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

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* 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.