

Botanizing on Niue Island

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To many, Niue Island has little significance because it is one of the more isolated of the Polynesian islands, has had few European or American visitors, and about which there has been little publicity. Furthermore, it lies in a lonely part of the south Pacific ocean and has little or no strategic or commercial importance. Because of the manner of its geological formation and other features it is, however, a very interesting island especially to the botanist and the geologist. It is situated at 19° S. latitude and 169° 50' W. longitude with the Samoan, Tongan and Society groups as its closest neighbors but with the nearest islands several hundred miles distant. It has no harbor with safe anchorage during storms. This fact discourages visits from any ships except the regular New Zealand government service boat which, previous to the outbreak of the war, was scheduled to visit the island once a month. For weeks the only vessels one may see are the dugout canoes in which the natives fish off the edge of the reef.

The island is approximately 13 miles long and 11 miles wide and has a native population of about 4,000 which has remained fairly constant for a number of years. The white population, mostly government officials and their families, numbers less than a score. The natives wear European clothing for the most part although a wrap-around, skirt-like garment similar to the Samoan lava-lava is also used. They are in the main a high type, quiet and peaceful people. They do not, however, have the spontaneity of the Samoans, for example, nor do they sing and play with as much enthusiasm. This may be because life is considerably more difficult in Niue than in most of the more fertile volcanic islands nearer the equator.

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The first European to see the island appears to have been Captain John Cook who visited it on June 20, 1774. Cook and some of his men, including Forster the botanist, attempted to land at two different places along the western coast of the island, as is recorded in his account of the visit. He was met with strong armed opposition by the natives and consequently was compelled to retire without exploring the island or collecting natural history specimens. Because of the violent resistance offered by the natives, Cook gave it the name of Savage Island and by this name it appears on some maps. The natives, however, do not like the name Cook gave their island but prefer the native name of Niue which is said to have been derived from *niu*, the Polynesian name for the coconut.

Most of the larger habitable islands of Polynesia are volcanic in origin thus offering a diversity of elevation as well as other topographic features including streams, ravines, etc., commonly favorable for abundant plant and animal life. Niue, on the contrary, is unique in that it is of the raised coral type of island. It has been formed by the elevation of an original coral reef which was nearly as large as the present island. The elevation was quite uniform so that the top of the island at present is nearly level or sufficiently so that differences can scarcely be noted without instruments. There is a slight dip toward the center of the island suggesting that the reef was originally of the atoll type. Following the initial uplift a new reef varying from about one hundred to four hundred or more meters in width developed around the raised part of the island. Eventually the entire island experienced an additional elevation with the new reef now forming a shelf or terrace about the original island. The total elevation of the island at present is between 65 and 70 meters at its highest point. The edge of the outer terrace ends at the sea with, for the most part, abrupt and precipitous cliffs often 20 or more meters high. A new coral reef, over which at high tide the waves dash against the rocky cliffs, is now forming about the island. Perhaps the island has experienced other elevations but these two, at least, are apparent to the geologically inexperienced eyes of a botanist. The geological history of Niue should prove of great interest to students of the raised-coral type of island.

During the centuries since the first elevation of the island, the coral has been undergoing decomposition and change. Naturally,

the central or older part of the island, shows more disintegration of the rock than does the terrace. With the coming of plant life, humus has formed and soil has gradually accumulated, though soil, in the ordinary sense, at no place exceeds much more than six inches in depth. Beneath this top soil, which lies in pockets and crevices of the rocks and is by no means a continuous layer, lies a layer of decomposed coral limestone, white and powdery, known as *makatea*. This decomposed limestone will not alone support plant life. It is now used to a considerable extent as a top dressing for roads where, when rolled, it forms a compact and fairly permanent hard surface. A red soil is also found in pockets here and there but to a more limited extent. This soil when mixed with the top loam may furnish a basis for plant growth.

The natives have cleared much of the island where the rock has disintegrated sufficiently to permit working, but most of the lower terrace, as well as large scattered areas on the upper level, still remain too rough for the cultivation of crops. In clearing, the felled trees and brush are burned which not only removes the woody debris but also destroys some of the humus in the soil as well as reducing the microfloral content. The government officials are attempting to teach the natives not to burn their clearings and to conserve all of the humus possible and that this is the one great need of the soil. Seeds of *Crotalaria anagyroides* are also supplied for scattering about the island in the hope that this legume, which grows well under Niue conditions, may aid in soil building.

Cultivation aside from simple hoeing is impossible. Taro, bananas, yams, and sweet potatoes are planted in holes which are made in the soil pockets with sharpened sticks. Weeds may be pulled but for the most part the crops develop, if at all, without benefit of mechanical aid. In spite of these handicaps, under normal moisture conditions, fair crops are produced. During periods of drought, when the plantations fail, the natives are compelled to subsist on coconuts, breadfruit, and the fruit, roots, and other edible parts of wild plants of which there are not a great variety providing usable parts. They may, of course, purchase a variety of canned foods in the "bush" stores whenever they are able to secure money through the shipment of produce to the New Zealand markets.

The soil normally contains enough strength to permit only about one season of cropping at a time. A new plantation area must then be located and the old one allowed to revert to nature when it soon becomes covered with a weedy second growth of herbaceous and shrubby plants. After five or six years of such rest the soil may again be cropped for a season. Thus, the soil is only able to produce once out of every six or seven years. This represents a system of rotating the soil rather than that of the crops. The difficulty of cultivating the plantations and the poor quality of the soil with the resulting low crop yield obviously place a limitation upon the population growth. Another feature which adds to the difficulty of living on the island is the lack of any source of fresh water aside from the rains. All water used for drinking purposes must be collected from rains and impounded in reservoirs which, during times of drought, may have to be severely rationed. Before the construction of the reservoirs the natives secured some water by catching drippings from the roofs of caves. They also relied to a considerable extent upon coconuts for drinking purposes.

As seen at a distance from the sea the island appears as though completely forested with medium to large trees. This impression is due to a considerable degree to the large numbers of coconut, breadfruit, mango, and other introduced trees of economic use which have been planted everywhere about the island particularly in the vicinity of villages, all of which are situated on or near the lower terrace.

A considerable proportion of the upper or older part of the island has been cleared and cultivated at some time. Large areas, however, still persist in what appears to be primitive forest. In these areas the coral has resisted the forces of disintegration and remains in exceedingly rough and rugged masses which make walking off the trails exceedingly difficult. In places, deep, rugged crevices and caverns with sharp projecting rock masses still exist. These, now masked in some instances by lianas, ferns and other

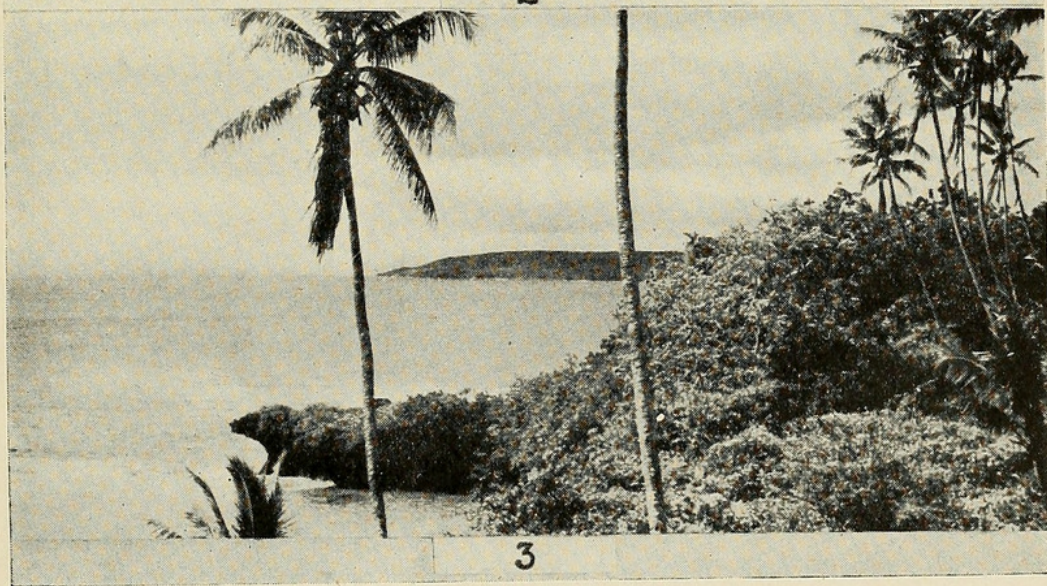
FIGURE 1. A forested "island" on the upper level with cleared plantation area in the foreground in early stages of second growth. FIGURE 2. A typical native house in a grove of coconuts, breadfruit, bananas and other food and ornamental plants. FIGURE 3. The cliffs along the western shore near where Captain Cook landed in 1774. The profile of the island in the distance shows the upper level and surrounding secondary terrace.



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growth offer some risk and persons have been injured or killed by falling into them.

In these forested areas which have persisted because they are too rocky to permit clearing and the cultivation of crops, one finds a number of different species of shrubs and trees some with great buttressed trunks and over a hundred feet in height. One also finds several species of ferns and herbaceous plants and vines growing together in great profusion. *Flagellaria gigantea*, a curious grass-like liana, which climbs to the tops of the tallest trees by means of its prehensile-tipped leaves is also found here. Its great clusters of small, white flowers are to be seen above the tops of the highest trees and are collected with considerable difficulty. Among the more abundant of the woody species to be found in the forested areas and in the older thickets may be mentioned the following: *Celtis paniculata*, *Trema orientalis*, *Paratrophis anthropophagorum*, *Ficus* spp., *Laportea Harveyi*, *Pipturus argenteus*, *Hernandia Moerenhoutiana*, *Pittosporum Brackenridgei*, *Adenanthera pavonina*, *Inocarpus fagiferus*, *Micromelum minutum*, *Acronychia* sp., *Canarium Harveyi*, *Dysoxylum Richii*, *Aglaia samoensis*, *Glochidium ramiflorum*, *Macaranga Harveyana*, *Rhus taitensis*, *Pometia pinnata*, *Ellatostachys falcata*, *Dodonaea viscosa*, *Colubrina asiatica*, *Alphitonia zizyphoides*, *Elaeocarpus samoensis*, *Grewia crenata*, *Psidium Guajava*, *Eugenia* spp., *Planchonella samoensis*, *Diospyros*, spp., *Linociera pauciflora*, *Fagraea Berteriana*, *Alyxia stellata*, *Tarennia sambucina*, *Psychotria insularum*, *Morinda citrifolia*, *Morinda Forsteri*, and *Scaevola frutescens*. The cleared areas on the upper level are either bearing crops or are covered with a mass of second growth of ferns, grass, introduced weeds, and low shrubs.

Along the coast on the exposed rocks or adjacent territory grow a number of interesting native species. A conspicuous shrubby plant which grows at the cliff edge is *Bikkia grandiflora* with its large white tubular flowers up to six inches or more long. Large numbers of *Messerschmidia argentea* trees grow along the rocky cliffs and when in flower are surrounded with great clouds of butterflies. Among other common species found in this region may be cited: *Procris pedunculata*, *Pipturus argenteus*, *Hernandia ovigera*, *Caparis sandwichiana*, *Leucaena glauca*, *Erythina variegata* var.

orientalis, *Mucuna gigantea*, *Aleurites moluccana*, *Triumfetta procumbens*, *Hibiscus tiliaceus*, *Thespesia populnea*, *Calophyllum inophyllum*, *Pemphis acidula*, *Barringtonia asiatica*, *Terminalia Catappa*, *Planchonella Grayana*, *Ochrosia parviflora*, *Cordia subcordata*, *Heliotropium anomalum*, *Premna taitensis*, *Hedyotis foetida*, *Gardenia taitensis*, *Guettarda speciosa*, and *Timonius polygamus*. Pandanus trees occur everywhere, the leaves of which are much used by the natives for the weaving of large numbers of baskets and other articles.

The government officials who have been stationed on the island during the past forty years, together with the missionaries, have been active in introducing ornamentals and plants of economic worth. The natives themselves have also been responsible for the introduction of a considerable number of species especially those of more ancient introduction such as the coconut, banana, breadfruit, yam, papaya, etc. In all of the villages are large numbers of those ornamentals commonly found through the tropics including species of: *Crinum*, *Hymenocallis*, *Hedychium*, *Antigonon*, *Bougainvillea*, *Bauhinia*, *Clitoria*, *Acalypha*, *Euphorbia*, *Codiaeum*, *Hibiscus*, *Polyscias*, *Plumbago*, *Jasminum*, *Allemanda*, *Plumeria*, *Nerium*, *Cestrum*, *Thunbergia*, etc. *Salvia coccinea* has become a common weed about villages and along roadsides. In January it produces a fine show with a blaze of red and pink flowers. Appropriately, it is known locally as Bon Fire. Recently the Cassia shower trees have been introduced and give promise of becoming an important decorative addition. Occasional Norfolk Island pines and introduced palms add to the landscape. The flame tree, *Delonix regia*, likewise grows well and recently planted trees are flourishing and will soon make a fine show of color during their blossoming season.

The writer was on the island for a number of weeks early in 1940 and attempted to secure as complete a collection of the plants occurring there as possible. To that end I had the very hearty cooperation of Captain William Bell, resident commissioner, and Mr. Joseph McMahon-Box, then Secretary-Treasurer of the island government, as well as a number of the natives. Good roads and trails lead to all parts of the island so that nearly all regions were readily accessible. In order to secure as many of the species as possible, particularly those which might be rare or obscure, the commissioner asked the native officials and older men of each village

to prepare a list of all of the plants which they knew. Many of the older natives were known to have a wide knowledge of the plants, particularly those with food or medicinal properties. The natives gathered in groups in the various villages and each person contributed the names of as many plants as he knew while one who could write would list them. In this manner more than a dozen lists, some of which included more than a thousand different native names, were obtained. Naturally, there were innumerable duplications and it was necessary to match lists and combine names when applied to the same species. From the list thus secured it was possible to seek those species not already collected and to locate, with the aid of a competent guide, a number of species which would likely have otherwise been overlooked. Finally, prizes were given to natives who could bring plants which were rare and of which specimens had not already been obtained. Most of those submitted had already been collected but a few interesting additions were secured in that manner. It was interesting to note that in many instances the natives employed a workable form of binomial nomenclature to designate the various species, using descriptive specific terms of color, habitat, leaf characters, etc. One wonders that professional botanists waited until the time of Linnaeus before adopting a similar system.

As might be expected, the endemic species are comparatively few. Practically all of them occur also in Samoa, Tonga, Raratonga or other islands of that general area. The total number of all species collected was found to be less than 500 of which something less than 50 percent are native. Considering the fact that there is little variation in the thin soil, that the topography of the island is flat and low, and that there is no surface water to furnish freshwater habitats of stream or marsh, one should probably not expect a larger number.

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