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A BOTANICAL DESCRIPTION OF BIG PELICAN CAY, A LITTLE KNOWN ISLAND  
OFF THE SOUTH COAST OF JAMAICA

by C. D. Adams

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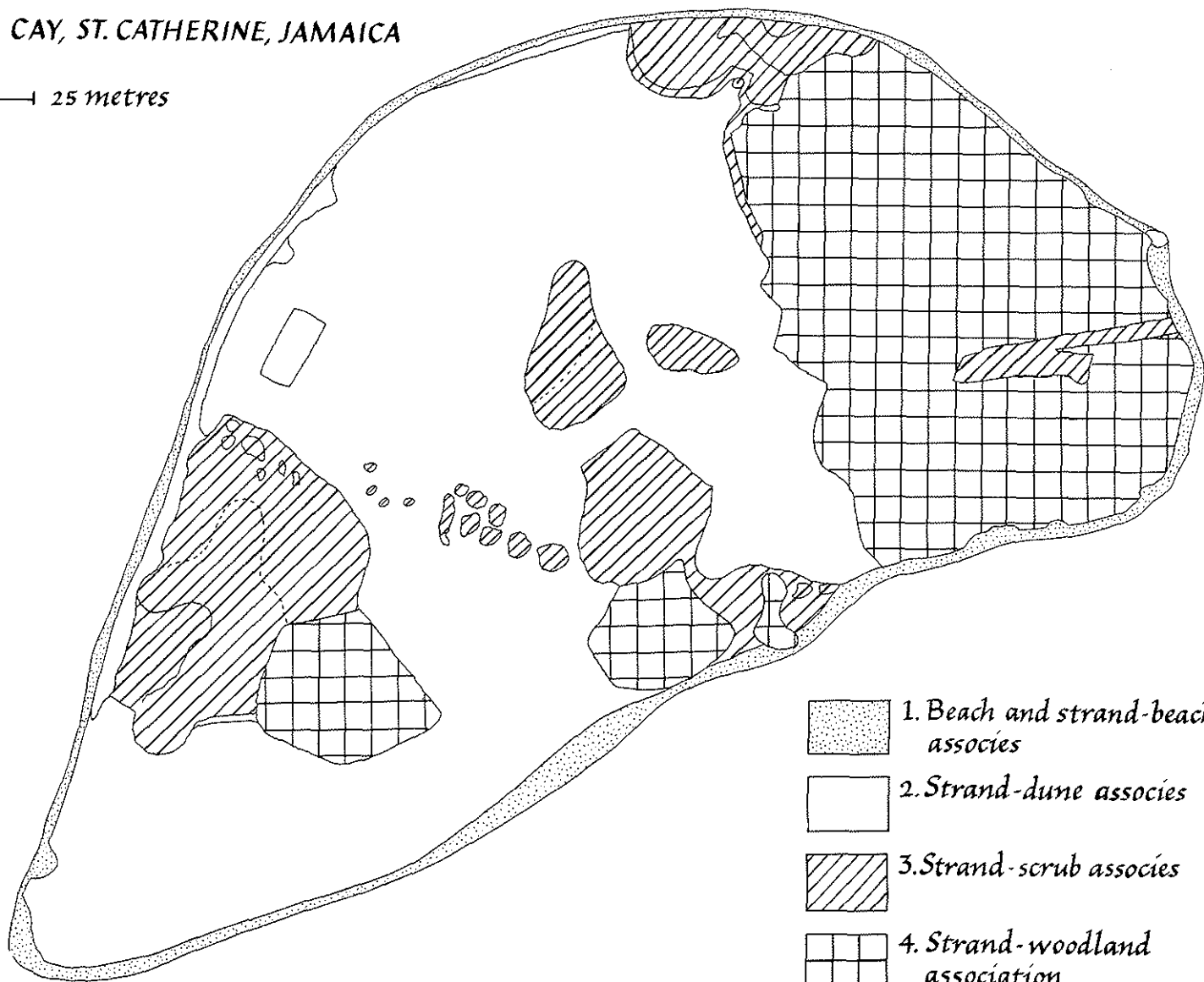
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



Washington, D. C., U. S. A.

August 15, 1969

**BIG PELICAN CAY, ST. CATHERINE, JAMAICA**

Scale ——— 25 metres



-  1. Beach and strand-beach associations
-  2. Strand-dune associations
-  3. Strand-scrub associations
-  4. Strand-woodland association

# A BOTANICAL DESCRIPTION OF BIG PELICAN CAY, A LITTLE KNOWN ISLAND OFF THE SOUTH COAST OF JAMAICA

by C. D. Adams <sup>1/</sup>

## Abstract

Big Pelican Cay is an island of 5-1/2 acres composed entirely of coral sand and lying about three miles off the south coast of Jamaica. The island has a natural flora of 44 species of vascular plants comprising a vegetation of several seral units, comparable with units described for the Florida Keys, and a woodland dominated by Conocarpus erectus. Within a small area the vegetation reaches a high level of complexity and includes not only common tropical seashore plants of more or less xeromorphic type but, within the woodland, herbs, shrubs and trees of more mesophytic character. The vegetation is unusual in that not only is the climax dominated by Conocarpus, which is elsewhere a transitional or marginal species, but it lacks any significant mangrove community. This cay exemplifies within the West Indian phytogeographical region, the vegetation of a sand cay.

## Acknowledgements

All information given in this account other than that obtained from cited references or acknowledged here, is the result of the author's observations during February/March 1963 and October 1967. The cooperation of Dr. Walter Carter, formerly of F.A.O., and of Mr. Michael Campbell of Kingston, whom I accompanied on visits to the island, is gratefully acknowledged. I am also grateful to Mr. Richard Wiczens, lately of the Jamaican Survey Department, who arranged for me to have the use of an aerial photograph from which Figure 1 was drawn, and to Mr. R. A. Gardiner of the Royal Geographical Society, for answering inquiries about other maps. Mr. D. O. Vickers, Director of the Jamaican Meteorological Service provided information about windspeeds.

## Position and general description of Big Pelican Cay

Big Pelican Cay is an island situated 2.9 miles SSW of Coleman's Bay off the southernmost tip of the Hellshire Hills in the parish of St. Catherine, Jamaica. Owing to its distance from the mainland, this cay does not appear on the topographical survey maps of Jamaica (1:50,000 edition), but its position is indicated on the maps showing the Portland Bight Cays accompanying the papers of Steers, Chapman et al. (1944) and Chapman (1944). Admiralty Chart No. 457 (1954) also

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shows the cay on a rather small scale. The island is one of few scattered along the almost continuous arc of reef extending north-eastwards from Portland Point.

The area of the cay above sea-level is 22,650 square meters (5.6 acres) and at no point is it more than 1.6 meters (5.4 feet) above sea-level. The oldest part is probably at the eastern end and the island seems to be increasing in a westward direction by deposition of calcareous sand largely composed of fragments of Halimeda opuntia and shells. This sand forms an undulating surface to the whole island where there is vegetation and there are no outcrops of smashed coral as at Lime Cay. Lime Cay is one of the well-known Port Royal Cays outside Kingston harbor, and is almost the same size as Pelican Cay. While Asprey and Robbins (1953) refer to Lime Cay as consisting of "sand containing a high proportion of the remains of the lime-encrusting Halimeda opuntia" without qualification, this is only true of its leeward aspects. Steers (1940) clearly distinguishes between shingle cays composed largely of exposed coarse broken coral material of which Lime Cay is an example, and sand cays such as Pelican Cay where even at the vulnerable windward end, the island consists uniformly of sand. The 1939 Cambridge expedition made a very brief survey of this cay and no detailed botanical description was included in their publications.

Climatic data are lacking for any of these cays but it is certain that one of the most important factors determining their shape and physical evolution, as well as to some extent, the character of their vegetation, is the consistent easterly breeze. Wave action and salt spray depend on this wind which at certain times of the year, especially in June and July, blows at strengths up to Force 5 for several daylight hours. The windward southern and eastern aspects are protected by a shallow lagoon several hundred meters broad outside which the principal reef lies. Wave action on these beaches in normal weather amounts to little more than a gentle lapping, but salt spray from the reef is often evident.

#### Vegetation of Pelican Cay

The four main communities described by Davis (J. H. Davis, 1942) for the Florida Keys can be recognized on Pelican Cay and account for all the communities which occur there. These are 1. the Strand-beach associates; 2. the Strand-dune associates; 3. the Strand-scrub associates and 4. the Strand-woodland association (the map, Figure 1, shows their distribution).

##### 1. The Strand-beach Associates

The pioneer vegetation occurring almost all around the island in a narrow marginal zone is not uniform and has three more or less distinct facies depending on the other communities with which it happens to be in contact:

- a) Where the beach is backed directly by the strand-dune associates and woodland or thicket is absent, the pioneer flora forms a distinct zone with several recognizable sub-zones. The first colonizers, of low cover value, are Sesuvium portulacastrum and Ipomoea pes-caprae, the former being constantly present and more abundant.

On the sharply rising upper beach this open sub-zone is replaced abruptly by Philoxerus vermicularis which then by less abrupt and intermingling stages gives way through sub-zones dominated by Euphorbia mesembrianthemifolia and then Canavalia maritima to the more stable dune community of almost pure Sporobolus virginicus on the higher better drained parts and Paspalum distichum with Sporobolus on the lower.

This series is well shown along the western half of the southern shore. The most obvious irregularities are to be found towards the extreme western tip of the cay where the common primary invaders may be replaced locally by Paspalum distichum and other forward dune species, namely Euphorbia mesembrianthemifolia, Canavalia maritima and Cenchrus tribuloides. All these species, except Euphorbia mesembrianthemifolia, have trailing branches and are dicotyledons with fleshy leaves or are grasses. Plants of Euphorbia mesembrianthemifolia are usually bushy and may rise to 45 cm (18 in.) tall. All the other species in the typical exposed pioneer to forward dune series are of lower stature, but Philoxerus tends to have ascending form even in exposed places.

- b) Where the beach is backed directly by the strand-scrub cactus thicket, as along the northwest facing shore, the upper beach is eroded and frequently has a distinct step about two feet high. Below the shelf so formed only a few trailing stems of Sesuvium occur. On the top of this shelf, which is composed of deep fine sand, there is a thin cover of the more erect bushy but still fleshy leaved herbaceous species of which Cakile lanceolata, Philoxerus vermicularis, Euphorbia mesembrianthemifolia and Stachytarpheta jamaicensis are the most conspicuous.
- c) Around the eastern end of the island woodland extends to within a meter of high-water and thus only a very narrow zone of herbaceous pioneer vegetation exists there. This consists of often isolated rather pure stands of Cakile lanceolata, Sesuvium portulacastrum, Alternanthera halimifolia, Philoxerus vermicularis and Paspalum distichum. Owing to the shelter provided by the nearby trees of Conocarpus erectus, these herbaceous plants grow taller than elsewhere on the island and some of them even tend to scramble among the lower branches of the trees. The only species which is conspicuous in all three facies of the pioneer zone is Sesuvium portulacastrum.

<u>Species of the Strand-beach Associes</u>	<u>Frequency</u> <sup>1/</sup>
<u>Alternanthera halimifolia</u> (Lam.) Standl.	o
<u>Atriplex pentandra</u> (Jacq.) Standl.	l
<u>Cakile lanceolata</u> (Willd.) O. E. Schulz	f
<u>Canavalia maritima</u> (Aubl.) Urb.	o
<u>Cenchrus tribuloides</u> L.	l

<sup>1/</sup> Explanation of abbreviations: o, occasional; l, local; f, frequent; vr, very rare; f-a, frequent to abundant; a, abundant; o-r, occasional to rare; ld, locally dominant.

Colubrina asiatica (L.) Brongn.	vr
Euphorbia mesembrianthemifolia Jacq. (E. buxifolia Sw.)	f
Ipomoea pes-caprae (L.) R. Br. ssp. brasiliensis (L.) Ooststr.	l
Paspalum distichum L. (P. vaginatum Sw.)	l
Philoxerus vermicularis (L.) Beauv.	f-a
Rhizophora mangle L. (seedlings or saplings only)	vr
Sesuvium portulacastrum (L.) L.	a
Sporobolus virginicus (L.) Kunth	l
Stachytarpheta jamaicensis (L.) Vahl	o-r

## 2. The Strand-dune Associes

This vegetation comprises the low grassland community occupying the extensive depression in the middle of the island and also much of the western half. At various points it abuts on to all the other communities and is the only one which is continuous at the present time. Its seral status is belied by the sharp boundaries existing between the grassland and the thickets or woodlands with which it is in contact. This apparently stable feature may be associated with a history of goat grazing (removed in the latter part of 1962) and possibly fire. On the other hand at certain places isolated or gregarious shrubs of Morinda royoc, Capparis flexuosa and Caesalpinia bonduc in young stages of growth indicate a developmental trend towards thicket. There is also probably a slow frontal encroachment upon the grassland by the larger continuous areas of Opuntia dillenii which might proceed in opposition to a grazing factor but be stabilized by fire. As the Opuntia scrub is distributed more towards slightly higher ground a drainage or soil salinity factor might also be involved in determining the position of the boundary with the grassland.

The grassland varies in cover value to a considerable extent, being thinnest towards the southwest, where it is patchily dominated by Paspalum, and is in continuous contact with the strand-beach associes. Cover approaches completeness along the boundary with the Conocarpus woodland in the northeast. It is fairly certain that the most dense aspects of the Sporobolus grassland would burn with a hot damaging fire after a long period of drought, but the indication from the amount of living and dead plant material which has accumulated is that this does not happen frequently.

In the extreme northern part of the island the Sporobolus grassland reaches the eroded beach and a little west of that there is a relatively pure and extensive stand of Panicum maximum.

As a result of human activity along the middle region of the northwestern shore and the presence of a small house, several cultivated plants and weeds occur independently of the more natural dune grassland.

<u>Species of the Strand-dune Associes</u>		<u>Frequency</u>
a) <u>Dune grassland species</u>		
Caesalpinia bonduc (L.) Roxb.	woody invader	o
Canavalia maritima (Aubl.) Urb.	trailing invader	f-a
Capparis flexuosa (L.) L.	woody invader	o
Cyperus planifolius L. C. Rich	tight-headed rufous variant	o
Echites umbellata Jacq.		l
Morinda royoc L.	woody invader	l
Panicum maximum Jacq.	north side only	ld
Paspalum distichum L.	southwest area	ld
Sporobolus virginicus (L.) Kunth		d
Tribulus cistoides L.		f
Turnera ulmifolia L.	Bushy hirsute variant	o
b) <u>Cultivated plants and weeds</u>		
Agave sisalana Perrine		l
Boerhavia coccinea Mill.	also in nearby dune	o
Casuarina equisetifolia J.R. & G. Forst.		l plant
Cenchrus brownii Roem. & Schult.		r
Cocos nucifera L.	seedlings and 6 plants *	
Delonix regia (Boj. ex Hook.) Raf.		l plant
Nerium oleander L.		l plant
Portulaca oleracea L.	also in nearby dune	f

\* All existing specimens of Cocos were removed in 1963 in preparation for an experimental planting of seedlings in the north-central grassland area.

### 3. The Strand-scrub Associes

This community is the most patchy and dissected vegetation represented on the island. It also lacks uniformity in the occurrence within the patches of gregarious shrubby species surrounded by Opuntia dillenii. All examples of scrub have boundaries with the grassland and most of the larger areas also have boundaries with Conocarpus woodland. The disposition of scrub in relation to woodland is consistently towards the northwest or leeward side.

Undoubtedly the strand-scrub associes is the most obviously seral and unstable vegetation of Pelican Cay. As plants of Opuntia dillenii are almost everywhere contiguous in each patch of scrub and form narrow hedges around the larger clumps of shrubs, it is not possible for man or grazing animals to enter. Being to the leeward of woodland these areas are least likely to be affected by wind or salt spray and except at the margins would not be damaged by fire. The community could therefore be expected to follow through a sequence of natural stages leading to woodland.

At the northern end of the large Conocarpus woodland there is a clear indication of the replacement of Opuntia by Suriana maritima. Here a substantially pure stand of Suriana rising to 2.5 meters (about eight feet), forms a localized thicket and this species is evidently competing successfully with the cactus in that there are dead or dying plants of the latter within the thicket. Nearby a narrow continuation

of the cactus fringe is separated by a higher hedge of Capparis flexuosa between it and the woodland. The same woody species, as well as Cordia sebestena, occur in clumps in the large scrub area in the western part of the island. Here enclosed by cactus, and again probably competing successfully with it are Cordia sebestena to 3.5 meters (about 12 feet), Capparis flexuosa to 2.5 meters (about eight feet) and Suriana maritima to 1.5 meters (five feet). At one point only was it evident that Conocarpus was invading the cactus scrub directly.

It is noteworthy that everywhere associated with Opuntia dillenii in the more open scrub are numerous herbaceous or woody scramblers and vines. These tend to cover and possibly suppress the cactus. The sequence of events in the succession is thus:

1) Opuntia dillenii and a few shrubby species invade the dune. The latter would possibly succumb to fire and grazing, the cactus only to fire and only then where directly in contact with combustible material such as dead Sporobolus;

2) the cactus is weakened or suppressed by vines such as Canavalia maritima, Ipomoea tuba and Echites umbellata which thereby create openings within the cactus area now protected from grazing, fire and wind for,

3) the establishment of erect shrubs, Suriana maritima, Capparis flexuosa and Cordia sebestena. Thereafter the field layer is eliminated by shade and

4) Conocarpus eventually takes over.

<u>Species of the Strand-scrub Associes</u>		<u>Frequency</u>
<u>Caesalpinia bonduc</u> (L.) Roxb.	prickly scambler	o
<u>Canavalia maritima</u> (Aubl.) Urb.	twiner	f
<u>Capparis flexuosa</u> (L.) L.	stragglng shrub	o-f
<u>Cordia sebestena</u> L.	shrub or small tree	l
<u>Echites umbellata</u> Jacq.	twiner	r
<u>Ipomoea tuba</u> (Schlecht.) G. Don	twiner	f-a
<u>Morinda royoc</u> L.	twiner	o
<u>Opuntia dillenii</u> (Ker-Gawl.) Haw.		d
<u>Suriana maritima</u> L.	erect shrub	f
<u>Tribulus cistoides</u> L.	trailing herb	r

#### 4. The Strand-woodland Association

The most advanced and stable community on Pelican Cay, and that which must be regarded as the local climax, is the woodland dominated by Conocarpus erectus. This woodland occupies one quarter of the total area at the eastern end and occurs also in two smaller patches in the south-center and southwest. The trees in this woodland are rather evenly spaced, being on an average about four meters (13 feet) apart, rise to a general height of about six meters (20 feet) with occasional taller examples and form a nearly closed canopy. A few other species, numerically insignificant in the vegetation, grow to the same dimensions as the Conocarpus and include Bursera simaruba, Metopium brownei and Citharexylum fruticosum. Around the margins of the woodland the Conocarpus trees tend to be of lower stature except along the northern shore. This is evidently due to wind in the southerly and easterly margins but may be due to youth along the boundary with the dune. The



trees seem to be invading the dune slowly and are mixed here with the shrubby Capparis flexuosa.

Within the woodland the old trunks of Conocarpus, greyish-brown in color and deeply long- and criss-cross-fissured, are mainly tilted and gnarled so that some of the larger branches reach the ground. Girths of these trees range from 89 cm (35 in.) to 140 cm (55 in.). There is a subsidiary thinly dispersed stratum of shrubs and small trees with Capparis flexuosa, the commonest species, occasionally reaching tree stature. Although the leaves of species of Capparis vary greatly in shape, being narrowly linear on young saplings and ranging to broadly oblong (C. flexuosa) or lanceolate (C. ferruginea), the two species are easily distinguished by the leaves of the former being entirely glabrous and those of the latter having stellate scales on the abaxial surface.

The western boundary of the main area of woodland is in contact with the dune grassland at the southern part and with scrub at the northern part where a narrow strip of Opuntia dillenii extends between the woodland and dune. The margin of the woodland along this boundary comprises younger plants of Conocarpus mixed with Capparis flexuosa and C. ferruginea. The herbaceous species Rivina humilis and Turnera ulmifolia are also present. Exposed more open and better illuminated parts of the woodland have a few plants of the climbers Ipomoea tuba and Canavalia maritima which may be relict from the scrub associates.

Along the eastern seashore trees come close to the beach, being separated from it by a narrow mixed herbaceous littoral zone (see 1, c).

There is no obvious indication of edaphic differences determining the boundary between the woodland and the dune but the woodland itself produces a deep leaf litter and superficial humus in the interior where there is very little herbaceous vegetation. It is noteworthy that Cyperus planifolius and Turnera ulmifolia occur there in forms distinct from those which these species adopt in the grassland. The woodland forms have a much more mesophytic appearance than their counterparts outside the woodland and, combined with the presence of Rivina humilis and a well established patch of Wedelia trilobata, indicate the dependence of these herbs on the shade and lower temperatures of the woodland interior.

<u>Species of the Strand-woodland Association</u>		<u>Frequency</u>
<u>Alternanthera halimifolia</u> (Lam.) Standl.	better lit	
	seaward margins	l
<u>Avicennia germinans</u> (L.) L.	seashore margins	r & l
<u>Bursera simaruba</u> (L.) Sarg.		r
<u>Caesalpinia bonduc</u> (L.) Roxb.	marginal climber	r
<u>Canavalia maritima</u> (Aubl.) Urb.	marginal climber	r
<u>Capparis ferruginea</u> L.		o
<u>Capparis flexuosa</u> (L.) L.		f
<u>Citharexylum fruticosum</u> L.		vr
<u>Coccothrinax jamaicensis</u> R.W. Read (2 plants)		r
<u>Conocarpus erectus</u> L.		d

Cyperus planifolius L.C. Rich	diffuse-headed green variant	f
Gossypium hirsutum L. var. marie-galante (Watt) J.B. Hutch.	(1 plant)	vr
Ipomoea tuba (Schlecht.) G. Don	marginal climber	o
Laguncularia racemosa (L.) Gaertn. f.	seashore margins	r & l
Metopium brownei (Jacq.) Urb.		o
Torrubia obtusata (Jacq.) Britton	(1 plant)	vr
Rivina humilis L.		a
Solanum bahamense L.		r
Trichostigma octandrum (L.) H. Walt.	interior climber	r
Turnera ulmifolia L.	attenuated glabrescent variant	f
Vallesia antillana Woodson	(1 plant)	vr
Wedelia trilobata (L.) Hitchc.		l

#### Representation of Mangrove Species on Pelican Cay

While all three of the commonly occurring American species of mangroves have been reported from Pelican Cay they have failed to establish themselves sufficiently to form a community or to contribute significantly to any of the communities already described. Avicennia germinans is represented by three plants; one old tree mentioned by Steers (1940), which had reached quite large dimensions grew at the most easterly point of the island but was felled in about 1964. Other younger plants occur with a few plants of Laguncularia along the southern margins of the Conocarpus woodland.

Steers (1940) and party in 1939 reported that "near the southern end of the windward side at least four seedlings of Rhizophora have taken root on the reef near the cay." One seedling of Rhizophora mangle was seen rooted in the shallow lagoon about two meters off the western shore in 1963. This plant was not seen in 1967 but five young plants have since become established off the southern shore. Two of these are saplings about one meter tall. It is obvious that many seedlings of this species must be carried to the cay from the east but although some of them root on the reef or in the lagoon they seem to be transient and none has survived there to make a stable unit of mangrove vegetation.

The contrast between the negligible contribution of mangroves to the vegetation of this island and to that of other islands where mangroves form distinct communities of their own, emphasizes one of the main differences between this sand cay and the shingle cay, exemplified by Lime Cay.

#### Affinities of the Flora

Common widespread tropical littoral species comprise the early seral stages as would be expected. Among the woody components of the more stable phases are West Indian plants of more limited distribution e.g. Suriana maritima, Cordia sebestena and Capparis ferruginea. It is among this group of life forms, the shrubs and trees, that the most significant comparisons in floristic composition can be made between the islands and adjacent mainland formations.

Pelican Cay is nearest to the southern Hellshire Hills which support a vegetation of thicket and woodland on limestone. This area is calcareous and rocky or sandy to the sea.

Several non-maritime species are common to the Hellshire Hills thickets and Pelican Cay; all have baccate or drupaceous fruits and have not been reported from Lime Cay. These include:

*Bursera simaruba*  
*Citharexylum fruticosum*  
*Coccothrinax jamaicensis*  
*Metopium brownei*  
*Solanum bahamense*  
*Torrubia obtusata*  
*Trichostigma octandrum*  
*Vallesia antillana*

For comparison Lime Cay, which is close to the shingle, pebble and non-calcareous sand spit known as Palisadoes, has the following species in common with Palisadoes which are absent from Pelican Cay:

Mangroves

*Avicennia germinans* forming communities  
*Rhizophora mangle* " "  
*Languncularia racemosa* " "

Non-mangroves

*Acacia tortuosa*  
*Batis maritima*  
*Cassia emarginata*  
*Coccoloba uvifera*  
*Alteramnus lucidus* (*Gymnanthes lucida*)  
*Lemaireocereus hystrix*  
*Piscidia piscipula*  
*Pithecellobium unguis-cati*  
*Stigmaphyllon emarginatum*  
*Thespesia populnea*

These non-mangroves are all species of some importance in Jamaican, if not West Indian, coastal formations and it is remarkable that they do not occur on Pelican Cay. The fruits are mostly dry and quite different from those of the plants in the Pelican Cay list. It is possible that fruit-eating birds have been responsible for a relatively greater contribution to the Pelican Cay flora than to the plant colonisation of Lime Cay. Pelican Cay is much farther than Lime Cay from the mainland and it is less frequently visited by man. Thus differences can be attributed to proximity and opportunity to some extent, but it is believed that these differences also reflect an ecological distinction resulting from the sand and shingle structure recognized by Steers. These two cays each have 44 species of vascular plants but only 24 species in common. Pelican Cay has a more mesophytic aspect than Lime Cay, emphasized by the absence of both xeromorphic woody legumes and halophytic mangroves. Both islands lack epiphytes.

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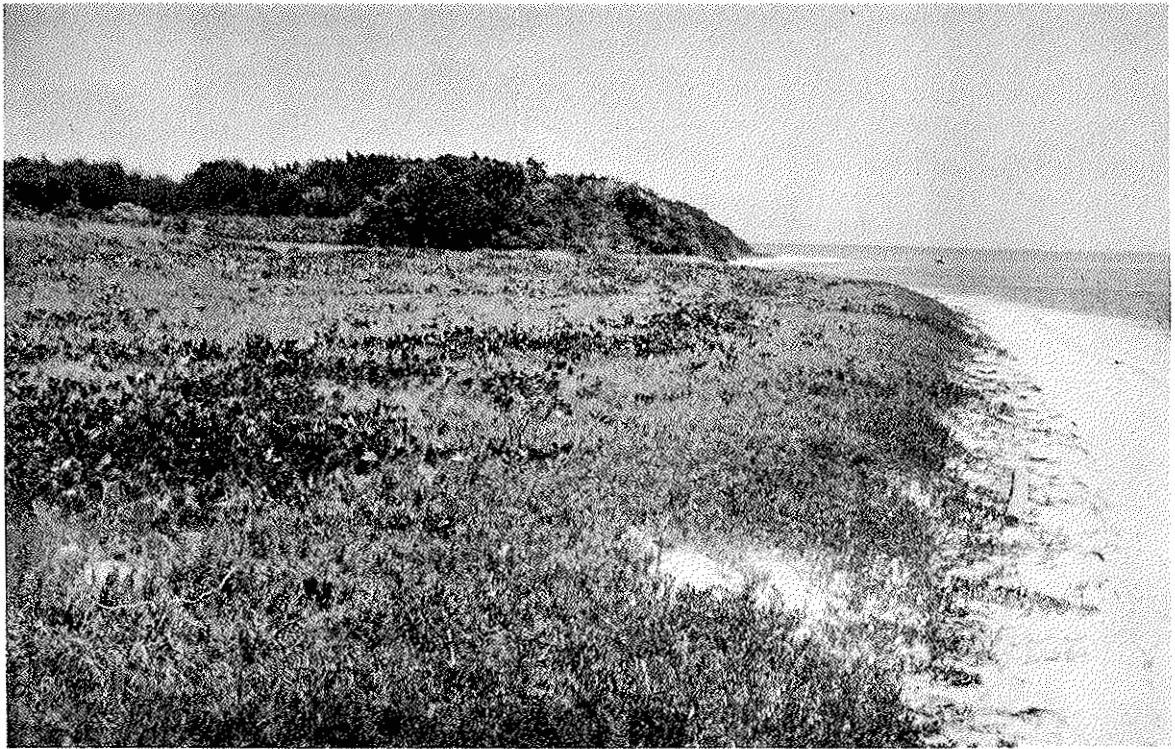


Plate 1. South shore and southeast tip. Pioneer zone on beach (Sesuvium) backed by Sporobolus and Canavalia. Conocarpus woodland at eastern end separated from grassland by thicket in middle distance. Note absence of offshore plants of Rhizophora (March 1963).



Plate 2. Southeast shore and tip. Conocarpus woodland in contact with Sesuvium at left. Note five saplings of Rhizophora offshore (October 1967). The reef is just below the horizon.



Plate 3. Boundary of Sporobolus grassland and thicket near the north-central part of the island. Sporobolus and Canavalia in left foreground. Hedge of Opuntia separates grassland from Suriana behind.



Plate 4. Typical old tree of Conocarpus in woodland. Note saplings of Conocarpus and solitary plant of Opuntia (in lower left corner) in otherwise open field layer.