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THE UNINHABITED CAYS OF THE CAPRICORN GROUP, GREAT BARRIER REEF, AUSTRALIA

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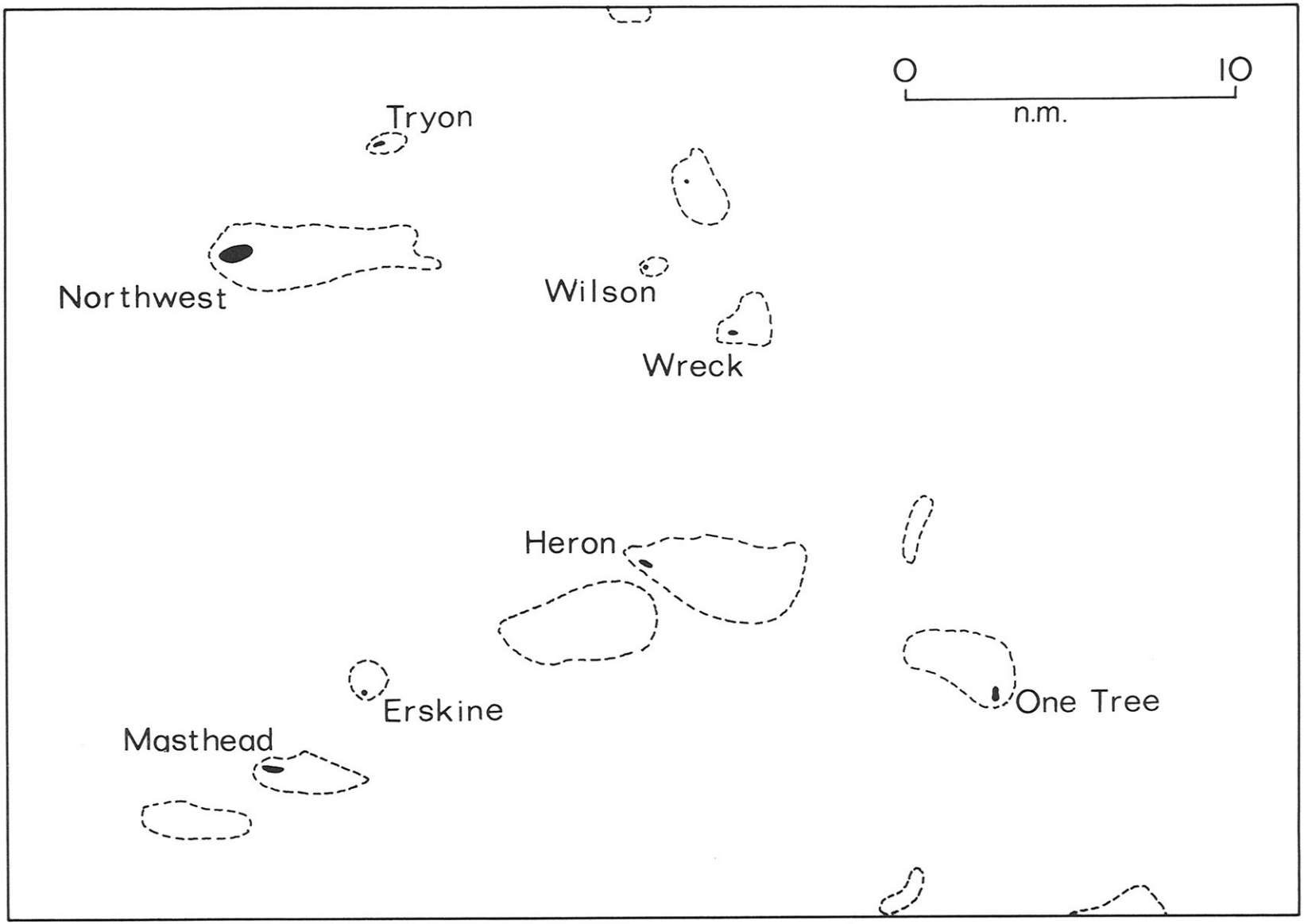

Fig. 1. Capricorn Group

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by S. B. Domm

INTRODUCTION

The islands and reefs comprising the Capricorn Group (Fig. 1) lie between 30 and 50 miles out from the port of Gladstone on the coast of Queensland, Australia. This area is near the southern end of the Great Barrier Reef (better called Reefs) of Australia and consists of nine coral cays or islands, two of which are inhabited (Heron Island and the lighthouse at North Reef). There are also four reefs having no vegetated cays on them, however these may contain sand or coarse rubble banks that are usually awash at high tide. Broomfield Reef has a small sand bank on its lee which appears to be growing in size and even at high tide rises about a foot above the water. [An early and very interesting, though incomplete, description may be found in the first chapter of Jukes 1847—Eds.].

Heron Island is one of the larger islands of the Capricorn Group and because a tourist resort and a biological research station (operated by the Great Barrier Reef Committee) are located on it, it is the site of considerable activity. For the past two and a half years the author has worked at the Heron Island Research Station and every opportunity has been taken to visit the other islands in this region.

Now is a good time for a general survey of this group of islands to be made, each year more people visit them as the romance of visiting or living on a coral island is ever alive. It is important to know what effect man is having on these islands in order to intelligently conserve and maintain them in their natural state. They belong to the future as well as to the present.

The nine islands of the Capricorn Group all lie in an area about 30 miles square with Heron Island approximately in the center. All of the islands are situated on reefs which rise from a submarine platform. Nowhere in this area does the depth of water exceed about 35 fathoms and around most of the islands it is much shallower. The platform extends to about 18 miles east of Heron Island where the 100-fathom contour can be taken as the seaward margin.

Since Heron Island is the focal point for all activity in this region, distances and direction will be taken from it. All of the islands of the Capricorn Group are of the type termed "cays" in that they were formed from wave transported material which has now become

stabilized by vegetation and beachrock. In discussing the different islands I am only concerning myself with the major trees, however the flora includes also many species of herbs, shrubs and grasses (see references). The major trees are:

Tournefortia argentea
Scaevola taccada
Casuarina equisetifolia
Pisonia grandis
Pandanus tectorius

On all of the larger sand islands these trees are characteristically found growing in zones. On the smaller islands these zones become less apparent due to the effect of the wind and probably moisture [and salinity ? Ed.]. Figure 2 is a diagrammatic sketch of a typical island of the larger type showing the usual zones of dominant trees.

All of the sand islands of the Capricorn Group are used extensively by the Green Turtle (*Chelonia mydas*) and the Loggerhead Turtle (*Caretta caretta*) to lay their eggs. The nesting turtles often do much damage to the marginal vegetation by digging up the area.

The Capricorn Group and the adjacent but more southerly Bunker Group together form a distinct province with many similar features, but most important of all is that they are the southern terminus of a vast complex of reefs and islands extending for over a 1,000 miles--the Great Barrier Reef of Australia.

BIRDS OF THE CAPRICORN GROUP

Wedge-tailed Shearwater or Mutton Bird (*Puffinus pacificus*)
Reef Heron (*Egretta sacra*)
Silver Gull (*Larus novaehollandiae*)
Brown or Common Noddy (*Anous stolidus*)
Black or White-capped, Noddy (*Anous minutus*)
Crested Tern (*Sterna bergii*)
Lesser Crested Tern (*Sterna bengalensis*)
Black-Naped Tern (*Sterna sumatrana*)
Bridled Tern (*Sterna anaethetus*)
Roseate Tern (*Sterna dougallii*)
Fairy Tern (*Sterna nereis*)
Black Oystercatcher (*Haematopus fuliginosus*)
Pied Oystercatcher (*Haematopus ostralegus*)
Little Pied Cormorant (*Phalacrocorax melanoleucos*)
Bar-Tailed Godwit (*Limosa lapponica*)
Eastern Curlew (*Numenius madagascariensis*)
Lesser Knot (*Calidris canutus*)
Turnstone (*Arenaria interpres*)
Mongolian Plover (*Charadrius mongolus*)

Golden Plover (Pluvialis dominica)
White-Breasted Sea Eagle (Haliaetus leucogaster)
Brown Booby, or Gannet (Sula leucogaster)
Lesser Frigate Bird (Fregata ariel)
White-eye, or Silver-eye (Zosterops lateralis)
Sacred Kingfisher (Halcyon sancta)
Banded Rail (Rallus philippensis)
Bar-Shouldered Dove (Geopelia humeralis)

This list is not comprehensive since various species of migratory waders and others may pass through this area unnoticed by the author. Furthermore, birds are occasionally seen from the mainland but these seldom if ever remain in permanent residence on the island (Northwest Island may be an exception).

DESCRIPTION OF CAYS

Northwest Island

Northwest Island (Fig. 3, Plates 1-2) is the largest of the Capricorn Group and is located about 18 miles to the northwest of Heron Island. It is composed of sand and situated on the western end of a long reef which has no lagoon; the island is aligned approximately southwest by northeast. The major trees are found in the zones characteristic of this region with Tournefortia and Scaevola plus Casuarina and scattered Pandanus growing along the perimeter and enclosing a very extensive forest of Pisonia. There is a grove of Casuarina on the western end of the island.

The only exposure of beachrock is on the northeast corner and here much of the sand is being washed away from behind the beachrock. For so large an island there is very little beachrock.

On the southwest corner active erosion is taking place and here one finds many uprooted trees (mostly Casuarina) and some cliffing of the beach margin. There is evidence of erosion on other parts of the island.

Northwest supports a very large population of White-capped (Black) Noddies, and Mutton Birds (Shearwaters) and many different types of waders can be found here. Also of interest is that this island is often the home of various types of mainland birds, the more obvious being: Currawong, Peewee, White-Faced Heron and Cuckoo-Shrike.

Introduced chickens appear to be increasing in number and there are at least several cats on the island. Because it is a large island on a long reef, Northwest provides a very good lee in southeasterly weather, also, since it possesses two sheds whose roof drainage provides at least some fresh water it is popular with visitors and is more often inhabited than the other islands.

Masthead Island

Masthead Island (Fig. 4, Plates 3-8) is the second largest uninhabited island of the Capricorn Group, about 12 miles southwest of Heron Island. It is somewhat protected by the presence of Pomaise Reef on the southwest and the much smaller Erskine Island and Reef 3 miles to the northeast. Masthead is a long rather narrow island aligned approximately east-west and is situated on the western end of a long narrow reef which has no lagoon.

Masthead is covered by a dense vegetation the major trees of which are zoned in the characteristic manner of this region. The interior contains a mature forest of Pisonia while the perimeter is colonized by the usual Tournefortia and Scaevola with scattered Pandanus. Casuarina are found in well-developed groves on the ends of the island and about halfway along the northern side. This last extensive grove is remarkable for the straight line of its trees and may have once continued further but has been eroded back as the whole island appears to have shifted its western end to the south; further evidence of this is found in several isolated outcrops of old beachrock now found a distance from the beach.

Beachrock is well developed along the southeast (windward) corner where also some erosion appears to be taking place. The lee of this island seems to be building up as low dunes are being colonized by grasses.

An interesting feature of Masthead is the presence of a type of cactus or prickly-pear which appears to be gradually gaining a foothold on the island and probably originated from seedlings or plants washed ashore. If such a plant as this continues to spread it could drastically upset the ecology of the island.

The usual sea birds frequent this island and I have seen hundreds of White-Capped Noddies and Mutton Birds, nesting Silver Gulls, Bridled Terns and Crested Terns.

The western Casuarina grove is a favored spot with campers.

Tryon Island

Tryon Island (Fig. 5, Plate 9) is located about 15 miles to the northwest of Heron Island and about 5 miles from Northwest Island. It is rather small, fairly narrow and aligned about 65 degrees. Tryon is composed entirely of sand and is rather flat with a slight ridge along the western side.

It is covered by a dense vegetation in which the major trees assume the zones found on most of the other islands. The central Pisonia forest is surrounded by a zone of Tournefortia and Scaevola with

scattered Pandanus and Casuarina. On the western tip there is a grove of Casuarina. There is a very large fig tree on this island, also a small palm. Otherwise the vegetation, as on most of the other islands, includes a few minor trees and bushes, with some grass.

There are several outcrops of beachrock, with one extensive development with a strike running out from the angle of the existing beach. These beachrock "spurs" are always good evidence that the margins of the island have migrated away, the sand being washed from here to be deposited elsewhere. On Tryon Island there is an outcrop of what I take to be fossil beachrock high up on the beach in the vegetation. If this rock is in situ, it represents beachrock that was formed when sea-level was slightly higher than at present, since beachrock at present only seems to form at the intertidal zone of the beach.

There appears to be little present erosion taking place on Tryon Island and this may be due to its relatively protected position. Northwest Reef and the sand train which continues almost to Wilson Island would certainly influence the force of the seas reaching Tryon Island during southeasterly weather.

The effect of visitors on this island doesn't appear to be very extensive, although campers on the nearby Northwest Island may frequently come across.

Wreck Island

Wreck Island (Fig. 6, Plates 10-11) lies about 8 miles NNE of Heron Island and is a small narrow island aligned approximately 240 degrees magnetic. Wreck Island was the site of a bore put down to explore the strata underlying these reefs in 1950. It is composed entirely of sand and there is well developed beachrock along the southern (windward) side extending for about half the length of the island; much of this beachrock is now being eroded away.

The surface of the island is rather uneven in that along most of the southern margin (central area) there is a high ridge (about 20 feet above the beach). This ridge forms a kind of "backbone" to the whole island and is covered by vegetation, indeed it is in the lee of this ridge that one finds the small but well developed Pisonia forest which provides a delightful camping spot. On a small island like this some sort of protection from the prevailing southeast winds and occasional storms is necessary if the rather fragile Pisonia trees are to attain anything approaching their mature height. The ridge itself is densely covered by bushes and especially along the margin facing the beach is found the zone of Tournefortia and Scaevola trees. On the ends of the island there are small groves of Casuarina, that on the northeast tip being especially well developed. Pandanus are found scattered about the entire surface of the island.

On the northwest side (lee) of the island there is a cleared area across the reef flat leading out from about the middle of the island to the reef margin. This was probably cleared during the time when the bore was sunk and provides an easy approach to the island in southeasterly weather when the depth of water is uncertain.

Some erosion is taking place along the margins of this island and the sand bars extending from its ends are constantly shifting.

Due to an unfortunate infestation by rats I expected the bird population to be adversly affected. However most of the birds characteristic of this area can be seen here at one time or another and the island seems to support quite a large Silver Gull population. An interesting point is that few White-Capped Noddies nest on Wreck Island while on Heron Island only a short distance away they nest in thousands. Wreck Island appears to be the favored nesting site for the Loggerhead turtle.

Unfortunately the effect of visitors has been such that much of the island's pristine character is now gone. There is an abundance of rusting tins of various types (including an old water tank) scattered about, and trees are being cut down in the camping area.

Wilson Island

Wilson Island (Fig. 7, Plates 12-15) is about 9 miles north of Heron Island and 3 miles from Wreck Island, and is located on the western side of a very small reef. Wilson Island has several interesting features; it is made up of a mixture of sand and coarse rubble, and it is a relatively large island in comparison to its reef, which indicates that the size of the reef is not a completely limiting factor in determining the size of a cay.

The distribution of the major trees is rather different on Wilson Island than on the other sandy islands. The dominant trees are Pandanus which forms an extensive grove along the eastern side and Casuarina which is abundant along the northwest and southwest sides. A cyclone several years ago did much damage to the Pandanus and now many are uprooted or have their tops blown off and are dead, presenting a rather bleak appearance. Wilson is rather open in that the vegetation for the greater part is scattered and there is no Pisonia forest, instead the Pisonia occur as scattered trees. Tournefortia and Scaevola are also present.

Very well developed beachrock encircles half of the island from the southeast to the northwest, i.e. on the windward side. Much of this beachrock has been broken up by wave action and lies high on the beach in great slabs. Wilson Reef is not large enough to protect the cay from the force of storm waves during a high tide, although some protection is gained from Wreck Reef and also the nearby Bloomfield Reef (2 miles to the northeast).

Wilson Island is very easy to approach as the cay is almost adjacent to the lowest part of the reef and even during low water there is sufficient depth over the reef for a small boat to be brought in to the beach. This makes Wilson a popular island for guests from the Heron Island Hotel to visit and therefore it must be the most frequented of the uninhabited islands of the Capricorn Group. Evidence of these visits can be found in the crude tables and small rubbish tip which detract from its beauty. It does not appear to support a very large bird population.

One Tree Island

One Tree Island (Fig. 8, Plates 16-20) is about 12 miles east-southeast from Heron Island and is the most exposed of the islands of the Capricorn Group. It has many unique features: it is the only island that is found on the eastern end of its reef, all the rest are found on the western end (lee); another unique feature (for the Capricorn Group) is that One Tree is constructed of coral rubble, there is practically no sand on it. The reef of One Tree appears to be slightly higher than that of others in the group and also contains a deep and well developed lagoon. Towards the center of the island there is a small pond of brackish water.

The zonation of dominant trees found on most of the other islands is absent from One Tree. Here the trees consist of scattered Tournefortia and Scaevola, either as single trees or in small clumps, found along the perimeter. There are also several small groves of rather wind-blown Pisonia and some well developed Pandanus. Between these scattered groves there is a thick vegetation of low bushes.

The shape of One Tree is a manifestation of the forces acting upon it; it is rounded towards the southeast and the lee is drawn out into two "horns" pointing down wind. Along the perimeter of One Tree are very high ridges of rubble formed by storm waves, and indeed the island seems to consist of a series of ridges. The coralline rubble is of a very coarse nature and consists of fragments of coral and reef rock.

One Tree appears to support a rich and varied bird fauna and especially the open area next to the pond is, during the nesting season for the Terns (spring), the scene of much activity. Crested, Lesser Crested, Roseate and Black-Naped Terns all vie with each other for nesting sites around the pond while Bridled Terns rear their young among the rubble along the margin of the island just above the high tide mark.

One Tree Island has in the past few years been the location for considerable scientific work and various studies are currently being carried out there, yet I am always impressed by the lack of evidence of these visits. There is a kind of lonely beauty about this rugged, rather desolate island that is different from all the other islands of the Capricorn Group.

Erskine Island

Erskine Island (Fig. 9, Plates 21-24) is the smallest of the Capricorn Group and is located about 7.5 miles southwest of Heron on the northwest side of a small reef. Erskine is composed entirely of sand and appears rather high for its small size. It may receive some protection from the nearby Wistari and Masthead reefs but this is doubtful since the southeast is unobstructed and the only effect of these two reefs may be to channel the tidal stream in such a way that it flows past Erskine at an increased rate.

The pattern of vegetation (major trees) is more simple here than on most of the other sand islands because Erskine is so small that it is not sufficiently protected from the wind to enable a central Pisonia forest to grow. Here one finds a well developed fringe vegetation of Tournefortia and Scaevola with many trees in the center of the island. On the lee side (north) of the island there is a small grove of very stunted and wind-pruned Pisonia seldom exceeding 10 feet in height. There are no Pandanus or Casuarina trees on Erskine.

Beachrock appears to have been very well developed in the past on the northern side (lee) but now it lies piled up in great slabs high on the beach. On so small a reef the island is rather vulnerable and subject to intense wave action during a strong wind with a high spring tide, yet very little active erosion appears to be taking place on Erskine.

Few White-Capped Noddies or Mutton Birds use this island for nesting nor does it appear to be used as extensively by nesting turtles as the other sand islands.

DISCUSSION

From the above "Descriptions" it can be seen that the islands of the Capricorn Group, with the exception of One Tree, are all very similar: in their composition (sand), in their location of the reef (lee) and for the larger ones in the zonation of their major trees. Even though in reality they are nothing more than permanent vegetated sand banks they are, under the present set of conditions, stable features, stable in that they exist in a state of equilibrium with the forces acting on them. Wind-driven waves during a spring high tide will very often cause erosion on the windward side; the sand that is removed may be lost to the island or merely transported to the lee sandspit found on many of the islands. Exposed roots, dead and uprooted trees, and cliffed beach margins attest to the fact that the foregoing conditions are not infrequent. The margins of most islands tend to shift position, being constantly molded by the prevailing weather conditions. It is possible for a whole island to slowly migrate to a slightly different position on its reef and proof of this can sometimes

be found in isolated outcrops of beachrock. These outcrops have a strike that is quite different from the line of the existing beach, all of the sand having been washed away from behind the line of rock which extends out onto the reef flat at an angle to the beach. During high tides erosion begins to remove the rocks and sometimes all one can see are scattered remnants of a once continuous stratum.

All of the islands are very low, seldom higher than about 10 or 15 feet above the high tide level, yet covered by a dense vegetation and reinforced by partial development of beachrock, they are able to withstand any type of storm. However the most important factor contributing to the stability of these islands are the breakwater effect of the surrounding reef and the rather protected position of some of these reefs themselves (relative to adjacent reefs). The prevailing wind is the southeast trade (April to October) and for days this wind can blow at from 15 to 20 knots. As most of the islands are situated on the lee of their reefs there is a relatively large expanse of reef in front of the island which has the effect of attenuating the force of the waves reaching it. The higher part of any high tide (i.e. part effective in island erosion) only lasts for about 2 hours before and 2 hours after the time of high tide (this being followed by the low tide 6 hours later), the actual time during which waves attack an island is not very great. However, during a cyclonic storm a wind from the northwest combined with a high tide could do extensive damage to an island as there would be much less reef to protect it. All of the cays of the Capricorn Group are located on a shallow submarine platform, therefore a strong oceanic swell is seldom experienced. Less obvious but probably important is the effect the tidal stream has on reducing the force of the sea adjacent to a reef. Here the tidal stream reverses its direction with the change of tide and can flow at rates exceeding 2 1/2 knots (Australian Pilot Vol. IV, 1962), however I believe that during mid-tide at the time of spring the velocity of the tidal stream can be even greater and could act as a buffer to reduce the impact of waves coming across the reef towards an island.

Various surveys of the islands of the Great Barrier have been carried out in the past (e.g. Spender, 1930, Steers, 1937) during which some or all of the islands of the Capricorn Group were visited briefly. From this work evolved several classifications of islands and their reefs, but the first realistic classification was presented in 1950 (Fairbridge, 1950). Using it the two categories relevant to the Capricorn Group are as follows:

Type 2. Vegetated Sand Cay. Moderately stabilized, generally with beach rock. In this group I would include all the sand islands of the Capricorn Group.

Type 3. Shingle Cay, with or without vegetation. Moderately stabilized and widely distributed, generally found on smaller more exposed reefs. In this category I would put One Tree Island.

All of the cays of the Capricorn Group are composed of material derived from the reef upon which they have formed. This material is either in the form of sand or else coarse fragments of reef rock (shingle or rubble), coral skeletons, mollusk shells, etc. All or most of the above has an organic origin; the sand is made up of small fragments of reef rock, tests of foraminifera, Halimeda fragments, and small particles of coral skeletons, etc. Reef rock is a conglomerate of the larger fragments derived from the reef cemented together with a calcareous cement produced by the fusing of small sand or silt-sized particles. Wind driven waves and to a lesser extent, tidal streams are responsible for the transportation and deposition of the material. Once the deposit is above the level of the highest tides the wind is important in forming and shaping it.

The genesis of the sand islands can be explained by the operation of two factors:

(1) The mass transportation of sand across the reef flat from the windward areas towards the lee by wind-driven waves moving across the reef flat during high tide and to a lesser extent by the tidal stream. During low tide sand is transported by drainage currents as well as by wind-driven wave action. Most reefs are slightly lower at their western ends (lee) and since the highest part of the whole reef is generally the outer rim or margin (reef crest) when the level of a dropping tide falls below this rim all of the water contained within the reef flat will drain towards the lee. The sand transported to the leeward part of a reef would be deposited here when the current looses some of its velocity as it meets an obstruction or enters the shallow water of the lee reef flat. Once a sand bank is formed the process of depositing sand continues until equilibrium is reached and erosion begins to have a negative effect. During low tide there is some drainage out along the sides of a reef and on the windward areas, association with the so-called "groove and buttress system" often found here (Fig. 10).

(2) The second factor in the genesis of the sand cays is the effect of cross-swell depositing sand on the lee of the reef. The southeast swell upon encountering a reef is refracted around the reef, the waves approaching more or less normal to the margin. The resulting turbulence will cause sand to be deposited in a very localized area on the lee of the reef. The above only takes place during high tide and periods of heavy swell (Fig. 10).

The cays consisting of coarse coralline shingle or rubble have a different mode of origin. One Tree is the only island of this type in the Capricorn Group, although Wilson has much coarse material in its composition and several reefs have rubble banks that are exposed during half tide on their windward sides, e.g. Heron and the nearby Wistari. Shingle cays are formed by the action of waves accumulating material and washing it up on the reef into ridges or banks. An examination of One Tree Island discloses a series of concentric ridges more or less

parallel to the margin and extending well into the island. It was formed as successive ridges of rubble accumulated, each tending to fuse with the next until a structure of some size evolved, able to support vegetation. These accumulations of rubble always tend to form towards the windward sides of a reef because here the wave action is the strongest, and this is necessary in order to move this type of material. Such highly irregular fragments interlock, giving the cay some resistance to erosion.

The question arises as to where the rubble, and to a lesser extent sand, comes from. On One Tree and the various rubble banks situated on the windward sides of their reefs the area producing rubble or shingle is very restricted as it must be to windward of the island. The normal life and death processes of the animals and plants living on the windward of such a reef as One Tree could not account for the enormous amount of coarse coralline rubble found there. This is especially true of reefs as far south as those of the Capricorn Group.

I believe that the material made available to form the cays, especially the coarse rubble or shingle, was produced by wave action in the past, when a drop in the level of the sea left the reef standing higher out of the water. Immediately the sea would begin to erode the reefs down to about their present height and in so doing would produce large quantities of debris. Most scientists concerned with the problem of sea level changes agree that there have been some marked changes in the past, at times the sea being higher than at present and at other times lower. However there is no agreement as to the exact height at any given time, but it is generally accepted that the last change was a drop of at least several feet, probably more. All of the reefs are now effectively planed down, and although some irregularities probably exist, most are stabilized at their present level and are covered by a veneer of living coral and other reef-dwelling organisms. The gradual destruction and depth of these organisms, to be replaced by others, would furnish sufficient material to maintain the existing islands in a state of equilibrium, just balancing the loss due to erosion.

HUMAN INTERFERENCE

At the present time human interference with most of the uninhabited cays of the Capricorn Group is not extensive. This is probably due to the number of visitors being relatively low, but alas the quality of many of these visitors is also very low. Whether persons going to these islands do so in their boats (these would be the lesser number) or via a charter boat, they for the greater part seem intent on enjoying themselves to the utmost, and regrettably, to give little thought to preserving the pristine character of the island on which they find themselves. As the islands become more accessible the increasing number of visitors, unless controlled, will eventually destroy these areas of great natural beauty. Some of the cays are state parks, but all are worthy of preservation.

The disappointment must be intense to one who, after much planning and dreaming of a vacation on a coral island, finally lands upon a beach and sees first an open rubbish tip, numerous empty beer bottles and some hideous tables and chairs made of beach flotsam. This same person is very likely to leave the island just as he found it! The effect is cumulative!

Northwest Island was many years ago the site of a cannery and evidence still remains of this activity in the form of an old shed and a few relics of boilers and machinery. There is a very small one-room cabin of more recent construction. The scattered heaps of rubbish and tins attest to the fact that Northwest Island is visited rather frequently. As it is the largest of the group, the actual area interfered with is very small, and old boilers, sheds, etc. are in an area about 200 feet square. There are cats and chickens but their effect on the natural flora and fauna is probably not significant on so large an island.

Masthead Island is also quite large and is visited frequently, but probably less so than Northwest and there is no fresh water and no sheds. The main camping area of Masthead is in a delightful grove of Casuarina on the western end of the lee side. Here the effect of man is much less than at Northwest and some crude furniture and perhaps a small rubbish heap are the only evidence of campers. There are no introduced animals but at least several clumps of a kind of cactus of prickly pear which may be spreading slowly.

Tryon Island, with Masthead Island, is probably the least affected of the larger islands of this group. Tryon is very similar to Masthead in that again the camping area is on the western end among Casuarina trees and the only sign of visitors is a crude table with some scattered tins and bottles.

Wreck Island has suffered the most from human interference. In 1950 an exploratory bore was put down, there were many men and some machinery on the island at this time. Later on, it was surveyed, possibly for a proposed airstrip, and much vegetation was cut down. During the summer of 1968 a party of campers lived on Wreck for about a week and when they left there was a large open garbage pit, many rusting tins, several ugly bits of furniture and a latrine had been constructed in the center of the most lovely grove of Pisonia. The pristine character of this island has been all but destroyed and may never return again. Rats introduced probably at the time of the bore are a nuisance and will certainly prey on young sea birds when available.

Wilson Island was once very lovely with its extensive grove of Pandanus. Now the Pandanus are drastically reduced due, so I understand, to a fire followed by a cyclonic storm. The fire would almost certainly have been set by visitors. Now this cay is visited regularly by an excursion from the hotel on Heron Island and this has its effect in a permanent rubbish tip and some crude tables.

One Tree Island shows the least human interference and yet has been visited by many persons, a high percentage of which would be scientists. There is almost a total absence of old tins, beer bottles, and the usual rubbish tips.

Erskine is very small but unfortunately the abundant evidence of visitors is here in the form of litter. Old tins, bottles and crates may be found scattered about.

In the absence of any form of control it is important that any person likely to visit these islands be informed that they are not to be misused: this should be presented in an unmistakable manner. It all depends on educating the individual to respect and treat with consideration areas of natural beauty which belong to all.

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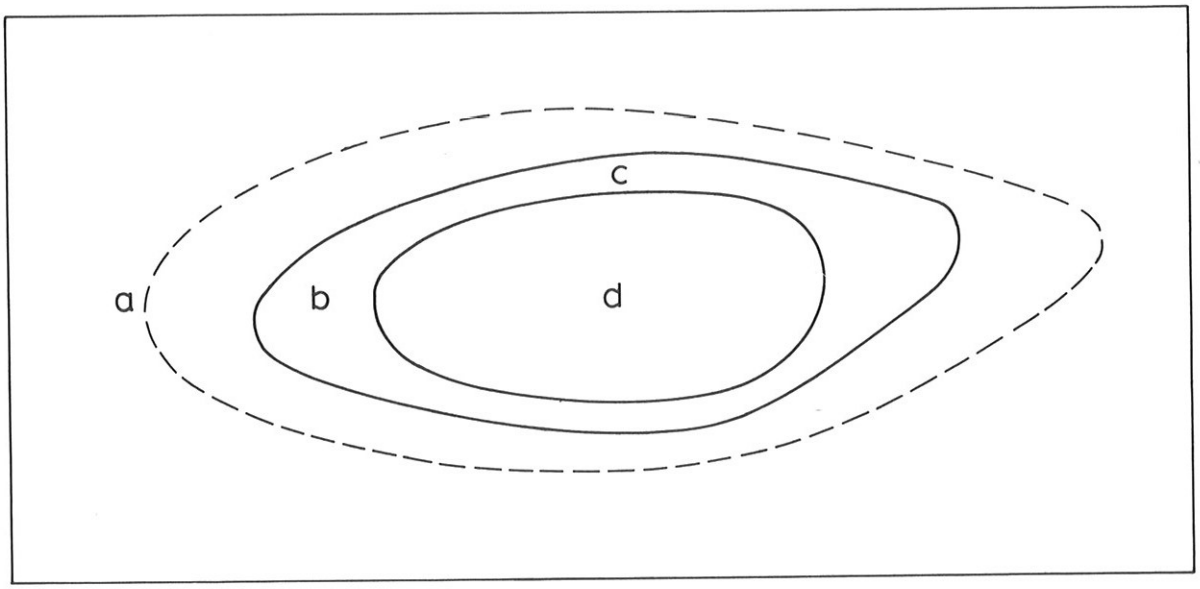
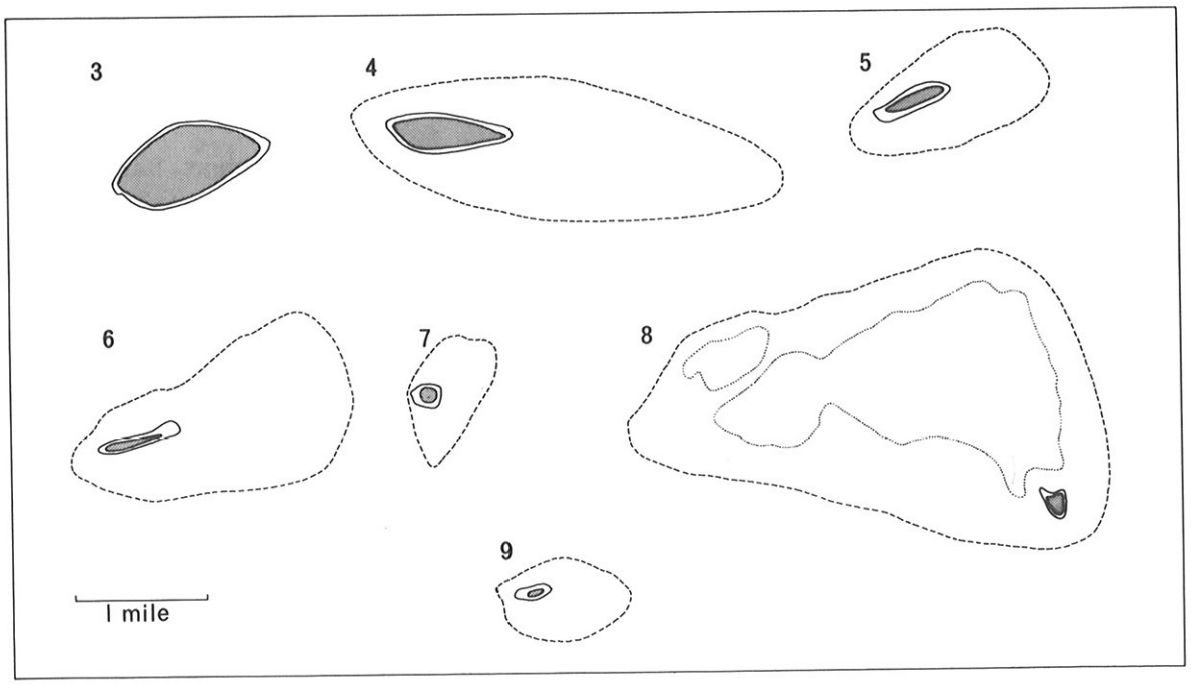


Fig. 2. Typical sand cay showing vegetation zonation

a. Beach margin; b. Casuarina grove often found on ends of island; c. outer zone of Tournefortia, Scaevola and Casuarina; d. inner zone of Pisonia.



Figs. 3-9: 3. Northwest Island. 4. Masthead Island. 5. Tryon Island. 6. Wreck Island. 7. Wilson Island. 8. One Tree Island. 9. Erskine Island.

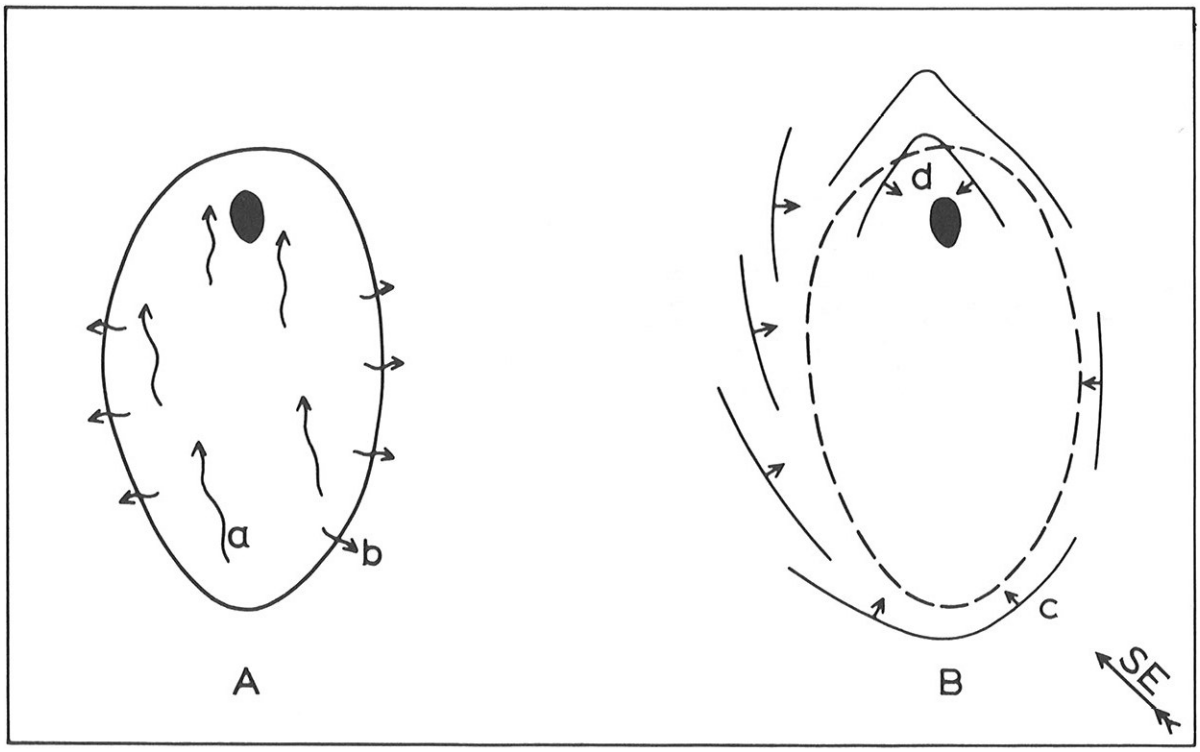


Fig. 10. Typical reef illustrating factors effective in genesis of a sand island.

A. Reef at low tide
   a. general current from windward to leeward;
   b. lateral drainage across reef crest

B. Reef at high tide
   c. wave fronts advancing on reef and being refracted around margins; d. cross swell on lee of reef due to refraction of waves.

Plate 1. View along beach, lee side, Northwest Island.

Plate 2. Old cannery building on Northwest I.

Plate 3. Results of erosion, south side, Masthead I.

Plate 4. Straight line of Casuarina on dunes, north side, Masthead I.

Plate 5. Casuarina grove, west end, Masthead I.

Plate 6. Spreading prickly pear, south side, Masthead I.

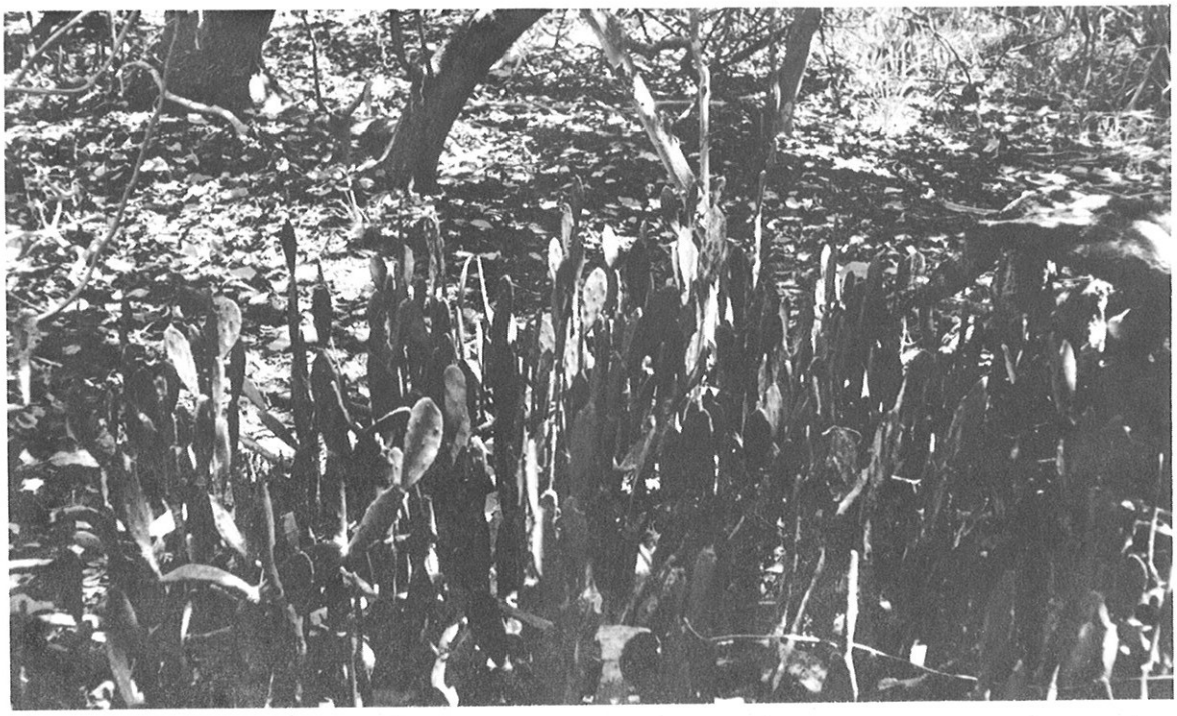


Plate 7. Well developed Pisonia forest, interior of Masthead I.

Plate 8. Casuarina grove, east end, Masthead I.

Plate 9. East end of Tryon I.

Plate 10. Latrine in center of camping area, in Pisonia forest, Wreck

Plate 11. Debris left by visitors, Wreck I.

Plate 12. Traces of weekly visits of tourists from Heron I. on Wilson I.

Plate 13. Traces of weekly visits of tourists from Heron I. on Wilson I.

Plate 14. Beachrock on windward side of Wilson I.

Plate 15. Devastated Pandanus on Wilson I.

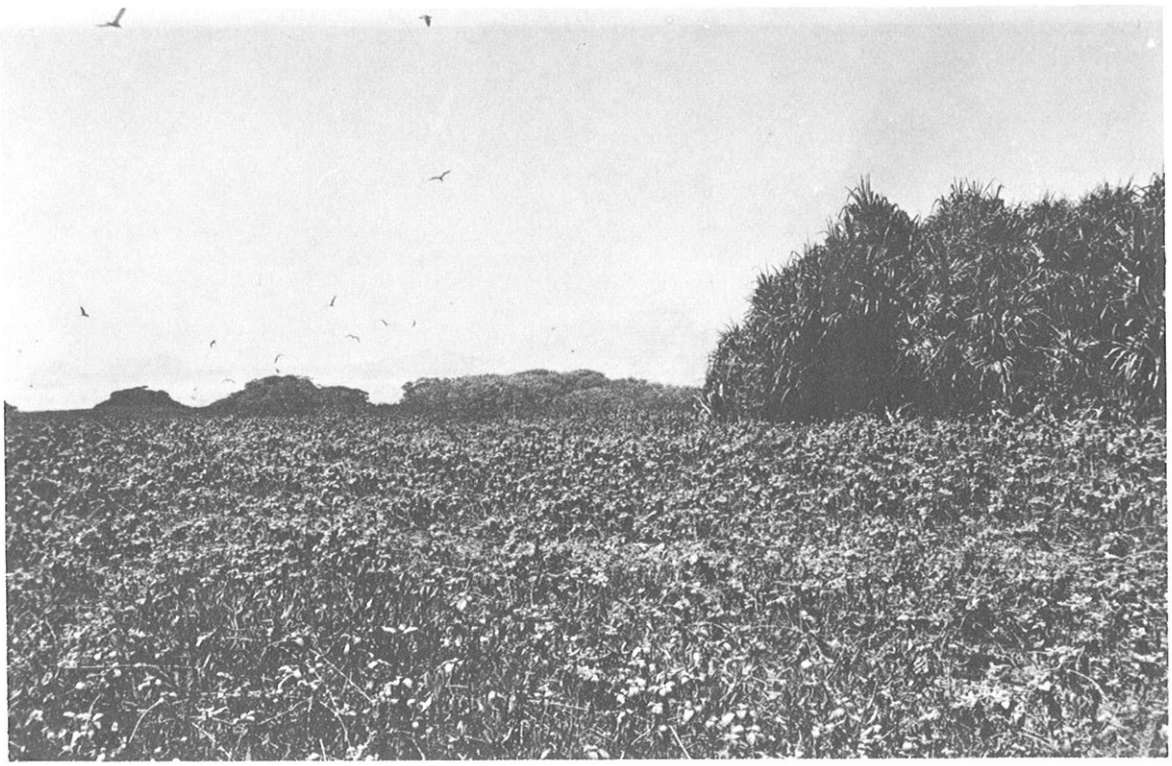


Plate 16. Low vegetation and Pandanus grove, One Tree I.

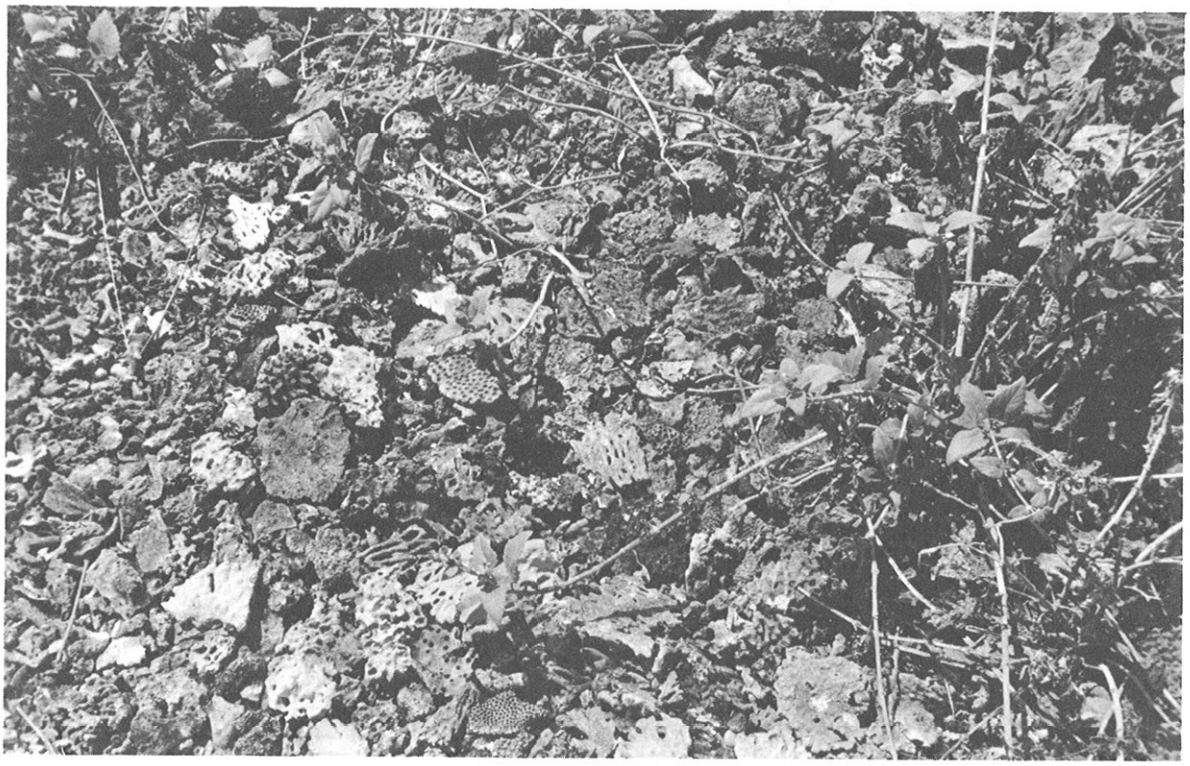


Plate 17. Coral rubble from which One Tree I. was formed.

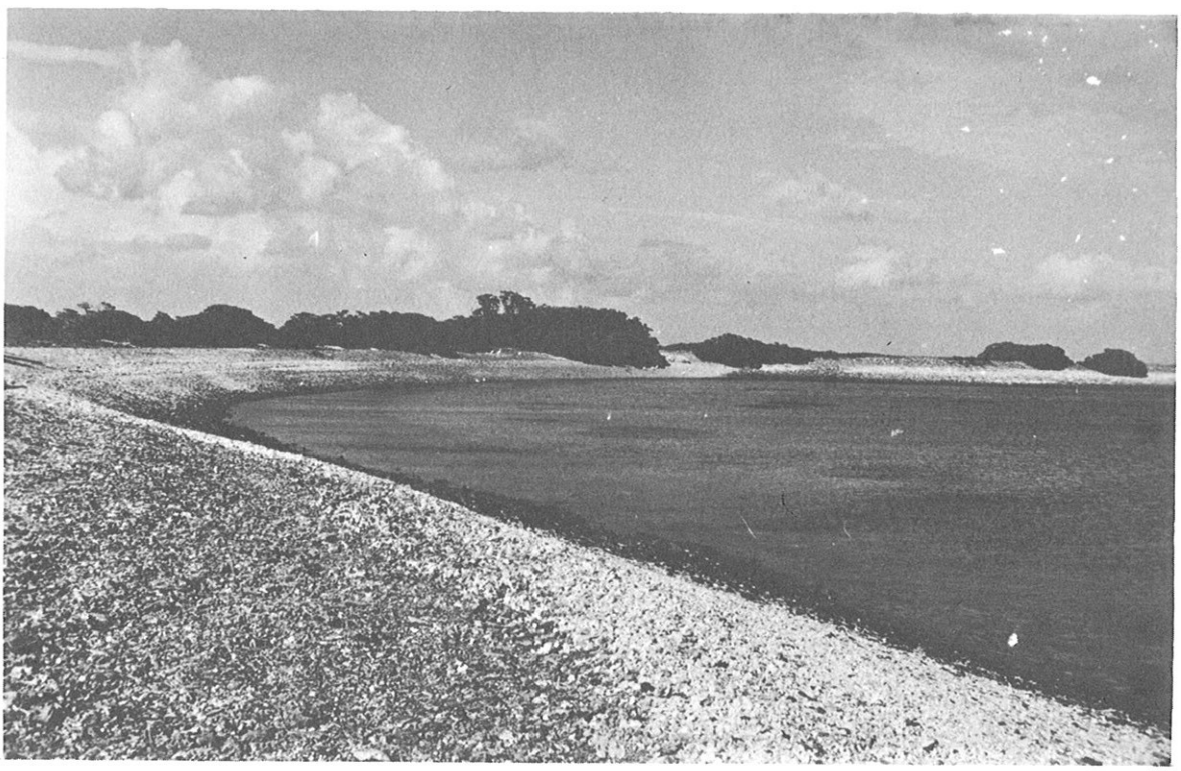


Plate 18. North-facing embayment, One Tree I.

Plate 19. Brackish pond in center of One Tree I.

Plate 20. Sea eagle's nest, possibly that recorded by Jukes in 1840, One Tree I.

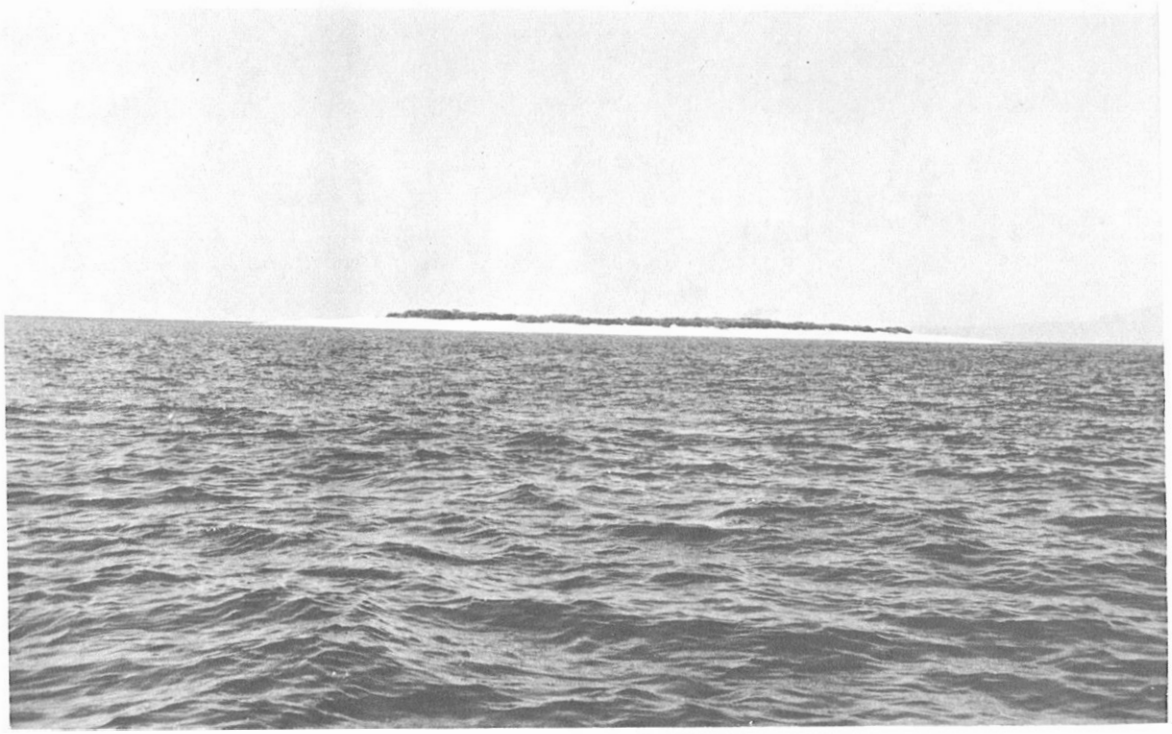


Plate 21. Erskine I., from 1 mile off.

Plate 22. Piled up slabs of beachrock, north side, Erskine I.

Plate 23. Tournefortia and Scaevola above slightly cliffed beach margin, Erskine I.

Plate 24. Erskine I. viewed across rubbly reef flat.