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**ANEGADA ISLAND: VEGETATION AND FLORA**

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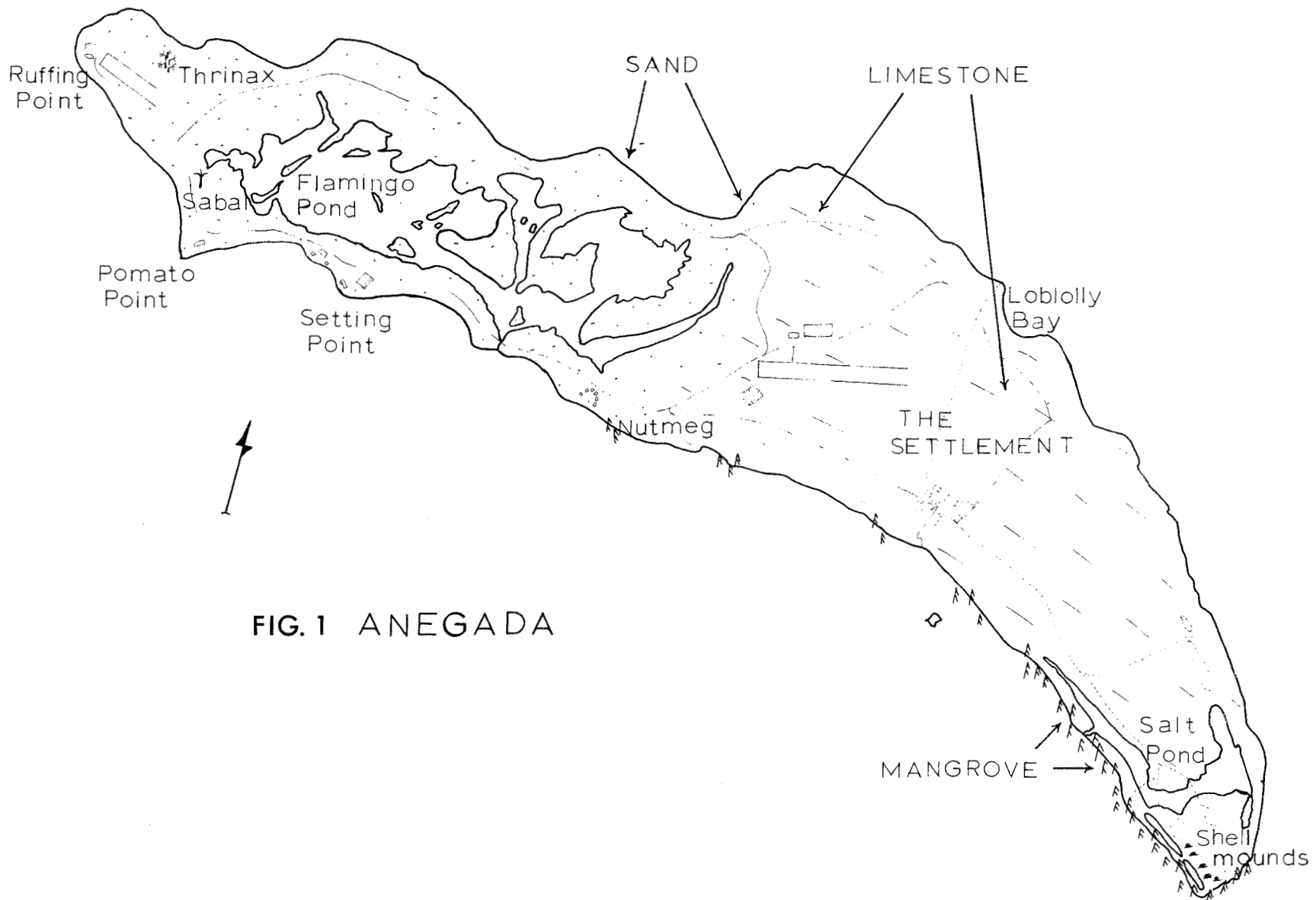


FIG. 1 ANEGADA

# ANEGADA ISLAND: VEGETATION AND FLORA<sup>1</sup>

by W. G. D'Arcy<sup>2</sup>

Anegada is a low, flat limestone island isolated from other land masses by prevailing wind direction and ocean currents, and although several nearby mountainous Virgin Islands are in view on the horizon, the 13 mile nearest distance is magnified insofar as possibilities for interchange of biota is concerned. The island is situated at the northeast tangent of the Antillean arc. It is about ten miles long and two miles wide with some large salt ponds, and it is populated by a cluster of West Indian families at The Settlement and, scattered around the island, a few recently arrived families from abroad (see map, Fig. 1.). In spite of the present small population, disturbance of the vegetation is of long standing and for much of the island, of a high order. The introduction of modern construction equipment in the past three years is already having an effect on the landscape. While the flora is mainly derived from that of dry sections of Puerto Rico and the vegetation structure is much like that of Barbuda and Anguilla, there are interesting differences.

The island has drawn the attention of several workers in the past, and recently I published an account with a brief checklist of the flora and summary of previous work (D'Arcy 1971). New field work has increased knowledge about the island and this is presented here: an annotated checklist of the flora and a description of the vegetation. An assessment is made of the effects of man on the flora and landscape. General information on the island is to be found in papers by Schomburgk (1832), Britton (1916) and Beard (1942). Britton & Wilson (1923, 1925) gave a floristic account based on the collections of N. L. Britton and W. C. Fishlock, then Curator of the Botanical Station, Road Town, and Beard in his account listed important plants and discussed the vegetation. A recent study of the birds was published by LaBastille and Richmond (1973).

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## GEOGRAPHY

Physical Features

Anegada is situated at 18°43'N and 64°19'W (The Settlement). It is ten miles long and 2-1/4 miles wide at its widest point with a surface area of 14.987 square miles (Klumb & Robbins 1960) or about 33 square km. The axis runs west by north and east by south and the overall shape is that of a crescent--concave to the Antillean arc. The greatest elevation is about 15 feet (ca 4.5 m).

Reliable rainfall data are wanting, but the amount is probably similar to that of Anguilla or Barbuda, similar flat islands at the east of the Caribbean Sea. Harris (1965) gives a mean of 39 inches for Barbuda and 45 inches for Anguilla. In this region, the months from January to April are usually dry and August to November are wet but there is great irregularity in the seasonal pattern. Even at points with comparatively high rainfall there may be periods of several months without significant rainfall (see D'Arcy 1967). Although Anegada is quite small and flat, Francis (1953) reported that "the island cumulous cloud that appeared each day reproduced remarkably the somewhat banana-shaped outline of the island." Because of the nearly continuous trade winds, this cloud probably drops little water on the island itself but may lead to precipitation in the sea to the west. Although the north coast enjoys a vigorous fanning from the trade winds, wind action inland is variable at ground level, some days being calm over much of the island and other days breezy. The breeze may be salt-laden at any point on the island.

Hurricanes strike the island infrequently but with considerable violence. Hurricane Donna of 1960 removed many of the houses in The Settlement from their foundations, and there was heavy rainfall. Schomburgk reported that a hurricane had occurred in 1819 which closed waterways and apparently reduced the mosquito population to an insignificant level.

During the winter months, a 'ground sea' coming from the north makes sailing rough and increases wave action on exposed north shores throughout the Virgin Islands. The difference in day length is about two hours between the winter and summer solstices. Temperature data are not available for the island but at Cruz Bay, St. John, some 25 miles to the southwest, the summer and winter maxima are 95 and 88° F respectively and the summer and winter minima 67 and 59° F respectively. The monthly mean temperatures range from 76.7 to 82.3° F. Both Beard and Francis reported that the daytime heat on the limestone plain was intolerable and I sometimes found the limestone pavement unpleasantly hot to touch. Temperature must impose a rigorous selection on the flora that can colonise the rock pavement and is a factor in maintaining generally xeric conditions on the island, even in times of good rainfall.

Extending out to sea along the south coast and southeast into the Anegada Passage is the Horseshoe Reef, one of the world's most

fearsome sailing hazards, vying with the reef off Anguilla and the shoals off Cape Sable in the North Atlantic in numbers of ships and lives lost. In the days of sailing transport when the Anegada Passage was a main route from Europe to the New World, this reef took a heavy toll and wrecking or spoiling was an important employment for residents of Anegada. The reef extends eight miles from East End and is five miles wide with scattered coral heads over most of its surface. Calcareous reef debris moves westward with the Antillean Stream which passes along the north coast and its narrow fringing reef. Sand is washed up on Anegada's north shore where it builds a dune of about 15 feet. The western third of the island consists of a sandy plain built up of sand blown from the north coast dunes, probably much of it across the limestone pavement which forms the eastern portion of the island. Some of this sand reenters the sea along the south coast where the dune is low or absent, and a counter-current returns some of it eastward again toward the main reef. To the west of the island's northernmost point is a ridge of sand on the sea floor extending to Jost Van Dykes some 25 miles further west.

Salt ponds cover a substantial portion of the Anegada land area. In the west, Flamingo Pond is the largest stretch of water. Surrounded on all sides by portions of the sandy plain, the western ponds have a narrow connection with the sea along the south coast, and Schomburgk mentioned a connection along the north coast which was blocked by the hurricane of 1819. There is probably considerable variation in the size of this pond depending on rain and wind conditions, but it is not apparent why drifting sand has not filled most or all of it in the century and a half since Schomburgk's visit. On Schomburgk's map the pond does not extend as far west as Pomato Point but now it extends well beyond this point. To the east, the large pond known as Salt Pond rests in a limestone saucer with exposed pavement sloping gently at the sides. Salt Pond has a narrow connection with the sea at the south side, and a fish weir in the Channel suggests some engineering by man. This pond now extends almost a mile further east on its southern arm as compared with Schomburgk's map, but the northern arm is somewhat contracted.

The eastern two thirds of the island consists of a limestone plain with here and there a shallow cover of sand, but much of the area is a naked limestone pavement. At the western end of this plain there is some exfoliating of the limestone in tiles. Puddles an inch or two deep lie in solution recesses of the pavement after a rain, and along the northern edge of the limestone plain are a few solution sink-holes or slobbs 8-10 feet deep which usually contain fresh water. Recent quarrying to a depth of 20-30 feet at the western end of the plain uncovered only a homogeneous appearing unbroken mass of creamy white limestone. Dr. Harold L. Levin examined hand samples from the quarry and found the material too compacted and degraded to yield much information, but he was able to state: "The rock is a bioclastic partially recrystallized limestone containing the foraminifer Archaias which ranges in age from Eocene to the Recent and has been recorded from Bermuda and Barbados."

### Man Made Features

The shell mounds at East End are good evidence of the presence of pre-European man. Covering half an acre and rising about 15 feet, the older mounds are now covered with a woodland of lignum vitae (Guaiacum), satinwood (Zanthoxylum) and other species, and one must scratch the surface to see that the mounds are, in fact, made of conch. A few yards further inland (to the west) are several slate-blue mounds of more recent date lacking vegetation altogether. These rise about eight feet above the limestone pavement. The mounds have been built up parallel to the south shore facing red mangroves across a channel just wide and deep enough to accept one or two canoes. The Indians evidently took their conch in the nearby reef and came to this point, the closest landfall, to clean the catch and perhaps dry it on the nearby stone pavement. The point is well sheltered from the sea and wood was available for fires or other domestic purposes. Schomburgk mentioned some of the mounds being pulled down for making building lime and the recent mounds were probably made by European or African settlers, but a good indication of pre-European conch harvesting is still intact.

In the years between the first European settlement and the past decade, man has affected the landscape mainly through burning and cutting the woods and through the introduction of his grazing animals. The main site of habitation was probably always The Settlement and this area has had the greatest disturbance. At other points there are some signs of former presence of man, e.g., a straight row of tall coconut trees on the sandy plain northwest of Flamingo Pond well away from the sea, but such indications are few. Until recently there were neither draught animals nor vehicles and hence no roads, and there were no paved walks. Well worn paths extended to various parts of the island and the Salt Pond is bridged in various places by stepping stones. One interesting feature which, if not man made, is at least man used, is "The Creek," a muddy pond of almost perfect rectangular shape about 20 feet on a side which harbors repugnant clouds of greenish scum and two species of Eleocharis not found elsewhere on the island. This pond, much used to water cattle, is about a mile east of The Settlement. It may be the same pond where Fishlock found Panicum geminatum in October, 1918. An important feature of the Anegada landscape is the stone fencing which divides the limestone plain into a reticulum of fields of one to many acres in size. The fences are of limestone tiles or small blocks and are mostly about three feet high. Until recently all land on Anegada was owned in common and it was important for the farmer to keep up his fences in order to maintain his claim to the plots he used. With economic changes of the past few years, fences are no longer maintained and animals roam the island at large.

In the 1950's a missile tracking station was established at the extreme west end of the island and an airstrip was prepared nearby. Both facilities are now abandoned; the airstrip is partly erased and the temporary buildings of the station are in decay. A recent purchaser may put this material and the nearby land back into use.

Late in the 1960's an enterprise from London, England, contracted with the local government for a large portion of Anegada to construct a

system of hotels and a retirement colony. Early in 1971, this enterprise ran into political and apparently also financial difficulties and withdrew from the colony. During the course of the project, several physical items of the scheme were initiated or completed and these are significant for the study of the island. The map (Fig. 1) indicates their approximate positions.

- A house site (actually a house trailer) was situated at Pomato Point.
- Former occupants of Setting Point were evicted and a small beach-side hotel was built. Adjacent to this a jetty was built and several large metal buildings were erected to house equipment and a shopping facility. The Setting Point clearing involved several acres.
- Inland from Windlas Bight on the north side of the island a large electric power plant was completed but never put into operation.
- At the western end of the limestone plain a new airstrip was prepared and this is in current use.
- Near Nutmeg Point a staff housing project of about a dozen houses of greenheart wood from Guyana was erected and several houses were occupied by staff.
- Roads were cut and graded between The Settlement and Pomato Point and to the power plant on the north. In addition, motorable tracks were extended to west end, to Loblolly Point and around Flamingo Pond on the north.
- A quarry some 50 feet on a side and 25 feet deep was dug near the airport.
- For work on the projects, a number of workmen were imported from the United Kingdom and these people, some with families, camped in tents or shacks in the western part of the island. By mid 1971, all had departed.

The projects built at this time opened new areas for plants associated with disturbance, while the habitats of several farms were eliminated or drastically altered. Weeds seen on the Soares farm at Setting Point in 1970 had moved with the family to the new farm site west along the south coast when the Setting Point farm was abandoned in 1971. The airport site took over farms which residents say had been active at that time, and it is difficult to say whether the weeds now associated with the airport were newly introduced or are holdovers from the former farming activity.

The activities in the western part of the island meant new economic pursuits for the residents of The Settlement. Fences for cattle holding and boats for fishing were let decay and many new concrete block houses arose in The Settlement. The main street was paved for most of its distance and a new water catchment was built near the school. Several residents acquired motor vehicles. There are now three or four small shops instead of one.

At the close of the hotel and residential colony scheme, the government took over the physical resources of the London developers and has not yet found a firm basis for continuing the scheme. By midyear 1971 the only people living outside The Settlement were those at the Soares homestead between Setting Point and Pomato Point and one or two

caretakers for the Setting Point hotel complex. However, the present is only a lull in the inevitable march towards modern development of the island. Whether the development means tourists, residents, or industry, it is certain that the recent construction is but a token of what is to come. The surface of the island will be substantially modified in the not too distant future. One drastic proposal is for the United States Navy to use the island as a naval gunnery target in replacement for the Culebra Range (Puerto Rico) where inhabitants have objected to the proximity of the present naval range (San Juan Star, 23 February, 1972). Perhaps the Government of the Virgin Islands will be able to set aside some of the island's most interesting localities for preservation. The shell mounds at East End and the palm communities in the west (D'Arcy 1971b) would be well worth saving.

#### VEGETATION

The vegetation of Anegada accords well with what Beard (1944) referred to as "Evergreen Bushland" and it corresponds closely with that vegetation type as it occurs on Barbuda. The substrata and other conditions are similar and have led to accumulation of a similar flora with a like physiognomy. Photos shown by Beard, Stoffers (1957) and Harris (1965) bear this out. An important difference is in the degree to which introduced species have modified the original vegetation. Arborecent species introduced into the Leeward Islands which have become important in the vegetation such as logwood (Haematoxylon campechianum), acacia (Acacia farnesiana, A. macrantha, etc.), mesquite (Prosopis juliflora), and species of Citrus, Eucalyptus or Ananas do not occur in the wild if at all on Anegada. Tamarindus indica is the sole alien tree seen and this occurs only in limited numbers at the western side of the airport. Beard specifically mentioned the Anegada situation as a "degraded bushland," and it certainly is that, both in terms of total floristic composition and in structure. Both Beard and Harris assumed that man and his animals are almost entirely responsible for this sort of situation, but this is less so on parts of Anegada than in the areas these workers described. Anegada's vegetation may be considered under four heads: the shorelines, the sandy plain, the limestone plain, and the vegetation near man. Other writers have not distinguished between the first two of these vegetation units but on Anegada there are ample differences. The vegetation under human influence is considered below under the edaphic categories.

#### The Shorelines

The entire north seacoast is a high dune mostly surmounted by a littoral hedge of Suriana maritima, Tournefortia gnaphalodes and Coccoloba uvifera. This association also occurs on the south coast west of Saltheap Point, although there is almost no dune and the shrubs are seldom dense enough to be considered a hedge. Occasional plants of Cenchrus echinatus, Leptochloöpsis virgata, Sporobolus virginicus, Cyperus elegans, Sesuvium portulacastrum and Scaevola plumieri also form part of this seacoast group. Cakile lanceolata, Canavalia maritima and Ipomoea pes-caprae are quite uncommon and may, in fact, occur as frequent adventives rather than as natural components of the flora. The shores of Flamingo Pond and the other salt ponds in the west are lined



with thickets or solitary plants of Conocarpus erecta, Coccoloba uvifera, Laguncularia racemosa and Borreria arborescens, mostly not more than 3 m tall and in the west only 1 m tall. In patches starting near Nutmeg Point and becoming a solid mass east of The Settlement, red mangroves (Rhizophora mangle) border the south coast, apparently without epiphytes or associates. Salt Pond in the east is surrounded by large areas of Batis maritima, Sueda linearis, Philoxerus vermicularis and Salicornia perennis. Along the south shore of the pond are abundant clumps of Salicornia bigelovii. Above the level of these diminutive succulents, the flora of the limestone plain begins. Behind the north coast dunes there is often a transition area where the flat limestone is covered here and there with sand from the dune. In this strip occur Tragus berteronianus, Cyperus cuspidatus, Ximenia americana, Stylosanthes hamata, Turnera diffusa, Evolvulus bracei, Borreria verticellata and Heliotropium microphyllum. These are all species of xeromorphic appearance and all except the Ximenia are diminutive. Not really forming a vegetation unit, these plants may represent an interdune flora between the littoral hedge and the interior woodland.

### The Sandy Plain

The plant community on the sandy plain comprises almost a dozen frequently found species of shrubs, half a dozen species of forbs, epiphytes or lianas and a dozen or so other species occurring in small numbers or only locally. The dominants are plentiful throughout the plain and range from 2 to 3 m in height, sometimes dense, but often with spaces wide enough for a man to walk through. The growth is mostly erect and flowering is in the "canopy" or near it. Spines are absent except for the sharp leaf tips of Ernodia littoralis. The dominant shrubs are:

Byrsonima lucida  
Chamaesyce articulata  
Croton discolor  
Cassine xylocarpa  
Crossopetalum rhacoma

Dodonaea viscosa  
Jacquinia arborea  
Lantana involucrata  
Erithalis fruticosa  
Gundlachia corymbosa

Growing on these shrubs as lianas or epiphytes are:

Encyclia bifida  
Tetramicra elegans  
Cassytha filiformis

Jacquemontia cayensis  
Cynanchum anegadensis

Nearly at ground level, Ernodea littoralis, Polygala hetacantha, Fimbristylis spadicea and Strumpfia maritima are very frequent, the Strumpfia often attaining a meter in height and breadth. Nearly two dozen other species occur on the sandy plain, some of them such as Borreria arborescens and Leptochloopsis virgata wandering onto the plain from nearby shoreline habitats. Trees are rare but a few Sabal cauiarum palms are conspicuous, a small, leathery leaved form of Tabebuia pallida occurs in small copses, scattered trees of Pisonia subcordata, Coccoloba krugii and Bumelia obovata are present, and occasional plants of Urechites lutea provide splashes of color. In a

swale-like depression near the northwest corner of the island is a flourishing colony of the dwarf palm, Thrinax morrisii. Beneath palms and the Pisonia trees specimens of Lasiacis divaricata, Gymnanthes lucida, Passiflora suberosa and Canella winteriana hover tenaciously at the threshold of survival.

Disturbed areas on the sandy plain have a special flora not found elsewhere on the island, all small, weedy species. The following occur on the airstrip, the house sites, or farm areas of the sandy plain:

<u>Chloris petraea</u>	<u>Phyllanthus amarus</u>
<u>Chamaesyce blodgettii</u>	<u>P. caribaeus</u>
<u>C. prostrata</u>	<u>Heliotropium angiospermum</u>
<u>C. serpens</u>	<u>Physalis angulata</u>
<u>C. torralbasii</u>	<u>Portulaca oleracea</u>

Only Portulaca oleracea of this list has been found elsewhere on Anegada.

Most of the plants composing the natural vegetation of the sandy plain occur also on the limestone to the east, some of them plentifully. Except for the endemic Cyanchum, the species are mostly widespread in the Caribbean area, although the Chamaesyce, Tetramicra, Jacquemontia and Polygala are restricted to the northeastern portion of the Caribbean. The floristic composition is clearly under edaphic control as not many of the evergreen bushland species which occur on the limestone plain manage to inhabit the sandy plain. A limited range of pollinators may add to the difficulty many species must have in establishing in this overdrained, overalkaline, undernourished substrate. It is not surprising that this vegetation includes as dominant members of such calciphilic families as the Euphorbiaceae, Celastraceae and Malpighiaceae.

Except for the obviously disturbed areas there is little in the flora or the physiognomy of the plants suggesting the influence of man or his animals. The resistance of some similar communities to floristic adulteration by species transported by man has been commented on by Sauer (1967). However, the possibility of long past use of fire or cutting out of the larger trees cannot be dismissed as reasons for the limited height of the scrub rather than the obvious wind and edaphic inhibitants to growth. On other islands, vegetation like that of Anegada's sandy plain is considered a part of the coastal dune vegetation. Palmetto Point, Barbuda, to judge from the literature and photographs may also have a sufficient area of sandy plain for it to be considered distinctive.

No observations were made of possible pollinators on the plain but the visitor is struck with the sameness of flowers of several different species. The Jacquinia, Jacquemontia, Cyanchum, Erithalis, Ernodia and Bumelia all have small, tube-like flowers, and the Croton, Chamaesyce and Polygala have differently shaped flowers of the same order of size. All of these flowers are brilliant white in the sunshine but become less conspicuous late in the day or at dusk. The Lantana involucrata has a small white flower too, but it becomes conspicuous late in the day or at dusk when it takes on a purplish hue and appears almost iridescent

against the foliage. Yet another flower-form syndrome is suggested by the two orchids and the Byrsonima which have creamy flowers with a good admixture of purple from throat lines and sometimes yellowish or orange in the throat. The flower of the Strumpfia is not unlike this in color pattern.

LaBastille and Richmond (1973) reported two species of hummingbird from Anegada, both seen in numbers on beaches and one on the scrub of the sandy plain. The typical hummingbird flower, i.e., a red tube, no fragrance and situated above the ground, is absent from the native flora of Anegada except for Oplonia microphylla, and there are no such flowers at all in the beach areas or the sandy plain. It is well known that hummingbirds rely on insects as a source of protein, but there are probably few areas of the world where hummingbirds exist without flowers of the typical hummingbird pollination morphology.

Another non botanical feature seen on this vegetation, chiefly on shrubs of Crossopetalum rhacoma and Cassine xylocarpa are the abundant snails, Drymaeus virgulatus elongatus (Röding), as many as 50 per bush 2 m tall. These adhere so tightly to the branches that to pull one off strips the bark, yet after a night of wind storm, all had disappeared and two days later very few had reappeared. Spent shells of these snails are abundant on the sandy surface of the plain.

#### The Limestone Plain

The limestone plain holds the richest flora on the island, and while many plants may be found throughout, it is by no means homogeneous. Reasons for variations in flora and vegetation are not always apparent. At the extreme east end of the island on the shell mounds and nearby, there is a woodland with a closed canopy and trees 20 feet tall of Guaiacum, Zanthoxylum, Pisonia and other arborescent species. Not far to the west, this formation undergoes changes which may be attributed largely to grazing. The trees are smaller, there is open space between them, and there is little soil cover. The major wooded area of the island east of The Settlement could probably be classed as a thorn woodland, yet the mesquite, acacias, citrus and other species typical of thorn woodland on nearby islands are wanting here, and not even cacti are plentiful. There are a number of species with thorny trunks or spines on fleshy basal leaves, but more remarkable is the number of species (or percentage of the flora) with spiny, small leaves. Fishlockia, Comocladia, Pictetia, Pithecellobium, Caesalpinia, Malpighia, Jacquinia and Ernodea all have leathery, shiny leaves with sharp spines, a feature well represented in the floras of Cuba and Hispaniola but perhaps not common elsewhere.

A second feature of this vegetation is the tendency for plants to form "labyrinth shrubs." Such shrubs are an impenetrable mass of woody twigs and thorns with the tiny leaves well protected within, and may be a response to the presence of a nibbling herbivore, especially in the absence of grass. On Anegada these shrubs sometimes stand 1.5 m high and extend 1.5 m across, sometimes forming thickets over extensive areas. Forestiera eggersiana, Clerodendron, Lycium, Randia and Oplonia all take on this form here and such species as Zizyphus, Pithecellobium and

Caesalpinia are not far from it. Commicarpus and Jacquinia berterii have a similar appearance but their structure seems to provide less protection from grazing. This degraded bushland or anomalous thorn woodland extends to the western edge of the limestone plain with regional differences in height perhaps associated with variations in grazing pressure. Behind the north shore dune there is a dense thicket or krumholz formation of Cassine, Rhacoma and some other species which also occur on the sandy plain. Tournefortia and Ficus are also found here. Just west of The Settlement, the land is more open than elsewhere and there is more rock scattered on the surface. Here are the conspicuous stands of Plumeria alba, Agave missionum and Bursera simaruba and the cacti, Opuntia dillenii, Pilosocereus royenii and epiphytic Tylocereus trigonus. Whether this flora is really richer than elsewhere on the limestone plain is problematical, but a number of species are frequent which are not conspicuous elsewhere.

The Settlement is the most heavily grazed area on the island and it is bare of all but the most resistant species. Several diminutive species live beneath the grazing limits of even sheep and goats including Sida ciliaris, S. procumbens, Alysicarpus vaginalis, Stylosanthes hamata, Portulaca halimoides, P. quadrifida and the parasite Cuscuta umbellata as well as species of Chamaesyce. Also well established around The Settlement are a number of aliens such as Physalis cordata, Coleus amboinicus, Kalanchoe pinnata, Solanum elaeagnifolium and Aloe barbadensis.

Several species were observed only on the cut and grazed edges of the airport runway and several others were seen only near the airport entrance. Those particular to the runway are all wide ranging aliens while those seen only near the airport entrance include species which are probably native. Reasons for the special diversity at this western edge of the limestone were not evident, although disturbance is certainly an important factor. Plants found only on the runway are:

<u>Dactyloctenium aegyptium</u>	<u>Rhynchosia minima</u>
<u>Chenopodium ambrosioides</u>	<u>Kallstroemia pubescens</u>
<u>Achyranthes aspera</u>	<u>Abutilon umbellatum</u>
<u>Boerhavia erecta</u>	<u>Ipomoea triloba</u>
<u>Argemone mexicana</u>	<u>Pectis linifolia</u>
<u>Centrosema virginianum</u>	

Plants found only near the airport entrance:

<u>Sporobolus pyramidatus</u>	<u>Euphorbia petiolaris</u>
<u>Commicarpus scandens</u>	<u>Rauwolfia viridis</u>
<u>Tamarindus indica</u>	<u>Capparis flexuosa</u>
<u>Erythroxylum rotundifolium</u>	<u>Heliotropium microphyllum</u>

#### THE ANEGADA FLORA

Some 210 species of vascular plants are known to grow on Anegada outside of cultivation and another 31 species are cultivated, mostly as garden ornamentals. The known non-vascular flora comprises three bryophytes, one charophyte, one blue green alga and nine lichens. There are

no pteridophytes. This flora includes one endemic genus, two endemic species of flowering plant and one endemic lichen. Most of the species occurring on Anegada occur also on Puerto Rico and on others of the Virgin Islands, but there are some which bypass these closest land masses and are disjunct on Hispaniola or Cuba or are found on one or more of the flat "limestone caribeas." While many species now growing on the island are pan-caribbean or pan-tropical weeds, the identifiable adulteration of the flora outside the immediate environs of man is negligible. The pasture animals which roam the island have had a significant impact on the physiognomy of the vegetation but have not led to the establishment of many obviously alien species.

The alkaline substrate, insolation, xeric moisture regime and the effects of wind and salt spray make the island unsuitable for a great proportion of the Caribbean flora. But similar habitats are the rule on the limestone caribeas, the chain of small flat coralline land masses flanking the outside of the Caribbean arc from Barbados to South Florida, and many species of flowering plants are common throughout the chain, including Anegada. Similar habitats appear in limited areas of the Greater Antilles, and some of the species from Anegada and other limestone outer islands occur in these sites. Ocean currents, prevailing winds and bird routes move in directions which tend to facilitate transport of material from Anegada to the north and west and to other islands, but discourage movement in the opposite direction, thus isolating Anegada from other biota and from the gene pools of the rest of the Caribbean. The result is the small but distinctive flora and vegetation structure, selected in the presumably short life of this recently created island with its rigorous selection regime.

The bird life of Anegada was recently described by LaBastille and Richmond (1973). They recorded two doves and a grassquit as the only granivorous species, none of these migratory. Ducks and shore birds, which sometimes feed on vegetable matter, occur as winter migrants. Of the 19 species of terrestrial habitat, only two doves, a cuckoo, an ani, two hummingbirds, a mockingbird, a thrasher, and a grassquit can be suspected of including plant material in their regular diet and none of these species is migratory. Opportunities for introduction of plant species by birds is restricted to the accident of a bird far off course coincident with his carrying propagable material.

For the most part, the character of the flora suggests an immigrant pattern where a random selection of species managed to reach and colonize the island. The Rubiaceae and Compositae, often the largest families in tropical floras, are not the largest here, and they are represented on Anegada by seven and eight genera respectively, each genus with one species, and more than half the species of these two families on Anegada can be traced to sources distant and independent of the evolutionary conditions of the northern and eastern Caribbean. But in some groups, evolution seems to be taking place on Anegada or at least the Anegada plants seem to be part of groups undergoing speciation in the region, if not participating in the same gene pools. Chamaesyce is the best example with eight species occurring on Anegada, most of them ranging through the limestone caribeas or Greater Antilles, but also the Urticaceae (Pilea),

Caesalpinaceae (Caesalpinia), Mimosaceae (Fishlockia), Malpighiaceae (Malpighia), Oleaceae (Forestiera), Asclepiadaceae (Cynanchum), Convolvulaceae (Evolvulus), Boraginaceae (Cordia, Heliotropium), each has either endemic species on Anegada or very similar and closely related species within the evolutionary theatre of the Antilles. The above does not dismiss, but neither does it require, past land connection between Anegada and other islands. Whether or not Anegada was continuous with other Virgin Islands during the pleistocene glaciations, it has had effective biological isolation of a significant order since. And because of the direction of principal vectors, a new taxon evolving on Anegada might not remain endemic for long but have its range extended downstream to other islands by wind or water.

### The Checklist

The checklist is based on published reports by previous workers and the writer's own collections and observations. Four visits were made to Anegada, the first in 1959 for a few hours when no collections were made and the second in 1967 for a like time when a few collections were made (D'Arcy 1971a). Then, facilitated by the West Indies Laboratory, two visits of about a week each were made in February and August 1971 for intensive collecting. Motor transport was available on both occasions. A limited range of material collected by N. L. Britton and W. C. Fishlock was borrowed from New York Botanical Garden to clarify specific points. The main set of collections is lodged with the Missouri Botanical Garden, but duplicates and even some of the unicate collections were placed with a number of other institutions. The abbreviations for herbaria which follow collectors' numbers are those listed in Index Herbariorum Part I ed. 5 (Regnum Vegetabile 31. 1964. Utrecht).

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Format

The checklist follows the order of Britton and Wilson (1923, 1925) which is essentially that of Dalla Torre and Harms. Nomenclature has been corrected, but recourse to type specimens was made in only a few cases. Citation of "B. & W." or of a Britton or a Fishlock specimen indicates that the species was reported by Britton and Wilson (l.c.). Only cultivated species are reported solely on the basis of sight records.

A. VASCULAR PLANTS

POACEAE

[Arundo sp.]

Reported by Schomburgk (1832) but not collected since. He may have been referring to Lasiacis divaricata.

Cenchrus echinatus L.

Frequent near the sea and scattered plants on the sandy plain. D'Arcy 4815 (MO).

Chloris petraea Sw.

In chickenyard, Setting Point. D'Arcy 4830 (MO).

Dactyloctenium aegyptium (L.) Willd.

Weed around the airport. D'Arcy 5117 (MO).

Echinochloa colonum (L.) Gaertn.

On limestone pavement between The Settlement and Loblolly Bay. This grass withstands high temperatures from the heated limestone. Leaves on Anegada material have prominent purple transverse lines. D'Arcy 2127 (FLAS).

Eragrostis tenella (L.) Beauv.

Scattered clumps around the island, both on the sandy plain and the limestone and in The Settlement. D'Arcy 4808 (FAU, MO, SIU, US); 4885 (MO).

Eragrostis ciliaris (L.) R. Br. [= E. urbaniana sensu B. & W.]

Scattered clumps around the island. Britton & Fishlock 957 (NY); D'Arcy 4823 (MO, SIU); 5064B (MO).

Lasiacis divaricata (L.) Hitchc.

Rare, growing in shade of Pisonia trees on the sandy plain. D'Arcy 4843 (MO).

Leptochloëpsis virgata (Poir.) Yates [= Uniola virgata].

Isolated clumps, mostly near the sea, various parts of the coastline. D'Arcy 4926 (C, FAU, MO, US); 4873 (MO).

Panicum geminatum Forsk.

"Water hole near settlement." Britton & Fishlock 1016 (NY).

Panicum utowanaeum Scribn.

"Thickets, junction of rocky and sandy parts." This species has prominent brown nodes. Fishlock 45 (NY).

Paspalum laxum Lam.

Frequent isolated clumps on the sandy plain. B. & W.; D'Arcy 4798 (MO); 4858 (MO).

Sporobolus pyramidatus (Lam.) Hitchc.

In scrub west of airport. D'Arcy 4891 (MO).

Sporobolus virginicus (L.) Kunth

At edge of Flamingo Pond; sandy plain near the sea. D'Arcy 4897 (MO, SIU).

Tragus berteronianus Schult.

Abundant locally in interdune area behind Loblolly Bay. D'Arcy 4955 (C, MO).

## CYPERACEAE

Abildgaardia ovata (Burm. f.) Kral

B. & W. [as A. monostachya (L.) Hassk.].

Cyperus cuspidatus H.B.K.

B. & W.

Cyperus elegans L.

Scattered behind dunes of north shore, Loblolly Bay. B. & W.; D'Arcy 4922 (MO); 4923 (MO).



Cyperus humilis Kunth

Western portion of the limestone plain. D'Arcy 4906A (MO).

Cyperus planifolius Rich.

Abundant but widely scattered on the sandy plain. B. & W. [as C. brunneus Sw.]; D'Arcy 4847 (MO); 4849 (MO); 4857 (MO).

Eleocharis atropurpurea (Retz.) Kunth

Forming dense mats in and around "The Creek," a muddy pond northeast of The Settlement. D'Arcy 5144 (C, IJ, MO).

Eleocharis mutata (L.) R. & S.

A few clumps in "The Creek." D'Arcy 5067 (MO, SIU).

Fimbristylis inaguensis Britt.

"Sandy plain, West End." Britton & Fishlock 966 (NY).

Fimbristylis spadicea (L.) Vahl

Scattered clumps around the sandy plain. D'Arcy 4811 (BM, C, FAU, MO, SIU); 4836 (FAU, MO).

## ARECACEAE

Cocos nucifera L.

A few trees around The Settlement and a small avenue at the west end well away from the sea. Sight record.

Sabal causiarum (Cook) Becc.

A few plants on the sandy plain (cf. D'Arcy 1971b). D'Arcy 4950 (FAU, MO, SIU).

Thrinax morrisii Wendl.

A numerous colony in a swale near West End. (cf. D'Arcy 1971b). B. & W.; D'Arcy 5096 (A, MO, SIU).

## BROMELIACEAE

Bromelia pinguin L.

Sparingly cultivated as a hedge around The Settlement. Sight record.

Tillandsia utriculata L.

Occasional in Pisonia trees in various parts of the island.  
B. & W.; D'Arcy 4899 (MO).

## COMMELINACEAE

Commelina elegans Kunth

B. & W.

Setcreasea purpurea Boom

Cultivated in The Settlement for ornament. Sight record.

## LILIACEAE

Aloe barbadensis Mill.

Naturalized on limestone pavement in and to the immediate west of  
The Settlement. Sight record.

## AMARYLLIDACEAE

Agave missionum Trel.

Abundant and conspicuous on the limestone plain west of The  
Settlement. B. & W.; D'Arcy 4910 (MO).

Furcraea tuberosa Ait. f.

A solitary plant cultivated in The Settlement. B. & W.; D'Arcy  
4982 (IJ, MO).

Pancratium sp.

Cultivated for ornament in The Settlement. Sight record.

Sansevieria metallica Gérôme & Labroy

Cultivated for ornament in The Settlement. Sight record.

## ORCHIDACEAE

Encyclia bifida (Aubl.) Britt. & Wils.

Abundant on the sandy plain where it grows as an epiphyte on low  
shrubs, the scapes waving above the scrub. Occasional plants  
occur on trees in eastern parts of the island. D'Arcy 4827 (C,  
DAO, FAU, FTG, GH, IJ, MO, NSW, NY, SIU).

Spiranthes stahlii Cogn. in Urb.

B. & W. [as Mesadenus lucayanus (Britt.) Schlecht.].

Tetramicra elegans (Hamilt.) Dogn.

Abundant in localized patches on the sandy plain as an epiphyte on low shrubs. B. & W.; D'Arcy 4831 (BC, C, FAU, FTG, IJ, MO, NSW, P, PMA); 5102 (MO).

#### MORACEAE

Ficus citrifolia Mill. var. citrifolia

Abundant on the limestone plain west of The Settlement and apparently cultivated in The Settlement itself. D'Arcy 4907 (MO, SIU); 4949 (BM, C, FAU, IJ, MO, SCZ, US).

Ficus citrifolia Mill. var. brevifolia (Nutt.) D'Arcy

A few trees west of The Settlement along the main road. The sterile specimen cited was identified by its red bark. D'Arcy 5075 (MO).

#### URTICACEAE

Pilea microphylla (L.) Liebm.

Britton & Wilson reported three species of Pilea which may be interpreted as variants of P. microphylla. At the edges of temporary pools and under low shrubbery on the limestone plain east of The Settlement, a race of this species forms frequent mats of delicate greenery and resembles what is frequently assigned to P. microphylla var. herniaroides (Sw.) Griseb. The erect, succulent stemmed variant commonly called "Artillery Plant" was seen cultivated for ornament in The Settlement but was not collected. B. & W. [as P. margarettae Britt., P. microphylla and P. tenerrima Miq.]; D'Arcy 5064 (MO).

#### OLACACEAE

Schoepfia obovata C. Wright

On the limestone plain west of The Settlement. D'Arcy 5978 (A, BM, C, FAU, IJ, MO).

Ximenia americana L.

Seen only in dense thickets behind Loblolly Bay. D'Arcy 4924 (MO).

#### LORANTHACEAE

Dendropemon caribaeum Krug & Urb.

Frequent on Pisonia trees. B. & W.; D'Arcy 4961 (MO); 5097 (A, MO, SIU).

## POLYGONACEAE

Coccoloba krugii Lindl.

Copses on the sandy plain and also on limestone. B. & W.; D'Arcy 2138 (FLAS); 4845 (MO, SIU, US); 5124 (A, MO).

Coccoloba uvifera (L.) Lindl.

Frequent coastal shrub and scattered clumps around the sandy plain. B. & W.; D'Arcy 4810 (MO).

## CHENOPODIACEAE

Chenopodium ambrosioides L.

Weed at the airport. D'Arcy 5113 (MO, SIU).

Chenopodium murale L.

Weed in The Settlement. D'Arcy 4981 (MO).

Salicornia bigelovii Torr.

Forming large masses on the south shore of the large Salt Pond in the eastern part of the island, rooting in a layer of mud covering the limestone pavement. D'Arcy 4963 (BM, C, FAU, IJ, MO, SIU, US).

Salicornia perennis Mill.

Frequent in shallow fresh and brackish water ponds in the eastern parts of the island; also along the south shore. B. & W.; D'Arcy 2120 (FLAS); 4916 (MO, SIU).

Sueda linearis (Ell.) Moq.

Behind the dunes on the north shore and at scattered points on the limestone plain. D'Arcy 4972 (MO); 5133 (MO).

## AMARANTHACEAE

Achyranthes aspera L.

Weed at the airport. D'Arcy 5119 (MO).

Achyranthes portoricensis (Ktze.) Standl.

B. & W. [a specimen to support this record was not located at NY].

Amaranthus caudatus L.

Cultivated for ornament in The Settlement. Sight record.

Amaranthus crassipes Schlecht.

Weed near habitation in various parts of the island. D'Arcy 4853 (MO); 4983 (MO).

Lithophila muscoides Sw.

Common, grazed ground of the limestone plain. B. & W.; D'Arcy 4884 (A, BM, C, FAU, IJ, MO, SIU, US).

Philoxerus vermicularis (L.) Beauv.

Loblolly Bay. B. & W.; D'Arcy 4945 (MO).

## NYCTAGINACEAE

Bougainvillia spectabilis Willd.

Cultivated for ornament in The Settlement and around other houses. Sight record.

Boerhavia diffusa L.

Weed in The Settlement, rare. D'Arcy 4909B (MO).

Boerhavia erecta L.

Weed at the airport. D'Arcy 5114 (MO).

Commicarpus scandens (L.) Standl.

Plentiful on disturbance northwest of the airport. D'Arcy 4938 (MO, SIU).

Mirabilis jalapa L.

Cultivated for ornament. Sight record.

Pisonia subcordata Sw.

A plentiful tree except on the sandy plain where rare. B. & W.; D'Arcy 4875 (MO, SIU).

## BATIDACEAE

Batis maritima L.

Plentiful near the seacoasts and near the ponds. D'Arcy 4803 (MO).

## AIZOACEAE

Cypselea humifusa Turp.

On the sandy plain near the ponds. B. & W.; D'Arcy 5084 (MO).

Sesuvium portulacastrum (L.) L.

Disturbed areas near beaches. D'Arcy 4931 (MO).

## PORTULACACEAE

Portulaca halimoides L.

Plentiful in The Settlement and other disturbed or grazed areas, also the sandy plain. Britton & Fishlock 1060 (NY); Fishlock 30 (NY); D'Arcy 4975 (MO).

Portulaca oleracea L.

Plentiful in The Settlement and other points of disturbance. B. & W.; D'Arcy 4974 (C, FAU, IJ, MO, SCZ, SIU, US).

Portulaca quadrifida L.

Plentiful on sand in and around The Settlement. D'Arcy 4902 (MO).

Talinum triangulare (Jacq.) Willd.

Cultivated in The Settlement. Sight record.

## ANNONACEAE

Annona squamosa L.

A few cultivated trees in The Settlement. D'Arcy 4910 (MO).

## LAURACEAE

Cassytha filiformis L.

Most plentiful on the sandy plain sometimes forming bright orange masses on herbs and shrubs; infesting Ernodia, Coccoloba and especially Dodonaea. D'Arcy 4817 (MO; 4837 (MO).

## PAPAVERACEAE

Argemone mexicana L.

A small patch near the airport entrance. D'Arcy 4934 (MO).

## CRUCIFERAE

Cakile lanceolata (Willd.) O. E. Schulz

Infrequent by the sea. D'Arcy 4816 (MO).

Capparis cynophallophora L.

Scattered trees on the limestone plain, several just west of The Settlement. D'Arcy 4898 (C, FAU, IJ, MO, SIU, US).

Capparis flexuosa (L.) L.

Scattered trees on the limestone plain. D'Arcy 4874 (MO).

## MORINGACEAE

Moringa oleifera Lam.

Cultivated at The Settlement. Sight record.

## CRASSULACEAE

Kalanchoë pinnata (Lam.) Pers.

Plentiful clumps in and near The Settlement. D'Arcy 4894 (MO).

Kalanchoë somaliensis Hook. f.

Cultivated for ornament in The Settlement. Sight record.

## MIMOSACEAE

Desmanthus virgatus (L.) Willd.

Only a few plants seen at East End. D'Arcy 5068 (MO).

Fishlockia anegadensis (Britt.) Britt. & Rose

Most plentiful west of The Settlement, it occurs throughout wooded portions of the limestone plain. Until plants are at least several dm tall, the leaves are pinnate, several-foliolate in the fashion of many species of Acacia. Even the smallest juvenile seen was spiny. A second view of the plant showed that this writer's earlier report of spines 8 cm long is exaggerated: the longest are 3-4 cm, still formidable. B. & W.; D'Arcy 2124 (FLAS); 4903 (FAU, MO, SIU, US); 4909C [juvenile] (MO); 4976 [juvenile] (A, MO).

Pithecellobium unguis-cati (L.) Mart.

Plentiful west of The Settlement. B. & W.; D'Arcy 4947 (FAU, MO, SIU).

## CAESALPINIACEAE

Caesalpinia ciliata Urb.

Rare, occurring on the limestone plain west of The Settlement.  
D'Arcy 4872 (C, FAU, IJ, MO, SIU, US).

Caesalpinia pulcherrima (L.) Sw.

Cultivated for ornament in The Settlement. Sight record.

Cassia bicapsularis L.

The Settlement. B. & W.; D'Arcy sight record.

Cassia glandulosa var. swartzii (Wickstr.) J. F. Macbr.

A rare plant behind the dunes. B. & W.; D'Arcy 4921 (MO).

Cassia polyphylla Jacq.

"Tree 4 m tall, rocky plain near settlement." Britton & Fishlock  
1034 (NY).

Cassia sophera L.

An uncommon weed in The Settlement. Britton & Fishlock 995 (NY);  
D'Arcy 2123 (FLAS, MO) [reported as C. occidentalis L. by D'Arcy  
1971b].

Delonix regia (Boj.) Raf.

One large cultivated tree in The Settlement. Sight record.

Tamarindus indica L.

Several large trees near the airport. D'Arcy 4937 (A, BM, C, FAU,  
IJ, MO, SIU, US).

## FABACEAE

Alysicarpus vaginalis (L.) D.C.

Plentiful on limestone pavement. D'Arcy 5132 (MO).

Canavalia maritima L.

Only a single, sterile plant seen on the beach near East End.  
D'Arcy 4967 (MO).

Centrosema virginianum (L.) Benth.

Weed near the airport. B. & W.; D'Arcy 4936B (FAU, MO, SIU).



Crotalaria lotifolia L.

B. &amp; W.

Galactia dubia DC.

On the limestone plain. D'Arcy 2116 (MO).

Pictetia aculeata (Vahl) Urb.

A frequent shrub on the limestone plain. B. &amp; W.; D'Arcy 2135 (FLAS); 4865 (MO); 4896 (C, FAU, MO, SIU).

Piscidia carthaginensis Jacq.

D'Arcy 4877 (MO).

Sophora tomentosa L.

B. &amp; W.

Stylosanthes hamata (L.) Taub.

Behind Loblolly Bay and in The Settlement. B. &amp; W.; D'Arcy 5112L (MO).

Rhynchosia minima (L.) DC.

Weed at the airport. D'Arcy 5116 (MO).

## ERYTHROXYLACEAE

Erythroxylum rotundifolium Lunan

Thickets, west side of the airport. D'Arcy 4946 (MO).

## ZYGOPHYLLACEAE

Guaiacum officinale L.

Plentiful near East End where one of the dominant trees, reaching 5 m tall. D'Arcy 4969 (BM, C, FAU, IJ, MO, SCZ, SIU, US).

Kallstroemia pubescens (G. Don) Dandy

Occasional plants at and near the airport. D'Arcy 4935 (MO, SIU); 5115 (MO).

## MALPIGHIACEAE

Bunchosia glandulosa (Cav.) DC.

One of the dominants on the sandy plain and also occurring on

limestone west of The Settlement. D'Arcy 4951 (MO); 4952 (MO, SIU); 4985 (FAU, IJ, MO, SIU, SCZ).

Byrsonima lucida (Mill.) DC.

Plentiful on the sandy plain. B. & W. [as B. cuneata (Turcz.) P. Wils.]; D'Arcy 4820 (A, FAU, IJ, MO, SIU).

Malpighia infestissima (Rich. ex A. Juss.) Niedz.

Rare, seen only in immature state on limestone west and north of The Settlement and again south of the airport. B. & W.

Malpighia linearis Jacq.

A plentiful shrub near The Settlement but not seen elsewhere. B. & W.; D'Arcy 2121 (FLAS); 4936A (MO).

Stigmaphyllon periplocifolium (Desf.) A. Juss.

Scattered plants along the road west of The Settlement. D'Arcy 4863 (IJ, MO).

RUTACEAE

Amyris elemifera L.

Plentiful on the limestone plain. B. & W.; D'Arcy 2126 (FLAS); 4954 (FAU, IJ, MO, SCZ, SIU); 5081 (FAU, MO, SIU); 5110 (MO, SIU).

Zanthoxylum flavum Vahl

Occasional shrubs on the sandy plain and one of the dominant trees near East End. D'Arcy 4953 (MO); 4968A (MO).

SURIANACEAE

Suriana maritima L.

The dominant shrub on many coastal dunes. B. & W.; D'Arcy 4813 (MO); 4856 (MO); 4925 (A, FAU, MO, SIU, US).

BURSERACEAE

Bursera simaruba (L.) Sarg.

On the limestone plain west of The Settlement. D'Arcy 4890 (MO).

POLYGALACEAE

Polygala hetacantha Urb.

Frequent but scattered plants on the sandy plain; also on disturbed

soil on the sandy plain (chickenyards). B. & W.; D'Arcy 4818 (BM, C, FAU, IJ, MO, SIU, US).

## EUPHORBIACEAE

Acalypha ?setosa A. Rich.

Weed in The Settlement. The specimen (staminate) is not adequate for firm identification to species. D'Arcy 4901 (MO).

Acalypha wilkesiana (L.) Poit.

Cultivated for ornament. Sight record.

Argythamnia candicans Sw.

Weed in The Settlement, also behind Loblolly Bay, on sand or rock. Britton & Fishlock 999 (NY); Fishlock 13 (NY); D'Arcy 2115 (MO).

Ateramnus lucidus (Sw.) Rothm.

Scattered plants on the sandy plain. D'Arcy 4855 (MO) [as Gymnanthes lucida Sw.].

Chamaesyce articulata (Aubl.) Britt.

Plentiful on the sandy plain, occasional on the limestone plain. B. & W.; D'Arcy 4796 (A, FAU, IJ, MO, SIU, US, USF).

Chamaesyce blodgettii (Engelm.) Small

Weed on the sandy plain, mostly on roadways and near house sites; according to Britton & Wilson also on rocks. B. & W.; D'Arcy 5100 (MO); 5103 (MO).

Chamaesyce mesembrianthemifolia (Jacq.) Dugand

B. & W. [as C. buxifolia (Lam.) Small]; D'Arcy 4697 (BM, C, FAU, IJ, MO, SCZ, SIU, US).

Chamaesyce hirta (L.) Millsp.

Weed around The Settlement. D'Arcy 4909A (MO).

Chamaesyce prostrata (Ait.) Small

Weed around houses and in farmyards, the sandy plain and The Settlement. D'Arcy 4821 (MO, SIU); 4822 (FAU, MO, SIU, USF); 5131 (MO).

Chamaesyce serpens (H.B.K.) Small

Weed around houses and in farmyards, the sandy plain. B. & W.; D'Arcy 5086A (MO); 5099 (MO, USF).

Chamaesyce torralbasii (Urb.) Millsp.

Weed around building site on the sandy plain. D'Arcy 4928 (A, BM, C, IJ, MO, SIU).

Chamaesyce turpinii (Boiss.) Millsp.

Plentiful on sand and rock on the limestone plain. Britton & Fishlock 998 (MO) [as C. anegadensis Millsp.]; D'Arcy 4956 (IJ, MO, USF); 5112J (MO).

Codiaeum variegatum (L.) Blume

Cultivated for ornament. Sight record.

Croton betulinus Vahl

Plentiful on the limestone plain. B. & W.; D'Arcy 2113 (FLAS); 4865B (MO); 5123 (A, MO).

Croton discolor Willd.

One of the dominants on the sandy plain and also occurring on limestone. The pubescence of this species exhibits exceptional variability on Anegada, ranging from yellow-green to brownish. The leaf size and shape also vary widely. B. & W.; D'Arcy 2125 (FLAS); 4920 (MO, US).

Euphorbia milii Ch. des Moulins

Much cultivated for ornament. Sight record.

Euphorbia petiolaris Sims

Fairly plentiful west of the airport. B. & W. [as Aklema petiolare (Sims) Millsp.]; D'Arcy 2137 (FLAS); 4896 (MO); 4942 (A, BM, C, FAU, IJ, MO, SIU, US); 5080 (MO, SIU).

[Hippomane mancinella L.]

Previously reported in error. Not known on the island.

Jatropha gossypifolia L.

Plentiful around The Settlement. D'Arcy 4860 (MO).

Pedilanthus tithymaloides (L.) Poit.

Cultivated in The Settlement. Sight record.

Phyllanthus amarus Schum. & Thonn.

Weed around houses on the sandy plain. D'Arcy 4933 (MO).

Phyllanthus caribaeus Urb.

Weed around houses on the sandy plain. D'Arcy 5089 (MO).

Phyllanthus polycladus Urb.

On limestone pavement near The Settlement and behind Loblolly Bay. The Britton & Fishlock specimen, although sterile, is an erect, slender plant some 40 cm tall and supports Webster's (1957) concept of this taxon as a subspecies of P. pentaphyllus Griseb. The D'Arcy collections, however, matching closely the type of P. polycladus (Puerto Rico, Sintenis 3440 (MO)), give strong support for considering this as a distinct species. The type of P. pentaphyllus (Cuba, Wright 1938 (MO)) is a tiny plant with erect, filiform stems while that of P. polycladus is much sturdier. Britton & Fishlock 1000 (MO); D'Arcy 5112K (MO); 5134 (MO).

Ricinus communis L.

Cultivated in The Settlement. Sight record.

## ANACARDIACEAE

Comocladia dodonaea (L.) Urb.

Common on the limestone plain, especially near East End. D'Arcy 4886 (C, MO).

## RHAMNACEAE

Colubrina arborescens (Mill.) Sarg.

Common west of The Settlement. B. & W. [as C. colubrina (Jacq.) Millsp.]; D'Arcy 2128; 4879 (MO, SIU).

Colubrina elliptica (Sw.) Brizicky & Stern

B. & W. [as C. reclinata (L'Her.) Brongn.]

Krugiodendron ferreum (Vahl) Urb.

B. & W.

Reynosia uncinata Urb.

Plentiful west of The Settlement. B. & W.; D'Arcy 4870 (MO); 4888 (MO).

Zizyphus rignonii Delp.

Plentiful shrub on the limestone plain. B. & W. [as Sarcomphalus domingensis (Spreng.) Krug & Urb.]; D'Arcy 2140 (MO); 2180 (FLAS); 4906 (FAU, MO, SIU); 5082 (MO, SIU).

## CELASTRACEAE

Cassine xylocarpa Vent.

One of the dominant shrubs on the sandy plain. B. & W. [as Elaeodendrum xylocarpum (Vent.) DC.]; D'Arcy 4800 (A, FAU, IJ, MO, SIU, US); 4833 (FAU, MO, SCZ, SIU, US); 4835 (MO, SIU); 4846 (MO); 4919 (MO).

Crossopetalum rhacoma Cranz

One of the dominant shrubs on the sandy plain. B. & W. [as Rhacoma crossopetalum L.]; D'Arcy 2139 (A); 4932 (BM, C, FAU, IJ, MO, SIU, US).

Gyminda latifolia (Sw.) Urb.

On the limestone plain. B. & W.; D'Arcy 2130 (MO); 4812 (FAU, MO, SIU).

Schaefferia frutescens Jacq.

Scattered plants west of The Settlement. D'Arcy 4940 (MO); 4986 (MO, SIU).

## SAPINDACEAE

Dodonaea viscosa Jacq. var. spatulata (J. E. Sm.) Benth.

By far the most plentiful of the dominant shrubs on parts of the sandy plain. B. & W. [as D. ehrenbergii Schl.]; D'Arcy 4828 (C, FAU, IJ, MO, SCZ, SIU, US, USF); 4842 (MO, SIU).

Serjania polyphylla (L.) Radlk.

Near East End. B. & W.; D'Arcy 4968B (MO).

## VITACEAE

Cissus trifoliata (L.) L.

Frequent west of The Settlement. B. & W.; D'Arcy 4866 (MO).

## TILIACEAE

Corchorus hirsutus L.

Infrequent plants throughout the island. B. & W.; D'Arcy 4839 (MO); 4959 (MO).

## MALVACEAE

Abutilon umbellatum (L.) Sweet

Weed at the airport. D'Arcy 5121 (MO).

Hibiscus sp.

Cultivated for ornament. Sight record.

Sida ciliaris L.

Plentiful on heavily grazed limestone at The Settlement. B. & W.;  
D'Arcy 4979B (MO); 5112H (MO).

Sida procumbens Sw.

Plentiful on heavily grazed limestone at The Settlement. B. & W.;  
D'Arcy 4979A (MO).

## STERCULIACEAE

Melochia tomentosa L.

Infrequent on the limestone plain. D'Arcy 4867 (FAU, IJ, MO, SCZ,  
SIU, US).

Waltheria indica L.

"Edge of cultivation." Fishlock 39 [as W. americana L.].

## CANELLACEAE

Canella winteriana (L.) Gaertn.

Infrequent, in shade of Pisonia trees on the sandy plain. B. & W.;  
D'Arcy 4840 (MO).

## TURNERACEAE

Turnera diffusa Willd.

Seen only behind dunes at Loblolly Bay where plentiful. D'Arcy 2112  
(FLAS, MO); 5111 (A, FAU, MO, SIU).

## PASSIFLORACEAE

Passiflora suberosa L.

Occasional in trees on both sandy plain and limestone plain. B. & W.  
[as P. pallida L.]; D'Arcy 4834 (MO); 4941 (MO).

## CACTACEAE

Hylocereus trigonus Safford

Locally conspicuous on trees on the limestone plain west of The Settlement but not seen elsewhere. D'Arcy 4930 (MO).

Melocactus intortus (Mill.) Urb.

Plentiful around The Settlement. B. & W. [as Cactus intortus Mill.]; D'Arcy sight record.

Opuntia dillenii (Ker.-Gawl.) Haw.

Plentiful in heavily grazed areas near The Settlement. D'Arcy 4929 (MO).

Pilosocereus royeri (L.) Byles & Rowley

Scattered trees on the limestone plain, abundant west of The Settlement. B. & W. [as Cephalocereus royeri (L.) Britt.]; D'Arcy sight record.

## LYTHRACEAE

Ammania coccinea Rottb.

Weed in The Settlement. D'Arcy 5108 (MO).

## COMBRETACEAE

Conocarpus erecta L.

Frequent near the sea. The silvery form was not seen. B. & W.; D'Arcy 4801 (MO); 4905 (MO).

Laguncularia racemosa (L.) Gaertn. f.

Along the south coast and plentiful around Flamingo Pond. B. & W.; D'Arcy 4802 (MO); 4917 (MO, SIU).

## MYRTACEAE

Eugenia axillaris (Sw.) Willd.

Infrequent on the limestone plain. B. & W.; D'Arcy 5067 (MO, SIU); 5072 (A, MO, SIU); 5073 (MO).

## RHIZOPHORACEAE

Rhizophora mangle L.

The dominant plant along the south coast in the eastern two thirds of the island. B. & W.; D'Arcy 4970 (MO).



## ARALIACEAE

Polyscias filicifolia (Moore) Bailey

Cultivated for ornament. Sight record.

## THEOPHRASTACEAE

Jacquinia arborea Vahl

One of the dominant shrubs on the sandy plain, also occasional on the limestone plain. "Sumba bush." B. & W. [as J. barbasco (Loefl.) Mez]; D'Arcy 4795 (A, BM, C, FAU, KSC, IJ, MO); 5086 (A, BM, BR, C, FAU, LE, MO, P, SIU).

Jacquinia berterii Spreng.

Rare on the limestone plain. B. & W.; D'Arcy 2134 (FLAS); 5071 (MO).

## SAPOTACEAE

Bumelia obovata (Lam.) A. DC.

Infrequent on both sandy plain and limestone plain. B. & W.; D'Arcy 4915 (MO, SIU); 5104 (A, C, IJ, MO).

## OLACEAE

Forestiera eggersiana Krug & Urb.

Seen once on the limestone plain northeast of The Settlement. The plant was pistillate. D'Arcy 5135A (C, IJ, MO).

Forestiera segregata (Jacq.) Krug & Urb.

Rare on the limestone plain. D'Arcy 5074 (MO).

## GENTIANACEAE

Centaurium brittonii Millsp.

"Shaded saline, sandy soil, West End." Britton & Fishlock 952 (NY).

## APOCYNACEAE

Catharanthus roseus (L.) G. Don

Cultivated and escaping in The Settlement. D'Arcy 4861 (MO).

Nerium oleander L.

Cultivated in The Settlement. Sight record.

Plumeria alba L.

Very common the limestone plain. B. & W.; D'Arcy 4887 (MO, SIU).

Rauwolfia viridis R. & S.

Uncommon, roadside near airport. D'Arcy 4913 (MO, SIU).

Urechites lutea (L.) Britt.

Occasional, climbing on shrubs in most parts of the island. B. & W.; D'Arcy 2119 (FLAS); 4829 (BM, C, FAU, IJ, MO, SIU).

## ASCLEPIADACEAE

Cryptostegia grandiflora R. Br.

Cultivated in The Settlement and escaping nearby. D'Arcy 4878 (MO).

Cynanchum anegadensis (Britt.) Alain

Very plentiful on the sandy plain, occasional on the limestone plain. B. & W. [as Metastelma anegadense Britt.]; D'Arcy 4809 (C, FAU, IJ, MO, SIU, US); 4973 (MO); 5087 (A, FAU, MO).

## CONVOLVULACEAE

Cuscuta globosa Benth.

On Cryptostegia grandiflora in The Settlement, a single patch. D'Arcy 5109 (MO).

Cuscuta umbellata H.B.K.

Infesting most of the Portulaca quadrifida in The Settlement. D'Arcy 4902 (FAU, MO, SIU); also on D'Arcy 4909 and Fishlock 30 (see Portulaca, above).

Evolvulus arbusculus Poir.

"Occasional on the rocky plain," "rocky plain, West End," and "Rare, only observed in one place on the edge of a small cove." Britton & Fishlock 1004 (NY); Fishlock 7 (NY) [as E. squamosus Britt.].

Evolvulus bracei House

On sand or limestone behind Loblolly Bay and near The Settlement. Britton & Fishlock 1035 (NY) [as E. sericeus Sw.]; D'Arcy 4958A (C, IJ, MO); 5112C (MO, NSW); 5126 (FAU, MO).

Evolvulus glaber Spreng.

Widely scattered in local patches on limestone, sometimes in heavily grazed areas. Britton & Fishlock 1008 (NY); D'Arcy 4905 (BM, C, FAU, IJ, MO, SIU, US); 5112 (MO).

Ipomoea batatas (L.) L.

Cultivated as a food crop. Sight record.

Ipomoea fistulosa Choisy

Cultivated for ornament in The Settlement. Sight record.

Ipomoea pes-caprae (L.) R. Br.

Occasional by the sea. D'Arcy 4943 (MO).

Ipomoea triloba L.

Plentiful at the airport. D'Arcy 5113 (MO).

Jacquemontia cayensis Britt.

Plentiful climbing on shrubs on the sandy plain. B. & W.; D'Arcy 4799 (FAU, MO); 5090 (A, C, FAU, MO, P, SIU).

Jacquemontia pentantha (Jacq.) G. Don

Rare, a single patch seen on fencerow west of the airport. D'Arcy 4911 (FAU, MO, SIU).

## BORAGINACEAE

Bourreria succulenta Jacq.

Scattered plants on the limestone plain. B. & W.; D'Arcy 4918 (MO, SIU); 5079 (MO, SIU).

Cordia rupicola Urb.

Scattered plants around the limestone plain. Anegada material lacks the long calyx appendages of C. bahamensis (Urb.) Millsp. but otherwise resembles the type of that name. Under C. rupicola further study might lead to recognition of infraspecific taxa for Puerto Rico, Anegada and the Bahamas. Except for its dull leaf surface, this species resembles C. lima (Desv.) R. & S. which occurs on Puerto Rico, Hispaniola and St. Croix. B. & W. [as Varronia bahamense (Urb.) Millsp.]; D'Arcy 4838 (MO); 4971 (MO); 5077 (A, FAU, MO, SIU).

Heliotropium angiospermum Murray

Occasional by house sites on the sandy plain. D'Arcy 4854 (MO).

Heliotropium crispiflorum Urb.

B. & W. [a specimen to support this record was not located at NY].

Heliotropium curassavicum L.

Large patches at the west of the rocky plain. D'Arcy 4882 (MO).

Heliotropium microphyllum Sw.

Scattered populations on the limestone plain, often growing with Evolvulus bracei which it superficially resembles. D'Arcy 2117 (FLAS); 4927 (A, BM, C, IJ, MO); 4957 (A, MO); 5128 (MO).

Tournefortia gnaphalodes (L.) R. Br.

One of the important shrubs of coastal dunes and other seacoasts. B. & W. [as Mallotonia gnaphalodes (L.) Britt.]; D'Arcy 4832 (MO).

Tournefortia volubilis L.

Occasional on the limestone plain. D'Arcy 2029 (FLAS, MO); 4912 (FAU, IJ, MO, SIU, US).

## VERBENACEAE

Citharexylum fruticosum L.

B. & W.

Clerodendron aculeatum (L.) Schlecht.

Occasional on the limestone plain. B. & W. [as Volkameria aculeata L.]; D'Arcy 4960 (MO); 4964 (MO).

Lantana camara L.

Scattered plants around The Settlement. D'Arcy 4864 (MO).

Lantana involucrata L.

One of the dominant shrubs on the sandy plain. B. & W.; D'Arcy 4797 (FAU, IJ, MO, SCZ, SIU, US).

## LABIATAE

Coleus amboinicus Lour.

Locally abundant on limestone just west of The Settlement. D'Arcy 4876 (MO).

Coleus scutellarioides (L.) Benth. [= Coleus blumei sensu B. & W.]

Sparingly escaped, The Settlement. D'Arcy 4984 (MO).

Ocimum basilicum L.

Cultivated for seasoning. D'Arcy 5092 (MO).

Salvia serotina L.

Plentiful around The Settlement. B. & W.; D'Arcy 2114 (FLAS);  
4859 (C, FAU, IJ, MO, SIU, US).

#### SOLANACEAE

Capsicum annuum L. var. annuum

Cultivated in The Settlement. Sight record.

Datura innoxia Mill.

Weed in The Settlement. D'Arcy 4900 (MO).

Lycium tweedianum var. chrysocarpum (Urb. & Ekm.) C. L. Hitchc.

Plentiful on the limestone plain, ranging from prostrate forbs at the west of the plain to large thickets 1.5 m tall covering several rods of area in the eastern end of the island. B. & W. [as L. americanum Jacq.]; D'Arcy 2136 (FLAS); 4862 (BM, C, FAU, IJ, MO, SIU, US).

Physalis angulata L.

Weed by house site on the sandy plain near Pomato Point. B. & W.;  
D'Arcy 4851 (MO).

Physalis cordata Mill.

Locally plentiful on muddy limestone path immediately east of The Settlement. D'Arcy 5056 (BM, C, FAU, IJ, MO, NSW).

Solanum americanum Mill.

Frequent large plants along road from The Settlement to the airport.  
D'Arcy 5122 (MO).

Solanum elaeagnifolium Cav.

Plentiful weed around The Settlement. D'Arcy 4861 (MO, SIU).

Solanum melongena L.

Cultivated in The Settlement. Sight record.

Solanum persicaeifolium Dun.

Locally plentiful on the limestone plain; variable as to flower color. B. & W.; D'Arcy 2154 (FLAS); 4825 (MO); 4869 (MO); 4893A (MO).

## SCROPHULARIACEAE

Capraria biflora L.

Common weed around The Settlement. D'Arcy 4880 (MO).

## BIGNONIACEAE

Tabebuia pallida (Lindl) Miers

Occasional small copses on the sandy plain and on the limestone plain. B. & W. [as T. heterophylla (DC.) Britt.]; D'Arcy 4841 (C, FAU, IJ, MO, SIU, US).

Tecoma stans (L.) H.B.K.

A flourishing ornamental in The Settlement. Sight record.

## ACANTHACEAE

Oplonia microphylla (Lam.) Stearn [= Anthacanthus spinosus]

Occasional large shrubs on the limestone plain, mostly east of The Settlement. D'Arcy 4939 (BM, FAU, MO, US).

## RUBIACEAE

Borreria verticillata (L.) G.F.W. Mey.

Weed in sand behind Loblolly Bay. D'Arcy 4944 (IJ, MO).

Erithalis fruticosa L.

On the sandy plain, plentiful. B. & W.; D'Arcy 4808A (C, FAU, MO).

Ernodea littoralis Sw.

Abundant on the sandy plain. B. & W.; D'Arcy 4804 (MO); 5095 (MO).

Exostemma caribaeum (Jacq.) R. & S.

B. & W.

Randia aculeata L.

Frequent on the limestone plain. B. & W. [as R. mitis L.]; D'Arcy 4868 (MO).

Spermacoce tenuior L.

Weed in The Settlement and in the sand or limestone on the limestone plain. B. & W.; D'Arcy 4980 (MO); 5064D (MO); 5112F (MO).

Strumpfia maritima Jacq.

Forming large masses on the sandy plain and frequent along the coastal dunes. B. & W.; D'Arcy 2141 (FLAS); 4826 (A, C, FAU, IJ, MO, SIU); 4850 (MO).

## CUCURBITACEAE

Cucumis anguria L.

"Rocky plain near settlement." Britton & Fishlock 1036 (NY).

Cucumis melo L.

Spontaneous near gardens, sandy plain. D'Arcy 4848 (MO).

## GOODENIACEAE

Scaevola plumieri (L.) Urb.

Scattered plants by sandy coasts. B. & W.; D'Arcy 4819 (MO).

## COMPOSITAE

Borrichia arborescens (L.) DC.

Small plants around Flamingo Pond. B. & W.; D'Arcy 4806 (C, FAU, MO, SIU, US).

Eclipta prostrata (L.) L.

Weed in The Settlement. D'Arcy 5105.

Gundlachia corymbosa (Urb.) Britt.

Plentiful around the island, especially on the sandy plain. B. & W.; D'Arcy 2122 (MO); 4806 (BM, C, FAU, KSC, MO, SIU, US).

Parthenium hysterophorus L.

Weed around The Settlement. D'Arcy 5066 (MO).

Pectis linifolia L.

A solitary plant seen at the airport. D'Arcy 5120 (MO).

Pluchea purpurascens (Sw.) DC.

"Rocky plain near settlement." Britton & Fishlock 1012 (NY).

Synedrella nodiflora (L.) Gaertn.

Weed in The Settlement. D'Arcy 4987 (MO); 5106 (MO, SIU).

Vernonia cinerea (L.) Less.

Weed in The Settlement. D'Arcy 4977 (MO); 5122B (MO).

Wedelia parviflora L.-Cl. Rich.

On the limestone plain. [includes W. calycina L.-Cl. Rich.]  
B. & W.; D'Arcy 2131 (MO); 4871 (MO); 4948 (C, FAU, IJ, MO, SCZ,  
SIU, US).

Zinnia sp.

Cultivated in cans in The Settlement. Sight record.

#### B. NON-VASCULAR PLANTS

##### BRYOPHYTA

Barbula agraria Hedw.

Encrusting surface rocks. D'Arcy s.n. (MO).

Bryum microdecurrens E.G. Britt.

B. & W.

Hymenostomum breutelii (C. Muell.) Broth.

B. & W.

##### CHAROPHYTA

Chara sp.

B. & W.

##### CYANOPHYTA

Scytonema hofmannii Ag.

Encrusting surface rocks. D'Arcy 5147 (PHILA).



## LICHENES

Dermatocarpon hepaticum (Ach.) T. Fr.

Plentiful and forming small mats around shallow solution puddles on the limestone plain. D'Arcy 5063B (MINEN).

Eight other lichens were reported by Britton and Wilson and the list was repeated by D'Arcy (1971a).

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