

An Enumeration of Niihau Plants.

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SO LITTLE is known about the flora of the island of Niihau that it was thought that an enumeration of the plants known to occur there might be of some interest. As far as known Lay and Collie sometime between 1826 and 1827, Jules Remy between 1851 and 1855, and Dr. Wm. T. Brigham in 1865, are the only botanists who have visited this island. The only record of these collections is the mention of a few peculiar indigenous species in Mann's Enumeration, and in Hillebrand's Flora;¹ and it is doubtful if many of the commoner introduced species were collected.

During the month of January, 1912, Mr. J. F. G. Stokes of this Museum had the rare privilege of visiting the island, and most of the plants in the following enumeration are based on his collection. A few weeks later Mr. Stokes' native guide, Mr. Kalua Keale, made a collection from the only small area which they had not previously visited, so the list is probably fairly complete for the island. Plants not observed by Mr. Stokes have probably become extinct, or at least very rare.

Niihau is an irregularly shaped island lying 15 miles west of Kauai, and has an area of 73 square miles, with an elevation of 1304 feet for its highest point. About one-third consists of volcanic table land, this being surrounded on all but the eastern side by a low rolling plain composed of both volcanic and coral rock.

The northern end is a low plain of volcanic material, fringed in the proximity of the sea with dunes of coral sand. Where these two soils meet the herbage has a brighter hue, which Mr. Stokes considers as due to an improved condition of the lava soil from the addition of lime.² Along the eastern coast, to the south of Kii, dunes

¹ H. Mann, Enumeration of Hawaiian Plants, Proc. American Acad., July, 1867. W. Hillebrand, Flora of the Hawaiian Islands, 1888. I have not had access to a copy of Hooker and Arnott Botany of Capt. Beechey's Voyage of the Blossom, in which Lay and Collie's collection is described.

² I have not had the opportunity to investigate this, but would consider that it was probably due to there being more available moisture in the soil at this particular locality.

have in places dammed up the surface drainage. On the same coast, north of Poleho, the sand has blown inland for about half a mile.

The plateau is also of volcanic material. The highest points are on the northern and northeastern boundaries, where the vertical cliffs reach 1304 feet at Paniau. From here the ground slopes downward to the south and west on a somewhat even grade, interrupted by several deep gorges, and by the high and prominent cone of Kaeo. The cliffs on the south are about 20 feet high. Kaali, the north cliff of the plateau, is rather moist, and there is a small spring at about the 800 foot elevation which is utilized as a water supply for the lowlands. It was here that Mr. Stokes collected most of his plants. The cliffs on the east were very dry and barren, there being a sparse growth of shrubbery on the talus slope, however.

Between the west coast and the plateau there is a low cliff of lime sandstone. The plain south of the plateau is composed of coral sand and sandstone, with an undulating volcanic belt near and parallel to the west coast. It has a low elevation and is frequently under water. Sand dunes and coral sandstone follow around the east and west coasts of this part. The southern point of the island consists of an eroded volcanic cone, reaching a height of 600 feet, which viewed from the southern end of the plateau over the low plain has the appearance of another island.

There are periods of very little rainfall, and the conditions affecting the flora are somewhat analogous to those of Kahoolawe described in another paper. Most of the available land is now used as pasturage for sheep and horses, as it has been for a great many years. The island was formerly overrun with goats, but these have been completely exterminated within recent years. Mr. Stokes reported that most of the island, especially on the top, was covered with Manienie (*Cynodon dactylon* Pers.). Near the southern end there are swamp-like areas where various species of *cyperus* occur, including *C. laevigatus*, from which the old natives made their famous mats. Most of Mr. Stokes' specimens were collected at Kaali on the western cliffs of the tableland, a few on the valley sides, and an interesting *Euphorbia* of the *Multiformis* group near the beach. This latter plant differs so strikingly from other members of the group that I have proposed it as a new species.

The flora of Niihau, like that of all the islands, has undergone great changes since the first botanist visited the group,

changes which are the direct result of man's industry and civilization. When Dr. Brigham first visited the island there was a fair covering of native scrub plants over the greater part of the top of the island. Old inhabitants report a considerable area of bastard sandalwood (*Myoporum sandwicense* (A. DC.) A. Gray), the trees being perhaps twenty feet high. Now only a few sticks of dead wood and roots remain to prove the truth of these statements. At that time a small patch of Manienie (*Cynodon dactylon* Pers.) was being tended with considerable care in the yard of the Sinclairs. Now this grass forms the main pasturage for the valuable flock of sheep. The areas of *Cyperus laevigatus* which used to be tended with some care are being crowded out by another species, as well as by sheep, except where Mr. Robinson has protected it by fencing as of historical interest. A great many of the plants which could have been collected by Lay and Collie probably do not occur on the island at the present time, while the number of naturalized plants has probably increased in as great or greater proportion.

Of the plants in the following list, 25 are peculiar to the Hawaiian group; 39 are indigenous to the group but also occur elsewhere; 10 may be considered of aboriginal introduction to the group; 37 were introduced and naturalized prior to 1886, and 4 have become naturalized since 1886.

Schiedea amplexicaulis and *Euphorbia Stokesii* are probably peculiar to Niihau, but may be expected to occur on Kauai. Of the naturalized plants many have probably arrived on Niihau within comparatively recent years, as, for instance, *Batis maritima*, which prior to 1886 was only known from a small area near Honolulu, has now spread all over the group.

As I have not had the privilege of visiting Niihau, I wish to thank Dr. Brigham and Mr. Stokes for information concerning the physical features and floral aspects of the island, and for help in correcting the proof.

FILICALES.

Adiantum capillus veneris L.

Ceropteris calomelanus (L.) Und.

Dryopteris, sp.

Sterile fronds only; probably *D. truncata* (Poir.) O. Ktz.

Nephrolepis exaltata (L.) Schott.

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LYCOPODIALES.

Psilotum nudum (L.) Griesb.*Psilotum triquetrum* Sw.

PANDANACEAE.

Pandanus tectorius Sol.*Pandanus odoratissimus* L.

One tree observed by Mr. Stokes.

GRAMINEAE.

Capriola dactylon (L.) Ktz.*Cynodon dactylon* Pers.**Heteropogon contortus** (L.) Beauv.**Chaetochloa verticillata** (L.) Scribn.**Panicum Beecheyi** Hk. & Arn.

Said to have been collected by Lay and Collie. Not in the Bishop Museum herbarium.

Panicum nephelophilum Gaud., var. *xerophyllum*?**Panicum pruriens** Trin.**Sporobolus virginicus** (L.) Kunth.**Saccharum officinarum** L.

Dr. Brigham remembers seeing the native sugar cane growing in coral caves on the lowlands. It was not observed by Mr. Stokes.

CYPERACEAE.

Cyperus caricifolius Hk. & Arn.**Cyperus cymosa** R. Br.

These two species were collected by Lay and Collie. There are no authentic specimens in the Museum herbarium.

Cyperus laevigatus L.**Cyperus pennatus** Lam.**Cyperus**, sp.

Only leaves collected.

Cyperus trachysanthus Hk. & Arn.**Cyperus polystachys** Rottb.**Scirpus lacustris** L.

PALMACEAE.

Cocos nucifera L.

Observed by Mr. Stokes, but not collected.

DIOSCOREACEAE.

Dioscorea sativa L.

PIPERACEAE.

Peperomia, sp.

BATIDACEAE.

Batis maritima L.

MORACEAE.

Artocarpus incisa Forst.

Broussonetia papyrifera Vent.

CHENOPODIACEAE.

Chenopodium album L.

Chenopodium sandwicheum Moq.

AMARANTACEAE.

Nototrichium sandwicense (A. Gray) Hillebr.

NYCTAGINACEAE.

Boerhavia diffusa L.

Boerhavia tetrandra Forst.

FICOIDEAE.

Sesuvium portulacastrum L.

CAROPHYLLACEAE.

Schiedea amplexicaulis Mann.

Collected by Remy; not in the Museum herbarium.

MENISPERMACEAE.

Cocculus Ferrandianus Gaud.

LAURACEAE.

Cassytha filiformis L.

PAPAVERACEAE.

Argemone mexicana L.

CRUCIFERAE.

Coronopus didymus (L.) J. E. Smith.

CAPPARIDACEAE.

Capparis sandwichiana DC.*Cleome sandwicensis* Gray.Recorded in Mann's Flora;³ not observed by Mr. Stokes.

LEGUMINOSAE.

Abrus precatorius L.*Acacia Farnesiana* Willd.

Observed but not collected by Mr. Stokes.

Caesalpinia bonducella (L.) Flem.*Canavalia galeata* Gaud., var. *pubescens* Hk. & Arn.*Cassia occidentalis* L.*Erythrina monosperma* Gaud.*Indigofera anil* L.*Meibomia triflora* (L.) Ktz.*Desmodium triflorum* DC.*Meibomia uncinata* (Jacq.) Ktz.*Desmodium uncinatum* DC.*Prosopis juliflora* DC.*Sophora tomentosa* Hk. & Arn.

Not in collection.

Sesbania grandiflora (L.) Pers.*Cracca purpurea* L.*Tephrosia piscatoria* Pers.

OXALIDACEAE.

Oxalis corniculata L.

ZYGOPHYLLACEAE.

Tribulus cistoides L.³Horace Mann. Flora of the Hawaiian Islands. Communications Essex Institute, Salem, Mass. 1871.

MELIACEAE.

Melia azedarach L.

EUPHORBIACEAE.

Euphorbia celastroides Bois.
Euphorbia geniculata Ortega.
Euphorbia peplus L.
Euphorbia pilulifera L.
Euphorbia Stokesii, sp. nov. (See page 27.)

SAPINDACEAE.

Cardiospermum microcarpum H. B. K.
Cardiospermum halicacabum L.
Dodonaea viscosa L.

MALVACEAE.

Abutilon abutilon (L.) Rusby.

Although one of the most common naturalized plants all over the group it has not been recorded before. *A. indicum* is also naturalized on the group.

Abutilon incanum G. Don.
Gossypium tomentosum Nutt.
Malvastrum tricuspidatum A. Gray.
Paritium tiliaceum St. Hil.
Sida fallax Walp.
Sida rhombifolia L.
Thespesia tilifolia St. Hil.

STERCULIACEAE.

Waltheria americana L.

CACTACEAE.

Opuntia tuna Mill.

ARALIACEAE.

Reynoldsia sandwicensis A. Gray.

UMBELLIFERAE.

Hydrocotyle verticillata Thnb.

PRIMULACEAE.

Lysimachia spathulata B. & H.

Collected by Remy; not seen by Stokes.

PLUMBAGINACEAE.

Plumbago zeylanica L.

SAPOTACEAE.

Chrysophyllum polynesianum Hillebr.

ASCLEPIADACEAE.

Asclepias curassavica L.

CONVOLVULACEAE.

Ipomoea batatas (L.) Lam.*Ipomoea insularis* Steud.*Ipomoea pentaphylla* Jack.*Ipomoea pes-caprae* Sw.*Ipomoea tuberculata* Roem & Sch., var. *trichosperma*.*Jacquemontia sandwicensis* A. Gray.

HYDROPHYLLACEAE.

Nama sandwicensis A. Gray.

BORAGINACEAE.

Heliotropium anomalum Hk. & Arn.*Heliotropium curassavicum* L.*Vitex trifolia* L.

VERBENACEAE.

Verbena bonariensis L.*Priva aspera* H. B. & K.

LABIATAE.

Plectranthus australis R. Br.*Plectranthus parviflorus* Willd.

Another plant belonging to this family not yet sufficiently identified.

SOLANACEAE.

Lycium sandwicense A. Gray.*Lycopersicum esculentum* Mill.*Nicotiana tabacum* L.*Solanum nigrum* L.

MYOPORACEAE.

Myoporum sandwicense (A. DC.) A. Gray.

RUBIACEAE.

Morinda citrifolia L.

LOBELIOIDEAE.

Brighamia insignis A. Gray.

Mr. Stokes observed on inaccessible cliffs. The plant is known from Kauai, Molokai and Lanai, but not as yet from the other islands.

Delissea undulata Gaud.

Brigham in herbarium of Bishop Museum; not seen by Mr. Stokes. Dr. Brigham says that this is the only *lobelia* that he saw on the island, and that it was more plentiful over the area where it occurred than perhaps any other lobeliaceous plant occurring in an equal area on the group.

Lobelia neriifolia Gray, var.

Field experience is showing this to be a variable species; the present specimen collected by Mr. Stokes may prove to be a distinct variety.

GOODENIACEAE.

Scaevola Koenigii Vahl.

Scaevola coriacea Nutt.

Collected by Remy; not seen by Stokes.

COMPOSITAE.

Ageratum conyzoides L.

Artemisia australis Less.

Bidens pilosa L.

Campylotheca micrantha (Gaud.) Cassin.

Erigeron albidum A. Gray.

Lipochaeta lobata DC.

Lipochaeta succulenta DC.

Vernonia cinerea (L.) Less.

Sonchus oleraceus L.

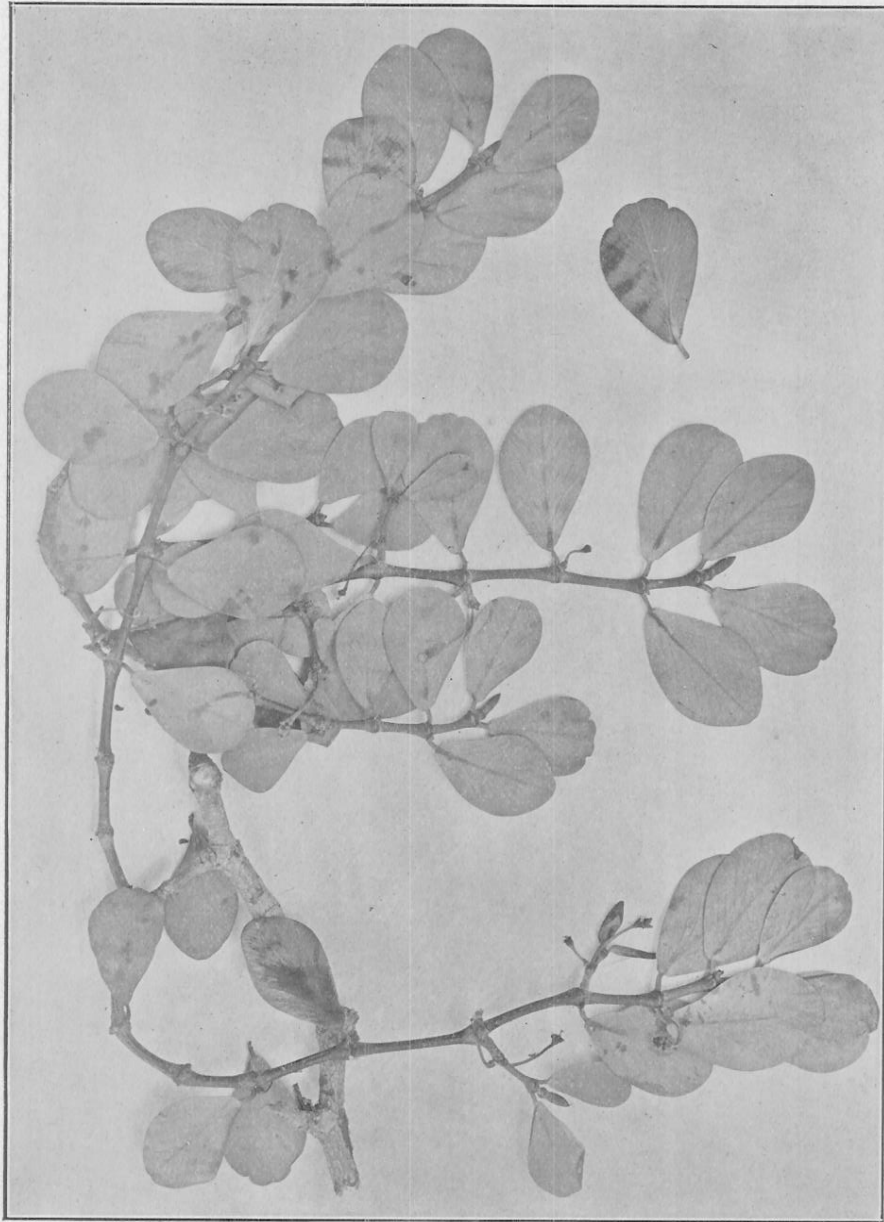
***Euphorbia Stokesii*, sp. nov.**

Frutex 6 dm. altus; foliis oppositis, obovatis, turbinatis vel emarginatis, carnosis, glabris, 4.2-4 cm. longis, 2.6 cm. latis, cum petiolis 5 mm. longis; stipulis membraceis. Axillares, solitari cum pedicellis 1.3-1.5 cm. longis; involucre campanulato, glabro, 2 mm. longo, cum 5 glandulis latioris quam altioris; lobis triangularis, tridenticulatis; staminodibus exsertis, bracteolis divisis et fimbris. Capsula glabra, 3 mm. longa; seminibus ovoidis, tetragonis, scrobiculatis, cinereis.

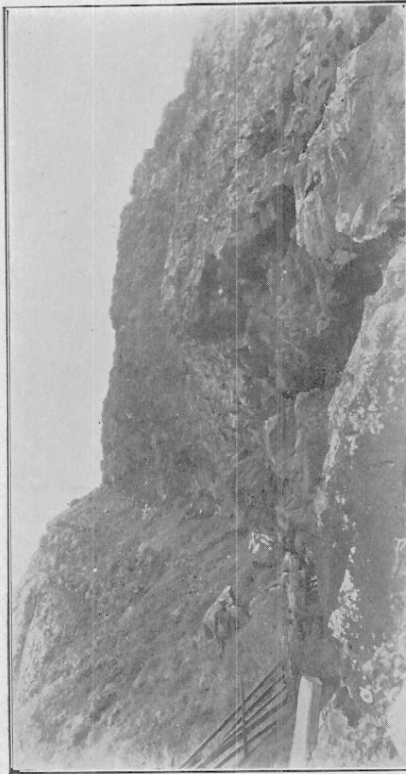
Type locality, near the beach at Kii, Niihau, H. I. J. F. G. Stokes. January, 1912.

A low prostrate shrub 6 dm. high; with thick nodose branches, sub-herbaceous at the ends. Leaves opposite, obovate, often emarginate or turbinate, rather fleshy, glabrous, bluish green above, paler beneath, 4.2-4 cm. long, 2.6 cm. wide; with petioles 5 mm. long. Stipules low rounded, membranous. Flowers axillary, single, on pedicels 1.3-1.5 cm. long. Involucre campanulate, 2 mm. long, glabrate; throat pubescent; glands 5, broader than high; lobes triangular with three minute teeth. Staminiophores exserted; bractlets about one-half the length of the staminiophore, split and fimbriate. Styles short. Capsule glabrous, 3 mm. long, on a short stalk. Seeds ovoid, tetragonous, scrobiculate, ash-colored.

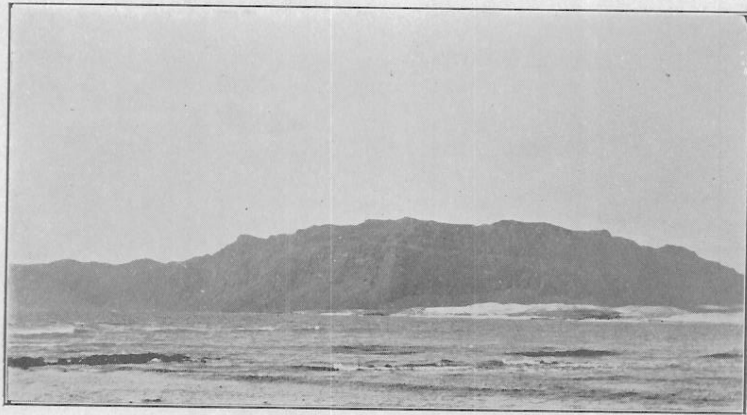
This plant can be readily distinguished from all other species of the *multiformis* group of these islands by the character of its very different leaves. They are relatively much wider and more fleshy than those of other members of the group.



1. *Euphorbia Stokesii* Forbes.



2. Close view of the cliffs near Kaali at the water hole where many of the cliff plants were collected.



3. Distant view of the table land looking from Kii toward Kaali.

