ATOLL RESEARCH BULLETIN

No. 82

Heron Island, Capricorn Group, Australia

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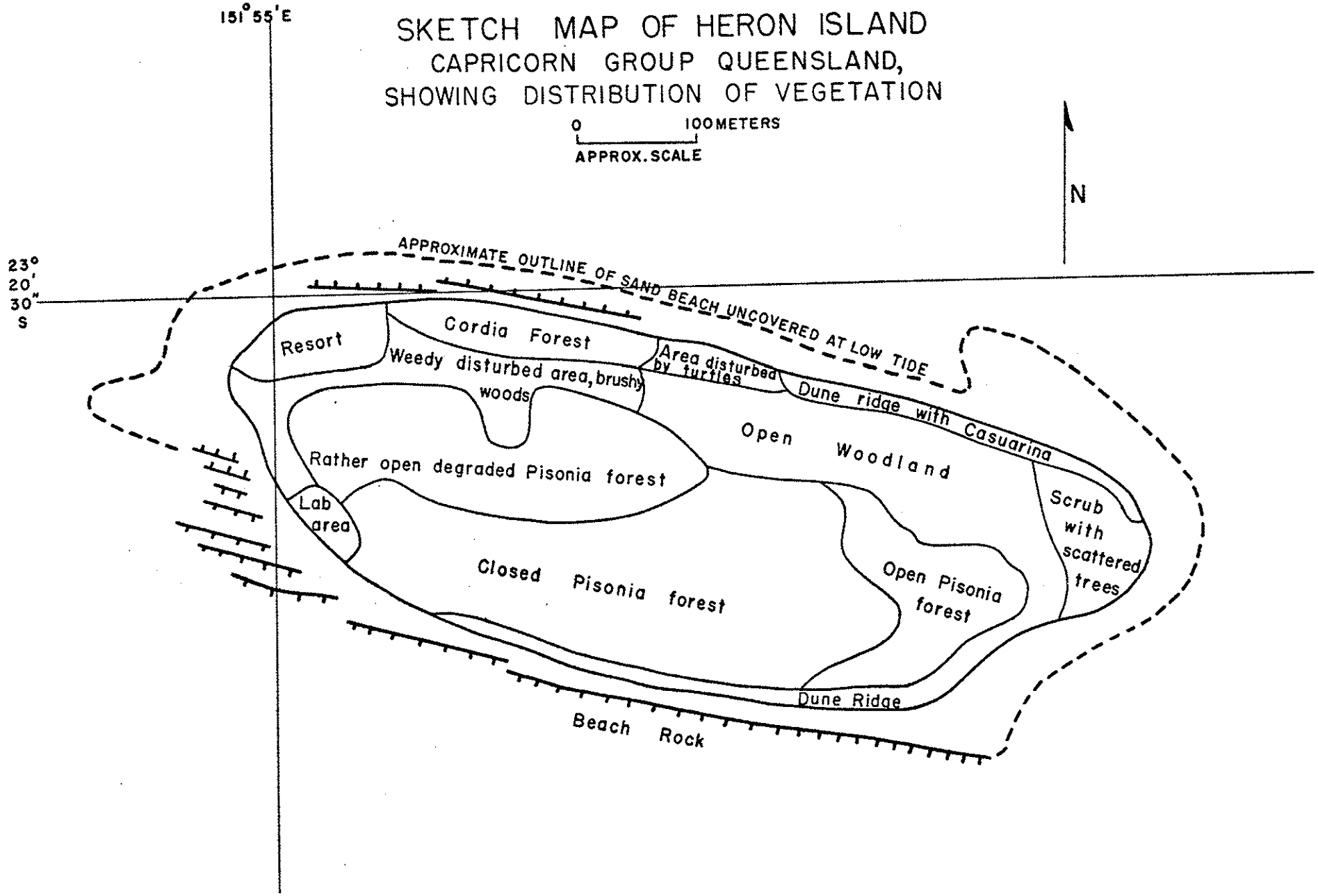
151°55'E
SKETCH MAP OF HERON ISLAND
CAPRICORN GROUP QUEENSLAND,
SHOWING DISTRIBUTION OF VEGETATION
0
100 METERS
APPROX. SCALE
N
23°
20'
30"
S
APPROXIMATE OUTLINE OF SAND BEACH UNCOVERED AT LOW TIDE
Resort
Cordia Forest
Weedy disturbed area, brushy woods
Area disturbed by turtles
Dune ridge with Casuarina
Open Woodland
Rather open degraded Pisonia forest
Lab area
Closed Pisonia forest
Open Pisonia forest
Scrub with scattered trees
Dune Ridge
Beach Rock

I. Description of Heron Island

by

F. R. Fosberg

Heron Island, of the Capricorn Group, at the south end of the Great Barrier Reef, Queensland, Australia, is the site of the Marine Laboratory of the Great Barrier Reef Committee and also of a small resort. It is reached by a 4 to 5 hour launch ride from the port of Gladstone, Queensland.

J. B. Jukes (Narrative of the Surveying Voyage of H.M.S. Fly ... 1:6-9, 1847) gave a rather general account of the island, but paid particular attention to the beach rock, which he described in detail, with one of the earliest scientific speculations as to the origin of beach rock.

Heron Island is a small island, narrowly oblong or bullet shaped, about 45 acres in extent, formerly more than 100 acres, but said to have been largely swept away by a hurricane; it lies on the western end of an elongate reef, 5 miles long. This reef is separated from Wistari Reef by a narrow channel. It lies just inside the tropic of Capricorn at lat. 23°26' 30" S, long. 151°55' E.

The entire island is a sheet of flat coral sand mostly one to two meters above high tide level. The highest point (near the guest house) is 3.6 meters above high water (H. F. Manning, conversation, 1960). Along the south side is a dune ridge rising to perhaps 3 meters at most, above the general level of the island. Along the north side, at least in the eastern part, is a much lower dune ridge, at most a meter above the general level of the island. On the northeast corner is a notable sand apron on the reef below the beach.

A broad series of inclined beds of beachrock extends along the entire south coast, leaving the coast where the beach swings north and shortly disappearing. On the north coast a narrower strip starts at the curve in the west end and extends a short distance along the beach. Then, slightly offset to seaward, a very narrow, much eroded and pitted strip extends perhaps nearly half the length of the island. On the south side large numbers of slabs of beachrock have been torn loose and strewn along the upper part of the beach. These beds are said to be completely buried in sand at times. Toward shore, at the extreme west end, the beds on the south side become horizontal or even dip slightly toward shore. It is hard to tell whether these are normally exposed beds or have been laid bare by stripping off the upper beds for use as building stone for sea walls around the resort, as this activity was taking place during my visit. There is no other consolidated rock of any sort on the island.

The most notable vegetation type on the island is a low forest of Pisonia grandis, of trees perhaps 6 to 8, rarely 10 m. high. The pale gray or cream-colored elephantine trunks of this tree give a character to the landscape that is not easily forgotten. Scattered in this forest

are a few slender trees of Celtis paniculata, and, forming a very sparse lower story, shrubs of this species, Ficus opposita, and Pipturus argenteus which are 2 to 4 m. tall. A shrub or tall herb layer, locally quite prominent and almost continuous, is formed of Abutilon albescens and, in places, Euphorbia cyathophora. In open places is a mat of Wedelia biflora a meter or so thick. Where the Pisonia is thickest this shrub layer is sparse or lacking. Low herbs are almost lacking except for small patches of Stenotaphrum micranthum. At this time (October 1960), after a long dry spell, the Pisonia is largely leafless, especially the upper branches, and is just coming into flower. This relatively dense Pisonia forest occupies the central and western parts of the island, except for the south dune ridge and a strip along the north coast. It has been disturbed on the northwest corner by the building of the resort, and on the southwest by the building of the Marine Biological Laboratory and caretaker's house. Around the resort buildings as a precaution against storm damage, the upper branches of the Pisonia have been lopped off. Occasional fallen Pisonia trees are observed in the forest, mostly producing sprouts from their trunks.

East of the middle of the island, especially near the south side, the Pisonia forest is much more open. Here Celtis and Ficus are more common and larger, Pandanus is occasional, and the undergrowth of Abutilon and Wedelia is prominent, with occasional patches of Euphorbia cyathophora.

Along the north side, beginning at the resort, the forest, for a little distance in from the beach, is dominated by Cordia subcordata, rare or absent elsewhere on the island, with some Pisonia. This forest is not especially dense and has an undergrowth, in the spaces between the low-branching crowns of the Cordia, of Abutilon, Wedelia, and Euphorbia. Scaevola and Tournefortia are common in the edges along the beach, with a loose sod of Sporobolus virginicus at the top of the beach. Along the dune ridge on the south side is an irregular scrub forest of Pandanus, Casuarina, Tournefortia, and Scaevola. On the steep sand slopes above the beach Euphorbia ramosissima, Cakile, and Thuarea are common.

East of the Cordia forest is an area of open sand, much dug up by turtles, with scattered small Casuarina, Ficus, Scaevola, Pandanus, and Tournefortia. On the sand are Cakile, Wedelia, Lepturus (mostly dead at this season), Euphorbia eremophila, and Cassytha; the latter is parasitic on many of the other plants.

Eastward, and also east of the open Pisonia forest, the undergrowth becomes thicker and Pandanus becomes dominant in the tree layer. Celtis, Casuarina, Ficus, some Tournefortia and several dense patches of Suriana are also present. Scaevola and Wedelia are common, as well as Abutilon. A dead grass, probably Lepturus, and Euphorbia eremophila are common and Cassytha is very prominent, thinly covering the bushes and, locally, the ground.

At the east end is an irregular scrub 1 to 2 m. high, of Tournefortia and Scaevola, open in places, and with irregularly scattered small Casuarina trees. These trees are especially notable at the top of the beach and extend in a line on the low dunes along about half the north coast, and along the dune ridge on the south coast.

The vegetation of the island has a considerably disturbed look. Trails and roads have been cut into the Pisonia forest, and around the resort and the laboratory weeds are very abundant, especially Euphorbia cyathophora and Gnaphalium sp. Exotic plants have been set out in some abundance, but except for one small coconut tree, a few papayas, an oleander and one or two plumerias, most of them are still small.

Much of the appearance of disturbance comes from the burrowing of the wedge-tailed shearwaters or mutton-birds (Puffinus pacificus) which stir up the ground on most parts of the interior, and from the holes dug by green turtles (Chelonia mydas) and occasional loggerheads Thalassochelys caretta), which lay their eggs here, the former in great numbers. The ground around the margins of the eastern half of the island appears thoroughly churned up by their activities.

Before this visit I confidently anticipated finding phosphatic hardpan soils, with raw humus accumulalion, of the Jemo series,* similar to those found in the Central Pacific atolls. The conditions, as described, with Pisonia forest growing on coral sand, with abundant seabirds, seemed perfect for development of soils of this series. Actually, no phosphatic hardpan whatever was found, and only a very small patch showed any raw humus accumulation. This little area was, apparently by chance, not disturbed by shearwater burrows.

The absence of either phosphatic hardpan or an extensive raw humus layer was anticipated by Dr. W. Stephenson, of Brisbane University Zoology Department, in a conversation before the visit. He said that the constant stirring up of the soil by the shearwaters and mixing in of coral sand with the humus would probably prevent much accumulation of humus, and consequently, no phosphate rock formation could take place granting the correctness of my theory* on the process. His prediction was realized. The absence of phosphate rock in this area, where neutralization of the humic acidity by calcium carbonate sand is the rule, may possibly be regarded as further evidence for the soundness of the theory.

Nearby Mast Head Island is described (by H. F. Manning, conversation 1960) as having thick Pisonia forest also, but with abundant nesting of crested terns (Thalasseus bergii), the burrowing shearwaters being present but not predominating as at Heron Island (see Barrett, C., Nat. Geogr. Mag. 58: 354-384, 1930, who reports shearwaters there). It is suggested that a well-developed layer of raw humus overlying a bed of phosphatic hardpan will be found there. Phosphate has been exploited on Lady Elliot Island, 60 miles to the southeast of Heron Island, but no information is readily available as to its nature and origin.

J. B. Jukes (Narrative of the Surveying Voyage of H.M.S. Fly 1: 2, 1847), in his account of "First Bunker's Island", described what must certainly be Jemo soil as follows, "The materials of the encircling ridge were quite low, and thinly covered with vegetable soil among the trees; but the sand of the central plain, which was dark brown, was sufficiently

* Fosberg, F. R., Soil Science, 78 : 99-107, 1954.

compact to be taken up in lumps, and a little underneath the surface it formed a kind of soft stone, with embedded fragments of coral. Some vegetable soil also was found, a few inches in thickness in some places, the result of the decomposition of vegetable matter and birds' dung." Saville-Kent, in The Great Barrier Reef of Australia... 101-102 [1893], quoted Jukes' description of First Bunker's Island and assumed that it applied to Lady Elliott Island. However, Jukes (op. cit. opposite p. 3) illustrated Lady Elliott Island, referring to it by that name. From the location, as described in Jukes narrative, it seems more likely that First Bunker's Island was Lady Musgrave Island, a few miles to the north of Lady Elliott.

II. Vascular plants of Heron Island

by

F. R. Fosberg and R. F. Thorne

Through the courtesy of the Great Barrier Reef Committee, the authors were able to make collections of the vascular plants of Heron Island. These collections, made at different seasons, May and October, complement each other and it seems proper to make a combined report of them, and to include several records from the herbaria at Brisbane and Sydney. No systematic search for such records could be made, because of lack of time. Also added are sight records of species planted, mostly in pots, at the resort on the island.

A previous list, by W. D. K. MacGillivray and F. A. Rodway, based on collections made in 1927, published in the Report of the Great Barrier Reef Committee vol. III, pp. 58-63, 1931, has been included, showing some changes in the flora and some, also, in the nomenclature.

The Fosberg collections cited were made on October 5-6, 1960, and are deposited in the U. S. National Herbarium. Those of Thorne were made on May 8-9, 1960, and are in the Herbarium of the State University of Iowa, with a set at the Brisbane Herbarium. F. R. Fosberg is finally responsible for the determinations, though preliminary identifications of many of the specimens were made by S. F. Blake, L. S. Smith and R. F. Thorne.

Polypodiaceae

Polypodium punctatum (L.) Sw.
Pot plant seen by Fosberg, 1960.

Pinaceae

Pinus sp.
Very chlorotic seedlings seen by Fosberg, 1960.

Cupressaceae

Cupressus sempervirens L.?
Pot plant seen by Fosberg, 1960

Pandanaceae

Pandanus tectorius Park.
Fosberg 41302, 41325, 41326; Thorne 27210, 27215, 27248.
MacGillivray and Rodway 1931, p. 63, as P. pedunculatus R. Br.

This variable plant is, in Australia, commonly referred to P. pedunculatus R. Br., but seems to be well within the range of variation of the widespread Pacific strand species.

Gramineae

Cenchrus echinatus L.
Fosberg 41336; Thorne 27236.

Digitaria ciliaris (Retz.) Koel.
Fosberg 41310; Thorne 27234.

This species, the tropical representative of the common D. sanguinalis, has been called D. adscendens (HBK) Henr. by Henrard in his Monograph of the Genus Digitaria, but Panicum ciliare Retz. (1786), basionym for D. ciliaris, is earlier than Panicum adscendens HBK (1815), basionym D. adscendens.

Eleusine indica (L.) Gaertn.
Fosberg 41340; Thorne 27238
MacGillivray and Rodway 1931, p. 63.

Eragrostis cilianensis (All.) Lut.
Thorne 27212

Lepturus repens var. subulatus Fosb.
Fosberg 41583, 41343; Thorne 27216
MacGillivray and Rodway 1931, p. 63, as L. repens R. Br.

Spinifex hirsutus Labill.
Fosberg 41330; Thorne 27231

Sporobolus virginicus L.
Fosberg 41313; Thorne 27235
MacGillivray and Rodway 1931, p. 63.

Stenotaphrum micranthum (Desv.) Hubb.
Fosberg 41590, 41331
MacGillivray and Rodway 1931, p. 63, as Stenotaphrum subulatum.

Thuarea involuta (Forst.) R. & S.
Fosberg 41332; Thorne 27217
MacGillivray and Rodway 1931, p. 63 as Thuarea sarmentosa Pers.

Palmae

Cocos nucifera L.
Planted seedlings, seen by Fosberg, 1960

Araceae

Monstera deliciosa Lieberm.
Pot plant seen by Fosberg, 1960

Scindapsus aureus (Lind. & Andre) Engl.
Pot plant seen by Fosberg, 1960

Commelinaceae

Zebrina pendula Schnizel
Pot plant seen by Fosberg, 1960

Liliaceae

Hosta sp. ?
Pot plant seen by Fosberg, 1960

Sansevieria guineensis (Jacq.) Willd.
Pot plant seen by Fosberg, 1960

Marantaceae

Maranta arundinacea L. ?
Pot plant seen by Fosberg, 1960

Casuarinaceae

Casuarina equisetifolia var. incana Benth.
Fosberg 41301; Thorne 27219
MacGillivray and Rodway 1931, p. 63.

Ulmaceae

Celtis paniculata (Endl.) Planch.
Fosberg 41589, 41315; Thorne 27225

Moraceae

Ficus opposita Miq.
Fosberg 41584, 41591, 41318, 41324; Thorne 27227, 27240; Mary E. Gilham, s.n.; Sydney Univ. Biol. Soc. in 1948
MacGillivray and Rodway 1931, p. 63.

Ficus obliqua var. petiolaris (Benth.) Corner
MacGillivray and Rodway 1931, p. 63 (as F. platypoda var. petiolaris), described as having complex buttressed trunks.

Ficus sp.
Pot plant seen by Fosberg, 1960

Urticaceae

Pipturus argenteus (Forst.) Wedd.
Fosberg 41588; Thorne 27241
MacGillivray and Rodway 1931, p. 63

Proteaceae

Macadamia ternifolia F. v. M.
Pot plant seen by Fosberg, 1960

Polygonaceae

Rumex vesicarius L.
Cultivated, Fosberg 41341

The sepals lack the marginal nerve characteristic of the more commonly cultivated R. roseus.

Nyctaginaceae

Boerhavia repens L.
Fosberg 41309; Thorne 27230; Gillham in 1958; Sydn. Univ. Biol. Soc. in 1948. MacGillivray and Rodway 1931 p. 63, as B. diffusa L.

This strand species, taken in the broad sense, has usually been called B. diffusa L., but study of the Linnean specimens and of living material in Ceylon, type locality of B. diffusa, suggests that the pantropical plant is B. repens L.

Commicarpa chinensis (L.) Heim.
Fosberg 41316; Mauritzon in 1936

This species has usually been called Boerhavia repanda Willd. and the genus Commicarpa should probably be regarded as a section of Boerhavia. However, since Valeriana chinensis L., the earliest name, has not been transferred to Boerhavia, the above name is used for the time being.

Mirabilis Jalapa L.
Planted, seen by Fosberg, 1960

Pisonia grandis R. Br.
Fosberg 41591, 41303, 41317, 41319; Thorne 27233; Sydn. Univ. Biol. Soc. in 1948. MacGillivray and Rodway 1931, p. 63, as P. brunoniana Endl.

Amaranthaceae

Amaranthus viridis L.
Fosberg 41306; Thorne 27239

Portulacaceae

Portulaca oleracea L.
Fosberg 41334; Thorne 27242

Lauraceae

Cassytha filiformia L.
Fosberg 41311; Thorne 27220
MacGillivray and Rodway 1931, p. 63

Berberidaceae

Nandina domestica Thunb.
Pot plant seen by Fosberg, 1960

Cruciferae

Cakile edentula (Bigel.) Hook.
Fosberg 41300; Thorne 27218

Coronopus didymus (L.) J. E. Smith
Fosberg 41338; Thorne 27245

Lepidium virginicum L.
Fosberg 41305; Thorne 27223

Sisymbrium orientale L.
Fosberg 41304; Thorne 27246

Crassulaceae

Kalanchoe sp.?
Pot plant seen by Fosberg, 1960

Leguminosae

Cassia sp.?
Pot plant seen by Fosberg 1960

Delonix regia (Bojer) Raf.
Planted seedling seen by Fosberg, 1960

Erythrina sp.
Pot plant seen by Fosberg, 1960

Samanea saman (Jacq.) Merr.
Planted seedling seen by Fosberg, 1960

Sophora tomentosa L.
Fosberg 21596

Zygophyllaceae

Tribulus cistoides L.
Fosberg 41308, 41321; Thorne 27229
MacGillivray and Rodway 1931, p. 62

Tropaeolaceae

Tropaeolum majus L.
Planted, seen by Fosberg, 1960

Simarubaceae

Suriana maritima L.
Fosberg 41323; Thorne 27228
MacGillivray and Rodway 1931 p. 62

Euphorbiaceae

Codiaeum variegatum (L.) Bl.
Pot plant seen by Fosberg, 1960

Euphorbia clutioides (Forst.f.) C. A. Gard.
Fosberg 41598, 41327; Thorne 27226
MacGillivray and Rodway 1931, p. 63, as E. eremophila A. Cunn.

Euphorbia cyathophora Murr.
Fosberg 41335; Thorne 27243

Euphorbia prostrata Ait.
Thorne 27222

Euphorbia pulcherrima Willd.
Pot plant seen by Fosberg, 1960

Euphorbia ramosissima H. & A. ?
Fosberg 41599, 41329; Thorne 27221
MacGillivray and Rodway 1931, p. 63, as E. atoto Forst.

It is by no means certain that this plant is really E. ramosissima, as the glands are greenish, rather than white, but it is certainly not E. atoto, and at least superficially resembles the widespread E. ramosissima.

Euphorbia tirucalli L.
Planted, seen by Fosberg, 1960

Malvaceae

Abutilon albescens Miq.
Fosberg 41587, 41320; Thorne 27244; Chadwick in 1951; Gillham in 1958.
MacGillivray and Rodway 1931, p. 61, as A. indicum G. Don.

This has been usually referred to A. indicum L. or A. indicum var. australiense Hochr, but is really much closer to A. asiaticum L. It should perhaps be regarded as a variety of the latter.

Caricaceae

Carica papaya L.
Planted seedlings seen by Fosberg, 1960

Cucurbitaceae

Cucurbita sp.
Planted, seen by Fosberg, 1960

Begoniaceae

Begonia sp.
Pot plant seen by Fosberg, 1960

Umbelliferae

Apium leptophyllum (Pers.) F.v.M.
Fosberg 41333

Plumbaginaceae

Limonium bonduelii (Lestib.) O.Ktze
Cultivated, Fosberg 41342

The leaves of this specimen are unusual for L. bonduelii, more nearly resembling those of L. brassicaefolia. The inflorescence, however, is that typical of L. bonduelii, with linear appendages at the nodes.

Apocynaceae

Nerium indicum Mill.
Planted, seen by Fosberg, 1960

Plumeria rubra L.
Planted, seen by Fosberg, 1960

Convolvulaceae

Ipomoea grandiflora Lam.
MacGillivray and Rodway 1931, pp. 60, 62 (on p. 60 in one paragraph said to have "a large purple flower and leaves often a foot in diameter," and in a lower paragraph "its flowers were pure white, opening in the evening and closing after the sun rose in the morning," this latter on One Tree Island)

The white flowered species to which this name is commonly but incorrectly applied is Ipomoea tuba (Schlecht.) Don, which is frequently found on coral islands and does not have leaves up to a foot in diameter. I. grandiflora Lam. is probably Stictocardia tiliifolia, which has pale purple flowers and large leaves, but does not usually occur on atolls. Neither were seen by us on Heron Island, nor was any other morning glory.

Ipomoea pes-caprae (L.) Sweet
MacGillivray and Rodway 1931, p. 62

Not seen either by Thorne or Fosberg.

Boraginaceae

Cordia subcordata Lam.
Fosberg 41312; Thorne 27232
MacGillivray and Rodway 1931, p. 62

Tournefortia argentea L.f.
Fosberg 41593; Thorne 27224

Solanaceae

Petunia violacea Lindl.?
Planted, seen by Fosberg, 1960

Solanum lycopersicum L.
Planted, seen by Fosberg, 1960

Solanum nigrum L.
Fosberg 41307; Thorne 27211

Solanum pterocaulon Dunal
MacGillivray and Rodway 1931, p. 63

Labiatae

Salvia splendens Sellow ex R. & S.
Pot plant seen by Fosberg, 1960

Bignoniaceae

Jacaranda sp.
Pot plant seen by Fosberg, 1960

Goodeniaceae

Scaevola sericea Vahl
Fosberg 41595, 41597, 41314, 41322; Thorne 27213
MacGillivray and Rodway, 1931, p. 62, as S. koenigii Vahl.

Most plants seen are of the glabrous form, but with some variation between white and purple in flower color.

Scaevola sericea Vahl (pubescent form)
Fosberg 41328

One clump, represented by Fosberg 41328, is pubescent and has purple flowers.

Compositae

Conyza bonariensis (L.) Cronq.
Fosberg 41339; Thorne 27237

Gnaphalium luteo-album L.
Fosberg 41585
MacGillivray and Rodway 1931, p. 62

Sonchus oleraceus L.
Fosberg 41337

Wedelia biflora cf. var. canescens (Gaud.) Fosb.?
Fosberg 41586, 41594; Thorne 27214
MacGillivray and Rodway 1931, p. 62, as W. biflora DC.

This is not exactly identical with the Guam material on which this variety is based, but until a detailed analysis of the complex is attempted, the canescent-leafed plants are probably best referred here.

Page 14 is missing

III. Some observations on the Heron Island fauna

by

James M. Moulton*

A primary objective of recording underwater sound and of identifying biological sources of some of its components in the Heron Island area has been partially realized during October and November 1960, during which I have been a guest investigator at the Heron Island Marine Research Station, as well as a Fulbright scholar in the Department of Zoology at the University of Queensland. As elsewhere, the primary biological sources of underwater sound are fishes and invertebrates (chiefly alpheids and stomatopods); porpoises (Tursiops) have also been recorded.

The end of the yearly southward migration of whales past the Capricorn Islands occurred in early October. A single unidentified whale was seen thrashing the water west of Heron Island on October 4, and an adult and calf of the hump-backed whale (Megaptera novaeangliae) passed through the channel between Heron Island and Wistari Reef on October 7.

The wedge-tailed shearwaters (Puffinus pacificus) appeared on Heron Island on October 8 and the first calls were recognized during the evening of October 10. The bulk of them will have left the Island by the end of April (H. F. Manning conversation, 1960). According to Island residents, arrival was a bit earlier than usual this year. Numbers mounted rapidly to thousands, the birds settling and burrowing on frequently travelled ground as readily as in less accessible vegetated areas. The burrows are generally about three feet in length and the inner burrow is about 8 inches in diameter. The birds return to the Island at dusk each evening in a great flight; occasional stragglers come in later in the evening.

As of this date (November 17) eggs have not been laid in any burrows examined, and the paired birds frequently remain in the burrow during the day. The events of breeding behavior strikingly parallel those of Leach's petrel in the Bay of Fundy. Another parallel lies in the odor of the oil emitted during breeding from the male bird. The male mutton-bird emits this oil in copious amounts while preening the female.

Other birds abundant on the Island, but less closely observed, are noddy terns (Anous sp.) which have a large rookery in Pisonia trees, reef herons (Demigretta sacra), the nests of which are scattered through the noddy rookery in Pisonia and Pandanus trees, and silver gulls (Larus novaehollandiae) and crested terns (Sterna bergii) which frequent the beaches but probably do not nest on the Island. There is a white-breasted sea eagle's (Haliaetus leucogaster) nest in one of the tallest Pisonia trees. A number of other kinds of birds frequent the Island which has a rich bird fauna. Old reef heron nests are at times filled with partially gnawed Pandanus fruits, probably by the island rat Rattus exulans.

* Department of Biology
Bowdoin College
Brunswick, Maine

One of the most striking populations on the Island is one of Cerithium monifilerum Kiener, a small gastropod called a clusterwink. This snail behaves with a tidal rhythmicity of considerable interest. On the falling tide individuals of this species aggregate together in dense patches on a flat beachrock surface at the western end of the Island. The clusters are well-formed by the time the water depth is 14 inches; they disperse again on a rising tide when it reaches a depth of about 4 inches over a cluster. During high tide, the snails are dispersed rather evenly over the bottom. Clusters may number from 2 to over 1375 individuals; a few isolated individuals are noted between clusters at low tide, the mean size exceeding that of clustering individuals. The smallest individuals (generally under 6 mm.) do not cluster but are scattered in the sand. The composition of individual clusters varies from one low tide to the next as marking experiments have shown, and the clusters do not always form in the same places on consecutive tides. The clustering behavior is probably a mechanism for retaining moisture during low tide. Individuals in a cluster are in movement during exposure to the sun, so some turnover occurs. A small amount of coral sand is intermingled with the clusters, and a green alga often binds the clusters loosely together. A cluster removed to the laboratory disperses, and individuals move about separately in shallow pans and aquaria.

The mechanisms involved here are of considerable interest; it would, for example, be of interest to remove some of these animals to other areas for a study of relation of behavior to tidal rhythms. As the amount of silt and algal scum varies on different beachrock areas, the populations of Cerithium will vary; increasing surface accumulation decreases Cerithium populations. The clusters are most strikingly formed on flat, denuded beachrock.

Turtles have been late in arriving this year, according to Island residents. The first track was formed on the night of November 11 - 12, and a few turtles have come up since then. As I write this, I have just come from the digging site of a large loggerhead preparing to deposit her eggs within a score of yards of the nearest buildings of the Island resort. While the turtles laying on Heron Island are the green (Chelonia mydas) and loggerhead (Thalassochylys caretta) turtles, a small hawksbill was captured on the reef in mid-October. The latter is said to be uncommon in the vicinity of Heron Island.