiced the terraces are not plowed but treaded into the proper consistency with water buffalo. A most striking practice is that the grain is stored in granaries in the head and threshed meal by meal, just as it is needed!

As regards the plants used by the Loi for different purposes, they are mostly the same as those used by the Chinese generally. Rice is their main crop, and to it they give their most serious attention. They cultivate many varieties, both irrigated and dry land, starchy and glutinous, red grained, white grained, and red bearded. They grow also some flint corn and sweet potatoes. They now and then have a little patch of raggee (*Eleusine coracana* Gaert), cassava (*Manihot utilissima* Pohl), Job's tears (*Coix lachryma-jobi* L.) or *Sesamum orientale*. Their vegetable gardens are given over mostly to tobacco and isolated specimens of plants such as *Rumex sp.*, and *Celosia sp.* and others which are supposed by them to possess medicinal value. *Basella rubra* L is found rather commonly, and serves as a vegetable. They usually have a few red peppers of which I saw now and then a white variety. About the only vegetable they cultivate with any care or regularity is the pumpkin. Nearly every hut has its pumpkin arbor whereon the vines grow profusely. The flowers and young leaves are cooked and eaten, as well as the fruit both green and mature. They also cook and eat the young fruits of *Carica papaya* L. They sometimes use as vegetables the green leaves of *Iresine herbstii* Hook and a variety of other wild herbs, including other Amaranaceae, the heart of the wild banana plant (*Musa para disiacea* var *seminifera* (Lour) Baker) and a pungent, spiny little herb,

Eryngium foetidum I tried them all—and found them better than none.

Fruits they do not cultivate seriously. But nearly every village has a tree or two of jackfruit (*Artocarpus integrifolia* L), pomelo (*Citrus decumana* Murr), and occasionally a litchi, mango or tamarind tree. The Loi seem to relish fruits, and knows every wild fruit that is edible. From the wild they get garcinias, rose apples, litchi, a small citrus fruit, large figs and many others.

In their simple lamps they use the oil expressed from the seeds of castor bean (*Ricinus communis* L), the physic nut (*Jatropha curcas* L) the wood oil tree (*Aleurites moluccana* (L) Wild), the domba oil tree (*Calophyllum inophyllum* L) and the tea oil tree (*Thea Oleosa* Lour). These plants are all semi-cultivated.

The fruiting heads of *Thysanolena maxima* are stripped of their seeds and bound together with split rattan into brooms. *Imperata cylindrica* Beauv is the grass always used to thatch their roofs. The bamboos (*Bambusa spp.*, *Dendrocalamus spp.*, and *Schizostachyum spp.*) both cultivated and wild, are indispensable to these people.

As to their relatives on the mainland, they use the sap of the sack tree (*Antiaris toxicaria* Lesch.) in preparing an arrow poison. They make a blue dye from the leaves of *Strobilanthes flaccidifolius* Nees, while the Chinese use a species of *Indigoferum* or *Polygonum*. For thread and cloth they use the fibres from *Gossypium hirsutum* L. var *arborescens* a tall perennial shrub which grows half cultivated around most of the villages. The coarse fibres of two species of *Helicteres*, of *Abroma augusta* L. and others are also used. *Boehmeria nivea* Gaudich is sometimes cultivated for its fibres. The ribbon-like leaves of *Pandanus spp.* are woven into hats and coarse matting. *Cyperus tegetiformis* Benth is used also in making matting. The leaves of several species of *Licuala* are dried and used to make raincoats. One of the most useful wild plants found in Hainan is the rattan. Several species of *Calamus* are gathered by the Loi for their own use as well as for the market. The raised floors of their houses are made from it. It provides tough thongs with which to bind the house frames together, to make bow strings and to mend many things.

One of the most prominent and beautiful trees occurring in the open, deforested country is the Formosan sweet gum (*Liquidambar formosana* Hance). Upon these trees there lives a species of wild silk worm from whose silk glands the silk gut of commerce is made by a very interesting process.

The known flora of Hainan had been, up to the time of my exploration there, only 370 species. My collections increased that number to 1375 species, an addition of about a thousand species. The complete collection contains 2231 numbers, representing 1118 species, which are distributed in about 150 families and 660 genera. Of these nearly 100 species are new to science. One family, Ochnaceae, of 38 known genera and many species was reported from China for the first time. Dr. E. D. Merrill, until lately Director of the Philippine Bureau of Science, determined the plants with the exception of the grasses, which were determined by Dr. A. S. Hitchcock, and the orchids, which were determined by Mr. Oakes Ames.

Among the plants collected were many of economic promise, such as lumber plants, drug plants, textile plants, food plants and many promising ornamentals. Many of the new species are of special interest, of which *Taractogenos hainanensis* Merr., a new member of the famous Chaulmoogra oil-yielding group (Flacourtiaceae); *Ficus palmatiloba* Merr., closely related to our cultivated fig; and *Schizostachyum hainanense* Merr., a climbing bamboo, are worthy of mention. There were also: a new *Pandanus*, two new *Licualas*, several new members of the Ginger family, a new *Quercus*, a new *Castanopsis*, a new *Piper*, two new *Kadsuras* (Magnoliaceae), two new *Polyalthias* and three new *Fissistigmas* (Annonaceae), seven new members of the Lauraceae, of which three are *Cryptocaryas*, and many others.

I was able to make only a light impression on the flora of the island during the 120 days I spent there. The other high and extensive mountain ranges which have never been touched will doubtless yield another thousand or possibly two thousand species.

I succeeded in reaching the top of the Five Finger Range and found the altitude of its highest peak to be 7300 feet.