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VEGETATION OF HENDERSON ISLAND

BY

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ABSTRACT

On the basis of field surveys from the north and north-west beaches, the vegetation of Henderson Island can be classified into 11 vegetation communities: 2 in littoral environments with sandy substrates, 4 on rocky coasts and 5 associated with the limestone plateau. Apart from the cutting of 'miro' wood by Pitcairn islanders, the communities are remarkably undisturbed, with only 5 adventive species recorded. Whereas the littoral communities are clearly differentiated into well-defined zones from shore to plateau, the island interior limestone forests (canopy 5-8m, with an understorey of herbs and shrubs) show many combinations of species, resulting in a complex mosaic of forest types. 9 species or varieties are presently recognised as endemic to Henderson and all are primarily plants of the island's interior.

INTRODUCTION

The study of the vegetation communities of Henderson Island is of both great interest and importance. Henderson's vegetation is of interest in a regional context, first, biogeographically, because of the island's remoteness in the south-east Pacific Ocean (Fosberg 1984) and secondly, because its floristic composition reflects a relatively rare stage in the continuum of vegetation types, controlled by increasing elevation above sea level, from the *motus* of sea-level atolls to the 'high' islands of Polynesia constructed from both volcanic rocks and limestones (Sachet 1985). In addition, Henderson's vegetation is of great significance to the wider debate on the structure and function of island ecosystems both past and present. As a result of the island's isolation, unsuitability for sustained human habitation and lack of economic phosphate deposits, the vegetation of Henderson Island has survived Polynesian and successive Western impacts (with only 5 introduced plant species) and provides an almost unique glimpse of the natural vegetation cover of a former atoll and lagoon well-raised above present sea level (for classification of different emergent reef surfaces see Figure 1; Fosberg 1985a). Furthermore, the continued removal of the natural vegetation communities of fragile tropical island ecosystems makes the field study of locations such as Henderson doubly important (Fosberg et al. 1983, Fosberg 1985b).

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Uplifted islands are also important because they offer a rare analogue for what Pacific atolls may have been like during the low sea stands that characterised much of the Pleistocene. As tectonic uplift took place in the relatively recent past (< 1.0 my ago, Spencer and Paulay, this volume) at Henderson, the island is especially appropriate as a model for atoll environments during low sea stands (mean duration of Pleistocene low sea levels ~ 100 kyr; Shackleton and Opdyke 1976). Thus, for example, soil development on Henderson has been poor by comparison with other uplifted islands such as Niue, S.W.Pacific (Wright and van Westerndorp 1965) or the makatea islands of the Southern Cook Islands (Wood and Hay 1970). Meagre soil development has likely been the result of both the recency of uplift and the lack of source minerals other than those available in limestone and humus. By contrast, fluvial inputs from the central volcanic highlands on Mangaia, S.Cook Islands (Wood and Hay 1970) and atmospherically-sourced volcanic particles (likely to be ash; Fieldes et al. 1960, Wright and van Westerndorp 1965) on Niue have contributed considerably to pedogenesis on these islands. Henderson's lack of soil accumulation and the coarse coral rubble (see Spencer and Paulay, this volume) which covers most of the island, probably explain the low stature of the vegetation, which rarely exceeds 10m in height. This contrasts with much taller mature forests on other uplifted islands: thus, for example, the canopy of the primary forest of Niue is 20-30m high (Sykes 1970, pers. obs. G.P.).

In this paper we consider aspects of vegetation (i) structure; (ii) function and adaptation; (iii) physiognomy; and (iv) floristic composition and ecological interactions. As such, it complements the published checklists of the island's flora (St John and Philipson 1962, Fosberg et al. 1983, this volume).

CLASSIFICATION OF VEGETATION COMMUNITIES

Vegetation units on Henderson Island can be broadly equated with topographic units and/or sedimentary environments. The following classification is proposed.

A. LITTORAL VEGETATION

(a) Sandy substrates

1. Strand pioneer vegetation and seaward beachridge slope community
2. Beachridge crest and back-barrier swale community

(b) Rocky substrates

3. Limestone platform community
4. 'Miro' woodland community
5. Limestone buttress and cliff face community
6. Fern slopes community

B. LIMESTONE PLATEAU MARGIN AND ISLAND INTERIOR VEGETATION

7. Cliff top and plateau margin community
8. Pinnacled-pitted limestone community
9. Timonius scrub community
10. Limestone glade woodland community
11. Lagoonal patch reef community

It should be stressed, however, that this classification is empirical and strictly only applies to those areas of the island, primarily the north and north-west coasts, visited by the 1987 expedition (for locations; see Spencer and Paulay, this volume). It is interesting to note that 3 species (*Asplenium lobulatum*, *Fimbristylis cymosa* and *Lycium carolinense* var. *sandwichense*) only collected on one occasion, by D R Tait in 1912, are indicated by St John and Philipson (1972) as being restricted to the South Point region. Whilst coral ledges and a reef flat dissipate wave attack on the north-western, northern and eastern shores, waves break directly onto the undercut cliffs of the south-western and south coasts with sea spray being thrown to heights above that of the cliff margin under even moderate sea conditions. Thus different ecological conditions prevail at the southern end of Henderson by comparison with the northern coasts. Even within the latter region field observations suggest that there may be micro-climatic differences between neighbouring coasts; for example, the cliff face and plateau margin environments above the north-west beach appear to be moister than the corresponding areas on the north coast. One reflection of these differences may be the apparently much poorer epiphytic flora on the northern plateau; further differences are considered below.

One of the great problems in delimiting the different vegetation communities on Henderson Island is that not only are they floristically diverse but also that many species are present in more than one, and often several, different communities. The following species lists by community document all the species seen by us in each community; the accompanying text indicates which species make each community recognizable and adds information from the work of previous plant collectors. Nomenclature follows Fosberg et al. (1983, and see also this volume).

DESCRIPTION OF VEGETATION COMMUNITIES

A. LITTORAL VEGETATION

The littoral vegetation, defined as seaward of the plateau margin, has more diverse and clearly differentiated communities than the interior vegetation. This diversity and differentiation is the result of a greater variation from shore to cliff top in elevation, substrate type, exposure to sea spray, and other microclimatic factors than are found in the island interior. The arrangement of most of this variation is normal to the coast, producing well-defined zones from shore to plateau.

The most seaward community may be either on sandy substrates (1. Strand pioneer and seaward beachridge community: see below) especially along the north coast, or on solid limestone (3. Limestone platform community: see below) depending on local physiography. These shoreward communities consist of a few salt tolerant species. In their shelter follow more diverse woodland communities on gently sloping or level ground on sand (2. Beachridge crest and back-barrier swale community: see below) or on limestone rock and rubble (4. 'Miro' woodland community: see below). These latter communities include the most disturbed areas on Henderson. They serve as camp-sites to visiting parties on the north and northwest beaches, most coconuts grow here, and miro (*Thespesia populnea*) is frequently cut. The transition from this littoral terrace to the plateau is via a mosaic of steep slopes and cliff faces that bear low-lying, dense, species-rich covers (5. Limestone buttress and cliff face community; and 6. Fern slopes community: see below).

1. Strand pioneer and seaward beachridge community

The beaches of Henderson are of two types: the long, relatively broad beaches of the northern and eastern shores and small pocket beaches, typified by the north-west beach and the eastern sections of the north beach. The pocket beaches are characteristically backed by a bevelled limestone ramp and flanked by low limestone outcrops (see Spencer and Paulay, this volume); they support few plants. The north beach can be divided into a lower foreshore dominated by beachrock and poorly-sorted sands and an upper, planar beach, 15 - 25m in width. At the western end of this beach the limestone cliffs come right down to the shore and only locally are incipient, small sand dunes present between the limestones and the beach sands. These low sand sheets are characterised by clumps of the grass *Lepturus repens*. In the central section of the north beach a beachridge fronts a broad embayment in the limestone cliffs (see Spencer and Paulay, this volume for north beach plan). The dominant colonist on the seaward face of this beachridge, at ~3.0 - 4.5m above sea level, is *Scaevola sericea* (Plate 1) with *Heliotropium anomalum* and *Pemphis acidula* being locally present.

Shrubs:	*Pemphis acidula* *Scaevola sericea* var. *tuamotuensis*
Herb:	*Heliotropium anomalum* var. *argenteum*
Creeper:	*Triumfetta procumbens*
Grass:	*Lepturus repens*

2. Beachridge crest and back-barrier swale community

At the Pitcairner's campsite on the north beach, the dominant vegetation on the beachridge crest is coconut plantation. To the west of this locality the beachridge supports an extensive cover of *Tournefortia argentea* both as a bushy ground cover and as gnarled trees, 3 - 4m high. *Tournefortia* is an opportunistic species characteristic of marginal and disturbed ground (Fosberg 1953) and is restricted to the littoral vegetation on Henderson. Beneath the latter may be an understorey of *Polypodium* sp(p).

The area between the beachridge crest and the base of the limestone cliffs, reaching ~30m in width on the central north beach, is clearly a zone of transition of both micro-climate and substrate. *Pemphis acidula* , common along the seaward margin, becomes noticeably absent as this zone is traversed. In the moist, shaded localities at some distance from direct marine influence, *Procris pedunculata* and the endemic *Peperomia hendersonensis* are particularly characteristic of this shrub-dominated community.

Trees:	*Cocos nucifera* *Pandanus tectorius* *Thespesia populnea* *Tournefortia argentea*
Shrubs:	*Guettarda speciosa* *Scaevola sericea* var. *tuamotuensis* *Timonius polygama* *Tournefortia argentea*

Herbs:	*Peperomia hendersonensis* *Procris pendunculata*
Creeper:	*Ipomoea macrantha*
Grass:	*Thuarea involuta*
Ferns:	*Asplenium nidus* *Polypodium* sp(p).

3. Limestone platform community

The limestone platform environment is dominated at its seaward margin by dense, monospecific stands of *Pemphis* (Plates 2 and 3), in a band usually less than 5m wide, and locally festooned by orange-green strings of *Cassytha filiformis*. The '*Pemphis* forest' is a characteristic and permanent community of rocky shores on Central Pacific atolls (Fosberg 1953), as well as on other uplifted islands (pers. obs.; S.Cooks, Niue). The creeper *Triumfetta procumbens* is also found on the seaward margin of this community.

Tree:	*Cocos nucifera* *Tournefortia argentea*
Shrub:	*Pemphis acidula*
Creepers:	*Cassytha filiformis* *Triumfetta procumbens*

4. 'Miro' woodland community

Inland from the *Pemphis* zone, trees become established on the last interglacial limestone unit. At the southern end of the north-west beach and particularly at the eastern end of the north beach the 3 - 5m high canopy is dominated by miro, *Thespesia populnea*, with an understorey of *Polypodium* sp(p). Gaps in the canopy and the presence of numerous logs on the limestone substrate attest to the management of this community by the Pitcairn Islanders who crop miro for wood carving. The *Thespesia* logs are surrounded by a thick litter layer of *Pandanus* leaves and *Polypodium* fronds. Under the densest miro canopy, near the foot of the limestone buttress, *Peperomia hendersonensis* appears and becomes an abundant ground cover. At the same location occasional *Timonius polygama* and *Procris pendunculata* give their first appearance. The large coconut grove on the northwest beach dominates the canopy of the seaward half of this community.

Trees:	*Cocos nucifera* *Cordia subcordata* *Guettarda speciosa* *Pandanus tectorius* *Thespesia populnea* *Tournefortia argentea*
Shrub:	*Timonius polygama*

Herbs:	*Peperomia hendersonensis* *Procris pedunculata*
Grass:	*Thuarea involuta*
Creeper:	*Cassytha filiformis*
Ferns:	*Asplenium nidus* *Polypodium* sp(p).

5. Limestone buttress and cliff face community

Although there are individual trees of *Celtis* sp., *Pisonia grandis* and, particularly at higher levels, *Pandanus tectorius,* the steep limestone faces are dominated by a close ground cover. At lower levels this may consist of low *Timonius* (Plate 4) tangle but at greater heights the cliffs are characterised by creeping herbs. Particularly noticeable is the way in which *Sesuvium portulacastrum* covers the outer floor of the highest (20.2 - 21.5m; see Spencer and Paulay, this volume), deepest and most laterally extensive of the marine notches on the limestone buttresses of the north shore, an association clearly seen from the north beach (Plate 2). The change from a low shrub to a herb assemblage appears to be correlated with a change in substrate from poorly sorted, sandy coral rubble to solid limestone.

Trees:	*Celtis* sp. *Pandanus tectorius* *Pisonia grandis* *Thespesia populnea*
Shrubs:	*Eugenia rariflora* *Timonius polygama* *Tournefortia argentea*
Herbs:	*Euphorbia sparrmannii* *Heliotropium anomalum var. argenteum* *Lepidium bidentatum* *Sesuvium portulacastrum*
Creepers:	*Boerhavia tetrandra* *Cassytha filiformis* *Ipomoea macrantha*
Ferns:	*Asplenium nidus* *Nephrolepsis hirsutula* *Polypodium* sp(p).

6. Fern slopes community

Above the vegetation communities of the immediate coastal fringe and in between the high angle cliffs and limestone buttresses are slopes of 25 - 30^0 in angle up to the cliff top. This topographic unit is dominated by extensive stands of the ferns *Polypodium* sp(p). and *Nephrolepsis hirsutula*. Alternating and mixed with this fern cover, especially on the

lower parts of the slope, are thickets of *Timonius* , forming a dense canopy ~ 1.5m high, draped with the parasitic *Cassytha* , and with the occasional emergent *Eugenia rariflora* reaching 2m.

Shrubs:	*Eugenia rariflora* *Pisonia grandis* *Timonius polygama*
Creeper:	*Cassytha filiformis*
Ferns:	*Nephrolepsis hirsutula* *Polypodium* sp(p).

B. LIMESTONE PLATEAU MARGIN AND ISLAND INTERIOR VEGETATION

In the simplest terms, the plateau interior of Henderson Island supports a limestone forest of large individual trees with a canopy at 5 - 8m and a wide variety of herbs and shrubs beneath that canopy, the most remarkable being the tall *Bidens hendersonensis* (Fosberg 1984). However, the way in which different species combine varies considerably across the island's surface. Some of these differences seem to be controlled by local geology. The island's interior is underlain by either jagged, pinnacled exposures of limestone or by flatter depressions, with fields of corals or areas of fragmented coral sticks, thought to represent a former atoll lagoon floor (Spencer and Paulay, this volume). Some areas of limestone bedrock may have no forest cover (8. Pinnacle-pitted limestone community: see below) or a low, tangled scrub vegetation (9.*Timonius* scrub community: see below). Similarly, a thick litter layer and pocket soils have developed over some lagoonal deposits, producing a distinctive limestone woodland (10. Limestone glade woodland: see below). It seems likely, therefore, that local changes in geology will be reflected in changes in forest floristic composition. Whereas on the northwest plateau there is an abrupt change from limestone island rim to lagoonal interior, on the northern plateau there is an alternation of bedrock exposures with lagoonal depressions (Spencer and Paulay, this volume); these differences might be expected to be echoed in forest type. Superimposed on geological constraints is the possibility of micro-climatic variation across the island top. Broad differences between the seemingly wetter north-western plateau and the drier northern plateau have already been alluded to: perhaps these differences explain the greater abundance of *Asplenium nidus* and *Nesoluma st-johnianum* on the north-west plateau and the more frequent occurrence of *Myrsine hosakae* in the northern interior. Finally, there are clearly ecological gradients from island margin to plateau interior. The plateau edge is a transition zone from the littoral limestone cliff communities, and is the only area where *Cordyline fruticosa*, *Scaevola sericea*, *Euphorbia sparrmannii*, *Caesalpinia major* and *Ipomoea macrantha* were noted on the island top (7. Cliff top and plateau margin community: see below). Further inland, these gradients are reflected in the abundance of certain species; thus *Bidens* , *Pisonia* and *Nesoluma* become more abundant as distance increases from the coasts whereas the opposite trend is exhibited by *Pandanus* . The following list shows the variety of species found within the limestone interior forest; different combinations of these species yield a complex mosaic of forest types. The communities that follow describe those associations that stand out as recognisable units within the plateau vegetation. Except for patches of *Timonius*, no area of the interior plateau is dominated by one or a few species, but supports diverse communities. It should be noted that the following list indicates only those 22 species, from a total of 41 species, which

are common across much of the interior island landscape. Unfortunately our record does not include the endemic tree *Santalum hendersonense* which St John and Philipson (1962) noted as being common on the plateau top. Opinion on Pitcairn (K. Brown pers.comm. 1987), however, suggests that the species occurs only in localised clusters.

Trees:	*Celtis* sp.
	Geniostoma hendersonense
	Guettarda speciosa
	Nesoluma st-johnianum
	Pandanus tectorius
	Pisonia grandis
Shrubs:	*Alyxia* sp.
	Bidens hendersonensis var. *hendersonensis*
	Canthium barbatum f. *calcicola*
	Canthium odoratum
	Cassia glanduligera
	Eugenia rariflora
	Glochidion pitcairnense
	Ixora fragrans
	Timonius polygama
	Xylosma suaveolens var. *haroldii*
Herbs:	*Dianella intermedia*
	Procris pendunculata
Creeper:	*Morinda umbellata* var. *forsteri*
Ferns:	*Asplenium nidus*
	Davallia solida
	Polypodium sp(p).

7. Cliff top and plateau margin community

The cliff top is characterized by a dense thicket vegetation in which *Timonius*, *Canthium odoratum*, *Nephrolepis* and *Polypodium* sp(p). are abundant (Plate 5). St. John and Philipson (1962; Plate 5) also show *Xylosma suaveolens* to be an important component of the cliff top community above the north-west beach; we concur with this observation. Particularly noticeable are large individuals of *Pandanus* ; their pyramidal forms often dominate the island skyline from the sea and give, perhaps, an impression of greater abundance than is actually the case (eg. Plate 4).

Away from the immediate marginal cliffs, *Eugenia* begins to decline in abundance whereas *Celtis* sp., *Ixora fragrans*, *Cassia glanduligera* and *Glochidion pitcairnense* start to appear as important constituents of the forest community on rocky substrates. At the north beach the presence of *Cocos nucifera* and *Cordyline fruticosa* at the plateau margin is clearly related to the trail leading into the island interior. Similarly, *Caesalpinia major* is only found in association with the north coast trail (curiously, the difficulties of passage produced by this species are documented by Fosberg et al. (1983) for Henderson yet the species was not collected by the Mangarevan expedition (St. John and Philipson 1962)).

Trees:	*Cocos nucifera*
	Celtis sp.
	Pandanus tectorius
	Pisonia grandis
Shrubs:	*Canthium odoratum*
	Cassia glanduligera
	Cordyline fruticosa
	Eugenia rariflora
	Glochidion pitcairnense
	Ixora fragrans
	Scaevola sericea var. *tuamotuensis*
Shrubs:	*Timonius polygama*
	Xylosma suaveolens var. *haroldii*
Herb:	*Euphorbia sparrmannii*
Creepers:	*Boerhavia tetrandra*
	Caesalpinia major
	Cassytha filiformis
	Ipomoea macrantha
Ferns:	*Davallia solida*
	Nephrolepsis hirsutula
	Polypodium sp(p).

8. Pinnacle-pitted limestone community

Inland from the north-west beach is an area of open limestone, with limestone pinnacles up to 2 m high (Plate 6; and well illustrated by Fosberg et al. 1983, Plates 11 and 12). The horrors of traversing this terrain are well described by St. John and Philipson (1962). Although we only saw a small, perhaps 50m diameter, area of this pinnacle-pitted limestone, both its unique landscape and unusual vegetation warrants its separation as a distinctive community. The fern *Nephrolepsis hirsutula* is scattered across the top of the pinnacles while *Asplenium nidus* sits in the hollows between them. Several *Hernandia stokesii* trees grow on this barren landscape, the only area where this species was observed both by the Mangarevan (Fosberg, pers.comm. 1987) and the 1987 expedition.

Tree:	*Hernandia stokesii*
Shrub:	*Eugenia rariflora*
Ferns:	*Asplenium nidus*
	Nephrolepsis hirsutula
	Polypodium sp(p).

9. *Timonius* scrub community

Locally, the limestone forest community may be replaced by a scrub vegetation dominated by monospecific thickets of *Timonius* . This comprises an almost inpenetrable low canopy up to 3m high with an intersecting mattress of brittle dead twigs and branches below. The

trees and shrubs which surround these patches are typical of the cliff top and plateau margin community (see above for species list).

Shrub: *Timonius polygama*

10. Limestone glade woodland community

The presence of pocket soils on the lagoonal deposits of the plateau is reflected in the development of a glade woodland with a more open canopy than that of the limestone forest. This community also often supports a lush fern understorey, largely composed of *Davallia solida* and *Polypodium* sp(p) but also with *Procris* and *Morinda umbellata* var. *forsteri*. Commonly found foraging through the litter layer in this community is the Henderson Island Rail, *Porzana atra*. The dominant tree species are *Pisonia* and *Nesoluma* with occasional *Pandanus* and the relatively rare *Myrsine* . *Alyxia* sp. is often entangled throughout the canopy and parasitic *Korthalsella* spp. and epiphytic *Pyrrosia serpens* are also present. Where breaks in the canopy occur, the main gap colonist is *Senecio stokesii* with *Glochidion* and *Cassia* invading at the margins.

Trees:
Myrsine hosakae
Nesoluma st-johnianum
Pandanus tectorius
Pisonia grandis

Shrubs:
Canthium barbatum f. *calcicola*
Canthium odoratum
Cassia glanduligera
Eugenia rariflora
Glochidion pitcairnense
Ixora fragrans
Premna cf. *serratifolia*
Xylosma suaveolens var. *haroldii*

Shrubs:
Korthalsella platycaula var. *vitiensis*
Korthalsella rubescens
Procris pedunculata
Peperomia hendersonensis
Senecio stokesii

Creepers:
Alyxia sp.
Morinda umbellata var. *forsteri*

Ferns:
Asplenium nidus
Davallia solida
Polypodium sp(p).
Pyrrosia serpens

11. Lagoonal patch reef community

As well as the coral heads and acroporid sticks within the lagoonal depressions, there are larger mounds of coral rubble within these depressions which we interpret as rather more

extensive patch reefs. Where large, these mounds show a distinctive vegetation cover, dominated by *Eugenia* and low *Pisonia* in a bushy habit (Plate 8).

Trees:	*Guettarda speciosa* *Nesoluma st-johnianum* *Pandanus tectorius*
Shrubs:	*Eugenia rariflora* *Glochidion pitcairnense* *Ixora fragrans* *Pisonia grandis* *Xylosma suaveolens* var. *haroldii*
Creeper:	*Morinda umbellata* var. *forsteri*
Fern:	*Polypodium* sp(p).

CONCLUDING REMARKS

Remarkably, the vegetation communites described above have been almost completely unaffected by human contact. Fosberg et al. (1983) list only four adventive species: *Cocos nucifera, Cordyline fruticosa, Aleurites moluccana* and *Achyranthes aspera* var. *pubescens*. To this list we add *Setaria verticillata* based on the collections made during the 1987 expedition. Of these five species, *Achyranthes* and *Aleurites* have not been collected since 1912 and 1922 respectively. Coconut plantations, clearly associated with campsites, are restricted to the central sections of the north beach and the north-west beach. These trees have obviously matured since the observations of the Mangarevan Expedition when the coconuts of the north-west beach were described as "all young" (Fosberg et al. 1983, 18). On the plateau surface, coconuts are restricted to the trail inland; mature trees near the cliff top and recent plantings at intervals along the trail in the interior. *Cordyline* is similarly restricted to trail-side locations and is only found near the plateau margin on the north coast. Only a single example of the *Setaria* grass, which is known from Pitcairn (Fosberg et al., this volume), was seen at the north beach camp-site, and all of it was excavated. It may have been a very recent colonist.The lime and orange trees reported by Maude in 1951, and assumed to be at the north landing (St John and Philipson 1962) were not seen on the 1987 expedition. We were not able to verify the presence or absence of introduced root crops at the north east point. The cutting of *Thespesia populnea* by the Pitcairners is largely confined to the low limestone platform near the shore and does not result in the disturbance of other vegetation communities.

Although the vegetation of Henderson Island is greatly enriched compared to neighbouring atolls, several typical atoll plants that occur in the Eastern Tuamotus or even on neighbouring Oeno Atoll are absent on Henderson, e.g. *Hedyotis romanzoffiensis, Sophora tomentosa, Calophyllum inophyllum, Barringtonia asiatica* and *Nesogenes euphrasioides*. Although the absence of such littoral species may in part be due to isolation, the limited extent of beaches, the lack of much reef protection, and the encroachment of the abundant 'high island' vegetation on the littoral community may also be important. The poverty of the strand flora is further reflected in our inability to find several previously reported strand plants. Of the 13 plant species that we failed to relocate from Fosberg et al.'s (1983) floristic list, 5 (*Portulaca lutea, Capparis sandwichiana, Suriana maritima.*

Lycium carolinense var. *sandwicense*, *Fimbristylis cymosa*) are predominantly littoral plants. The other species that we did not relocate include 2 introduced plants (*Achyranthes aspera* var. *pubescens* and *Aleurites moluccana*) that may have disappeared since 1934 and *Asplenium lobulatum*, *Asplenium obtusatum*, *Pittosporum aborescens*, *Sesbania coccinea*, *Santalum hendersonense* and *Meryta brachypoda*. Several of these plants are obviously rare or localised; 8 of the 13 were also not collected by the Mangarevan Expedition.

Nine species or varieties are presently recognised as endemic to Henderson (Fosberg et al. 1983, present volume): *Peperomia hendersonensis*, *Celtis* sp., *Santalum hendersonense*, *Xylosma suaveolens* var. *haroldii*, *Myrsine hosakae*, *Nesoluma st-johnianum*, *Geniostoma hendersonense*, *Alyxia* sp. and *Canthium barbatum* f.*calcicola*. All the endemics are primarily inland plants and, with the exception of *Santalum*, which we did not find in 1987, all were noted to be common in the island interior.

It seems likely that botanical collecting trips to Henderson Island will continue to be both infrequent and brief. Clearly, however, there would be value in attempting to visit the southern area of the island, not collected since Tait in 1912, and the eastern shores which must be under-collected or possibly not even collected at all. It is certain that much remains to be learnt about the vegetation communities of Henderson Island and its remarkable flora.

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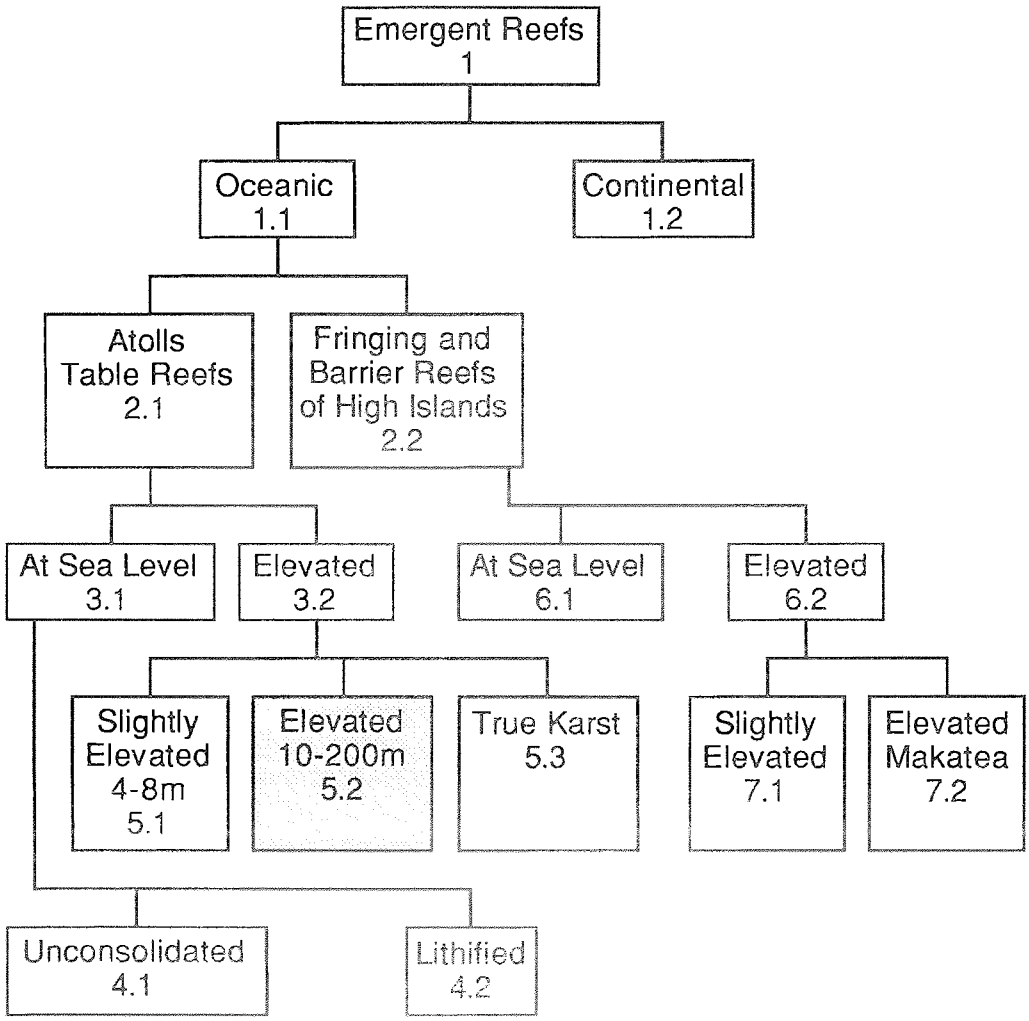

Figure 1. Diagram of classification of emerged reef surfaces (from Fosberg 1985a). Henderson Island falls within category 5.2 (Elevated 10-200m)

Plate 1. Looking west along north beach from the landing. *Scaevola sericea* var. *tuamotuensis* on seaward slope of beachridge, *Tournefortia argentea* and *Pandanus tectorius* on beachridge crest.

Plate 2. Limestone buttress, south-central north beach. Monospecific *Pemphis acidula* on low limestone platform behind beach. *Sesuvium portulacastrum* on notch floor (centre middle) of buttress.

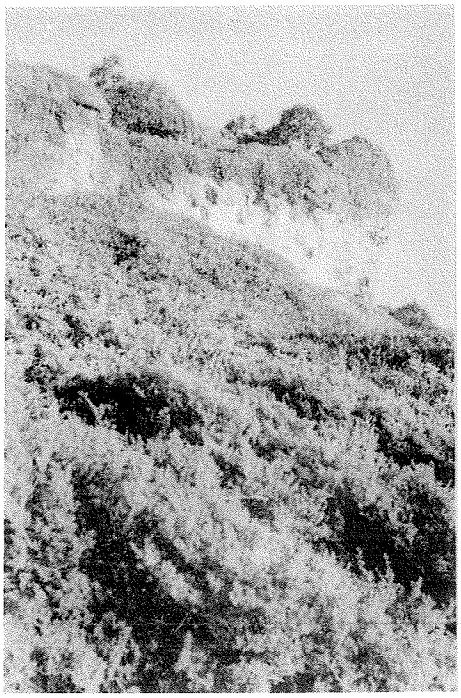

Plate 3. *Pemphis acidula* on lower limestone unit replaced by fern slopes community on higher slopes, north-west beach. Notch floor of buttress (centre right) characterized by *Sesuvium portulacastrum*, *Euphorbia sparrmannii* and *Lepidium bidentatum*.

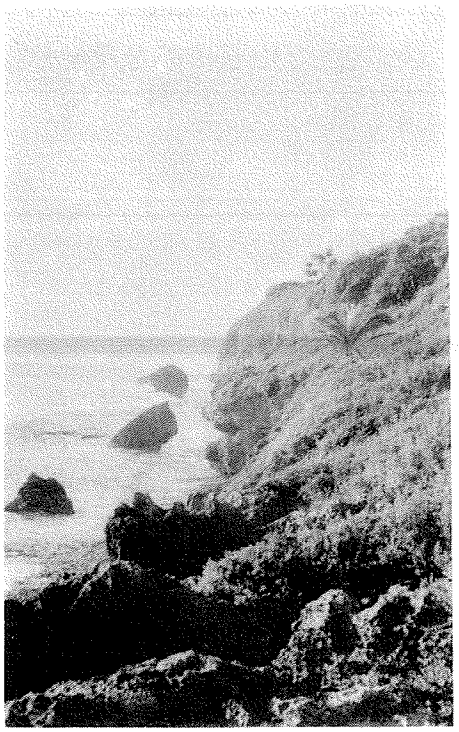

Plate 4. Looking north from end of north-west beach. *Pemphis acidula*, *Timonius polygama* and emergent *Cocos nucifera*. Skyline *Pandanus tectorius* is typical.

Plate 5. Plateau margin scrub thicket vegetation. N. beach trail

Plate 6. Pinnacle-pitted limestone, inland from north-west beach. Limestone forest in background.

Plate 7. Limestone glade woodland community, N. beach trail. *Pisonia grandis* and *Pandanus tectorius* with predominantly fern understorey.

Plate 8. Lagoonal patch reef vegetation dominated by bushy *Pisonia grandis* and *Eugenia rariflora*.