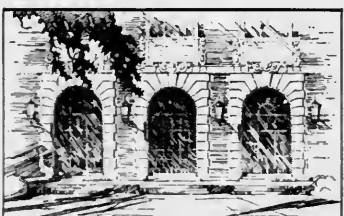




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FLORA  
OF THE  
SAND KEYS  
OF  
FLORIDA

BY

CHARLES FREDERICK MILLSPAUGH,  
Curator, Department of Botany.



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# FLORA OF THE SAND KEYS OF FLORIDA

CHARLES F. MILLSPAUGH

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Mr. O. E. Lansing, Jr., having been commissioned by the Museum to make a botanical examination of all those islets lying to the westward of Key West, Florida, arrived at the City of Key West on the twenty-seventh of February, 1904, and, while making arrangements there for his work on the sand keys, collected a series of the plants of the island. Later he succeeded in commissioning a small sloop, in which he visited Marquesas "A" and "C" on March 10th; "B" and "D" on March 11th; "E," "F," "G," "H," "I," on March 12th; Boca Grande, Ballast and Man Keys on March 13th; Key C, Woman Key, Key B, Archer's Key, and the small keys north and west of Woman Key on the 14th; and Mule, Cottrell, Mullet and East and West Crawfish Keys on the 15th. Returning to Key West, and gaining passage on the U. S. Lighthouse Tender, he reached Fort Jefferson, in the Tortugas. From this garrison, as a base, he worked Bird and Loggerhead Keys on March 19th; Sand (or Hospital) and East Keys on the 21st; and concluded his work in an investigation of Garden Key on the 22d.

Mr. Lansing faithfully carried out his instructions, making a thorough investigation of each islet, during which he collected every species he saw on each no matter how well known to him nor how common its occurrence might be. These collections, together with his comprehensive notes and maps made on the spot, form the basis of the detailed consideration of the islets in the following pages.

As was to be expected, this archipelago proves to be vegetated with only the usual broad strand species common to similar situations on the Antillean islands in general. The principal value of this survey lies, therefore, first: in the historical record of the present flora, which should enable future students to determine what species have come to the different islands since 1904, and what have been unable to survive; second: in the knowledge of what species come first to such

microcosms, thus forming a basis upon which to judge of the ease or difficulty of dispersion exhibited by certain species; and third: how, and in what conformation, species spread when brought into an untainted environment, thus establishing a datum point for the possible solution of many problems in plant dissemination, as well as those relating to the property inherent in certain plants to maintain their specific characters in newly implanted localities.

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### THE MAPS

Heading each map-page is an outline sketch of the whole area upon which an arrow points to the islet that is enlarged beneath. The enlarged maps of the individual keys are oriented as is usual in maps and upon them is indicated, by arbitrary signs, the location and extent of the various species, each species being always represented by the same sign on the different maps.

The small keys north and west of Woman Key, Mule Key, Cottrell Key, Mullet Key, East and West Crawfish Keys and Conch Key being mangrove colonies only; and Long Key and Middle Key being devoid of vegetation, are not mapped or included in detail in this paper.



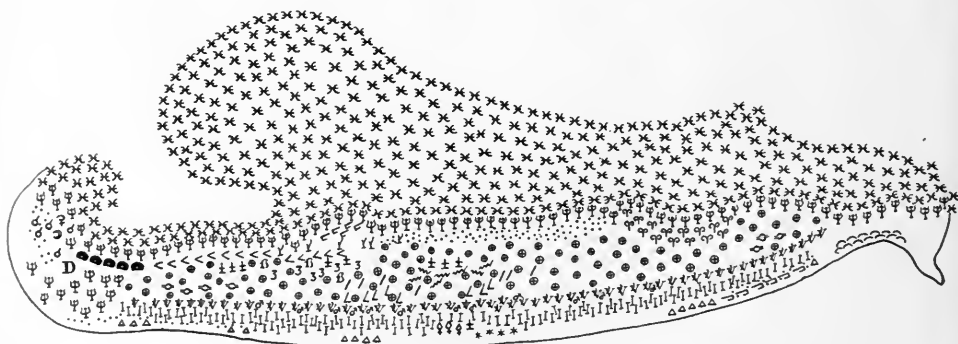
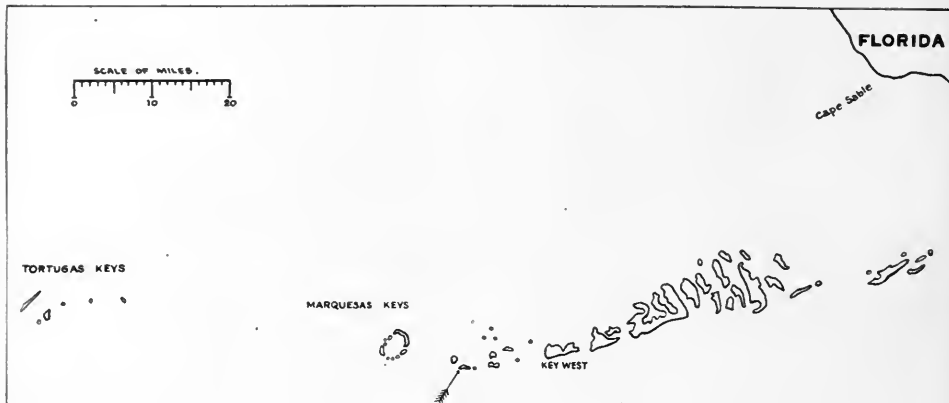
KEY C

MARCH 14, 1904

○	<i>Alternanthera brasiliana</i> (2373)	±	<i>Melanthera nivea</i> (2369)
♂	<i>Atriplex cristata</i> (2393)	=	<i>Metastelma bahamense</i> (2377)
⊕	<i>Avicennia nitida</i> (2370)	≠	<i>Monanthochloë littoralis</i> (2381)
∩	<i>Batis maritima</i> (2374, 2383)	⊗	<i>Passiflora minima</i> (2390)
<	<i>Borrchia arborescens</i> (2394)	●	<i>Pithecolobium guadalupense</i> (2376)
♂	<i>Cenchrus tribuloides</i> (2392)	P	<i>Portulaca oleracea</i> (2375)
°	<i>Cyperus brunneus</i> (2366)	⋈	<i>Rhizophora mangle</i> (2395)
∩	<i>Dondia linearis</i> (2389)	≡	<i>Salicornia ambigua</i> (2380)
·	<i>Euphorbia buxifolia</i> (2364)	⌒	<i>Sesuvium portulacastrum</i> (2382)
∩	<i>Eustachys petraea</i> (2378)	D	<i>Solanum bahamense</i> (2388)
⊖	<i>Flaveria linearis</i> (2367)	G	<i>Sporobolus purpurascens</i> (2371)
⊖	<i>Hymenocallis caribaea</i> (2391)	F'	<i>Sporobolus virginicus</i> (2363)
∏	<i>Laguncularia racemosa</i> (2379)	Y	<i>Suriana maritima</i> (2386)
∏	<i>Lantana involucrata</i> (2387)	/	<i>Waltheria americana</i> (2365)
≅	<i>Lithophila vermicularis</i> (2372)		

A low sand and mangrove islet, substantially circular in form, about three quarters of a mile in diameter and rising barely two feet above the sea at its highest point. The eastern part is devoted entirely to a colony of *Rhizophora mangle* a small sand beach on the west being the only dry land in the mass. This bit of strand has an immediate sea border of *Cenchrus tribuloides* backed by a *Eustachys-Borrchia-Hymenocallis* association with which a few patches of *Cyperus brunneus* are mingled. Upon the area between this higher land and the mud flat near the mangroves is a mixture of various species without definite association character; the low, muddy flat between this and the mangroves yields the usual *Salicornia-Batis-Monanthochloë-Sesuvium* association of the key salinas; while bordering the mangroves themselves is the typical scattering of *Laguncularia* and *Avicennia*.

The large number of diverse species on so small a bit of land indicate it to be a favorite resting place of aquatic birds.



Man Key.

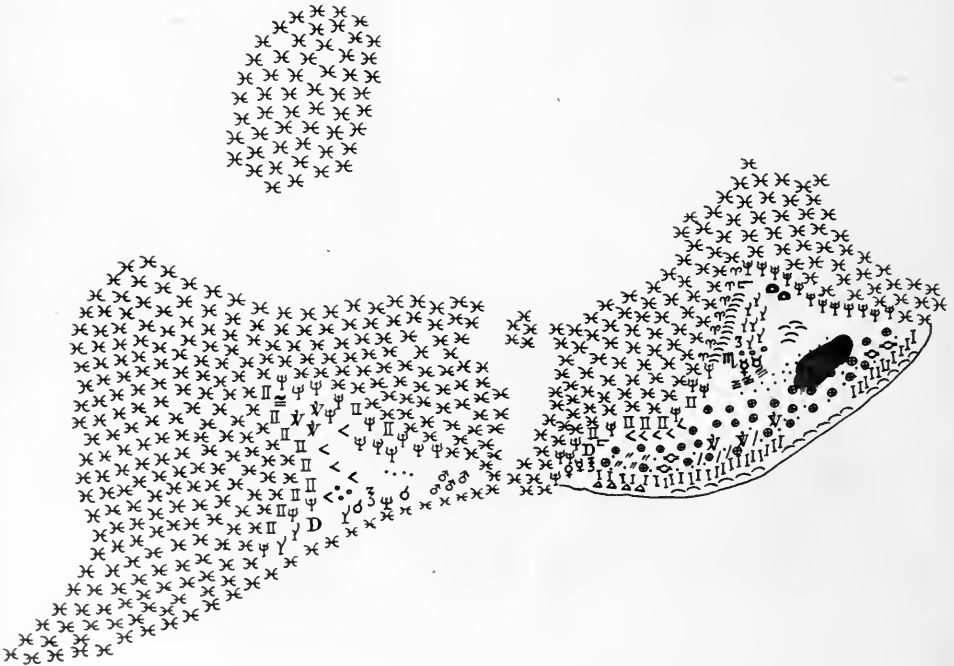
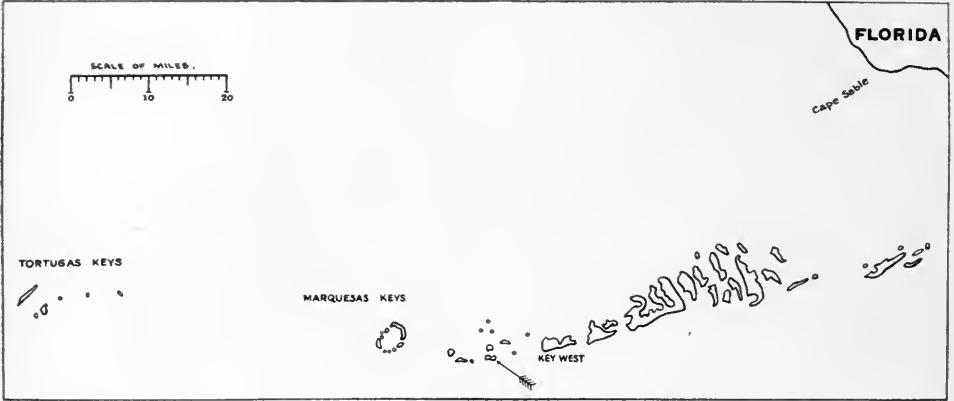
MAN KEY

MARCH 13, 1904

- |  |  |
|--|--|
| ⊙ Alternanthera brasiliana (2353)                  | ♂ Galactia spiciformis (2332)          |
| ⊕ Andropogon glomeratus (2325, 2357)               | ☉ Hymenocallis caribaea (2326)         |
| ♣ Avicennia nitida (2335)                          | ☼ Ipomoea pes-caprae (2330)            |
| ♣ Batis maritima (2339)                            | ♀ Iva imbricata (2342)                 |
| < Borrichia arborescens (2360, 2334)               | ± Melanthera nivea (2333, 2348, 2348a) |
| ∠ Bradburya virginiana (2347, 2350)                | ∇ Panicum maximum (2345)               |
| △ Cakile fusiformis (2324, 2328, 2343, 2344, 2358) | ∩ Paspalum distichum (2329)            |
| ♂ Cenchrus tribuloides (2346)                      | ◐ Pithecolobium guadalupense (2362)    |
| □ Conocarpus erecta (2340)                         | ✕ Rhizophora mangle (2336)             |
| · Euphorbia buxifolia (2338)                       | ( Sesuvium portulacastrum (2323)       |
| ♂ Euphorbia havanensis (2351, 2354, 2355, 2356)    | D Solanum bahamense (2361)             |
| ♀ Eustachys petraea (2352)                         | Y Suriana maritima (2337)              |
| β Flaveria linearis (2331, 2349)                   | * Tournefortia gnaphalodes (2341)      |
|  | I Uniola paniculata (2359)             |
|  | / Waltheria americana (2327)           |

Man Key is a narrow sand ridge about one mile long by a quarter mile wide. The southern beach rises abruptly to a bank, about four feet high in its central part, whence it slopes to the west into a narrow strand and to the east to a sea-washed spit. The brink of the plateau is occupied by a *Uniola-Euphorbia* association with *Cakile* between it and the water. Back of this association is a new aggregation of *Panicum* and *Cenchrus*. The plateau itself is almost covered with *Andropogon* admixed with scattering plants of *Waltheria*, *Flaveria*, *Ipomoea*, and *Melanthera*, and a goodly sprinkling of *Galactia* and *Bradburya*.

The extensive and marked zonal arrangement of the *Uniola*, *Panicum*, *Andropogon*, *Borrichia*, *Avicennia*, *Batis*, and *Euphorbia* is unique upon this key; on none other do the various elements of the flora remain in such pure colonies; nor is there found anywhere else among the keys an area so peculiarly implanted. The next feature of note, beside the remarkable zonal arrangement, is the absence of *Laguncularia* from the mangrove border, and *Cyperus brunneus* from the plateau.



Woman Key.

WOMAN KEY

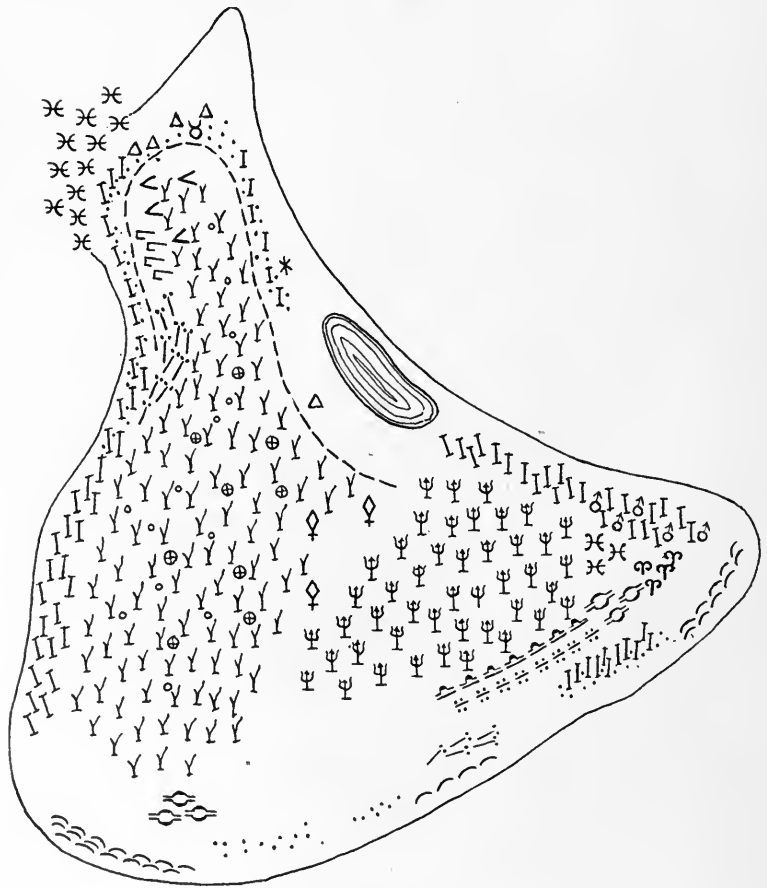
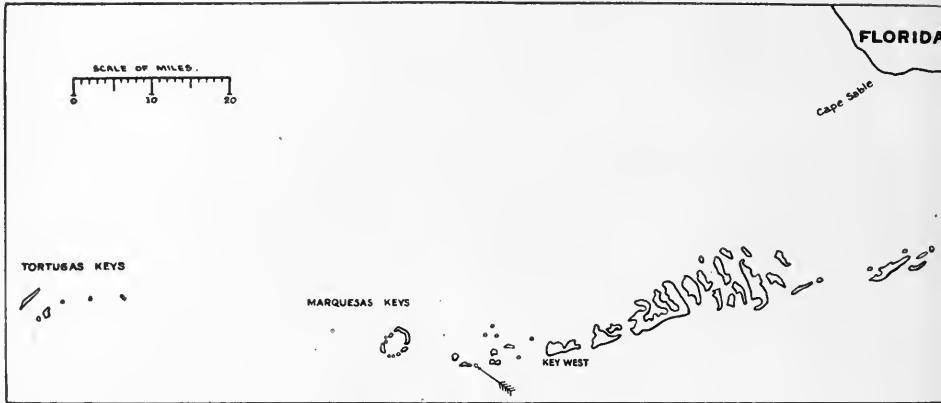
MARCH 14, 1904

⊕ <i>Andropogon glomeratus</i> (2398)	⊖ <i>Galactia spiciformis</i> (2422)
♂ <i>Atriplex cristata</i> (2411)	∩ <i>Hymenocallis caribaea</i> (2405)
♀ <i>Avicennia nitida</i> (2410, 2429)	⊔ <i>Laguncularia racemosa</i> (2414, 2433)
♀ <i>Batis maritima</i> (2413)	≅ <i>Lithophila vermicularis</i> (2424, 2436)
< <i>Borrichia arborescens</i> (2420, 2425)	Υ <i>Panicum maximum</i> (2399, 2435)
△ <i>Cakile fusiformis</i> (2408)	● <i>Pithecolobium guadalupense</i> (2423)
⊖ <i>Calonyction album</i> (2400, 2432)	✕ <i>Rhizophora mangle</i> (2421, 2430)
♂ <i>Cenchrus tribuloides</i> (2437)	♀ <i>Rivina humilis laevis</i> (2403, 2406)
⊔ <i>Conocarpus erecta</i> (2407, 2415)	∩ <i>Sesuvium portulacastrum</i> (2416)
° <i>Cyperus brunneus</i> (2417, 2418, 2434)	D <i>Solanum bahamense</i> (2404, 2426)
∩ <i>Dondia linearis</i> (2419)	Υ <i>Suriana maritima</i> (2412, 2431)
• <i>Euphorbia buxifolia</i> (2409, 2427)	I <i>Uniola paniculata</i> (2397)
" <i>Euphorbia Garberi</i> (2396)	/ <i>Waltheria americana</i> (2402)
♀ <i>Euphorbia trichotoma</i> (2401, 2428)	

A low, sandy islet, less than a mile long and about one quarter mile wide, composed of an abrupt southeastern beach rising about three feet above the level of the sea, backed and extended by two mangrove colonies.

The southeast beach is fringed with a line of *Sesuvium*, terminated on the west by a few plants of *Cakile*. On the rise above this fringe grows a nearly complete line of *Uniola*, back of which the open plateau of the key is clothed with a dense growth of *Andropogon*, amongst which are scattering plants of *Panicum maximum*, *Hymenocallis*, *Euphorbia buxifolia* and *E. Garberi*, and *Waltheria*. On the mud flat, between the higher land and the border of the mangroves, are separated colonies of *Suriana*, *Sesuvium*, *Cyperus brunneus*, *Atriplex cristata*, and *Lithophila vermicularis*; a single individual of *Dondia linearis*; and two shrubs of *Pithecolobium*. At the western extremity of the *Andropogon* community, evidently profiting by the shade cast by the *Avicennias*, are a few individuals of *Rivina humilis laevis*, *Calonyction album*, *Solanum bahamense*, and *Euphorbia trichotoma*. The mangrove border presents its usual association of *Borrichia arborescens*, *Batis*, *Sesuvium*, *Laguncularia*, and *Avicennia*, and two separated nuclei of *Conocarpus erecta*.

The western half of the key, separated by a narrow strait, is a mangrove colony in which a new bit of dry land is in process of formation. The flora of this terra nova shows mostly individual infarction in its *Solanum*, *Suriana*, *Calonyction*, *Lithophila*, *Euphorbia havanensis*, and *Borrichia arborescens* elements, while its *Euphorbia buxifolia*, *Cenchrus tribuloides*, *Cyperus brunneus*, and *Panicum maximum* show an early tendency to communize. Its mangrove border evidences, so far, only the primal elements of the usual society—*Laguncularia-Avicennia*.



Ballast Key.



BALLAST KEY

MARCH 13, 1904

—	<i>Ambrosia hispida</i> (2308)	°	<i>Cyperus brunneus</i> (2319)
⊕	<i>Andropogon glomeratus</i> (2320)	·	<i>Euphorbia buxifolia</i> (2302)
♂	<i>Atriplex cristata</i> (2315)	⊖	<i>Hymenocallis caribaea</i> (2301)
♀	<i>Avicennia nitida</i> (2306)	♀	<i>Iva imbricata</i> (2309)
∩	<i>Batis maritima</i> (2305)	≡	<i>Monanthochloë littoralis</i> (2307)
<	<i>Borrchia arborescens</i> (2312)	✕	<i>Rhizophora mangle</i> (2311)
△	<i>Cakile fusiformis</i> (2317, 2318)	⊔	<i>Salicornia ambigua</i> (2303)
∴	<i>Canavalia obtusifolia</i> (2304)	∩	<i>Sesuvium portulacastrum</i> (2322)
♂	<i>Cenchrus tribuloides</i> (2321)	Y	<i>Suriana maritima</i> (2310)
□	<i>Conocarpus erecta</i> (2316)	*	<i>Tournefortia gnaphalodes</i> (2314)
		I	<i>Uniola paniculata</i> (2313)

This small key is separated from Man Key by a channel so narrow that the branches of the mangroves of both nearly touch. This channel is very shallow and destined soon to be colonized by the mangrove and cause the islet to lose its identity in consolidation with Man Key. The key is now about 250x240 feet, and in the neighborhood of 2 feet at its highest point. Like Bird Key, this islet has no abrupt shore, being more or less rounded in topographic contour with the strand everywhere at a gentle slope.

Its vegetation presents the odd condition of having its mangroves and *Avicennias* disposed at the farthest points they could possibly grow apart, instead of being, as usual, in association. This condition is repeated in the two colonies of *Uniola* and *Euphorbia*, one on the east and the other on the south strand, though there are two associated groups of these elements on the other two shores—northwest and southeast.

The two lines of *Batis* and *Salicornia* appear to be forming their true association with the *Avicennia*, and at one point *Cenchrus* its frequently noted camaraderie with *Uniola*. At the north point appears a peculiar continuous line of *Ambrosia* which apparently indicates that the strand at this end of the islet is in process of formation from the sea. The extensive implantation of *Suriana* is not pure, like the similar growth on Bird Key, but scatteringly admixed with a floor growth of *Cyperus* and *Andropogon*.

The small lagoon, on the eastern side, is evidently of late inclusion; again pointing to new strand formation on this part of the key.



## BOCA GRANDE KEY

MARCH 13, 1904

☉	<i>Alternanthera brasiliana</i> (2279)	☐	<i>Gossypium religiosum</i> (2287)
—	<i>Ambrosia hispida</i> (2280)	☉	<i>Hymenocallis caribaea</i> (2273)
⊕	<i>Andropogon glomeratus</i> (2293)	∏	<i>Laguncularia racemosa</i> (2290)
ψ	<i>Avicennia nitida</i> (2286)	×	<i>Maytenus phyllanthoides</i> (2292)
γ	<i>Batis maritima</i> (2285)	±	<i>Melanthera nivea</i> (2297)
☽	<i>Bumelia microphylla</i> (2291)	=	<i>Metastelma bahamense</i> (2277)
♁	<i>Caesalpinia crista</i> (2282)	∏	<i>Pectis Lessingii</i> (2295)
△	<i>Cakile fusiformis</i> (2266)	∏	<i>Phaseolus pauciflorus</i> (2284)
⊗	<i>Cenchrus echinatus</i> (2300½)	☛	<i>Pithecolobium guadalupense</i> (2272, 2278)
+	<i>Cordia sebestena</i> (2296)	✕	<i>Rhizophora mangle</i> (2289)
°	<i>Cyperus brunneus</i> (2298)	≡	<i>Salicornia ambigua</i> (2288)
♁	<i>Diapedium assurgens</i> (2283)	∩	<i>Sesuvium portulacastrum</i> (2275)
∏	<i>Dondia linearis</i> (2294)	C	<i>Smilax havanensis</i> (2274)
⊙	<i>Erithalis fruticosa</i> (2269)	D	<i>Solanum bahamense</i> (2268)
○	<i>Ernodea littoralis</i> (2276)	Y	<i>Suriana maritima</i> (2299)
"	<i>Euphorbia Garberi</i> (2271)	/	<i>Waltheria americana</i> (2270)
♂	<i>Euphorbia havanensis</i> (2300)		
β	<i>Flaveria linearis</i> (2267)		

This most interesting of all the isolated sandy keys is about three fourths of a mile long and five eighths of a mile in width. It rises abruptly, on the west, from a narrow beach to an elevation of about 4 feet, then after exhibiting a narrow and but slightly vegetated plateau quickly slopes to two small lagoons and a mangrove-surrounded plain consisting principally of small bits of coral rock.

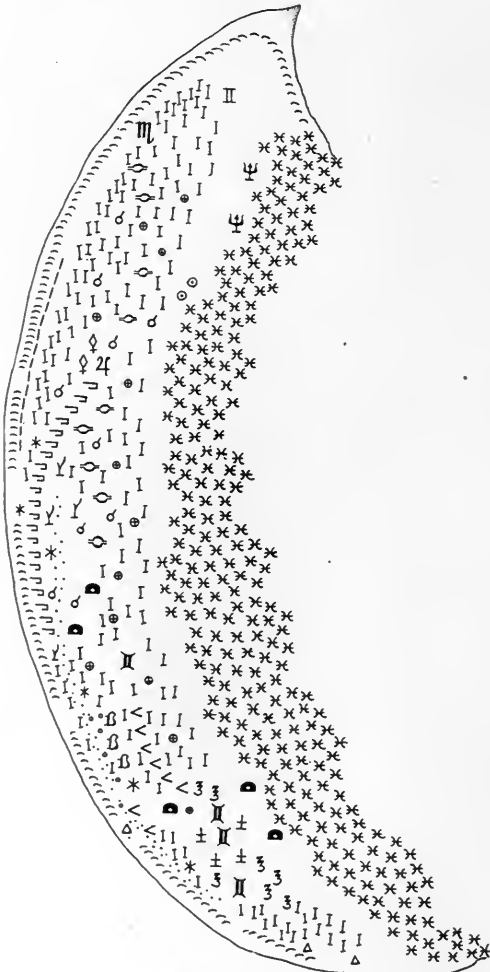
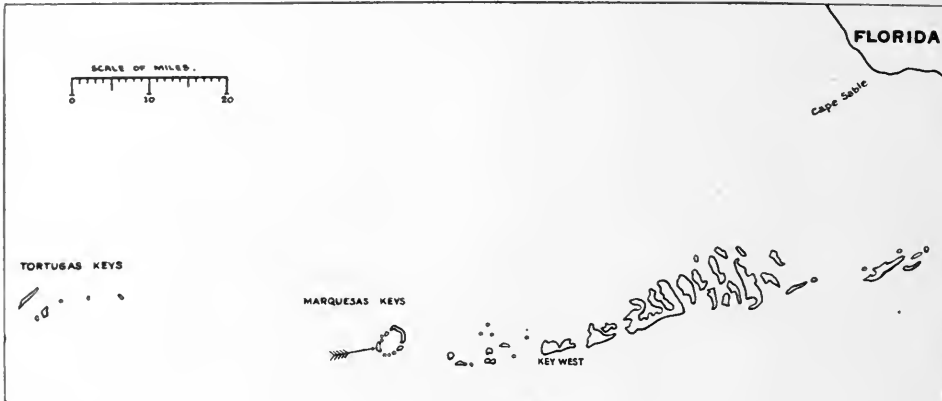
The narrow western beach is flanked, at the base of the abrupt bank which forms the wash line, by an almost continuous line of *Sesuvium*, as is so often the case among these keys. The plateau association is *Andropogon-Cyperus*, instead of *Uniola-Euphorbia*, the latter being inexplicably absent, not even presenting a single individual of its elements. At the northern end the mangrove border association of *Avicennia-Dondia-Salicornia-Batis* is very characteristic, while the heterogeneous admixture of species, between this association and the beach, can but suggest a favorite resting ground for both sea and land birds.

The plain of coral debris is peculiar to this key alone in the archipelago. It is nearly barren except for its odd aggregation of shrubs of *Cordia*, *Gossypium*, *Bumelia*, *Melanthera* and *Maytenus*, the first two of which suggest former residence of man. The passageway between the plateau and the coral plain is flanked on each side by large masses of *Ambrosia* that run into the *Laguncularia* on the north and the mangroves on the south.



## THE MARQUESAS GROUP

The sand keys forming this group have been arbitrarily designated as "A," "B," "C," etc., for reference in this work, and are also so indicated upon the labels of the specimens, the maps, and in the field notes. The reason for this is that these islets are only known collectively, among the boat and turtle men, as "The Marquesas," not being individually differentiated by them. On the U. S. Coast and Geodetic Chart No. 170, our Key "H" is noted as Round Island and the small key lying between our Key "I" and Key "A" (which was found to be covered with mangroves only) as Conch Key; these names are, however, unknown to the boat men. Mr. Lansing's observations, during his survey of the group, point to several changes having befallen the islets since the survey which resulted in the formation of the chart. Key "A" he found to be continuous instead of composed of two portions; this was also true of Keys "G" and "H" and of Conch Key; and Key "D" has been reduced from narrowly oblong to a more or less semicircular form. These changes are in no wise peculiar but are due to the natural expansion of the mangrove colonies, erosion by the waves and current, and the drifting or upwashing of the fine, light, coral sand of which these keys are all composed. All of these natural forces are uniting to form, in course of time, a solid island embracing this whole group.



Marquesas "A"

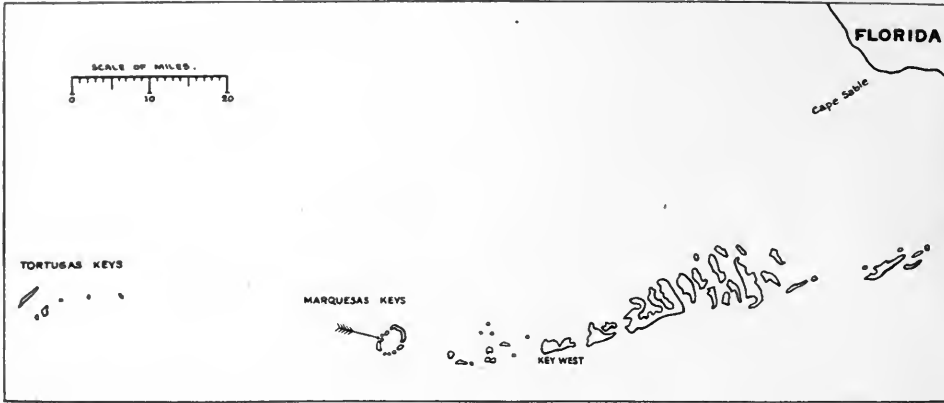
MARQUESAS "A"

MARCH 10, 1904

—	<i>Ambrosia hispida</i> (2104)	☉	<i>Hymenocallis caribaea</i> (2120)
⊕	<i>Andropogon glomeratus</i> (2123)	♀	<i>Iva imbricata</i> (2124)
⊕	<i>Avicennia nitida</i> (2101)	⊖	<i>Laguncularia racemosa</i> (2102)
<	<i>Borrichia arborescens</i> (2109)	⊖	<i>Lantana involucrata</i> (2111, 2114)
♂	<i>Caesalpinia crista</i> (2103)	±	<i>Melanthera nivea</i> (2116)
△	<i>Cakile fusiformis</i> (2110)	⊖	<i>Paspalum distichum</i> (2125)
♂	<i>Calonyction album</i> (2121)	●	<i>Pithecolobium guadalupense</i> (2105, 2106)
°	<i>Cyperus brunneus</i> (2122)	✕	<i>Rhizophora mangle</i> (2099)
⊎	<i>Dondia linearis</i> (2100)	⊖	<i>Sesuvium portulacastrum</i> (2118)
⊙	<i>Erithalis fruticosa</i> (2119)	γ	<i>Suriana maritima</i> (2108)
·	<i>Euphorbia buxifolia</i> (2113)	*	<i>Tournefortia gnaphalodes</i> (2107)
♂	<i>Euphorbia havanensis</i> (2115)	I	<i>Uniola paniculata</i> (2112)
β	<i>Flaveria linearis</i> (2117)		

This islet, the most western of the Marquesas group, is semilunar in outline with the concavity looking substantially inward. It is of clear sand, about 1.5 miles long and 300 feet wide, and has an elevation of about 3.5 feet maintained throughout its central line of length. The northern horn of the crescent is a sloping sand spit; while the southern gradually merges into the mangroves that completely border the concave western side. The unbroken eastern convex strand is very narrow and is backed at the wash line of the waves with an almost continuous strip of *Sesuvium*. The mangrove association is almost pure, having only a few *Avicennias* at its northern extremity and nearby, to the south of these, a small number of *Erithalis* shrubs.

The central portion of the islet, a sandy plain, is almost covered with a quite close growth of *Uniola* intermingled with the islet's complete flora as listed above. The vegetable peculiarities of this colonization are:—The comparatively few shrubs of *Suriana*; the localized lines of *Ambrosia* and *Paspalum*; the confinement of *Euphorbia buxifolia*, *Calonyction* and *Flaveria* to the lower half of the islet when evidently the conditions are the same throughout; and the general scattered arrangement of the balance of the species. The unicate vegetation consists of *Caesalpinia*, *Dondia*, and *Laguncularia*, all on the northern half.



Marquesas "B."



## MARQUESAS "B"

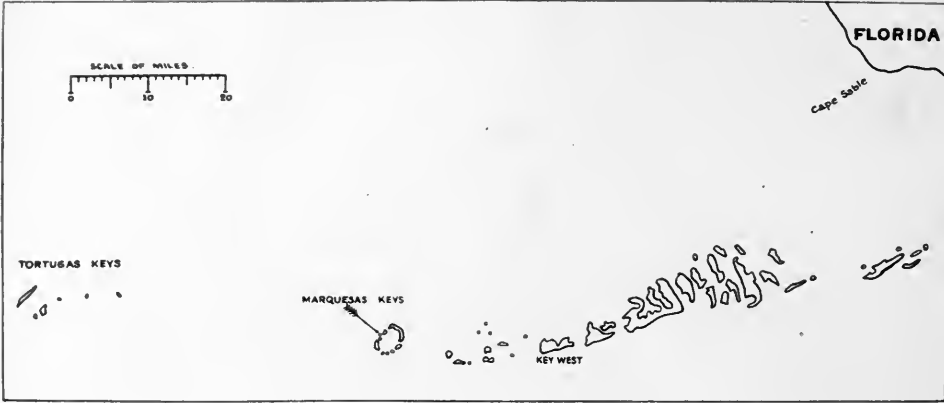
MARCH 11, 1904

- ⊕ *Andropogon glomeratus* (2163)
- ψ *Avicennia nitida* (2165)
- < *Borrichia arborescens* (2157)
- ∴ *Canavalia obtusifolia* (2162)
- ° *Cyperus brunneus* (2159, 2161)
- ϕ *Distichlis maritima* (2160)
- ∩ *Dondia linearis* (2167)
- *Euphorbia buxifolia* (2168)
- ∏ *Laguncularia racemosa* (2164)
- ∩ *Sesuvium portulacastrum* (2166)
- ∩ *Suriana maritima* (2158)
- I *Uniola paniculata* (2169)

This, smallest of the Marquesas group, is a sand key 40' by 100 feet in extent, barely twelve inches above the wash of the sea. Its sloping strand is broad and clean except at the southeastern point where the encroachment of the sea upon the *Laguncularias* shows a tendency to loss of insular area. The flow of the tide forth and back through the narrow passages, both to the north and south of this islet, is apparently too strong to allow the fruits of *Rhizophora* to gain a foothold upon any part of its shores.

The *Uniola-Euphorbia* association, at the wave limits of the north strand, is a very characteristic one, terminated at both extremities by pure colonies of *Sesuvium*. The scattered flora of the central portion of the islet contains more of the elements of Marquesas "A" to the south than of "C" to the north, and one element, in *Distichlis*, that does not appear upon either of its neighbors.

Without the aid of the mangrove it would seem highly probable that this will be one of the last elements to play its part in joining the islets of the Marquesas group into a complete mass.



Marquesas "C."

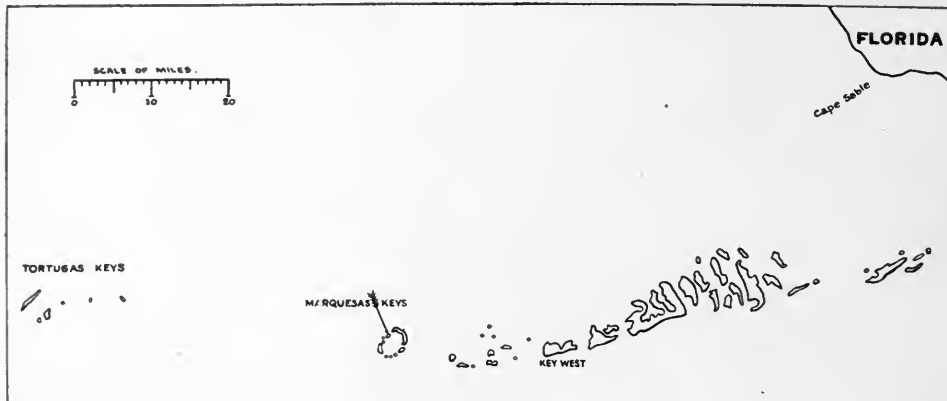
MARQUESAS "C"

MARCH 10, 1904

- ♂ Atriplex cristata (2129)
- ♂ Calonyction album (2137)
- : Canavalia obtusifolia (2135)
- ° Cyperus brunneus (2131)
- ♂ Euphorbia havanensis (2133)
- ♀ Euphorbia trichotoma (2128)
- ♂ Flaveria linearis (2136)
- ♀ Iva imbricata (2134)
- Π Laguncularia racemosa (2127)
- = Metastelma bahamense (2139)
- √ Pharbitis cathartica (2138)
- ⌘ Rhizophora mangle (not collected)
- D Solanum bahamense (2130)
- Y Suriana maritima (2132)
- I Uniola paniculata (2126)

This small sand islet, one of the three forming the nuclei of the western consolidation of the group into a future island, is about 250 feet in length and (including the mangrove association) 50 feet at its widest point. It rises abruptly on its northwestern, or sea, beach to a central plateau about 3 feet above tide.

The salient peculiarities of its vegetation are:—The absence of *Sesuvium*, *Euphorbia buxifolia*, and *Cakile*; the thorough colonization of *Laguncularia* along the mangrove border; the presence of two large convolvulaceous colonies—*Calonyction* and *Pharbitis*; and the presence in unicate of *Solanum* and *Iva*. With these prominent exceptions the general disposition of the vegetation marks a strong similarity to Islet "A."



Marquesas "D."

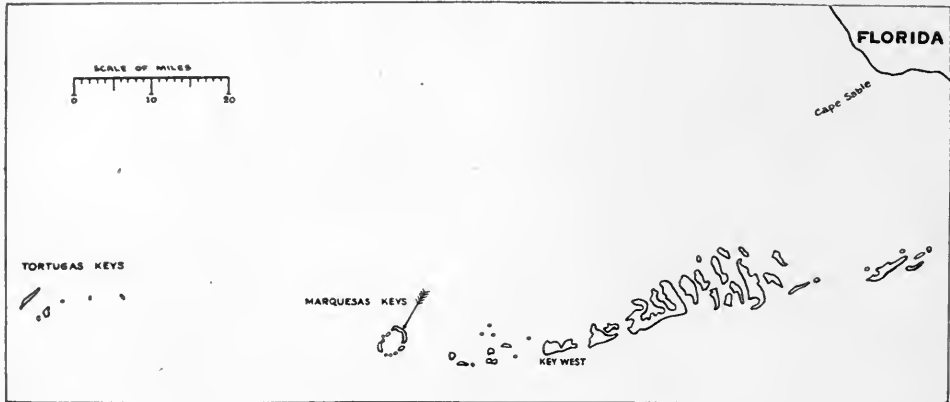
## MARQUESAS "D"

MARCH 11, 1904

- *Ambrosia hispida* (2145)
- < *Borrichia arborescens* (2155)
- ∩ *Caesalpinia crista* (2154)
- *Cyperus brunneus* (2152)
- *Ernodea littoralis* (2156)
- *Euphorbia buxifolia* (2143)
- ∏ *Laguncularia racemosa* (2151)
- ∏ *Lantana involucrata* (2144)
- ± *Melanthera nivea* (2148)
- *Pithecolobium guadalupense* (2147)
- ⊗ *Rhizophora mangle* (2141)
- ♀ *Rivina humilis laevis* (2146)
- D *Solanum bahamense* (2149)
- F *Sporobolus virginicus* (2153)
- Y *Suriana maritima* (2140, 2142)
- I *Uniola paniculata* (2150)

This odd, helmet-shaped islet presents a peculiarly clear-cut companionship of the species forming its flora. In extent it is about 150 by 75 feet with an elevation of about 4 feet throughout the central plateau. Its high sea border is almost sheer, while its plateau gently slopes into the mangrove swamp that characteristically faces the inner shallows of the group.

The *Uniola-Euphorbia-Cyperus* association exhibits the usual features with no exception whatever, but beyond this the groupings are striking. The central position of the *Ambrosia* which is almost always found on the immediate strand; the strongly separated colonies of *Sporobolus*; the entire absence of *Sesuvium* when its presence would certainly be expected; and the clear-cut isolation of the various colonies, that habit the slope between the plateau and the mangroves, marks a vegetal problem that can only offer as a solution the youth of that portion of the islet between the mangroves and the plateau.



Marquesas "E."

MARQUESAS "E"

MARCH 11-12, 1904

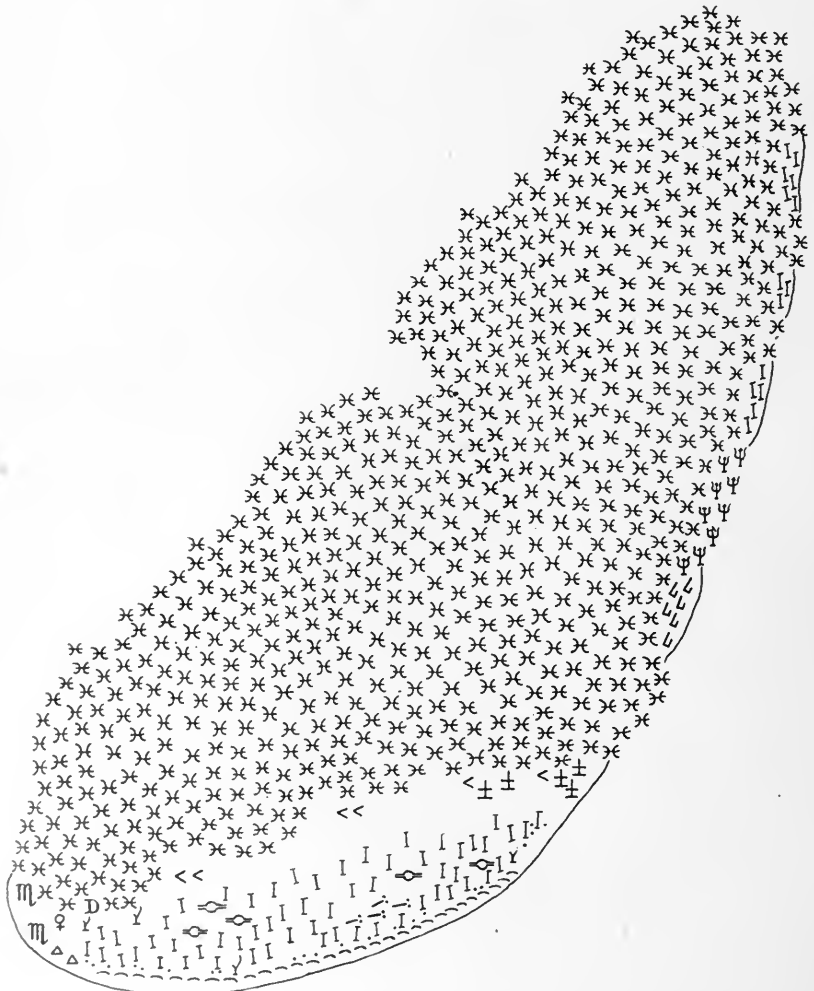
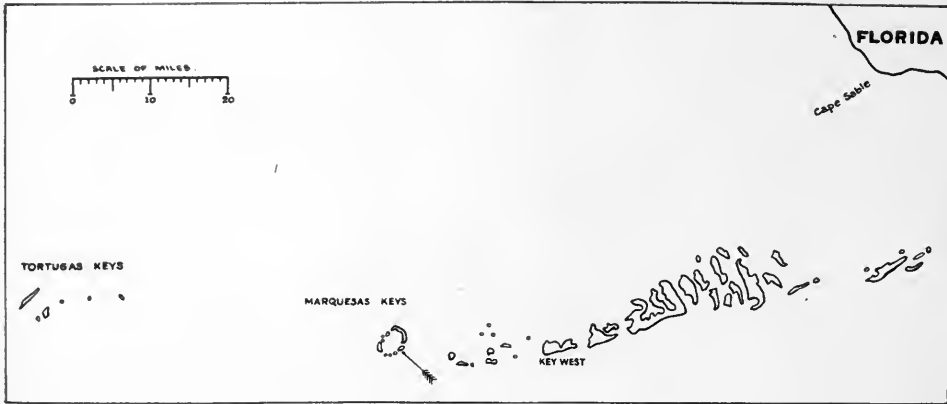
☉	<i>Agave decipiens</i> (2184)	∏	<i>Laguncularia racemosa</i> (2192)
—	<i>Ambrosia hispida</i> (2170)	±	<i>Melanthera nivea</i> (2179)
⊕	<i>Andropogon glomeratus</i> (2194, 2207)	=	<i>Metastelma bahamense</i> (2172)
ψ	<i>Avicennia nitida</i> (2191)	∴	<i>Oreodoxa regia</i> (2198)
<	<i>Borrichia arborescens</i> (2196)	∞	<i>Passiflora minima</i> (2177)
Δ	<i>Caesalpinia crista</i> (2207 ½)	∞	<i>Pharbitis cathartica</i> (2200)
△	<i>Cakile fusiformis</i> (2183, 2190)	●	<i>Pithecolobium guadalupense</i> (2175, 2188)
→	<i>Canavalia obtusifolia</i> (2182)	✕	<i>Rhizophora mangle</i> (2204)
♂	<i>Cenchrus tribuloides</i> (2206)	♀	<i>Rivina humilis laevis</i> (2203)
⊥	<i>Coccolobis uvifera</i> (2197)	△	<i>Salicornia ambigua</i> (2186)
+	<i>Coccothrinax jucunda</i> (2201)†	□	<i>Scaevola Plumieri</i> (2199)
○	<i>Erithalis fruticosa</i> (2187)	—	<i>Sesuvium portulacastrum</i> (2202)
○	<i>Ernodea littoralis</i> (2173, 2193)	Y	<i>Suriana maritima</i> (2174)
·	<i>Euphorbia buxifolia</i> (2171, 2185)	*	<i>Tournefortia gnaphalodes</i> (2195)
♂	<i>Euphorbia havanensis</i> (2180)	I	<i>Uniola paniculata</i> (2205)
3	<i>Galactia spiciformis</i> (2178, 2181)	/	<i>Waltheria americana</i> (2189)
J	<i>Jacquinia keyensis</i> (2176)		

This most extensive link of the group exhibits no characters materially differentiating it from islet "F." It shows a growing mangrove bond in the process of forming land between its older southern end and its younger northern spit. The total extent of the link is in the neighborhood of 5 miles, while its dry-ground width is in no place over 800 feet and nowhere over 6 feet above sea level. Its two extremities are wave and current washed, though the southern shows the greater disturbance on account of the strength of the current that flows between it and islet "F." Here the strand is very abrupt and as usual in such situations bordered at the wash line with *Sesuvium*.

Situated on the higher ground of the northern end is a charcoal burner's cabin, long since deserted, the former occupancy of which is doubtless responsible for the nearby presence of *Agave decipiens* and *Oreodoxa regia*, and possibly also of the sea grapes (*Coccolobis*), though not at all for any other species of the islet's vegetation, the well developed *Coccothrinax* being too far away from the cabin to admit the possibility of its having been purposely planted there. The sheer rise of the northwestern beach is characterized by the absence of vegetation, and the clothing of the higher level with a fringing *Ambrosia* colony backed by the usual plateau association of *Uniola* and *Euphorbia*. The peculiar long stretch of but slightly vegetated sand joining this point with the cabin end exhibits a very "spotty" avevecent implantation. The absence of *Sesuvium*, *Cakile*,\* and *Hymenocallis* and

†See also *Thrinax keyensis* p. 240.

\*Except what might easily be a late implantation.



Marquesas "F."



the presence of *Coccothrinax jucunda* and *Coccolobis* on this end of the islet strongly suggests that while it was occupied by charcoal burners they probably kept a swine or two; that entirely uprooted the former, and on account of them the coalers brought in and planted the latter.

The southern end bears a strong vegetal resemblance to the other small islets of the group, the association showing no peculiar characters.

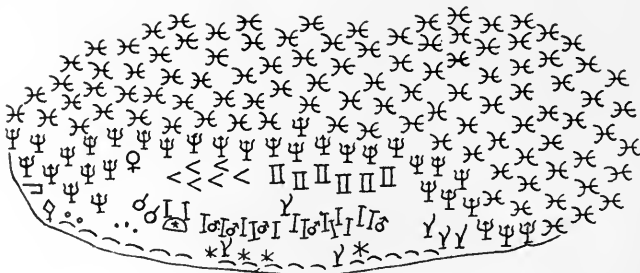
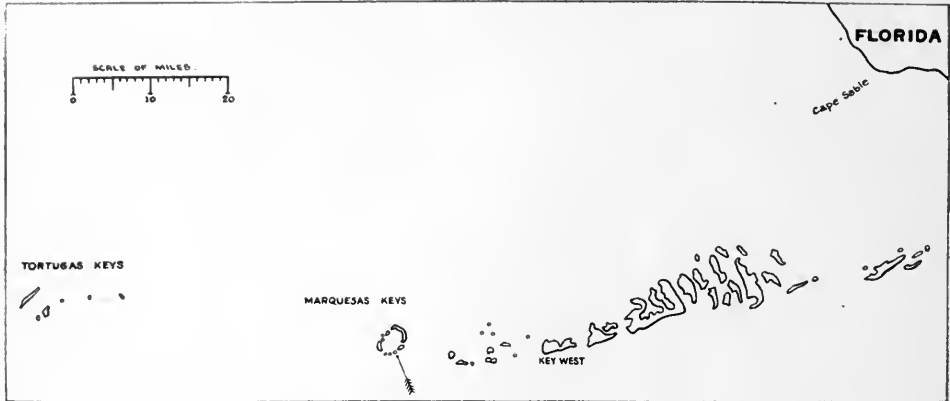
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### MARQUESAS "F"

MARCH 12, 1904

- ψ *Avicennia nitida* (2217)
- < *Borrichia arborescens* (2220)
- △ *Cakile fusiformis* (2213)
- ∴ *Canavalia obtusifolia* (2219)
- ⌊ *Conocarpus erecta* (2216)
- ∩ *Dondia linearis* (2208, 2209)
- *Euphorbia buxifolia* (2212)
- ♀ *Euphorbia trichotoma* (2215)
- ⊖ *Hymenocallis caribaea* (2221)
- ± *Melanthera nivea* (2211)
- × *Rhizophora mangle* (2218)
- ∩ *Sesuvium portulacastrum* (2223)
- D *Solanum bahamense* (2214)
- Y *Suriana maritima* (2210)
- I *Uniola paniculata* (2222)

This formation, only separated from "A" by a channel about 300 feet wide, shows no other character of differentiation from that key. It is about one mile in length and is mostly a mangrove colony. Its southern extremity rises in a sand ridge about 3 feet above tide, upon which is the usual *Uniola-Euphorbia* association. The only striking vegetal characters are the presence of *Euphorbia trichotoma*, the implantation of the bit of beach central to the eastern margin with *Conocarpus*; and the *Avicennia* connective between this and the next small bit of sand beach to the north.



Marquesas "G."

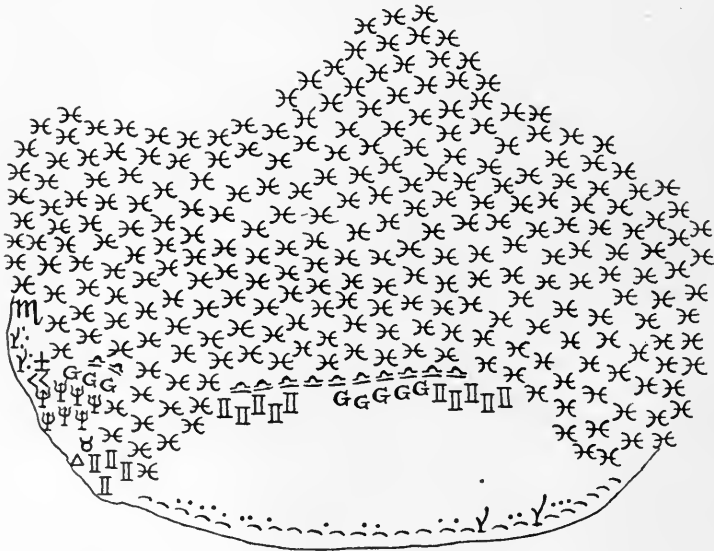
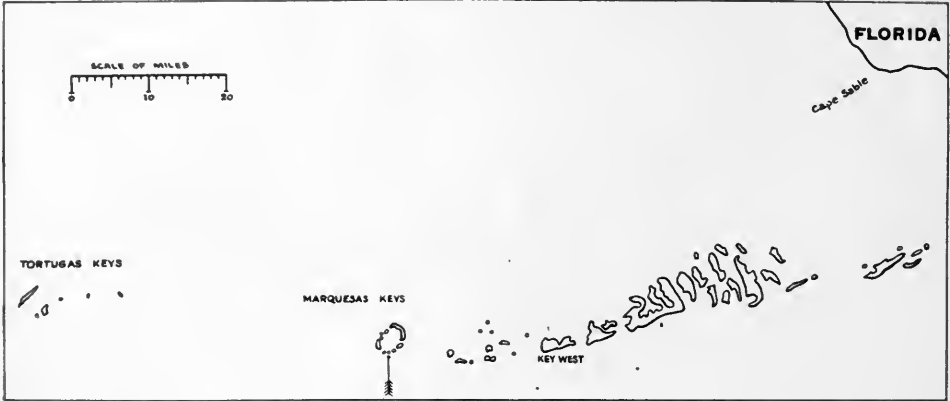
MARQUESAS "G"

MARCH 12, 1904

- ⊕ Avicennia nitida (2235)
- ∧ Borrichia arborescens (2236)
- ◊ Cenchrus tribuloides (2229)
- Cyperus brunneus (2238)
- Euphorbia buxifolia (2225)
- ♂ Euphorbia havanensis (2232)
- ☉ Euphorbia heterophylla (2233)
- ⊕ Euphorbia trichotoma (2224)
- ♀ Iva imbricata (2237)
- ∏ Laguncularia racemosa (2227)
- ∩ Paspalum distichum (2239)
- ✕ Rhizophora mangle (2234)
- ) Sesuvium portulacastrum (2226)
- Y Suriana maritima (2228)
- \* Tournefortia gnaphalodes (2231)
- I Uniola paniculata (2230)

This bit of sand and mangrove, about 200 x 75 feet in extent and 2 feet above the tide, is the beginning of a connective destined to unite the group on the south.

The *Uniola* association of the sand plateau differs in its component species from the other small keys in that the *Euphorbia buxifolia* element is largely supplanted by *Cenchrus* and *Euphorbia havanensis* and *E. heterophylla*—the latter of doubtful specific differentiation. Its vegetal distinction from the other keys is also prominent in the large number of individuals of *Avicennia* associated in forming an unbroken landward border for the mangrove colony.



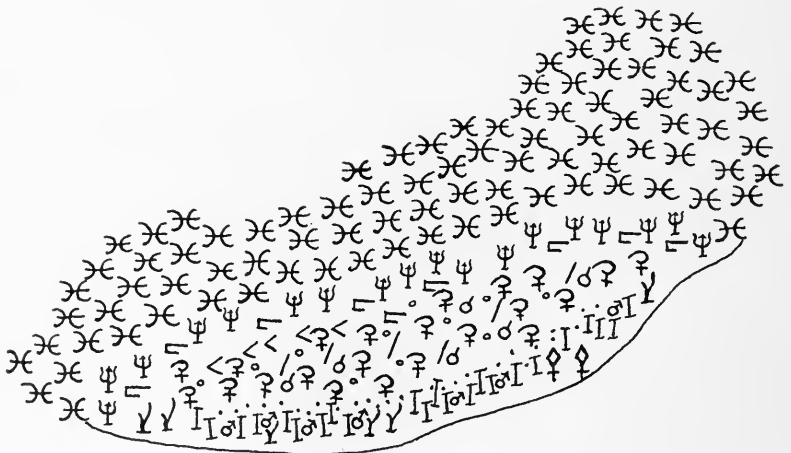
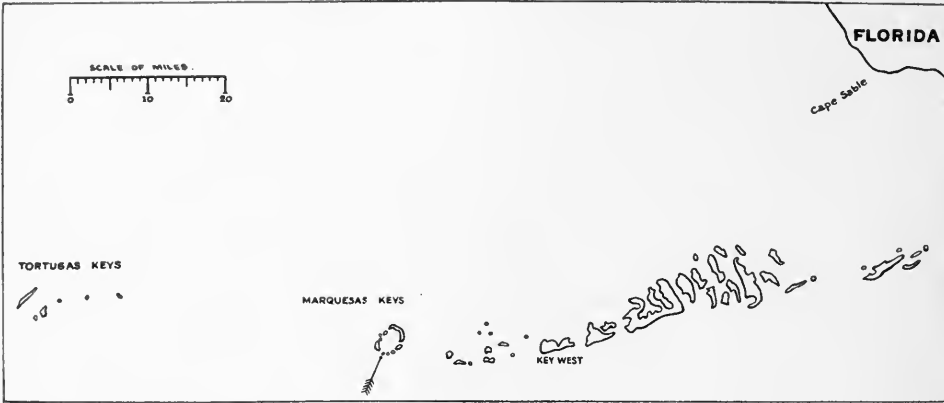
Marquesas "H."

## MARQUESAS "H," OR ROUND ISLAND

MARCH 12, 1904

- ♂ *Atriplex cristata* (2246)
- ψ *Avicennia nitida* (2242)
- < *Borrchia arborescens* (2248)
- △ *Cakile fusiformis* (2250)
- ∩ *Dondia linearis* (2249)
- *Euphorbia buxifolia* (2247)
- ∏ *Laguncularia racemosa* (2241)
- ± *Melanthera nivea* (2251)
- × *Rhizophora mangle* (2245)
- ⊖ *Salicornia ambigua* (2243)
- ∩ *Sesuvium portulacastrum* (2252)
- G *Sporobolus purpurascens* (2244)
- Y *Suriana maritima* (2240)

This small key, about 1200 feet in area, is distinctive in having its plateau, about 3 feet in elevation, absolutely barren of vegetation, having as yet formed no *Uniola* association, the *Euphorbia* element being turned over to the *Sesuvium* border on the abrupt south beach. In the pasty mud at the base of the slope to the *Rhizophora* swamp, close to the mangroves themselves and between them and the usual *Laguncularia*, is an incipient salina strip devoted solely to *Salicornia* bordered on the landward side by *Sporobolus purpurascens*. None of the other elements of the vegetal association is particularly unique.



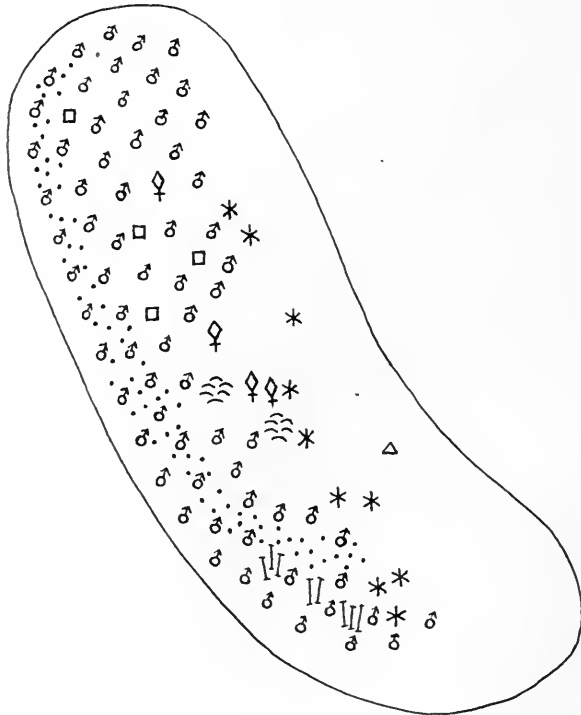
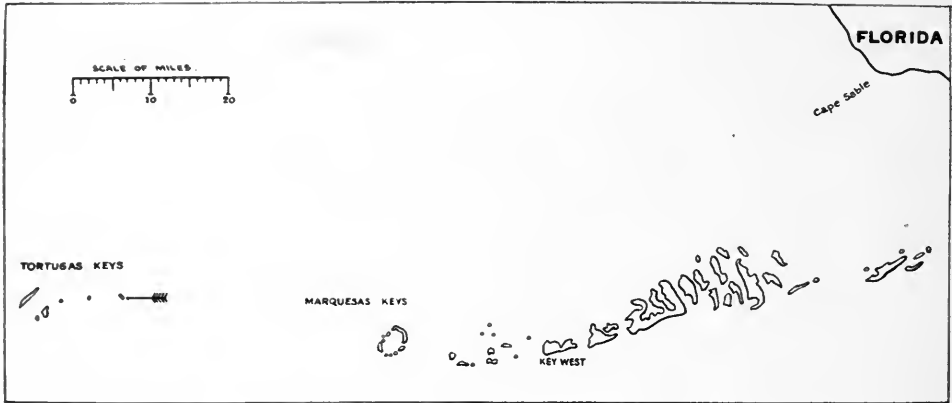
Marquesas "I."

## MARQUESAS "I"

MARCH 12, 1904

- ⊕ *Avicennia nitida* (2256)
- < *Borrichia arborescens* (2257)
- ♂ *Cenchrus tribuloides* (2264)
- ⌈ *Conocarpus erecta* (2259)
- *Cyperus brunneus* (2262)
- *Euphorbia buxifolia* (2263)
- ♂ *Euphorbia havanensis* (2265)
- ♀ *Eustachys petraea* (2255)
- ♀ *Iva imbricata* (2253)
- ✕ *Rhizophora mangle* (2258)
- Y *Suriana maritima* (2261)
- I *Uniola paniculata* (2254)
- / *Waltheria americana* (2260)

A small sand strip about 100 feet in length, 25 feet wide, and less than 2 feet in elevation. Its seaward shore is too abrupt for a *Sesuvium* colony, or has been recently eroded to such an extent as to have lost it. The immediate brow of the bank is given over to the usual *Uniola-Euphorbia* association in which the ample admixture of *Suriana* so near the brink proves with near certainty the erosion of this shore. The colonization of the plateau is quite distinctive in its novel association of *Eustachys* and *Waltheria*. This association appears to have weaned the *Cyperus* element away from the *Uniola* association, which in turn has adopted *Cenchrus* as a substitute. The mangrove border, while retaining a complete fringe of *Avicennia*, here shows for the first time in the group a full substitution of *Conocarpus* for *Laguncularia*.



East Key.



## TORTUGAS GROUP

The islets of this group, the most western of the Florida Keys, are too shifting, or lacking in coral mud, to form an anchorage for *Rhizophora mangle*, in this respect differing radically from the mangrove-formed Marquesas group, from which they are separated by over fifty miles of open sea. Long and Middle Keys are so low as to be awash during heavy weather and, on this account, are void of vegetation. The details of the vegetation of the other keys of the group are as follows:

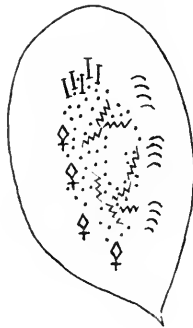
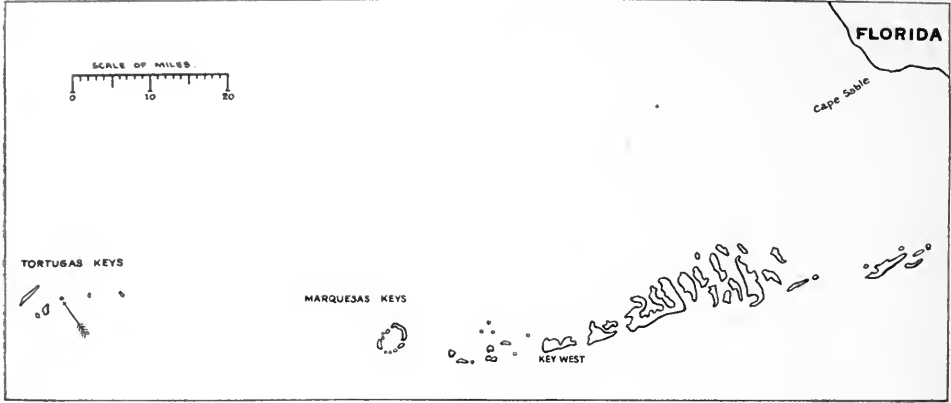
## EAST KEY

MARCH 21, 1904

- △ *Cakile fusiformis* (2492)
- ♂ *Cenchrus tribuloides* (2487)
- *Euphorbia buxifolia* (2485)
- ♀ *Iva imbricata* (2484 and 2486)
- *Scaevola Plumieri* (2489)
- ∩ *Sesuvium portulacastrum* (2490)
- \* *Tournefortia gnaphalodes* (2491)
- I *Uniola paniculata* (2488)

East Key lies about four miles north of east from Garden Key. It is little more than a mere sand bank about 280x50 feet in area. Its west shore is narrow and rises abruptly to an elevation of about 2 feet, whence the surface slopes gradually to broad strands on the east and south.

The vegetation consists principally of *Cenchrus* and *Euphorbia* with a sprinkling of *Uniola* at the southern end; two isolated patches of *Sesuvium* near the center of the islet; and the few other species scattered without definite association.



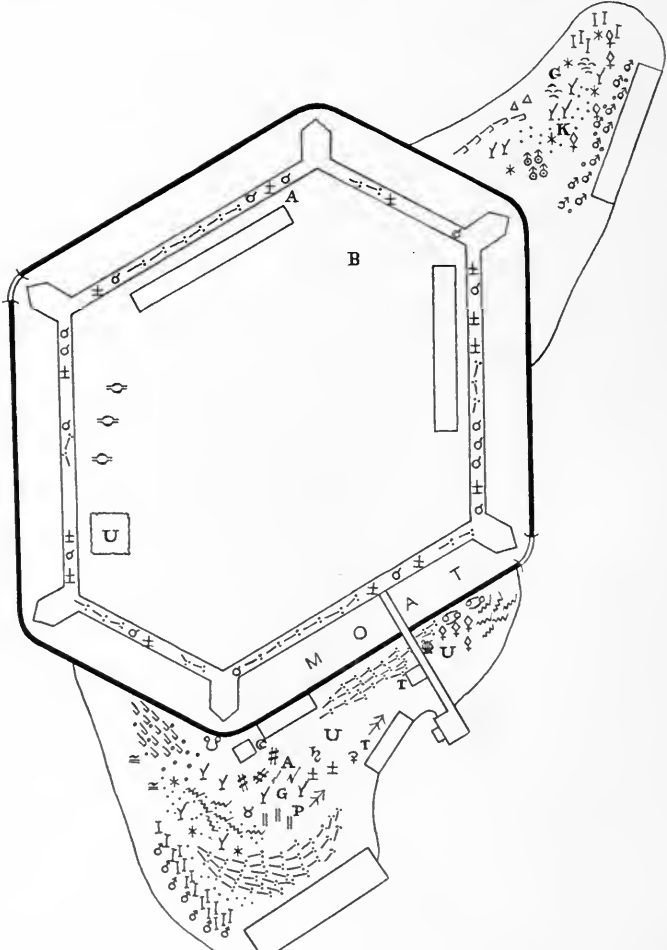
Sand or Hospital Key.

## SAND, OR HOSPITAL KEY

MARCH 21, 1904

- *Euphorbia buxifolia* (2493, 2494)
- ≡ *Ipomoea pes-caprae* (2497)
- ♀ *Iva imbricata* (2496)
- ⌒ *Sesuvium portulacastrum* (2495)
- I *Uniola paniculata* (2498)

Sand Key, the smallest vegetated key in the group, is situated about one and a half miles northeast of Garden Key. This little, oval patch of sand, known to the natives as Hospital Key, is about 50 x 80 feet, and has lost nearly the same area since it was charted by the U. S. Hydrographic Survey. The central portion, which rises about three feet above the sea and comprises fully one half the surface of the islet, is occupied by a growth of *Euphorbia buxifolia* and *Ipomoea pes-caprae* flanked on the eastern border by three separated patches of *Sesuvium portulacastrum*, on the west by four shrubby plants of *Iva imbricata*, and on the north by a clump of *Uniola paniculata*.



Garden Key.

## GARDEN KEY

MARCH 22, 1904

⊙	<i>Amaranthus viridis</i> (2521)	☞	<i>Ipomoea pes-caprae</i> (2518)
☞	<i>Argemone leiocarpa</i> (2531)	♀	<i>Iva imbricata</i> (2520)
♂	<i>Atriplex cristata</i> (2522)	≅	<i>Lithophila vermicularis</i> (2527)
♀	<i>Bidens leucantha</i> (2506)	±	<i>Melanthera nivea</i> (2505)
♀	<i>Boerhaavia viscosa</i> (2530)	≠	<i>Opuntia Dillenii</i> (2537)
△	<i>Cakile fusiformis</i> (2517, 2526)	⊔	<i>Paspalum distichum</i> (2528)
÷	<i>Canavalia obtusifolia</i> (2516)	P	<i>Portulaca oleracea</i> (2503)
↗	<i>Capraria saxifragaefolia</i> (2501)	T	<i>Sesbania sericea</i> (2519)
♂	<i>Cenchrus echinatus</i> (2512)	∩	<i>Sesuvium portulacastrum</i> (2524)
♂	<i>Cenchrus tribuloides</i> (2511)	A	<i>Sida carpinifolia</i> (2515, 2535)
°	<i>Cyperus brunneus</i> (2529)	B	<i>Sida diffusa</i> (2534)
♁	<i>Euphorbia adenoptera</i> (2502)	U	<i>Sonchus oleraceus</i> (2499, 2533)
.	<i>Euphorbia buxifolia</i> (2523)	G	<i>Sporobolus purpurascens</i> (2507-8)
♂	<i>Euphorbia havanensis</i> (2536)	Y	<i>Suriana maritima</i> (2532)
♀	<i>Eustachys petraea</i> (2504)	K	<i>Syntherisma fimbriatum</i> (2510)
	<i>Heliotropium curassavicum</i> (2509)	*	<i>Tournefortia gnaphalodes</i> (2513)
⊖	<i>Hymenocallis caribaea</i> (2514)	I	<i>Uniola paniculata</i> (2525)
		⊙	<i>Valerianodes jamaicensis</i> (2500)

Garden Key, the central islet of the group, is almost wholly occupied by the structure and outbuildings of Fort Jefferson, leaving to natural vegetation only a small sandy point to the northeast and a somewhat larger one to the south of the walls of the fortress. Within the bastion walls, near the officers' quarters, have been planted about thirty trees of *Avicennia nitida*, one *Tamarindus indica*, and a number of individuals of *Catappa catappa*, the balance of the enclosed area being devoted to a parade ground. On the western edge of this parade are a few clumps of *Hymenocallis caribaea*; on the parade itself a few plants of *Sida carpinifolia*; in the waste space back of the officers' quarters several clumps of *Sida diffusa*; and within the walls of a ruined powder magazine a few plants of *Sonchus oleraceus*.

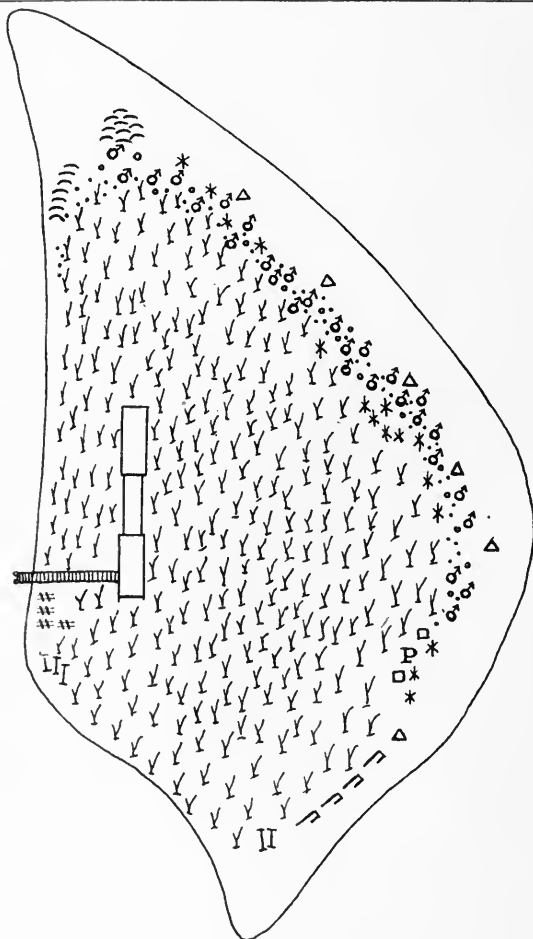
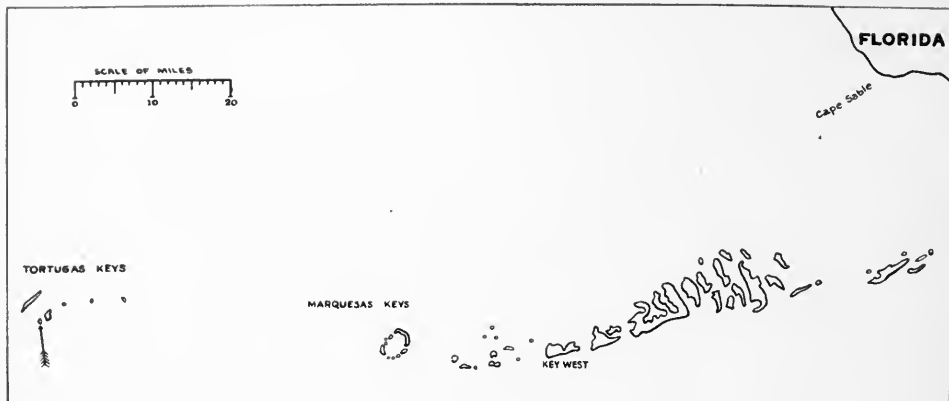
The small area of natural islet northeast of the base of the fortress walls supports an intermingling of the following species: *Paspalum distichum*, *Cakile fusiformis*, *Sesuvium portulacastrum*, *Sporobolus purpurascens*, *Uniola paniculata*, *Tournefortia gnaphalodes*, *Suriana maritima*, *Euphorbia buxifolia*, *Cenchrus echinatus*, *Syntherisma fimbriatum*, and *Iva imbricata*. This vegetated area is bordered on the east by a complete line of *Cenchrus tribuloides* and *Cyperus brunneus*.

The southern projection of the key presents the most interesting

flora of the Tortugas group. The great number of species on this bit of sand, not differing in itself from that of the other islets, must be due either to ballast dumping or some element connected with the presence of man. Along the west beach is a stretch of *Paspalum distichum* with a sprinkling of *Cyperus brunneus*, two isolated patches of *Lithophila vermicularis*, and beyond these to the southern extremity a complete border of *Uniola paniculata* with a fringe of *Cenchrus tribuloides* at its seaward base. The southern portion of the point is given up to *Canavalia obtusifolia* which is separated from the *Uniola* by a growth of *Euphorbia buxifolia*. In the center of the spit is a heterogeneous intermingling of *Ipomoea pes-caprae*, *Euphorbia buxifolia*, *Atriplex cristata*, *Bidens leucantha*, *Suriana maritima*, *Tournefortia gnaphalodes*, *Heliotropium curassavicum*, *Canavalia obtusifolia*, *Sida carpinifolia*, *Melanthera nivea*, *Sonchus oleraceus*, *Eustachys petraea*, *Capraria saxifragaefolia*, *Sesbania sericea*, *Sporobolus purpurascens*, *Euphorbia adenoptera* and *Portulaca oleracea*. Near an outbuilding, a few feet from the base of the moat wall, is a clump of *Opuntia Dillenii*, a cluster of *Amaranthus viridis*, and a patch of *Boerhaavia viscosa*; between these and the board walk the space is occupied entirely by *Canavalia obtusifolia*, terminating in one plant of *Sesbania sericea*. The bit of sand between the walk and the east beach close to the wall of the moat is occupied by the *Canavalia*, *Argemone leiocarpa*, *Sonchus oleraceus*, *Valerianodes jamaicensis*, *Iva imbricata*, and immediately at the beach *Ipomoea pes-caprae*.

On the coping of the bastions grows the only implantation of *Euphorbia havanensis* in the group; it is accompanied by *Canavalia obtusifolia* and *Melanthera nivea*.





Bird Key.



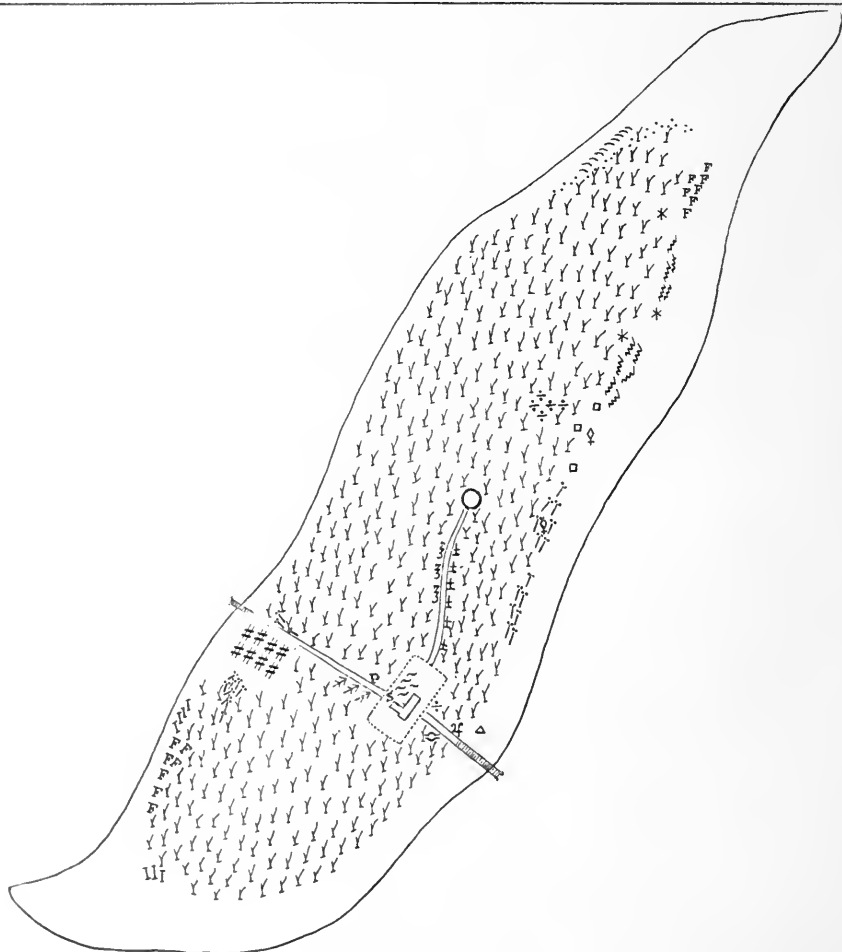
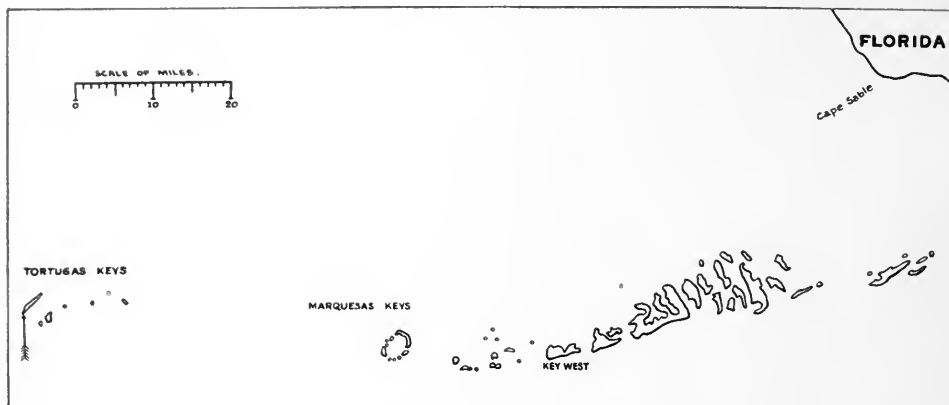
BIRD KEY

MARCH 19, 1904

- |   |   |   |  |
|---|---|---|--|
| △ | <i>Cakile fusiformis</i> (2458, 2460, 2462, 2463) | □ | <i>Paspalum distichum</i> (2450)       |
| ♂ | <i>Cenchrus tribuloides</i> (2454½)               | P | <i>Portulaca oleracea</i> (2459)       |
| ○ | <i>Cyperus brunneus</i> (2452)                    | □ | <i>Scaevola Plumieri</i> (2456)        |
| · | <i>Euphorbia buxifolia</i> (2453, 2455)           | ∩ | <i>Sesuvium portulacastrum</i> (2461)  |
| ‡ | <i>Opuntia Dillenii</i> (2454)                    | Y | <i>Suriana maritima</i> (2451)         |
|   |   | * | <i>Tournefortia gnaphalodes</i> (2449) |
|   |   | I | <i>Uniola paniculata</i> (2457)        |

This low sand islet, situated about three quarters of a mile south of west from Garden Key, extends about 500 feet north and south, about 250 feet east and west at its broadest part, and at its highest point rises only about 3½ feet above the sea. The northern extremity is a broad sea-washed sand spit; the west beach is very narrow and rises immediately into an abrupt bank about two feet high; the east shore slopes into a broad strand, and the southern extremity forms a sand spit similar to that of the north point but less extensive. Wave action from the northwest appears to be rapidly eroding the western beach, the vegetation on the shore plainly showing the encroachment.

Almost the entire Key is covered with a dense growth of *Suriana maritima* which extends to the verge of the west shore and to the wave limit of the east beach, clothing the center of the islet to the exclusion of other species. The east border is plentifully strewn with an intermingling of *Cenchrus tribuloides*, *Cyperus brunneus*, *Euphorbia buxifolia* and *Tournefortia gnaphalodes*, while scattering clumps of *Cakile fusiformis* venture out from this zone toward the sea. Two small, separate colonies of *Sesuvium portulacastrum* have become established at the wave line of the northern point, the space between them and the *Suriana* being occupied by a shrubby form of *Euphorbia buxifolia* (2455). Toward the southern extremity of the eastern wave limit appear two detached plants of *Scaevola Plumieri* and between them a small patch of *Portulaca oleracea*. The wave line is terminated on the south by an extensive growth of *Paspalum distichum* and ends with two plants of *Uniola paniculata*, the latter species also appearing south of a clump of *Opuntia Dillenii* near the hospital boat landing on the western beach. These twelve species comprise all of the vegetation observed upon the key.



Loggerhead Key.

LOGGERHEAD KEY

MARCH 19, 1904

2f	Caesalpinia crista (2479)	±	Melanthera nivea (2482)
△	Cakile fusiformis (2472)	≠	Opuntia Dillenii (2476)
⊖	Calonyction album (2483)	P	Portulaca oleracea (2480)
÷	Canavalia obtusifolia (2464)	S	Salvia serotina (2481)
↗	Capraria biflora (2477)	□	Scaevola Plumieri (2469)
+	Cordia sebestena	~	Sesuvium portulacastrum (2468)
·	Euphorbia buxifolia (2475)	F	Sporobolus virginicus (2474)
∞	Hymenocallis caribaea	Y	Suriana maritima (2465)
∞∞	Ipomoea pes-caprae (2470)	*	Tournefortia gnaphalodes (2467)
◇	Iva imbricata (2471, 2473)	~	Tribulus cistoides (2478)
		I	Uniola paniculata (2466)

This highest and westernmost key of the archipelago, and largest of the Tortugas group, is completely reef-invested on its eastern and western shores. It is about three quarters of a mile long by an eighth of a mile broad, with a central plateau full nine feet above tide. Although it has for years been occupied by a lighthouse and its attendants, it is nevertheless notably free of homovectent plants, *Salvia*, *Cordia sebestena* and *Tribulus* being the only species present that might be considered to have been brought here by man.

Its central plateau, like that of Bird Key, is entirely implanted with a pure *Suriana* group, the individuals of which are about six feet high. The vegetation of the islet presents no associations whatever, all its species being elementally scattered subtropic, maritime "weeds." Even the usually associated *Uniola* and *Euphorbia* appear as far separated as the limits of the surface will allow.

The lighthouse enclosure contains a *Papaya*, and several Coconut and Geiger trees, the walk being bordered by two patches of *Hymenocallis*. The garden contained no flower-beds nor vegetable patches at the time of Mr. Lansing's visit.

## SUMMARY

This reconnaissance of a full series of isolated and grouped subtropic sand keys, appears to prove that such species as are able to avail themselves of avevectent and aquavectent transportation, and can withstand, or actually need, a surcharged saline soil and atmosphere avail themselves, with more or less heterogeneity of association, of those sands upon which their seeds are cast; there to spread in just so far as their demands for nourishment and needful space will permit. Ventevectant transportation appears to play no part whatever in the vegetal colonization of such isolated portions of land.

## DISTRIBUTIONAL NOTES

*Agave decipiens* :

This species undoubtedly has been planted on Marquesas "E" by the charcoal burners who once camped thereon. There are about a dozen of the plants together not far from the location occupied formerly by their hut.\* It was probably planted there that it might serve in lieu of soap when stores of that detergent failed.

*Amaranthus viridis* :

See note under *Argemone leiocarpa*.

*Argemone leiocarpa* :

This species is one of the forms of the common Antillean weed *A. mexicana*, appearing, like its frequent companions *Bidens leucantha*, *Sonchus oleraceus*, and *Amaranthus viridis*, frequently about the habitations of man. Their introduction on Garden Key is doubtless due to ballast shifting, as are also *Capraria biflora*, *Euphorbia adenoptera*, *Heliotropium curassavicum* and *Sesbania sericea*.

*Avicennia nitida* :

Occurs only in association with the mangrove and even then only on the receding, and drying borders. (On the south side of New Providence, in the Bahamas, it is, however, found in the open but shallow sea fully a hundred yards or more from the shore.)

\* See under *Rhizophora mangle*.

*Batis maritima:*

See concluding paragraph under this head.

*Bidens leucantha:*

See note under *Argemone leiocarpa*.

*Borrichia arborescens:*

See concluding paragraph under this head.

*Cakile fusiformis:*

None of the Antillean species is better adapted to dissemination by water than this, nor indeed for ready spreading when once a foothold is gained. See page 125.

*Caesalpinia crista:*

Doubtless aquavectent. The pods are excellent pontoons and are often found at sea far from land.

*Canavalia obtusifolia:*

Doubtless aquavectent. The pods are excellent voyagers and the seeds retain their vitality even after prolonged salt water immersion.

*Capraria biflora:*

See note under *Argemone leiocarpa*.

*Cenchrus tribuloides:*

The fruits of this grass are especially adapted for clinging to the webbed feet of marine birds; it is, on this account, one of the first species to be implanted upon newly formed strands and islets.

*Coccolobis uvifera:*

While the Sea Grape is a common plant on the rocky keys of Florida and the shores of the Antillean Islands in general, and its appearance on these sand keys might be considered by no means extraordinary, yet I am inclined to judge that it is planted on Marquesas "E" (the only islet of the archipelago on which it is found).

*Coccothrinax jucunda:*

This species is common on the eastward keys of Florida and there appears no valid reason why it may not have been implanted naturally upon Marquesas "E." From the fact that this species will not survive transplantation it is certain that the supposition that it had been brought here to serve for future rethatching of the hut is erroneous.

*Conocarpus erecta:*

See concluding paragraph under this head.

*Cordia sebestena:*

The natural implantation of this species in both its localities (Boca Grande and Loggerhead Keys) is open to serious doubt. On account of the splendor of its flaming flowers it has become a common

practice in the Antilles to plant, or at least transplant, it as an ornamental shrub. It, however, readily spreads from seed after being planted and the upper station on Loggerhead Key, among the Surianas, is quite possibly due to "seeding in."

*Cyperus brunneus:*

This species is a quite constant element of the Antillean strand flora from the Bahamian Archipelago through to Vera Cruz, Mexico. The seeds are avevectent, *per pedis et intestinis*. See concluding paragraph under this head.

*Dondia linearis:*

See concluding paragraph under this head.

*Euphorbia adenopectera:*

See note under *Argemone leiocarpa*.

*Euphorbia buxifolia:*

This is the commonest herbaceous species of the Antillean strand flora. Its communication from island to island is accomplished principally through the medium of the feet of aquatic birds. Once established it apparently spreads, not only by the catapultic property of the fruits, but also through the drifting of the seed with the shifting sand.

*Gossypium religiosum:*

See remarks under Boca Grande Key.

*Heliotropium curassavicum:*

See note under *Argemone leiocarpa*.

*Hymenocallis caribaea:*

See remarks under Marquesas "E."

*Ipomoea pes-caprae and Calonyction album:*

I am somewhat in doubt as to whether the fruits of these plants are aquavectent (a method of transportation for which they are well fitted) or whether the seeds are avevectent; the latter, I should judge from the often high location of the species on many rocky Antillean islands, is the more probable.

*Iva imbricata:*

See concluding paragraph under this head.

*Jacquinia keyensis:*

This shrub is of very common occurrence upon the eastern keys of Florida and the islands of the Bahamian Archipelago. Notwithstanding the fact that its growth upon Marquesas "E" is unique, and represented by but two specimens, I am inclined to include it among the naturally implanted species.

*Laguncularia racemosa:*

This species is generally found on the receding border of a man-

grove colony. The exception is Key "B" of the Marquesas group, where it is present notwithstanding the fact that the mangrove is entirely absent; and Marquesas Keys "F" and "I," and Man and Ballast Keys, where although the mangrove colony borders seem especially suitable to its growth, the *Laguncularia* has not yet, at least, become implanted.

*Opuntia Dillenii:*

This common Antillean cactus is one of the most readily avevectent species. Its implantation on Bird and Garden Keys is therefore not at all unnatural. Although, from its location on Loggerhead Key, the introduction of the species might well be supposed to be homoevectent, yet, as I have noted its presence on other tropic sand keys where of a certainty man would not have planted nor even conveyed it, I feel justified in considering the presence of the plant also natural in this situation.

*Oreodoxa regia:*

About half a dozen of these Royal Palms still stand on Marquesas "E" near the charcoal burner's hut\* to which situation they were doubtless transplanted from the neighborhood of Cape Sable, probably by the coalers themselves. They served the camp two purposes: that of shade, and as a much needed landfall when returning from boat expeditions.

*Pithecolobium guadalupense:*

The bony seeds of this species are partly invested by a fleshy aril attractive to birds both in color and in taste. This species becomes quite readily transplanted through the medium of the larger migrating land birds.

*Rhizophora mangle:*

This species occurs upon all the islets between Key West and the Marquesas group, and upon all the islets of that group except key "B" where the shores are too strongly current-washed to permit of its gaining a roothold. Many of the smaller keys noted upon the charts of this region proved, in so far as they could be examined, to be pure colonies of this species with no dry land among the plants. The mangrove has not yet found a resting place upon any of the Tortugas. This species yields one of the best and hardest of charcoals and was at one time extensively "burned" upon Marquesas "E".

\* See under *Rhizophora mangle*.

*Salicornia ambigua:*

See concluding paragraph under this head.

*Salvia serotina:*

While this species is a common Antillean weed yet, from its widespread utilization as an antifebrile tea, I judge that its presence in the dooryard of the lighthouse residence on Loggerhead Key is due to intentional planting.

*Scaevola Plumieri:*

The black, pulpy fruits of this plant form a very attractive food for land birds; it thus becomes scattered far throughout the Antillean region.

*Sesbania sericea:*

See note under *Argemone leiocarpa*.

*Sesuvium portulacastrum:*

This is one of the commonest examples of aquavectant plants in this region. Its large, bladder-like leaves prove excellent pontoons to float the light axillary capsules. This is generally about the first herb to find anchorage upon newly formed sand islets and strands.

*Sida carpinifolia:*

This, with its companion species, *S. diffusa*, is one of the commonest grass-plant and wayside weeds of the Antilles. The introduction of these two species into the lawn of Fort Jefferson on Garden Key was possibly accomplished through sowing grass seed from Key West or South Florida.

*Sonchus oleraceus:*

See note under *Argemone leiocarpa*.

[*Thrinax keyensis:*

The type locality for this species is Marquesas "E," where it is doubtless in close association with *Coccothrinax jucunda*. As the species have a similar appearance when neither in fruit nor flower, Mr. Lansing only collected the latter.]

*Tribulus terrestris:*

There is little doubt but that the presence of this species in the dooryard of the lighthouse on Loggerhead Key is due to intentional transplantation from Key West or Indian Key.

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The balance of the species in the Table of Distribution are common Antillean avevectant plants that are coming into the Sand Key Flora with more or less heterogeneity, and will doubtless continue to do so and be added to by many other species of like ease of transportation.



SEQUENCE OF APPEARANCE.

From a somewhat wide field study of isolated insular and strand formations in the Antillean region I have come to the conclusion that the order of precedence in the clothing of the wave-formed sand keys of Florida has been substantially as follows:

1. *Sesuvium portulacastrum* (Aquavectent).
2. *Cakile fusiformis* (Aquavectent).
3. *Euphorbia buxifolia* (Avevectent).\*
4. { *Cenchrus tribuloides* (Avevectent).\*
- { *Cyperus brunneus*
5. *Uniola paniculata* (Aquavectent).
6. *Andropogon glomeratus* (Avevectent).\*
7. { *Suriana maritima* (Avevectent).\*
- { *Tournefortia gnaphalodes*
8. { *Borrichia arborescens* (Avevectent).\*
- { *Iva imbricata*
9. *Ambrosia hispida* (Aquavectent).

Of the mangrove-formed strands the order of precedence, from the mangrove nucleus toward the strand, appears to be:

1. *Rhizophora mangle* (Aquavectent).
2. { *Avicennia nitida* (Avevectent).
- { *Laguncularia racemosa*
3. *Conocarpus erecta* (Avevectent).
4. { *Batis maritima*
- { *Salicornia ambigua* (Avevectent).
- { *Dondia linearis*

The open or sea margin of the mangrove-formed strand vegetates synchronously with the mangrove border in the usual sequence of the sand keys.

An interesting comparative map, that may be consulted in illustration of these conclusions, is that of Woman Key, where we have not only an open or sea islet strand on the eastern part of the key, but also an isolated mangrove islet on the western part still entirely surrounded by a *Rhizophora* colony upon which there is an utter absence of species depending upon the sea for dissemination.

\* Through the medium of the feet of sea birds.



LIST OF SPECIES	Key C	Woman Key	Ballast Key	Man Key	Boca Grande	MARQUESAS								East Key	Sand Key	Garden Key	Bird Key	Loggerhead	
						"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"						"I"
<i>Sesuvium portulacastrum</i> .....	I	I	I	I	I	I				I	I	I	I	I	I	I	I		
<i>Sida carpinifolia</i> .....																			
<i>diffusa</i> .....																			
<i>Smilax havanensis</i> .....					I														
<i>Solanum bahamense</i> .....	I	I		I	I		I	I		I									
<i>Sonchus oleraceus</i> .....																			
<i>Sporobolus purpurascens</i> .....	I																		
<i>virginicus</i> .....	I							I									I		
<i>Suriana maritima</i> .....	I	I	I	I	I	I	I	I	I	I	I	I					I		
<i>Syntherisma fimbriatum</i> .....																			
<i>Tournefortia gnaphalodes</i> .....			I	I	I				I		I		I				I		
<i>Tribulus cistoides</i> .....																			
<i>Uniola paniculata</i> .....	I	I	I	I		I	I	I	I	I	I	I	I	I	I	I	I		
<i>Valerianodes jamaicensis</i> .....																			
<i>Waltheria americana</i> .....	I	I		I	I					I									



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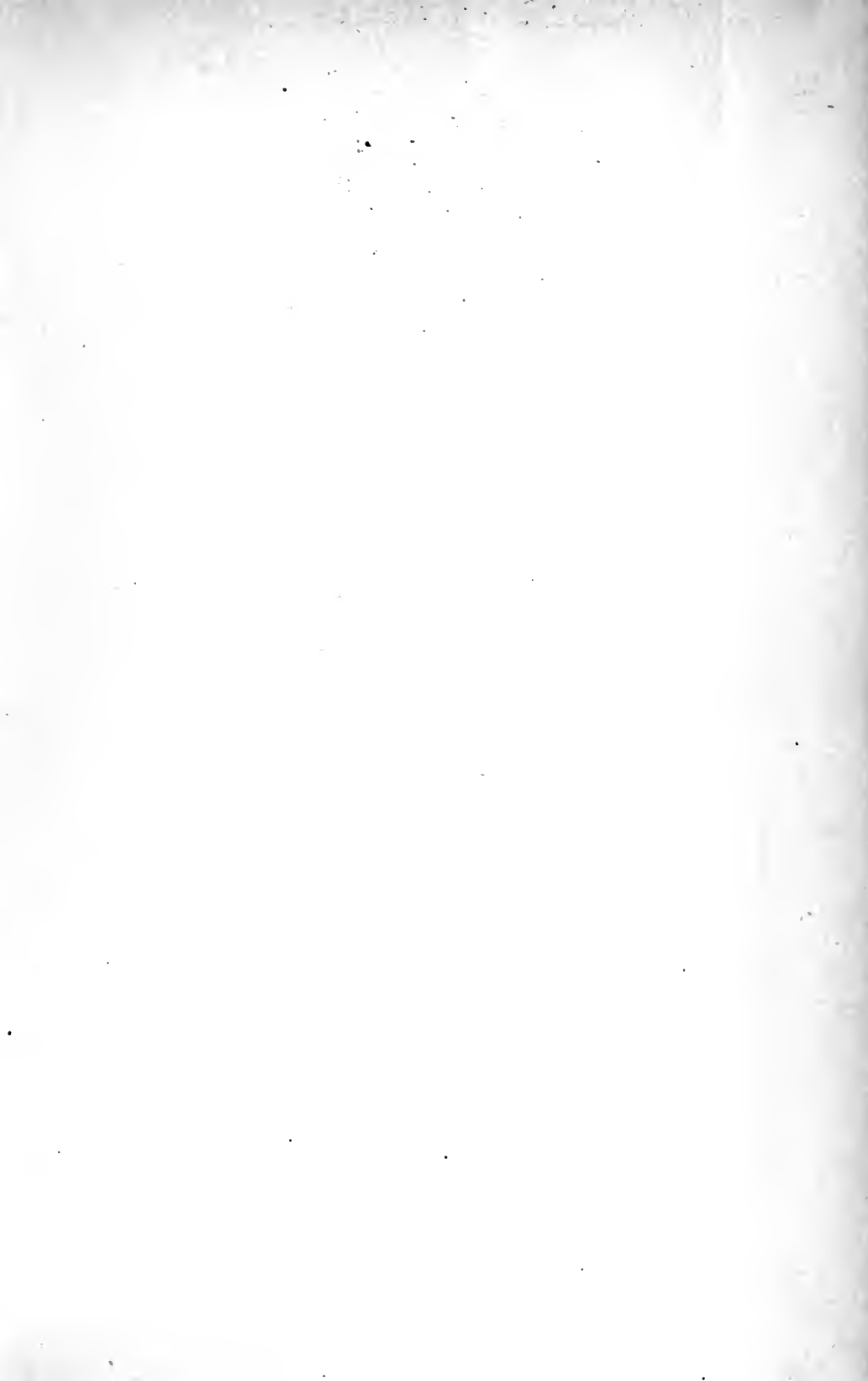
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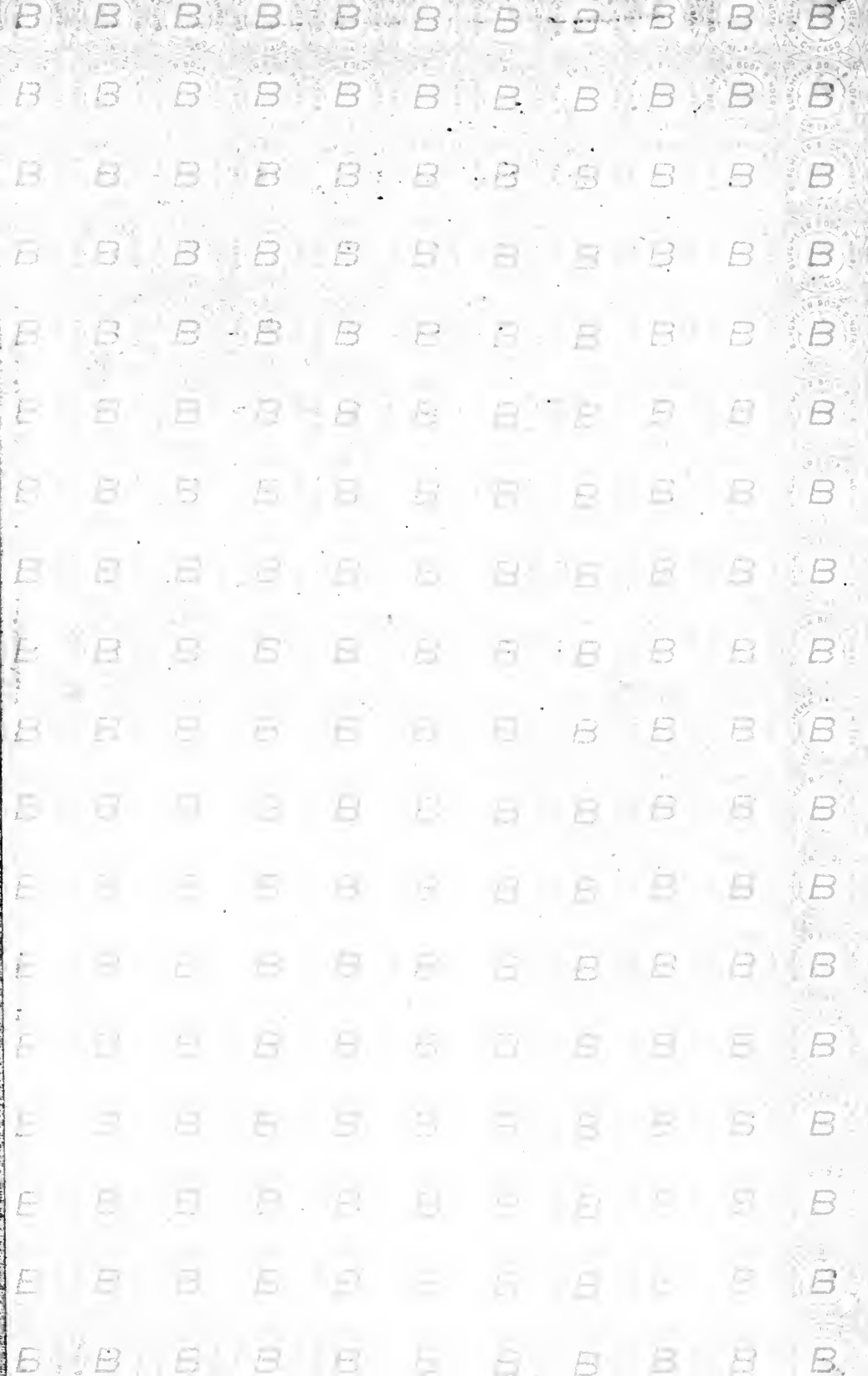
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