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**FLORA OF THE PHOENIX ISLANDS, CENTRAL PACIFIC**

**BY**

**F. RAYMOND FOSBERG AND DAVID R. STODDART**

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# FLORA OF THE PHOENIX ISLANDS, CENTRAL PACIFIC

BY F. RAYMOND FOSBERG<sup>1</sup> AND DAVID R. STODDART<sup>2</sup>

## ABSTRACT

This paper lists the vascular flora of the three atolls (Canton, Gardner, Hull) and five small islands (Birnie, Enderbury, McKean, Phoenix, Sydney) of the Phoenix Group, located in the arid equatorial belt of the Central Pacific, based on extensive collections made in 1973 and 1975 and on previous records and collections. The flora includes 87 species in 36 families. Only 28 of the species (32%) are considered native. A further 60 species have been recorded in the literature, many of them deliberate introductions which have not persisted. These are mentioned but not described.

## INTRODUCTION

The Phoenix Islands lie in the geographic center of the Pacific Ocean, at approximately 170°W longitude and 5°S latitude (Figure 1). They comprise eight islands and atolls (Figure 2). Canton, Gardner (Nikumaroro) and Hull (Orona) are atolls; McKean, Birnie, Sydney, Phoenix and Enderbury are smaller islands with residual enclosed lagoons. Locations and areas are as follows:

	<u>Longitude</u>	<u>Latitude</u>	<u>Land area</u>
Atolls:			
Canton	171°41'W	2°49'S	10.9 sq km
Gardner	174°31'30"W	4°40'30"S	6.7 sq km
Hull	172°11'W	4°31'S	4.3 sq km
Islands:			
Birnie	171°31'W	3°35'S	62 ha
Enderbury	171°5'15"S	3°7'45"S	745 ha
McKean	174°7'30"S	3°35'45"S	91 ha
Phoenix	170°42'45"W	3°43'15"S	94 ha
Sydney	171°14'45"W	4°27'15"S	1067 ha

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<sup>1</sup> Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

<sup>2</sup> Department of Geography, University of California at Berkeley, Berkeley, California 94720, U.S.A.

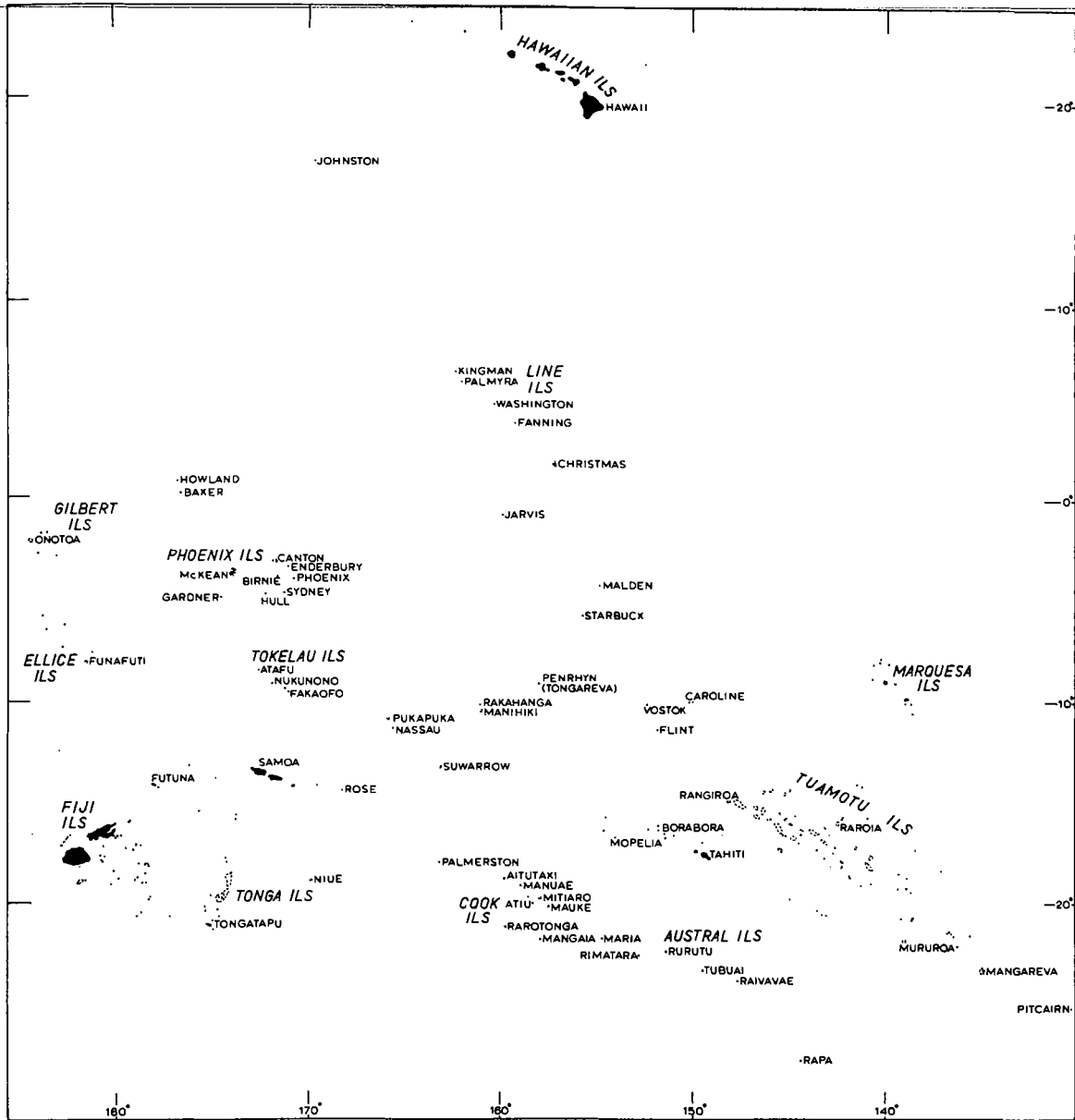


Figure 1. Location of the Phoenix Islands in the Central Pacific.

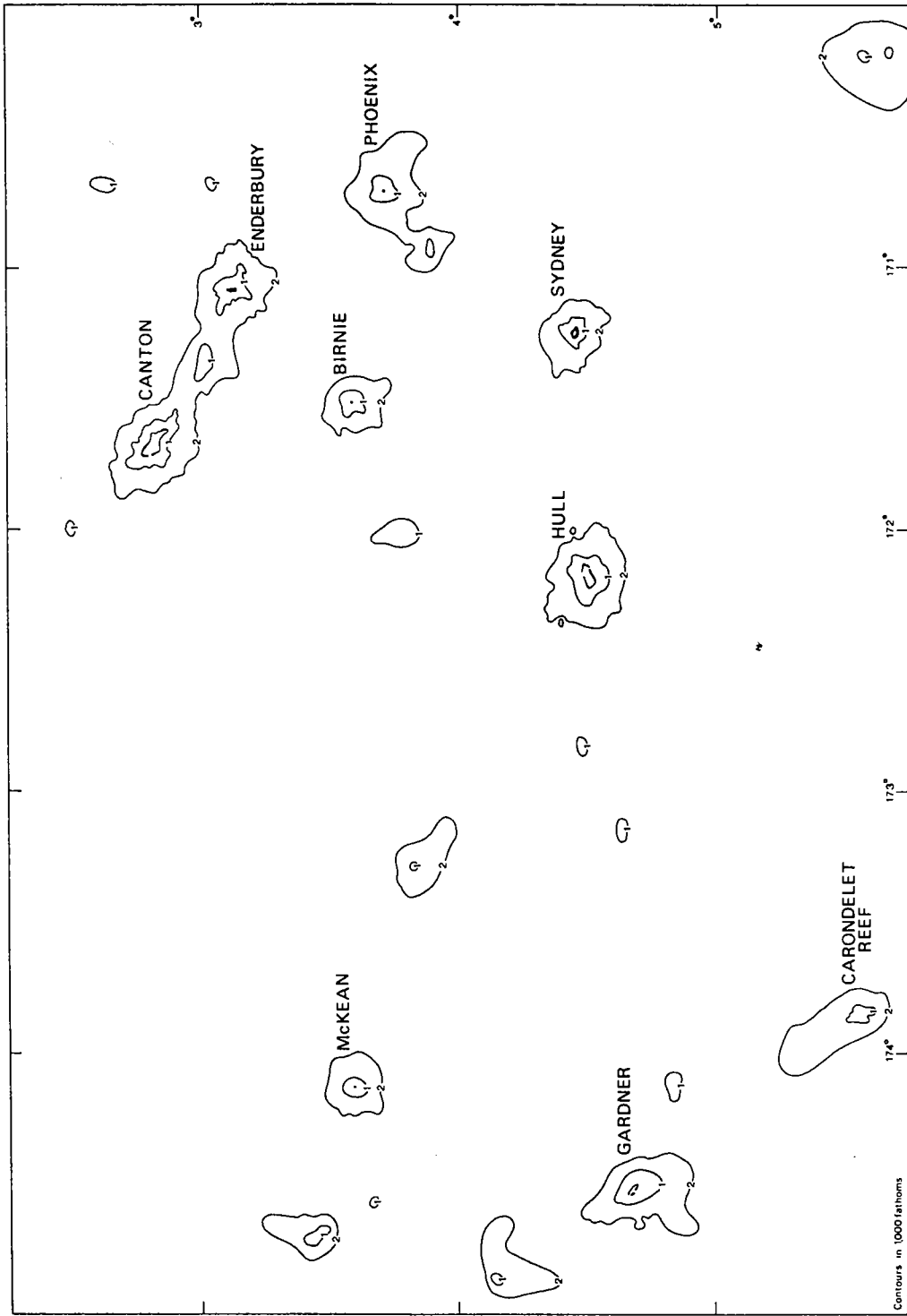


Figure 2. The Phoenix Islands.

Land areas are wholly formed of reef derived materials and mostly rise only a few meters above sea level. The highest measured elevations are 7.0 m on Enderbury, 6.3 m on Sydney, 6.0 on Birnie, 5.5 m on Gardner, 5.4 m on Canton, McKean and Phoenix, and 4.0 m on Hull. The group is located east of Kiribati (of which it forms a part) and Tuvalu, north of the Tokelau Islands, and south of the equatorial islands of Howland and Baker. The nearest high islands are those of Samoa and Fiji to the south and southwest.

All the Phoenix Islands are dry, with great fluctuations in annual rainfall and periods of severe drought. Canton in the north has a mean annual rainfall of 710 mm (1942-67, 1972-75), and the central tier of small islands (McKean, Birnie, Phoenix, Enderbury), though lacking instrumental records, are probably equally dry. The southern group of Hull, Sydney and Gardner are rather wetter and support scrub forest and coconut groves. Mean annual rainfall at Hull (1952-63) is 1171 mm, with a highest recorded annual total of 2599 mm and a lowest of 565 mm; Sydney has a mean (1948-49, 1952-61) of 985 mm (Highest 1846 mm, lowest 463 mm); and Gardner a mean (1951-61) of 1319 mm (highest 2722 mm, lowest 275 mm).

From May 29 to June 12, 1973 a party from the Smithsonian and the Royal Society was able through the courtesy of the U. S. Air Force SAMTEC Project, to visit and study the flora and vegetation of six of the eight islands in the group, and to make collections needed to document the vascular floras of these islands. The party was accommodated on Canton, and Birnie, Enderbury, Phoenix, Hull and Sydney were visited for periods of one to several days. The visit occurred toward the end of a major El Niño event: the total rainfall at Canton over the nine-month period July 1972 to March 1973 was 2629 mm. The vegetation was perhaps at its best during this visit and excellent collections were made, including a number of species not previously recorded from certain of the islands. The best sets of the specimens collected have been deposited in the U. S. National Herbarium and in the herbaria of the B. P. Bishop Museum, Honolulu, and the Royal Botanic Gardens, Kew, England. Others have been sent to several other institutions with Pacific interests.

In 1975, from March 19 to April 2, the same party revisited the Phoenix Islands, again under USAF/SAMTEC auspices, and was able to fill gaps in the 1973 collections, and to observe changes in vegetation and in the abundance of some species. This was a normal arid year in the Phoenix Islands. Canton total rainfall for the nine months July 1974 to March 1975 was 255 mm (for the same period in 1973-74 it had been only 155 mm). The effects of dry conditions were studied, as well as the responses of some of the species to extreme drought. All eight of the islands in the archipelago were visited, including especially Gardner and McKean, which could not be reached in 1973. Excellent collections were gathered on these two islands.

The climatic conditions in the Phoenix Islands are marginal for human settlement, and the group is at present uninhabited. There is archaeological evidence of Polynesian settlement, but it was probably sporadic. The islands were visited by whalers and guano diggers during the nineteenth century, when small settlements were established on the wetter southern islands and efforts made to establish coconut plantations. Hull, Sydney and Gardner were the site of a Gilbertese colonization project beginning in 1938-40. Climatic conditions proved marginal for cultivation, however, and following a severe

drought in 1960 the scheme was abandoned in 1962 and the colonists resettled in the Solomon Islands. Canton was occupied by British and American personnel in the late 1930s, pursuing the territorial claims made to the group by both countries, and when Canton began to be used by trans-Pacific Pan-American flights. In World War II it became a major air force base, and the U.S. Air Force was still in occupation of Canton (with small facilities on Enderbury, Hull and Sydney) at the time of our visits. Military use ended shortly afterwards.

The attempts at colonization and the recent occupation by military and aviation personnel are responsible for the introduction of a large number of the plant species recorded below. Experience has shown, however, that the majority of these exotic species will not persist long without the help of man. In 1950-51 Otto Degener, at the request of the U. S. Civil Aeronautics Administration, then in charge of Canton Island, introduced 129 species of plants to the atoll (Degener and Gillaspay 1955, pp. 35-39). Of these only 14 were observed to be persisting in 1973, and only two, *Coccoloba uvifera* and *Conocarpus erecta*, showed any tendency to spread out of the continually disturbed areas of present human occupation. Certain other exotic species persist at the sites of abandoned Gilbertese settlements, and a very few around old guano operations. Some weeds have been brought in accidentally and have persisted, including *Cenchrus echinatus*, *Eleusine indica*, *Portulaca oleracea*, *Euphorbia hirta*, *E. hypericifolia*, *Pluchea carolinensis*, *P. indica*, *Tridax procumbens*, and *Vernonia cinerea*.

Botanical investigations in and collections from the Phoenix Group have been few. The Wilkes Expedition visited Enderbury in 1840 and 1841 and possibly also Gardner. John Arundel sent a few specimens to Kew Herbarium in 1882. E. H. Bryan visited the group in 1924 and again in 1938. His collections are in the B. P. Bishop Museum, Honolulu. F. R. Fosberg and E. H. Walker collected a few plants by moonlight during a one hour refueling stop enroute to New Zealand in early February 1949, and F. R. Fosberg got another small collection during a slightly longer stop on his return trip in March of the same year. These collections are deposited in the U. S. National Herbarium, as are a few collected by Dr. Leonard Schultz in 1939. Otto Degener and W. H. Hatheway collected on Canton in 1950 and 1951, and Dr. and Mrs. Degener in 1958. S. H. Lamb made a few collections in 1938 which are in the Bishop Museum. Under the auspices of the Pacific Biological Survey Program of the Smithsonian Institution, in 1964, C. R. Long made extensive collections and observations on the vegetation on all the Phoenix Islands, and P. Marshall and P. W. Woodward a few more. These are divided between the U. S. National Herbarium, B. P. Bishop Museum and the University of Hawaii. A small collection was made by Dr. Katherine Luomala in 1949-1950, now housed in the Bishop Museum. Roger Clapp brought a small collection from Canton and Hull Atolls in 1971. On our 1973 expedition 196 numbers were gathered, mostly by Fosberg and Stoddart, a few by Fosberg and Clapp, and in 1975, 97 numbers were collected by Fosberg, with at least five sets of duplicates of most of them.

All specimens that we have seen, and those listed by Degener and in manuscripts by C. R. Long are cited below. If we have actually examined and verified them the herbaria where they are deposited are cited by Index Herbariorum abbreviations. Unfortunately, time has not been available to examine many of the rich collections in the Bishop Museum and the University of Hawaii.

Species considered exotic are indicated by an asterisk \*.

~~A few doubtful species are noted in the discussion. Species mentioned as~~ growing on Canton by Degener, but not found on this survey are mostly mentioned but not described. Of great utility during the present investigation were manuscript lists of species and notes on vegetation made by C. R. Long during the Pacific Biological Survey and furnished to us by Mr. Roger Clapp, who was also a most agreeable companion and an encyclopaedic source of information on the Phoenix group during the expeditions.

The late Dr. Marie-Hélène Sachet furnished many records from herbaria and literature that she had examined and contributed greatly to the organization of the information included in the paper.

A full account of the Phoenix Islands is near completion and includes a description of the vegetation of each island. This flora though published separately forms an integral part of that larger account. The flora is organized alphabetically by family, and the species named are indexed at the end of the paper.

## ACANTHACEAE

\**Pseuderanthemum carruthersii* var. *atropurpureum* (Bull) Fosb.

Upright, branched purplish or purplish-green shrub, stems white speckled, leaves elliptic to elliptic oblong; flowers borne in terminal spikes, corollas salverform, slightly irregular, limb thickly speckled with dark magenta-crimson.

A single sterile shrub that is probably this plant persists in the old Gilbertese village on Hull. In sterile condition this is very hard to distinguish with certainty from *Graptophyllum pictum*. Planted, also, on Canton in U.S.A.F. area, 1975.

CANTON: Fosberg 55715 (US, BISH). HULL: Fosberg & Stoddart 54795 (US, HAW, K); Clapp P-71-42 (US).

## AIZOACEAE

*Sesuvium portulacastrum* L.

Fleshy, prostrate, mat-forming herb, rooting at nodes; leaves opposite, very fleshy but somewhat flattened, linear-oblong to obovate, blunt, sessile or narrowed to a very short thick petiole; flowers axillary on short pedicels, 4-parted, with one whorl of perianth parts that are expanded and petaloid, white or colored within, somewhat appendiculate and slightly cucullate at apices; capsule closely invested by sepals; seeds compressed, orbicular, black.

Two Pacific varieties are easily distinguished; both have been reported from the Phoenix Islands.

**\**Sesuvium portulacastrum* L. var. *portulacastrum***

This was reported from Canton near the dock by Degener in 1959 but was not seen in 1973 or 1975. It was also collected by Long on McKean. It is red-stemmed, with shiny green leaves and purplish flowers.

CANTON: Degener & Degemer 24651. McKEAN: Long 2035 (US), 2430 (US).

***Sesuvium portulacastrum* var. *griseum* Degener & Fosberg**

Stems pale green, not at all reddish; leaves thick, dull grayish green, surface under a lens, when fresh, covered with distended turgid epidermal cells; flowers white to pale pink.

This variety is known only from the Central Pacific atolls, including the Phoenix group, while the other is pan-tropical. This plant forms dense mats along the shores of lagoons and other low areas where salinity is high and drainage poor.

CANTON: Fosberg & Walker 30207 (US, BISH), Fosberg 30203 (BISH), 30204 (BISH), 30205 (BISH); Degener & Hatheway 21305, 21313, Degener 21451 (BISH, type); Bryan 24 (BISH). BIRNIE: Fosberg & Stoddart 54725 (US, HAW, K); Long 2635 (US). ENDERBURY: Fosberg & Stoddart 4756 (US, HAW, K); Lamb in 1938 (BISH); Marshall 2 ; Long 2097 (US), 2112, 2653 (US). PHOENIX: Fosberg & Stoddart 54763 (US, HAW, K); Bryan 19 (BISH); Long 2083 (US), 2088 (US), 2625 (US). HULL: Fosberg & Stoddart 54822 (US, HAW, K). SYDNEY: Stoddart 54865 (US, HAW, K); 55713 (US, BISH,K). GARDNER: Long 2452 (US); Fosberg 55767 (US). McKEAN: Fosberg 55792 (US, BISH, K).

Refs.: Degener and Fosberg (1952), pp. 45-47; Degener and Gillaspay (1955), p. 21; Degener & Degener (1959), p. 9; Maude (1952), p. 70; Pickering (1876), pp. 240, 241, 243.

**\**Tetragonia tetragonioides* (Pallas) O. Ktze. New Zealand Spinach. Mentioned by Hatheway (1955, p. 5) as planted on Canton in 1951 but not seen in 1973 or 1975.**



## AMARANTHACEAE

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**\**Alternanthera bettzickiana* (Regel) Nicholson**

Low, bushy intricately branched herb with reddish stems and reddish or variegated small ovate to elliptic leaves and small tight axillary clusters of white chaffy flowers.

Planted sparingly on Canton among buildings as an ornamental foliage border plant. A recent import.

CANTON: Fosberg 55722 (US, BISH, K).

**\**Amaranthus dubius* Mart. ex Thell.**

Pigweed

Reported in 1941 by Van Zwaluwenburg as introduced to Canton from Oahu, and by Degener as growing sparingly in 1951, but as not seen in 1958. We did not find it in 1973 or 1975, but it may well persist around dwellings and installations.

CANTON: Degener & Hatheway 21295.

Refs.: Van Zwaluwenburg (1941, 1943); Degener & Gillaspay (1955), p. 21; Degener & Degener (1959), p. 9.

**\**Amaranthus viridis* L.**

Pigweed; Chinese spinach

Small herb with alternate ovate-triangular leaves, greenish spikes of small flowers, with tiny green deeply rugose fruits, shiny black seeds.

Very rare, established in terminal area on Canton Island.

CANTON: Fosberg 55726 (US).

## ANACARDIACEAE

**\**Schinus terebinthifolius* Raddi**, reported by Degener as present in 1958 on Canton, was not seen in 1973 or 1975.

## APOCYNACEAE

\**Catharanthus roseus* (L.) G. Don

Madagascar periwinkle

Erect herb, sparingly branched below; leaves opposite, oblong obtuse, sessile; flowers on very short pedicels or in very condensed cymes in upper axils; sepals 5, small; corolla salverform, tube somewhat swollen below summit, limb very patent, white to deep rose or white with a red eye, anthers sessile near top of tube surrounding stigma which terminates a filiform style; fruits paired linear terete follicles.

A native of Madagascar now at home in all tropical countries, planted but easily naturalizing itself. Occasional in residence area of U.S.A.F. establishment on Canton.

CANTON: Fosberg & Stoddart 54903 (US).

\**Nerium oleander* L. was mentioned but not collected by Luomala, 1951, pp. 166, 173.

\**Ochrosia* sp. [probably *O. elliptica* Labill.] was seen cultivated on Canton in 1950, but has apparently not been recorded since, nor was it seen in 1973 or 1975 by us.

\**Plumeria rubra* L., the Frangipani or Plumeria, grown everywhere in the tropics, has been tried a number of times in Canton without much success (Luomala 21 (BISH), Degener 21298 (BISH)). One small, poor-looking plant (Fosberg & Stoddart 54910 (US)) was seen in 1973 and one or two more in 1975 growing in the U.S.A.F. residence area. When well-grown the species is a small tree with very thick branchlets, abundant latex, and spirally arranged elliptic acuminate leaves, white and veiny beneath; very fragrant tubular funnellform white, yellow, pink or red flowers with recurved obovate obtuse corolla lobes.

Refs.: Degener & Gillaspay (1955), p. 27; Degener & Degener (1959), p. 12; Luomala (1951), pp. 167, 173.

A small \**Plumeria obtusa* L. was also seen in 1975.

## ARACEAE

\**Anthurium* and \**Philodendron* mentioned as house-plants in Canton by Degener in 1955, not seen in 1973.

\**Cyrtosperma chamissonis* (Schott) Merr., the "Babai" or Giant Taro as reported (as *Alocasia indica* p. 156 and *C. chamissonis* p. 153) by Laxton (1951), pp. 153 and 156, from Gardner. It has in all likelihood not persisted after the Gilbertese left the atoll.

*Alocasia macrorrhiza* (L.) Schott was seen in a pot at the U.S.A.F. installation on Canton, 1975.

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\**Dieffenbachia seguine* (Jacq.) Schott (*Dieffenbachia picta* Schott) Dumb Cane

This was seen in 1975 around a house in the U.S.A.F. residence area on Canton. It will probably not persist here without shelter and irrigation.

\**Syngonium angustatum* Schott cv. "*Albolineatum*," planted close to buildings in U.S. Air Force settlement on Canton in 1973, one sterile individual climbing on a residence (Fosberg & Stoddart 54909). This may survive as long as it is watered regularly.

### ARALIACEAE

\**Polyscias guilfoylei* (Bull) Bailey, the Hedge Panax of Hawaii and other tropical countries was found in Canton in 1953 by Katherine Luomala (7). It was still growing in 1958 according to Degener, collected by Clapp (P-71-15 (US)), and was seen but not collected by Fosberg and Stoddart in 1973 beside a building in the old British Settlement. It is a tall bush with a strong odor when broken, alternate pinnately compound leaves, with few large elliptic leaflets usually irregularly white-margined, the margins toothed. It seldom flowers and is always propagated by cuttings. A sterile bush of the similar \**P. fruticosa* (L.) Harms was found beside a building in the U.S. Air force residence area, Fosberg & Stoddart 54908 (US); Clapp P-71-16 (US). These are not regarded as part of the established flora.

Refs.: Degener & Gillaspay (1955), pp. 26-27; Luomala (1951), pp. 168, 173.

### ARECACEAE (PALMAE)

\**Cocos nucifera* L.

Coconut

Tree, often very tall, with a columnar trunk ringed by leaf scars, surmounted by a rosette of gigantic pinnately compound leaves; inflorescences axillary, paniculate, at first enclosed in a woody sword-shaped spathe or surrounding bract which is caducous as the panicle expands; staminate flowers distal on panicle branches, pistillate toward bases, perianth of ivory-colored scale-like segments; fruit a large oval 3-sided fibrous drupe, one of 3 locules developed and with a single gigantic seed, this with a thin brown testa, a layer of white endosperm, jelly-like when young, oily when mature, surrounding a large cavity, when young filled with a very palatable water which later largely disappears.

A most useful tree, planted on all the islands except Birnie and Phoenix (and McKean?). Those earlier reported on Enderbury are now gone, but seedlings were planted around U.S.A.F. installation and one naturally started from a drift nut on the

beach. Very abundant on Hull and Sydney and Gardner, forming planted forests, especially around abandoned Gilbertese village sites. Able to tolerate considerable salinity and some drought, but disappearing on small islands and islets during extreme dry periods. 600 were said to have been planted on Birnie by Maude in 1952 but have vanished if indeed they ever grew.

SYDNEY: Bryan 42.

Refs.: Degener & Gillaspay (1955), p. 10; Degener & Degener (1959), p. 7; Laxton (1951), pp. 138 et seq.; Groves (1951), p. 5.

\* *Phoenix dactylifera* L., the Date Palm, was planted on Canton by Degener in 1950; two small palms survived in 1958 (Degener & Degener (1959), p. 8); none were seen in 1973 or 1975.

## ASCLEPIADACEAE

\**Calotropis gigantea* (L.) Ait.

Crown Flower

Strong erect shrub with abundant milky sap; leaves orbicular to broadly oblong, opposite, cordate at base, round at apex, arachnoid tomentose beneath; flowers in pedunculate umbels in upper axils, light dull purple or (in forma *wilderi* Deg.) white, calyx 5-parted, corona a handsomely sculptured structure surrounding the anther tube which closely surrounds the large fleshy stigma; fruit a large follicle, borne in pairs.

Introduced on Canton in 1940 or earlier (Van Zwaluwenburg 1942) and by Degener in 1950-51. Both white and purple color forms were growing on Canton in 1958, according to Degener, and at least one large bush of forma *wilderi* was seen in the U.S.A.F. residence area in 1973 and again in 1975. The purple-flowered form had apparently not survived.

CANTON: Degener & Hatheway 21294 (BISH); Clegern 4 (BISH).

Refs.: Van Zwaluwenburg (1942), p. 50; Degener & Gillaspay (1955), p. 27; Degener & Degener (1959), p. 112; Luomala (1951), pp. 166, 173.

## ASTERACEAE (COMPOSITAE)

\**Conyza canadensis* (L.) Cronq. (Degener & Hatheway 24961), \**Gaillardia picta* Sweet, and \**Tagetes* sp. were reported on Canton by Degener as present in 1958, and \**Emilia sonchifolia* (L.) DC., by Van Zwaluwenburg in 1941 but none of them were seen in 1973. \**Borrchia arborescens* (L.) DC. had persisted from 1951 to 1958 (Degener & Degener 24615 (POM)), but was not seen in 1973 or 1975.

**\**Pluchea carolinensis* (Jacq.) G. Don (*P. odorata* (L.) Cass.)**

Resinous aromatic shrub to 2 m tall, with grayish oblong-lanceolate leaves, corymbiform flat-topped terminal clusters of dull purplish heads, fruit with a crown of capillary pappus enabling it to be carried readily by wind.

Locally abundant on Canton near the docks and air strip on very-much-disturbed ground. Considered by Degener to have been of recent introduction in 1951; found by Fosberg & Walker in 1949.

CANTON: MacDaniels in 1950 (BISH); Fosberg & Stoddart 54888 (US, HAW, K); Fosberg & Walker 30210 (US); Degener & Hatheway 21295 (BISH, US, NY, A); Luomala 27 (BISH).

Refs.: Degener & Gillaspay (1955), p. 31; Degener & Hatheway (1952), p. 34; Degener & Degener (1959), p. 17; Luomala (1951), p. 174.

**\**Pluchea indica* (L.) Less.**

Erect shrub to 1 m tall; leaves green, somewhat dentate, erect, with a resinous odor, terminal rounded corymbose clusters of purplish pink narrow heads; fruits with a crown of short pappus bristles.

Very local on Canton, on very disturbed ground near the docks, in 1950-51 introduced from Hawaii, where it is abundant.

CANTON: Fosberg & Stoddart 24889 (US, HAW, K).

Ref.: Degener & Degener (1959), p. 17.

***Pluchea x fosbergii* Coop. & Gal.**

Rather depressed, much branched grayish shrub; leaves oblong, distally toothed; heads dusty dull purplish in rather large, open, flattopped clusters; fruits lacking fertile seeds.

A spontaneous, sterile hybrid between the two preceding species, that seems to be so successful here that locally it is more abundant than either of its parents. It is interesting in that its rather depressed habit and lanky branching are characters not found in either parent.

CANTON: Fosberg & Stoddart 54890 (US, HAW, K); Fosberg 55719 (US, BISH, K); Degener 24637 (BISH).

*\*Tridax procumbens* L.

Decumbent leafy herb with erect flowering scapes; leaves angular or somewhat lobed, dull dark green; heads with whitish rays, yellowish disk; receptacle with prominent chaffy bracts; fruits with scale-like pappus.

Apparently not present in 1958 but present in 1971 according to photographs by Roger Clapp, now very abundant in disturbed areas around the U.S.A.F. establishment on Canton. Found in 1975 on Hull at abandoned U.S.A.F. site. All plants seen were removed.

CANTON: Fosberg & Stoddart 54887 (US, HAW, K). HULL: Fosberg 55742 (US, BISH, K).

*\*Vernonia cinerea* (L.) Less.

Little Iron-weed

Erect, simple to sparsely branched herb with a basal rosette of obovate leaves and leaves on stem decreasing in size upward, with terminal open clusters of small narrow purple heads with white bristly pappus.

Abundant in weedy disturbed areas on Hull and Sydney around old Gilbertese village sites, not known elsewhere in the group.

HULL: Fosberg & Stoddart 54798 (US, HAW, K); Long 2006 (US), 2012 (US), 2044; Clapp P-71-43 (US). SYDNEY: Fosberg & Stoddart 54851 (US, HAW, K); Long 2546 (US), 2585, 2562 (US), 2563 (US); Bryan 41 (BISH).

*\*Zinnia elegans* Jacq.

Zinnia

An erect herb with opposite leaves and conspicuous heads with bright colored spreading spatulate ligules.

This was, in 1975, seen growing in a sheltered garden at the U.S.A.F. base on Canton.

## BORAGINACEAE

*\*Cordia sebestena* L.

Geiger Tree

Small tree; leaves alternate, ovate, subcordate to cordate at base, obtuse at apex, very rough above, somewhat stiff, petiolate; flowers in terminal rather compact cymes, calyx cylindric, striate, toothed, corolla funnellform-salverform, brilliant scarlet, about 2 cm across; stamens included, style twice branched; fruit a large soft fleshy white drupe.

Originally from sea-beaches in the Caribbean, this beautiful tree is widely planted in the tropics. Introduced on Canton before 1949, it persists in the old British Settlement site and here and there in the U.S.A.F. establishment.

CANTON: Fosberg 30874 (US); Degener 21374; Luomala 16 ; Fosberg 55721 (US, BISH, K); Clapp P-71-24 (US), P-71-20 (US).

Refs.: Degener & Gillaspay (1955), p. 28; Degener & Degener (1959), p. 13; Luomala (1951), pp. 167, 174.

*Cordia subcordata* Lam.

Small tree with low sweeping branches; leaves alternate, broadly ovate to broadly elliptic, tending to be acuminate, base obtuse, upper surface of blade slightly scabrous to almost smooth, petiolate, petioles often yellow; flowers in loose few-flowered cymes, calyx cylindrical, not ribbed, 4-5 toothed at apex, teeth hirsute within; corolla funnellform, limb flaring, intense reddish orange, somewhat crispate, stamens in throat, anthers oblong; style bifid, the branches again bifid just below stigmas; fruit a green drupe with thin flesh and a narrow neck, formed by the calyx remaining around the corky rugose stone.

A tree native to most tropical Pacific islands, especially coral islands, found on all the islands studied except Birnie and Phoenix; rare on Gardner; forming a small forest on Sydney's lagoon shore.

CANTON: Bryan 21 (GH), 1332 (A); Degener 21374; Luomala 1, 11; Degener & Hatheway 21287 (A); Fosberg 55724 (US); Clapp P-71-9 (US); Browne in 1939 (BISH, A). ENDERBURY: Fosberg & Stoddart 54751 (US, HAW, K); Bryan 1336; Lamb s. n.; Marshall 10; Long 2091 (US), 2093 (US), 2100, 2662 (US). HULL: Fosberg & Stoddart 54812 (US, HAW, K). SYDNEY: Fosberg & Stoddart 54867 (US, HAW, K); Long 2577 (US), 2590 (US). GARDNER: Fosberg 55765 (US, BISH, K), 55784 (US, BISH, K). "Gardner's and Birney's Islands", U.S. Expl. Exped. (US).

Refs.: Bryan (1942), pp. 50, 60, 71; Degener & Gillaspay (1955), pp. 28-29; Hatheway (1955), pp. 3-9; Luomala (1951), pp. 167, 174; Laxton (1951), p. 143; Maude (1952), p. 70; Pickering (1876), pp. 240, 242, 243; Degener & Degener (1959), pp. 13-14.

\**Heliotropium procumbens* Mill. (*H. ovalifolium* var. *depressum* (Cham.) Merr.)

Low herb, stems branching, prostrate to ascending; leaves narrowly oblong or spatulate to obovate, appressed hairy; flowers in terminal scorpioid cymes, tiny, white, fruit depressed globose, somewhat 4-lobed, eventually falling into 4 parts.

Recently introduced on Canton probably from Guam or Wake, found only in area of U.S.A.F. establishment, at least as early as 1971 from a photo by Roger Clapp, but now common there; introduced from there to the enclosure around the U.S.A.F. installation on Hull, still present in 1975.

CANTON: Fosberg & Stoddart 54897 (US, HAW, K); Fosberg & Clapp 54898 (US, HAW). HULL: Fosberg & Stoddart 54842 (US, HAW); Fosberg 55741 (US, BISH); Clegern 119 (BISH) .

*Tournefortia argentea* L. f. (*Messerschmidia argentea* (L. f.) Johnst.) Tree Heliotrope

Rounded shrub or small tree, young growth and leaves sericeous-strigose, giving leaves a grayish frosty green appearance; leaves alternate, elliptic to obovate, obtuse, thinly fleshy, narrowed to short, thick petioles; flowers in dense, 1-2 times branched scorpioid cymes, these terminal but very soon becoming axillary by growth of branches at base of peduncle; flowers white, very fragrant, corolla 5-lobed; fruiting clusters pendent, fruit a drupe with 4 stones, the flesh of which dries to a firm highly aerogenous pithy material causing the pea-size fruits to float.

A widespread Indo-Pacific strand plant, one of the first colonists of sand and gravel bars, not reproducing in shade, but abundant in beach ridge scrub and in other peripheral vegetation. Known from Canton, Enderbury, Hull, Sydney, also on Gardner.

CANTON: Fosberg 30884 (US); Luomala 13 (BISH); Bryan 22 (BISH); Murphy in 1949 (BISH). ENDERBURY: Fosberg & Stoddart 54752 (US, HAW, K); Lamb in 1938 (BISH); Marshall 1; Long 2095 (US), 2681. HULL: Fosberg & Stoddart 54816 (US, HAW, K); Schultz in 1939 (US); Clegern 94 (BISH). SYDNEY: Fosberg & Stoddart 54843 (US, HAW, K). GARDNER: reported by Laxton; Fosberg 55744 (US, BISH, K).

Refs.: Bryan (1942), pp. 46, 50, 60; Degener & Gillaspay (1955), p. 29; Hatheway (1955), pp. 4-5, 7-9; Luomala (1951), pp. 164, 165, 174; Degener & Hatheway (1952), p. 34; Laxton (1951), p. 143; Maude (1952), p. 70; Pickering (1876), pp. 240, 242, 243.

## CANNACEAE

A hybrid \**Canna* was growing in a sheltered spot in the U.S.A.F. installation in 1975.

## CARICACEAE

\**Carica papaya* L.

Papaya or Pawpaw

A gigantic tree-like herb, with a stem 8-20 cm thick, a crown of great palmately incised orbicular leaves on long petioles, milky sap; large cream-white pistillate flowers sessile on the stem, smaller staminate and hermaphrodite flowers in open elongate



panicles; large melon-like orange edible fruit with a large central cavity containing many globose rough black seeds, each in a juicy globose envelope.

The papaya was planted and growing at various times on Canton (Luomala 15), but did not prosper (Degener & Gillaspay (1955), p. 26; Degener & Degener (1959), p. 12; Luomala (1951), p. 173). A single plant was seen in the U.S.A.F. establishment in 1973. Long collected it on Hull in 1964, 2025 (US) and also on Gardner 2474 (US). Clapp also collected it on Hull, P-71-41 (US).

### CARYOPHYLLACEAE

\**Spergularia marina* (L.) Griseb., introduced on Canton by Degener in 1958, probably never became established. It was not seen in 1973 or 1975.

### CASUARINACEAE

\**Casuarina equisetifolia* L.

Ironwood

Erect tree with very heavy hard wood, dark green, jointed, cylindrical photosynthetic branchlets or "needles, each segment bearing a whorl of tiny scale-like or tooth-like, vestigial leaves; male and female flowers borne in separate catkins, reduced to stamens and pistils enclosed in small bracts, the pistils rose-purple; the pistillate inflorescence accrescent, the bracts enlarging, becoming woody, the whole inflorescence superficially resembling a diminutive pine cone, the actual fruit small, winged.

Growing sparingly around the U.S.A.F. residence area and at the abandoned British settlement.

CANTON: Degener & Hatheway 21303.

Refs.: Degener & Gillaspay (1955), p. 20; Degener & Degener (1959), p. 8.

\**Casuarina glauca* Sieb.

Similar to the above, but more a large shrub than a tree, producing root sprouts, the needles coarse, stiffer, glaucous green, less prominently striate.

Persisting in a healthy condition around the old British Settlement on Canton.

CANTON: Degener 21372; Fosberg 30876 (US); Clapp P-71-11 (US); Fosberg & Stoddart 54777 (US, HAW, K).

Refs.: Degener & Gillaspay (1955), p. 20; Degener & Degener (1959), p. 8.

## COMBRETACEAE

### *\*Conocarpus erectus* L.

Button-wood or Button Mangrove

Small tree or bushy shrub, leaves alternate, rather small, elliptic, either bright green or silvery-sericeous; flowers small, with inferior ovaries; crowded in catkin-like oval heads which are borne in terminal panicles; fruits flat and somewhat winged, borne packed together in ellipsoidal or oval heads.

Both the green and silvery forms of this species are well-established on Canton, resulting from Degener's introductions in 1950-51. This, and *Coccoloba uvifera*, are the only ones of Degener's introductions that have tended to spread at all beyond the areas of intensive human activity, past or present. They are both very sparingly established part way east on both north and south sides of the atoll.

CANTON: Fosberg & Stoddart 54885 (US, HAW, K) (green form), 54886 (US, HAW, K) (silvery form); Clapp P-71-35 (US) (silvery form); P-71-34 (US) (green form), P-71-33 (US) (silvery form), P-71-29 (US) (green form).

Refs.: Degener & Gillaspay (1955), p. 26; Degener & Degener (1959), p. 12.

### *\*Terminalia catappa* L.

Tropical almond

Tree with conspicuously horizontal whorls of branches, dark brown velvety pubescence on young tips, and a characteristic style of branching with a branchlet from below the terminal growing point of a horizontal branch assuming dominance, dipping downward and arching up level with the turned up apical rosette of the original branch, then the process repeating itself; leaves spirally crowded into rosettes at the branchlet-tips, large, obovate, stiff, glossy, turning bright red before falling off; flowers in axillary slender spikes, cream-white, ovary inferior, perianth campanulate, of one series, 5-lobed, caducous from the top of the ovary, stamens 10, with subulate filaments, conspicuously exerted, pistil 1, conspicuously exerted, hooked at summit, soon caducous; fruit about 4 cm long, 2.5 cm wide, a somewhat compressed ovoid drupe with two keels, the flesh drying rather corky, the seed like an almond, only one or two fruits usually maturing on a spike.

This widespread tropical cultivated and spontaneous strand and lowland tree was growing about the old Pan American Hotel in 1949, but was not seen in 1973, or 1975, although the following species was flourishing.

CANTON: Fosberg 30875 (US); Luomala 2; Clapp P-71-30 (US).

Refs.: Degener & Gillaspay (1955), p. 26; Degener & Degener (1959), p. 12; Luomala (1951), pp. 167, 173.

\**Terminalia muelleri* Benth. (*T. melanocarpa* sensu Luomala and Degener & Gillaspay, non F. v. M.).

Well-shaped tree with a spreading crown, leaves somewhat similar, darker green than in *T. catappa*, glaucous beneath, similar branching, similar inflorescence and flowers; fruiting spikes maturing a number of fruits, these ovoid, somewhat compressed, about 2 cm long, with dark blue epidermis and dark red juicy flesh, rather sour and astringent.

Several trees are in very healthy condition, bearing flowers and fruits in the old British Settlement.

CANTON: Fosberg & Stoddart 54783 (US, HAW, K), 54784 (US, HAW, K); Luomala 22; Fosberg 30879 (US); Clapp P-71-22 (US), P-71-13 (US).

Ref.: Degener & Gillaspay (1955), p. 26; Luomala (1951), pp. 167, 173.

*Terminalia samoensis* Rech.

Shrub or small tree, young growth with yellowish close pubescence; leaves alternate, obovate, short-petioled, thinly coriaceous; flowers on axillary spikes, white, small, fruits fleshy, dark red when ripe, ovoid, somewhat compressed, 1-1.5 cm long, 1 cm wide.

Known in the Phoenix Islands only from Gardner. The record from Canton (Luomala (1951), p. 173), based on Fosberg 30879, was a misidentification of *T. muelleri*.

GARDNER: Long & Woodward 2475 (US); Long 2494 (US); Fosberg 55762 (US, BISH, K), 55768 (US, BISH, K).

## COMMELINACEAE

\**Rhoeo spathacea* (Sw.) Stearn and \**Setcreasia purpurea* Boom, mentioned by Degener & Degener (1959, p. 8) as doing well in gardens on Canton in 1958, were not seen in 1973; however, *Rhoeo* was still present in 1971, as it was photographed then by Roger Clapp.

## CONVOLVULACEAE

\**Ipomoea batatas* (L.) Poir., Sweet Potato, was observed by Degener in 1958 as planted and growing, but chlorotic, "in the housing area" (Degener and Degener (1959), p. 13), but had disappeared by 1973.

*Ipomoea macrantha* R. & S. (*I. tuba* (Schlecht.) Don; *Calonyction* sp.; *Ipomoea turpethum* sensu Pickering, non *Operculina turpethum* (L.) Manso; *Ipomoea grandiflora* Lamarck).  
Moon flower

An extensive and climbing twiner; leaves alternate, large, orbicular cordate, shortly pointed, petiolate, flowers in few-flowered axillary cymes, with 5 overlapping orbicular concave sepals; coralloa long tubular-salviform, to 10-12 cm long, limb spreading, delicate, white, contorted in bud, opening in the evening, collapsing the following day when sun gets hot; stamens 5, included; style filiform, stigma capitate, included; calyx strongly accrescent, fleshy, closely investing the capsule, when mature becoming reflexed, the capsule thin, dehiscent, with four black hairy large seeds with one angle.

Indigenous on most coral atolls, pan-tropical, elsewhere climbing trees, in the Phoenix Islands as often spreading over large patches of herbaceous and shrubby vegetation or on bare coral rubble, dying back to a thick root-crown in very dry periods, sending out new creeping, twining stems when water is available. The thickened fruiting calyces are known elsewhere to serve as a source of water for rats, and may well do the same in the Phoenix Islands. Found on Canton, Enderbury, Hull, Sydney and Gardner. Mentioned from these islands as *I. grandiflora* Lam. by Hemsley and in notes with a specimen, Arundel 7 (K), collected October 1882.

CANTON: Degener & Hatheway 21309, 21310; Degener 24359 (BISH), 24360 (BISH); Luomala 42 (BISH), 43 (BISH); Bryan 25 (BISH); Clegern 41 (BISH); Fosberg 55725 (US, BISH, K). ENDERBURY: Fosberg & Stoddart 54735 (US, HAW, K); Bryan 13, 31 (BISH), 1333 (BISH); Lamb in 1938 (BISH); Marshall 11; Long 2099 (BISH, US), 2655 (US), 2678 (BISH, US); Clegern 138 (BISH). HULL: Fosberg & Stoddart 24793 (US, HAW, K); Long 2071 (BISH, US); Clegern 85 (BISH). SYDNEY: Fosberg & Stoddart 54858 (US, HAW, K); Long 2538 (BISH, US), 2584 (BISH, US). GARDNER: Woodward & Long 2523 (US); Long 2503 (BISH, US); Fosberg 55774 (US, BISH, K).

Refs.: Degener & Gillaspay (1955), p. 27; Degener & Degener (1959), p. 13; Luomala (1951), pp. 164, 171, 173; Degener & Hatheway (1952), p. 34; Pickering (1876), pp. 240, 242, 243; Hemsley (1885), p. 116.

*Ipomoea pes-caprae* ssp. *brasiliensis* (L.) van Ooststr. (*Convolvulus maritimus* sensu Pickering non Gouan, nec. Lam., nec Pall., prob. Desr.).  
Beach Morning-glory

Extensive creeper, rooting at nodes; leaves alternate, ovate-cordate, deeply bilobed at apex, petiolate, subcoriaceous; flowers in few-flowered ascending axillary cymes; ~~sepals 5, orbicular, closely imbricate and concave; corolla deeply campanulate,~~ with short tube and long throat, limb flaring, rich rose purple, darker in center, open at night, collapsing about midday; stamens 5, included; style 1, filiform, included, stigma capitate, white; fruit a hard dehiscent capsule; seeds 4, dark brown, hairy.

A pan-tropical beach species, occasionally inland, found in the past very sparingly on Canton by Hatheway in 1951; a single plant was seen by us at an old fortified spot on a high beach ridge on the north side and some in front of the U.S.A.F. residence area on the lagoon beach. On Hull it was found on an open sand flat back of the beach and in an opening in the coconut plantation in the old Gilbertese village, and seedlings on a dry channel beach with many other drift seeds, on the north side.

CANTON: Fosberg & Stoddart 54880 (US, HAW, K); Degener in 1951; Bryan 1326 (BISH), 27 (BISH). HULL: Fosberg & Stoddart 54800 (US, HAW, K), 54806 (US); Clegern 67 (BISH).

Refs.: Pickering (1876), p. 243; Hatheway (1955), p. 7; Degener & Gillasp (1955), pp. 27-28; Luomala (1951), pp. 166, 173.

**\**Ipomoea quamoclit* L.**

Slender twiner with pinnately dissected leaves, and small bright red trumpet-shaped flowers with strongly exerted stamens and pistil.

Planted in shelter of buildings and seeding itself in the immediate vicinity, on Canton in the U.S.A.F. residential area. Not likely to persist.

CANTON: Fosberg & Stoddart 55802 (US).

**\**Merremia tuberosa* (L.) Rendle.** A vigorous extensive twining vine with palmately divided leaves, clusters of bright yellow morning-glory-like flowers; the fruiting calyxes become enlarged and hardened surrounding the globose capsule, forming a "wood rose."

Seen planted on Canton, climbing on a trellis, but not yet flowering in March 1975.

## CRASSULACEAE

\**Kalanchoe pinnata* (Lam.) Pers. (*Bryophyllum pinnatum* (Lam.) Kurz), was said to be present on Canton in 1958 (Degener & Degener (1959), p. 10) but was not seen in 1973 or 1975.

## CRUCIFERAE

\**Lepidium bidentatum* var. *o-waihiense* (C. & S.) Fosb. (*L. o-waihiense* C. & S.) was introduced to Canton by Degener in 1950-51. It was said to be abundant in 1958 (Degener & Degener 24636), but was not seen at all in 1973 or 1975.

## CUCURBITACEAE

\**Cucurbita pepo* L., the pumpkin, was collected by Bryan on Sydney in 1938 (Bryan 44 (BISH)). It was not seen there in 1973, nor in 1975.

Three other cucurbits were reported on Canton by Degener (Degener & Gillaspay (1955), p. 30; Degener & Degener (1959), p. 16), but do not seem to have persisted. They were \**Citrullus lanatus* var. *caffer* (Schrad.) Mansf. (*C. vulgaris* Schrad.), the watermelon, collected by Luomala (20) (seen again by Fosberg in the U.S.A.F. residential area in 1975); \**Cucumis dipsaceus* Ehrenb., the Teasle-gourd, introduced by Degener in 1951 and abundantly naturalized in 1958; and \**Cucumis melo* L., the Muskmelon, growing spontaneously in 1950, in a garden in 1958. None of them were seen in 1973. *Cucumis melo* was collected on Hull by Long (2003 (US)) in 1964, but we did not see it in 1973. \**Cucumis sativa* L., the cucumber, was collected on Canton by Luomala 28 (BISH) in 1950, but was not seen by us in 1973 nor in 1975.

## CYPERACEAE

*Cyperus javanicus* Houtt.

Loosely tufted rough-leaved sedge with grayish-green color, ascending to erect stout peduncles, umbelloid inflorescences with very long bracts, spikelets falling intact.

Introduced on Canton by Degener in 1950-51, persisting in 1958, but not seen in 1973 or 1975. Common on Sydney, in coconut plantation, not on wet ground.

CANTON: Degener & Degener 24650. SYDNEY: Fosberg & Clapp 54850 (US, HAW, K); Long 2557 (US).

Refs.: Degener & Gillaspay (1955), p. 34; Degener & Degener (1959), p. 7.

\**Cyperus polystachyos* Rottb. was reported from Canton (Degener & Degener 24655) by Degener in 1959, but not seen in 1973 or 1975.

\**Cyperus rotundus* L.

Nut-grass

Plant spreading by underground rhizomes and persisting by small nut-like tubers, narrow bright green leaves arching close to ground, peduncle erect with clusters of linear brown spikelets.

Introduced on Canton at least as early as 1941, seen in 1951 and 1959 by Degener and colleagues, and again by us near the terminal in 1973 and in 1975. It had increased its area considerably between 1973 and 1975. Seen only sterile.

CANTON: Degener 21413 (US); Fosberg 55717 (US); Clapp P-71-32 (US).

Refs.: Van Zwaluwenburg (1941), p. 19; Degener & Gillaspay (1955), p. 19; Degener & Degener (1959), p. 7.

*Fimbristylis cymosa* R. Br. (*F. diphylla* sensu Degener 1955 and *F. dichotoma* sensu Degener 1959, non (L.) Vahl; *F. pycnocephala* Hbd.)

Dense clumps of short branches and stiff narrowly linear blunt leaves, fibrous roots with a pleasantly peppery odor, erect peduncles with dense to open clusters of ovoid to fusiform spikelets, dark brown or black achenes.

Common on Canton, perhaps introduced, very abundant on Sydney, local near desiccating pond on Hull, very recently introduced in U.S.A.F. Station enclosure on Enderbury and about the U.S.A.F. station on Hull. Varying enormously in stature, also varying in inflorescence from dense and button-like (var. *pycnocephala* (Hbd.) Kük. ex F. Br.) to open and spreading, spikelets ovoid to lanceolate.

CANTON: Degener & Hatheway 21290, 21288, 21289 (UC, NSW); Fosberg & Stoddart 54882 (US, HAW, K), 54901 (US, HAW, K), 54902 (US, HAW, K); Clapp P-71-28 (US), P-71-3 (US). ENDERBURY: Fosberg & Stoddart 54743 (US, HAW), 54744 (US, HAW). HULL: Fosberg & Stoddart 54826 (US, HAW, K), 54837 (US, HAW, K); Long 2048, 2059 (US), 2021 (US). GARDNER: Long 2459 (US); Fosberg 55746 (US, BISH, K). SYDNEY: Fosberg & Stoddart 54848 (US, HAW, K), 54849 (US, HAW, K); Bryan s.n.; Long 2543 (US), 2548 (US), Woodward & Long 2575 (US).

Refs.: Degener & Gillaspay (1953), p. 19; Degener & Degener (1959), p. 7.

*Scirpus subulatus* Vahl.

Bulrush

This was not found in 1973 or 1975, and is not clear where a habitat for such a marsh plant could exist on Canton. However, a specimen was supposedly collected in 1964.

CANTON: Holway in 1964 (BISH)

## EUPHORBIACEAE

\**Acalypha wilkesiana* M.-A.; a colored-leafed ornamental, was seen cultivated on Canton in 1950-51 by Degener, but had disappeared by 1958 and was not seen by us in 1973, or 1975.

### *Euphorbia* L.

A protean genus of a great many species, found almost everywhere except in the Polar and Sub-Polar regions, differing widely in habit and other vegetative characters, but united in the reduction of the inflorescences to cup-like fused involucre or cyathia, which may resemble flowers because of petaloid appendages on glands on their rims. This genus is divided into several or many by some authors, and there is something to be said for this course. However, there seems no logical place to stop dividing the aggregate and, on the whole, it seems more convenient to maintain the genus in the broad Linnaean sense.

\**Euphorbia cyathophora* Murr. (*Poinsettia cyathophora* (Murr.) Kl. & Garcke; *E. heterophylla* var. *cyathophora* (Murr.) Griseb.) Wild or Fiddle-leafed Poinsettia

Erect branched herb with abundant milky sap; alternate leaves, oblong in general outline but deeply several-lobed on the sides; clusters of cyathia terminal, surrounded by a whorl of leaves similar to those below but usually with a red blotch on the upper surface at the base. Fruit a 3-celled capsule; seeds rather cubical, blackish, very rough.

Introduced on Canton, Hull, Gardner, and Sydney, found in weedy places, noted on Canton by Degener as in the British Settlement, but on this survey seen only around the buildings of the U.S.A.F. establishment, more abundant in 1975. One plant, only, seen on Hull in 1973, locally abundant in edges of coconut plantation on Sydney and around the native village site on Gardner.

CANTON: Fosberg 30885 (US); Degener & Hatheway in 1951; Foale 5 (K); Clegern 46 (BISH); Luomala 24 (BISH). HULL: Fosberg & Stoddart 54797 (US, HAW, K); Bryan 49 (BISH); Long 2018 (BISH, US). SYDNEY: Fosberg & Stoddart 54873



(US, HAW, K); Long 2536 (BISH, US). GARDNER: Long & Woodward 2466 (US); Fosberg 55753 (US, BISH, K).

Refs.: Degener & Gillaspay (1955), p. 24; Degener & Degener (1959), p. 10; Luomala (1951), pp. 168, 169, 173; Degener & Hatheway (1952), p. 34.

**\**Euphorbia hypericifolia* L.** (*Chamaesyce hypericifolia* sensu Degener, *Euphorbia glomerifera* (Millsp.) Wheeler

Slender erect or ascending herb, arching at tips, rarely reaching 0.5-1 m tall and then rather woody at base or a slender shrub, sap milky; leaves oblong, opposite, minutely toothed; cyathia in small clusters in upper leaf axils, gland-appendages white; seeds gray.

A widespread tropical weed, in the Phoenix group known only from Canton, where it is common around U.S.A.F. installations and from Enderbury. We have no information as to exactly where on Enderbury the Clegern specimen was found in 1973.

CANTON: Fosberg & Walker 30216 (US); Degener & Hatheway 21300 (BISH); Fosberg & Stoddart 54780 (US); Fosberg 55718 (US, BISH, K); Clapp P-71-23 (US); Clegern 55 (BISH). ENDERBURY: Clegern 173 (BISH).

Refs.: Degener & Gillaspay (1955), p. 23; Degener & Hatheway (1952), p. 34; Degener & Degener (1959), p. 10; Luomala (1951), p. 166.

**\**Euphorbia hirta* L.** (*Chamaesyce hirta* (L.) Millsp.)

Hairy Spurge

Small generally pubescent herb, erect to ascending, arching at tips; leaves opposite, pointed, ovate, serrate, up to 2 cm long, reddish or brownish-green; cyathia in dense axillary clusters, gland appendages whitish.

One of the most common tropical weeds, having followed man almost everywhere in the tropics and subtropics except where it is extremely dry. It is facultatively annual or perennial. In the Phoenix group known from Canton, Enderbury, Hull and Sydney. On Enderbury it has been established locally for a long time and was probably introduced by the guano-diggers. One tiny plant of it was found by us in the enclosure of the U.S.A.F. station, far from any other places where it is found. This probably represents a second accidental introduction from Canton. On Hull it was found around both the U.S.A.F. station, and the abandoned Gilbertese village, on Sydney around the abandoned Gilbertese village, more abundant in 1975 than in 1973 and had become extremely abundant there and throughout the surrounding coconut plantation.

CANTON: Fosberg 30873; Degener & Hatheway 21298; Fosberg & Stoddart 54786 (US, HAW, K); Luomala 17; Clapp P-7-1-4 (US), P-71-6 (US), P-71-21 (US). ENDERBURY: Bryan 30 (P); Fosberg & Stoddart 54745 (US), 54757 (US, HAW, K). HULL: Fosberg & Stoddart 54786 (US, HAW, K); Long 2028 (US). SYDNEY: Fosberg & Stoddart 54852 (US, HAW, K); Long 2545 (US), 2571.

Refs.: Degener & Gillaspay (1955), p. 23; Degener & Degener (1959), p. 10; Degener & Hatheway (1952), p. 34.

**\**Euphorbia prostrata* Ait. (*Chamaesyce prostrata* (Ait.) Small). Prostrate Spurge**

Very prostrate very slender plant forming tiny purplish green mats, sap milky; leaves orbicular or nearly so, very small, opposite; cyathia on axillary pedicels or in several-flowered clusters; capsules 3-angled, the angles hairy.

Common on bare ground around U.S.A.F. installations and old British settlements on Canton and Hull, and in abandoned Gilbertese villages on Hull and Sydney, not seen on Sydney in 1975. Luomala's (1951, p. 169) description of a change in habit from prostrate to erect suggests that either the plants were infected by a rust, causing the erect habit, or that the erect plants were really *E. hypericifolia* misidentified as *E. prostrata*.

CANTON: Degener & Hatheway 21299 (BISH); Fosberg & Stoddart 54779 (US, HAW, K); Luomala 29 (BISH); Clapp P-71-5 (US); Clegern 43 (BISH); Fosberg 30880 (US); Fosberg 55715 (US, BISH). HULL: Clegern 130 (BISH); Jenkin in 1865 (K); Fosberg & Stoddart 54788 (US, HAW, K); Bryan 48 (BISH, K). SYDNEY: Fosberg & Stoddart 54860 (US, HAW, K).

Refs.: Degener & Gillaspay (1955), p. 23; Degener & Degener (1959), p. 10; Luomala (1951), pp. 169, 173.

**\**Euphorbia pulcherrima* Willd. (*Poinsettia pulcherrima* (Willd.) R. Grah.) Poinsettia**

This common ornamental was reported by Degener & Hatheway (1952), p. 35, as present on Canton in 1951, but was not seen in 1973.

**\**Pedilanthus tithymaloides* (L.) Poit. Shoe-flower**

Fleshy erect shrub or stiff herb with zig-zag branches; leaves alternate, ovate, acute, distichous; cyathia red, slipper-shaped, pointed.

Widely planted tropical ornamental, one bush seen in U.S.A.F. establishment.

CANTON: Fosberg & Stoddart 54912 (US, HAW, K). GARDNER: Long 2506 (US).

**\**Phyllanthus amarus* Schum. & Thonn. (*P. niruri* sensu Degener, non L.).**

Erect pale green herb with horizontal branches with tiny pinnately arranged leaves which hang together and "go to sleep" at night; flowers tiny, greenish, in axils of leaves,

male and female in same axil; capsules small, depressed globose; seeds are like sections of a depressed sphere, strongly striate.

A common pantropic weed, said by Degener to have been introduced to Canton probably in soil from Fiji, also abundant around the abandoned Gilbertese village on Hull.

CANTON: Fosberg & Stoddart 54715 (US); Clapp P-71-25 (US); Degener & Degener 24646 (BISH). HULL: Fosberg & Stoddart 54803 (US, HAW, K); Long 2005 (US); Clegern 79 (BISH). GARDNER: Woodward & Long 2471a (US).

Refs.: Degener & Gillaspay (1955), p. 23; Degener & Degener (1959), p. 10.

### GOODENIACEAE

*Scaevola taccada* (Gaertn.) Roxb. (*S. frutescens* sensu Degener, non (Mill.) Krause; *S. sericea* Vahl)

Tall shrub, rounded and mound-like when growing in open stands or isolated, to 3-4 m tall; leaves obovate, entire, narrowed to a sessile base, rounded at apex, bright green, exstipulate, with few to abundant white axillary hairs; cymes axillary, dichotomous, flowers white, gamopetalous, tube split to base dorsally, lobes 5, patent, arranged in a semicircle like a small fan, margins very thin; fruit a drupe with white flesh, a ribbed corky stone that floats very well.

Common generally on Canton, Hull and Sydney; one individual bush on Enderbury at the top of the east beach; occurs as almost impenetrable thickets on Sydney. Forms with glabrous and pubescent leaves were seen in mixed populations, in different proportions. Var. *fauriei* Deg. & Deg. was introduced from Oahu by Degener in 1950-51, but was not seen in 1973 or 1975.

CANTON: Fosberg 30872 (US); Bryan 1339 (BISH, NY); Degener 24644 (NY); Degener & Hatheway 21301 (G, BISH), 21302 (G, BISH, NY, A); Fosberg & Stoddart 54877 (US, HAW, K); Luomala 12 (BISH); Long 2409 (US). ENDERBURY: Clegern 134 (BISH); Fosberg & Stoddart 54737 (US, HAW, K). HULL: Fosberg & Stoddart 54810 (US, HAW, K), 54841 (US, HAW, K), 54824 (US, HAW, K); Bryan in 1924 (BISH); Long 2002; Clegern 92 (BISH). SYDNEY: Fosberg & Stoddart 54845 (US, HAW, K), 54846 (US, HAW, K); Bryan 43 (BISH, A); Long 2586 (US), 2559 (US), 2560 (US). GARDNER: Long 2453 (US, BISH), 2488 (US), 2495 (US); Fosberg 55745 (US, BISH, K), 55778 (US, BISH, K).

Refs.: Bryan (1942), pp. 46, 60; Degener & Gillaspay (1955), pp. 30-31; Hatheway (1955), pp. 2-9; Luomala (1951), pp. 164, 165, 174; Degener & Hatheway (1952), p. 34; Maude (1952), p. 70; Laxton (1951), p. 143; Pickering (1876), pp. 240, 241; Degener & Degener (1959), pp. 16-17.

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**GUTTIFERAE (CLUSIACEAE)**


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**\**Calophyllum inophyllum* L.**

Portia Tree or Kamani

Large tree with milky sap; leaves opposite, leathery, large, oblong to elliptic, rounded at ends, petiolate; flowers in axillary panicles, white to slightly pinkish, sepals small, petals 4, orbicular, stamens many, pistil 1; fruit a pendent globose drupe 2.5-3 cm in diameter, corky within, seed much smaller.

Introduced on Canton before 1950, and still growing well in 1958 (Degener & Degener (1959), p. 11), but not located in 1973 nor 1975. Several fairly large trees on Hull in the old Gilbertese village site; probably planted here, although presumably native or at least of spontaneous introduction in some other islands of the South Pacific.

CANTON: Luomala 18; Clapp P-71-36 (US). HULL: Fosberg & Stoddart 54794 (US, HAW, K); Long 2033 (US).

Refs.: Degener & Gillaspay (1955), p. 25; Degener & Degener (1959), p. 11; Luomala (1951), pp. 168, 173.

**LAURACEAE*****Cassytha filiformis* L.**

Love-vine

Leafless green to orange tangled string-like twining stems, sending haustoria or penetrating organs into the tissues of other plants (or itself) when it touches them; flowers very small, white, in short spikes; fruits globose drupes, greenish white turning purple when very ripe, with a hard globose stone.

Native on most tropical beaches and on most Pacific Islands including two of the Phoenix group, Canton and Enderbury; parasitic on many plant species including, in the Phoenix group, at least *Scaevola*, *Portulaca*, *Boerhavia*, *Suriana*, *Sida*, and *Triumfetta*. On Enderbury droppings, presumably of curlews, were found to be packed with *Cassytha* stones, suggesting one of the means by which the plant may be dispersed from island to island.

CANTON: Bryan 26 (BISH), 1338 (BISH) in 1938; Degener & Hatheway 21282; Luomala 31 (BISH). ENDERBURY: Marshall 4; Long 2106 (US), 2682 (US).

Refs: Degener & Gillaspay (1955), p. 22; Degener & Degener (1939), p. 9.

## LECYTHIDACEAE

### *Barringtonia asiatica* (L.) Kurz

Tree reaching a large size, with large alternate obovate leathery entire leaves, large flowers with many long showy pink and white stamens, the filaments coherent at base, and pendent large square fruits each containing a single large poisonous seed.

This species has not been known from the Phoenix Islands, but in 1975 a 1 m seedling was seen in the shelter of a building in the U.S.A.F. area on Canton Island. In all probability a drifted fruit was picked up on the beach and planted.

## LEGUMINOSAE (MIMOSACEAE)

\**Desmanthus virgatus* (L.) Willd. was introduced to Canton in 1950-51 by Degener. A few plants survived in 1958 (Degener & Degener 1959, p. 10) but were not seen in 1973 or 1975.

\**Intsia bijuga* (Colch.) O. Ktze Degener & Degener 24687 (US). Drift seed only.

\**Leucaena leucocephala* (L.) deWit (*L. glauca* sensu auct. plur., non (L.) Benth.)

Shrub with alternate twice pinnately compound leaves with many small oblong-lanceolate leaflets; flowers in globose heads on axillary peduncles, white, with many stamens; fruit a thin flat, linear-oblong dehiscent pod with transversely arranged flattened dark brown hard seeds.

This was introduced to Canton with soil from Oahu before 1941 and still persisted around the old British settlement in 1975.

CANTON: Fosberg 30881 (US); Degener & Hatheway 21296; Luomala 3; Clapp P-71-14 (US).

Refs.: Van Zwaluwenburg (1941), p. 19; Degener & Gillaspay (1955), p. 22; Degener & Degener (1959), p. 10; Degener & Hatheway (1952), p. 35; Luomala (1951), pp. 169, 172.

\**Prosopis pallida* (H. H. K.) Willd. (*P. chilensis* sensu Degener, non (Mol.) Stuntz) was seen by Degener as a pot plant in 1958 but evidently has not persisted. Seedlings of \**Delonix regia* (Boj.) Raf. were seen in a bath house on Canton in 1975.

**LILIACEAE (sensu latissimo, including AGAVACEAE and AMARYLLIDACEAE)**

A sterile *Aloe*, possibly *\*A. barbadensis* Mill. and a sterile *\*Yucca* appear in photos of Canton made by Roger Clapp in 1971 and were seen by us, around dwellings in the U.S.A.F. establishment there in 1973 and in 1975. They were not collected or identified.

***\*Cordyline fruticosa* (L.) Chev. (*C. terminalis* (L.) Kunth)**

Ti

Erect stick-like woody stem with a feather-duster-like rosette of large elliptic or oblong leaves. Various red-variegated horticultural forms as well as the normal green-leaved one are commonly planted as ornamentals. Several color forms seen planted about USAF buildings on Canton in 1975. A small plant of the green form of *\*Cordyline fruticosa* (L.) Chev. was seen in a bath-house on Canton in 1975.

***\*Crinum asiaticum* L.**

Crinum lily

Large rosettes of soft lanceolate leaves, often caespitose and reproducing by offsets, with axillary scapes overtopping leaves with subumbellate clusters of large white flowers, perianth tubular with linear-oblong recurved lobes, 6 long-exserted stamens with linear anthers, a single long pistil; fruit fleshy, with very large fleshy seeds.

A common ornamental, persisting around abandoned village sites on Hull and Sydney atolls; reported from Canton in 1955 and 1959 but not seen there in 1971; unless Clapp P-71-17 (US) is this species; persisting in the old village site on Gardner in 1975.

HULL: Long 1998. SYDNEY: Bryan 45; Fosberg & Stoddart 54874 (US). GARDNER: Fosberg 55769 (US, BISH).

**LYTHRACEAE**

***Pemphis acidula* Forst.**

Erect stiff shrub with many intricate slender branches and a very hard wood; leaves opposite, small, 1-2 cm long, elliptic, thick, astringent to taste; flowers axillary, calyx united, campanulate, striate, with 12 teeth, petals 6, white, clawed, stamens 12, in 2 series, styles of different lengths on different plants; fruit a dark reddish brown capsule, closely invested by calyx to give the appearance of an inferior ovary; seeds many, small.

One of the most characteristic coral island plants, usually growing on coral rock, rarely, as on Canton, on loose coral sediments; apparently recorded earlier from Canton (Degener and Gillaspay (1955), p. 23) but the records discounted by Degener as misidentifications of *Suriana*, which sometimes looks similar but has yellow flowers.

The present Canton plant was a single bush growing along the road on the lagoon beach and is positively *Pemphis*. It is abundant on Hull Atoll. Not recorded previously nor found on this survey on Birnie, Enderbury, Phoenix or Sydney. Reported by Hemsley as collected on Hull by J.T. Arundel.

CANTON: Fosberg & Stoddart 54717 (US, HAW, K). HULL: Fosberg & Stoddart 54805 (US, HAW, K); Fosberg 55731 (US, BISH, K), 55738 (US, BISH, K); Bryan 54; Schultz 43; Long 2054, 2014 (US).

Ref.: Hemsley (1885), p. 116; Pickering (1876), p. 241.

### MALVACEAE

\**Gossypium brasiliense* Macf. and \**G. tomentosum* Nutt. were introduced on Canton by Degener in 1950-51 (Degener & Degener (1959), p. 11) but have apparently not persisted, as they were not seen in 1973. \**Hibiscus rosa-sinensis* L., reported as present on Canton in 1951 and 1958 by Degener, likewise was not found in 1973. A single plant of a pink garden hybrid *Hibiscus* (Fosberg & Stoddart 54802 (US, HAW, K); Clapp P-71-39 (US)) was found flowering abundantly but not fruiting in the old Gilbertese village on Hull. It is not likely to spread. Another hybrid, red flowered (Fosberg & Stoddart 54904 (US)), grows near a house in the U.S.A.F. area, Canton.

\**Hibiscus tiliaceus* L. (*Pariti tiliaceum* (L.) Britt.)

Hau (Hawaii)

A fair-sized tree, often low and with weak, tangled branches, and tough inner bark; leaves orbicular, cordate, slightly pointed, to 10-15 cm across, dark green above, white beneath, long petiolate, with large oblong stipules that enclose the terminal buds; flowers in few-flowered open terminal racemes, base of each flower subtended by a whorl of linear involucre bracts; calyx short, toothed, corolla large, showy, campanulate, petals imbricate rolled, united at base, yellow with maroon base, turning reddish and falling toward evening; stamens many, filaments united into a fleshy column, their tips, with the anthers, free; ovary densely hairy, style filiform, 5-branched, stigmas hairy, capitate; fruit a 5-valved loculicidal hairy capsule; seeds dark brown, small.

A few trees in the U.S.A.F. establishment on Canton, but not seen in the old British settlement where Degener reported it. It was "recently introduced" according to Van Zwaluwenburg in 1943. Several large, but slightly chlorotic plants grow in the old Gilbertese village on Hull.

CANTON: Fosberg & Stoddart 54900 (US, HAW, K); Fosberg 30888 (US); Degener & Hatheway 21284; Luomala 45; Clapp P-71-37 (US) (leaves green beneath, possibly var. *sterilis* F. Br.), P-71-27 (US). HULL: Fosberg & Stoddart 54799 (US).

Refs.: Van Zwaluwenburg (1943); Degener & Gillaspay (1955), p. 24; Degener & Degener (1959), p. 11; Luomala (1951), pp. 167, 173.

\**Sida acuta* Burm f. (*Sida carpinifolia* L. f.) introduced on Canton prior to 1951 in soil imported from Fiji, but not reported since 1951, and not seen in 1973 or 1975.

Ref.: Degener & Gillaspay (1955), p. 25.

***Sida fallax* Walp.**

Ilima (Hawaii)

Shrub varying in habit from prostrate and mat-forming to erect and 2.5 m tall; leaves alternate, dull green to gray-green, tomentulose, orbicular, cordate, margin crenulate, petioles slender; flowers on axillary pedicels, sepals united, with 5 acute lobes, corolla orange, rarely (in the Phoenix Is.) reddish in center, 1.5-2 cm across, petals united at base, closing in the evening and falling, stamens united into a column, style with 5 branches; fruit splitting into 5 segments or carpids, these shortbeaked, the beak splitting into a pore for the ultimate escape of the seed, sides of carpids reticulate rugose. Some specimens (Long 2670, 2540) have very small leaves.

Generally distributed, one of the most abundant plants on all the Phoenix Islands, where it dominates the vegetation in many areas, except on Birnie where there was in 1973 only a very small colony of less than a dozen plants. This had apparently disappeared by 1975. It was mentioned from Canton, Enderbury, Hull and Gardner in notes with a specimen, Arundel 11 (K) collected Oct. 1882.

CANTON: Fosberg & Walker 30201 (US); Lister in 1889 (K); Degener & Hatheway 21329, 21330, 21331, 21332 (NSW); Degener & Degener 24661 (NY); Fosberg & Stoddart 54761 (US, HAW, K), 54914 (US, HAW, K), 54915 (US, HAW, K); Long 2408 (US); Schultz 22 (US); Luomala 34. BIRNIE: Fosberg & Clapp 54720 (US, HAW, K), (not found in 1975). ENDERBURY: Fosberg & Stoddart 54733 (US, HAW, K), 54736 (US, HAW, K); Marshall 9; Long 2098 (US), 2650 (US), 2670 (US); Lamb in 1938 (K). PHOENIX: Fosberg & Stoddart 54761 (US, HAW, K); Fosberg 55801 (US; BISH); Long 2077 (US), 2079, 2080, 2089 (US), 2614 (US), 2634 (US). HULL: Fosberg & Stoddart 54815 (US, HAW, K), 54835 (US, HAW, K); Long 2007, 2067 (US); Schultz 43 (US). SYDNEY: Fosberg & Stoddart 54847 (US, HAW, K); Long 2540 (US), 2589 (US). GARDNER: Fosberg 55750 (US, BISH, K); U.S. Expl. Exped. (NY). McKEAN: Recorded in Long's notes; Fosberg 55794 (US, BISH, K).

Refs.: Bryan (1942), pp. 50, 53, 54; Laxton (1951), p. 147; Degener & Hatheway (1952), p. 34; Maude (1952), p. 70; Degener & Gillaspay (1955), p. 25; Degener & Degener (1959), p. 11; Hatheway (1955), pp. 5-7; Luomala (1951), pp. 162, 163, 171, 173; Pickering (1876), pp. 240, 241, 243; Van Zwaluwenburg (1942), p. 49.

\**Thespesia populnea* Sol. ex Correa, a pantropical strand tree but not native in the Phoenix Islands, was introduced to Canton before 1942 (Van Zwaluwenburg (1943), p. 3; Degener & Gillaspay (1955), p. 25) and was growing around the wharf and the Pan American Hotel in 1951 (Degener & Hatheway 21308 (NY) and still in 1958 (Degener &



Degener (1959), p. 11), also shown on a 1971 photograph by Roger Clapp, but was not seen in 1973 or 1975. Hemsley reported it as having been collected by J.T. Arundel on Enderbury before 1884.

Ref.: Hemsley (1885), p. 116; Luomala (1951), pp. 166, 170, 173; Degener & Degener (1959), p. 11.

### MORACEAE

\**Artocarpus altilis* (Park.) Fosb. (or *A. altilis* X *mariannensis*). The breadfruit was seen and collected in the Gilbertese village on Hull, presumably planted, by Long [1999 (US)], but was not seen in 1973. The species was seen as a pot plant on Canton in 1975.

\**Ficus microcarpa* L.

The Chinese banyan usually starts as an epiphyte, becoming a strangler, surrounding the trunk of the host tree with roots, these anastomosing to form a very irregular trunk with the remains of the host tree within; leaves alternate, blade obovate to broadly elliptic, obtuse to acuminate, thick, veins rather obscure except basal pair; stipules acuminate; figs small, axillary, globose.

A plant, probably this, seen in photograph taken on Canton in 1971, not seen in 1973 or 1975. Clegern 170 (BISH), labeled as from Enderbury, could scarcely have come from there, and was probably from a pot plant, or from around buildings on Canton.

### MUSACEAE

\**Musa nana* and, presumably, \**Musa sapientum* were reported by Degener & Gillaspay (1955), p. 20 and Degener & Degener (1959), p.8, as introduced and cultivated on Canton, but in 1973 and 1975 they were not seen. A species of \**Musa* was identified on a photograph of Canton taken by Roger Clapp in 1971 and Clapp P-71-38 (US), leaf only, is presumably the same; likewise a young plant on a photo taken on Canton by Robert Clegern in September 1973. In 1975 a small but healthy banana was seen in a sheltered spot around a house in the USAF residence area on Canton. Such plants will doubtless grow as long as they are sheltered from salt spray and kept well watered.

## NYCTAGINACEAE

*Boerhavia albiflora* Fosb.

Similar to *B. tetrandra* below but stems green, leaves irregularly oval or ovate, peduncles from beside the leaf axils rather than in them, bearing umbellate branches, the flower clusters glomerate, perianth white, campanulate, 5-lobed, lobes emarginate, not recurved, stamens 1-3, mostly 2, style curved.

A widespread species found on all eight islands studied on this survey, growing abundantly in different habitats, in places in pure stands, forming large mats or a continuous ground-cover. The thickened tap roots reach 8 cm or more in diameter and produce long horizontal branch roots, especially in sandy places. Plants similar to this occur from Wake and the Northern Marshalls to the Phoenix Islands, with a variety on the Great Barrier Reef of Australia, where it was recently found on Heron Island. It has generally been referred to *B. diffusa* or *B. repens*, both of which seem to be different.

CANTON: Fosberg & Walker 30207; Degener & Hatheway 21305, (NY); Fosberg & Stoddart 54892 (US, HAW, K); Clapp P-71-10 (US), P-71-2 (US); Browne in 1939 (BISH); Murphy in 1949 (BISH); Lamb in 1938 (BISH); Long 2404 (BISH); Holway in 1964 (BISH); MacDaniels in 1950 (BISH); Luomala 35 (BISH), 10A (BISH); Clegern 30 (BISH); Bryan 1327 (BISH). BIRNIE: Fosberg & Stoddart 54724 (US, HAW, K); Long 2636. ENDERBURY: Fosberg & Stoddart 54747 (US, HAW, K), 54748 (US, HAW, K), 54759 (US); Bryan 32 (BISH); Lamb in 1938; (BISH); Marshall 13; Long 2094 (BISH), 2096 (BISH), 2102 (BISH), 2119, 2121 (BISH), 2651 (BISH), 2666 (BISH); Clegern 150 (BISH). PHOENIX: Fosberg & Stoddart 54762 (US, HAW, K), 54767 (US, HAW, K), 54768 (US, HAW), 54770 (US); Bryan 17 (BISH); Long 2077 (HAW) (slightly infected with *Albugo*, habit condensed, leaves small), 2081 (US, BISH), 2083 (US, BISH), 2087 (US, BISH), 2622 (US). HULL: Fosberg & Stoddart 54823 (US, HAW), 54832 (US, HAW, K); Bryan 52 (BISH, P); Long, 2010, 2061, 2062, 2064, 2065, 2066, 2068, 2069; Clegern 102 (BISH). SYDNEY: Fosberg & Stoddart 54854 (US), 54859 (US, HAW, K), 54864 (US, HAW, K); Long 2541 (US, BISH), 2580 (US), 2588 (US, BISH). GARDNER: Fosberg 55761 (US, BISH, K), 55772 (US, BISH, K). McKEAN: Long 2030 (US) (very large leafed form), 2046 (US), 2028 (BISH), 2041 (US, BISH), 2034 (US), 2037 (US, BISH), 2428 (US, BISH) (peduncles and their branches very heavy), 2439 (US, BISH), 2443 (US, BISH); Fosberg 55788 (US, BISH, K), 55795 (US, BISH, K).

Two collections, Long 2612 (US, BISH) and 2622 (BISH) from Phoenix, and two from Hull, Long 2068, 2010, have the appearance of this species, but have pink flowers according to the labels. They do not appear to be *B. tetrandra*, as neither the leaves nor the inflorescence resemble that species.

Gräffe (1864, p, 207), mentions a plant with thick heart shaped leaves, small white flowers and thick insipidly sweet root which is cooked and eaten by colonists. Plant described as probably cruciferous. McKEAN. This may be *Boerhavis albiflora*.

Ref.: Degener & Gillaspay (1955), p. 21; Hatheway (1955), pp. 4-6; Pickering (1876), pp. 240, 242, 243; Fosberg (1978), pp. 11-12.

***Boerhavia tetrandra* Forst. f.**

Prostrate reddish stems radiating from a thickened vertical tap-root, elongate, leaves oval or broadly oblong, rounded at both ends, white beneath; inflorescences axillary, umbelloid, at least twice branched, flowers in open clusters, pink, perianth scarcely lobed, its margin tending to be turned back, stamens 3-4, mostly 4, pistil 1; fruits 5-ribbed, club-shaped, the ribs glandular viscid.

One patch, only, found on a bare cobbly flat on Hull; reported by Degener from Canton, but since he specifically says the flowers are white, he probably collected *B. albiflora*. Long, (m.s.), reports both pink and white flowered plants from Phoenix, but his pink-flowered specimens (2612, 2622) are not *B. tetrandra*. His 2120 (BISH), from Enderbury may be *B. tetrandra* but has acute leaves which are not right. It is not disposed of here. None but white-flowered plants were seen by us on any but Hull and Gardner Islands. A single small pink flowered plant was found in the village site on Gardner. Bryan (1942, pp. 54, 57, 238) indirectly reports *B. tetrandra* from Phoenix and Birnie, but says nothing that would permit one to think he distinguished 2 species. Hemsley reported this species as collected on Canton, Hull, and Enderbury by J. T. Arundel, but we have not seen the specimens.

HULL: Fosberg & Stoddart 54820 (US, HAW, K); Bryan 53 (BISH); Long 2065 (BISH). GARDNER: Fosberg 55777 (US).

Ref.: Pickering (1876), p. 242? Hemsley (1885), p. 116.

**\**Bougainvillea glabra* Choisy**

Bougainvillea

A white form of this thorny vine was growing by one of the buildings in the U.S.A.F. establishment in 1973 (Fosberg & Stoddart 54911 (US, HAW, K)) but will not likely persist unless it is kept watered during dry periods. The same form was seen in another sheltered spot in 1975.

\**Mirabilis jalapa* L., the garden four-o'clock, was planted in the Gilbertese village on Hull (Long 2032 (US), 2039 (US)), but was not found there in 1973 or 1975.

***Pisonia grandis* R. Br. (*Calpidia ovatifolia* sensu Pickering probably an error for *Calpidia ovalifolia* Bojer which is totally different.)** Buka

Large tree with pale smooth often enormous trunk, soft brittle pulpy wood; opposite large ovate to oblong, obtuse to somewhat acuminate light green leaves, deciduous during drought periods, dioecious umbelloid cymes of small greenish flowers, open panicles of clavate, 5 ribbed, spinose very glutinous fruits.

Common on Hull, collected once on Sydney by Bryan and by Long, but not seen by us in 1973 or 1975; locally abundant on Gardner (1975). This is one of the ~~characteristic atoll trees, found from eastern Polynesia to the western Indian Ocean,~~ its fruits admirably adapted to being carried around by sea birds, which use the tree as a nesting site. A specimen collected by the U.S. Expl. Exped. s.n. (US) has a label that seems to read "Enderbury's Island." This species has not been seen or collected on Enderbury in recent years. The Expedition called there in 1840 and 1841.

Canton: Degener & Hatheway 21285 (BRI), 21283 (BISH); Luomala 30 (BISH); Cranwell Smith in 1956 (BISH). HULL: Fosberg & Stoddart K; Clegern 99 (BISH). SYDNEY: Bryan 38 (BISH). Long 2015 (US). GARDNER: Long 2507 (US); Fosberg 55764 (US, BISH, K), 55779 (US, BISH, K), 55783 (US, BISH, K). ENDERBURY: [?] Clegern 154 (BISH), 153 (BISH).

Refs.: Bryan (1942), pp. 60, 64, 71; Laxton (1951), p. 136; Maude (1952), p. 70; Pickering (1876), pp. 240, 242.

## PANDANACEAE

\**Pandanus tectorius* Park. (*sensu lato*)

Screw Pine

Small tree with long linear prickly-margined leaves and subglobose to cylindrical-oval heads of fruits.

In all likelihood not native to the Phoenix Group. Introduced from Hawaii to Canton in 1950 and said by Degener to have been well-established in gardens in 1958. Several healthy trees were seen at the abandoned settlement, on the lagoon shore in 1973. This is a small-fruited form. In the coconut plantations and around the abandoned village sites on Hull (planted according to Long), Sydney, and Gardner several of the large-fruited Micronesian forms (*P. pulposus* Mart.) are common. These are edible forms doubtless introduced and propagated vegetatively by the Gilbertese settlers. Quite a few seedlings of them were seen, but none large enough to give any indication of the types of fruits they would bear. Information from Marshallese informants suggests that seedlings of the large-fruited forms usually bear small inedible fruits, at least in the Marshall Islands, where the edible varieties are propagated vegetatively. On Sydney *Pandanus* trees were seen sparingly in the old village site, much more abundantly toward the lagoon from the village.

CANTON: Fosberg & Stoddart 54878 (US, HAW, BISH); Luomala 25. HULL: Long 2004 (US), 2041; Fosberg & Stoddart 54827 (US, BISH). SYDNEY: Long 2535 (US); Fosberg & Stoddart 54844 (US, HAW, BISH, K). GARDNER: reported by Pickering and Laxton; Fosberg 55771 (US, BISH, K).

Refs.: Laxton (1951), p. 144; Pickering (1876), p. 240; Degener & Gillaspay (1955), pp. 16-17; Degener & Degener (1959), p. 4; Degener & Hatheway (1952) p. 35; Luomala (1951), p. 171.

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**PASSIFLORACEAE**

\**Passiflora foetida* L. was observed growing in cultivation on Canton in 1950 and more seeds were sown (Degener & Gillaspay 1955, p. 26), establishing the plant locally, as observed by Degener (1959) in 1958. The species was not seen in 1973 nor in 1975.

**POACEAE (GRAMINEAE)**

\**Cenchrus echinatus* L.

Sand-burr

An annual or perennial grass with racemes of prickly bur-like fruits about the size of a small pea.

Abundant on Canton around present and former installations, introduced at least prior to 1949. Common on Sydney in the plantation, very local on Gardner, rare in Hull, seen by us there only at the U.S.A.F. installation, but found earlier by Long. Not known previously from Enderbury where in 1973 it was well established around the U.S.A.F. installation, doubtless brought accidentally from Canton. We recommended in 1973 to the Air Force authorities that it be eliminated from the stations on Hull and Enderbury. In 1975 a few plants persisted around the abandoned sites. All seen were pulled up.

CANTON: Fosberg & Walker 30202 (US, BISH), 30217 (US, BISH, K); Degener & Hatheway 21252; Luomala 9, 38. ENDERBURY: Fosberg & Stoddart 54732 (US, HAW, K). HULL: Long 2005 (US), 2052 (US), 2034 (US); Fosberg & Stoddart 54840 (US, HAW). SYDNEY: Long 2583 (US); Fosberg & Stoddart 54885 (US, HAW); Fosberg 55730 (US, BISH, K). GARDNER: Fosberg 55752 (US, BISH, K).

Refs.: Degener & Hatheway (1952), p. 34; Degener & Gillaspay (1955), p. 17; Laxton (1951), p. 143; Hatheway (1955), p. 1; Degener & Degener (1959), p. 4; Luomala (1951), pp. 169, 173.

\**Chloris inflata* Link

Finger Grass

Loosely tufted grass with purplish digitate inflorescences, these rather hairy.

Introduced to Canton in 1950, now abundantly naturalized around the U.S.A.F. installations and housing. Recently established and spreading about the U.S.A.F. enclosure on Hull.

CANTON: Degener & Hatheway 21251; Luomala 40. HULL: Fosberg & Stoddart 54787 (US, HAW, K).

Refs.: Degener & Gillaspay (1955), p. 17; Degener & Degener (1959), p. 5; Degener & Hatheway (1952), p. 34; Luomala (1951), p. 172.

\**Cynodon dactylon* (L.) Pers.

Bermuda Grass

Prostrate, tightly rooted, mat-forming fine grass with erect slender peduncles and digitate inflorescences.

Naturalized at least before 1941, on Canton; still persisting here and there about U.S.A.F. installations but only on Canton through our visit in 1973, but what was probably this was seen sterile at the abandoned U.S.A.F. site on Hull in 1975.

CANTON: Degener & Hatheway 21286.

Refs.: Van Zwaluwenburg (1941), p. 19; Degener & Hatheway (1952), p. 34; Degener & Gillaspay (1955), p. 17; Degener & Degener (1959), p. 5; Luomala (1951), p. 172.

\**Digitaria ciliaris* (Retz.) Koel. (*D. sanguinalis* sensu Degener, non (L.) Scop., *D. timorensis* sensu Degener, non (Kunth) Bal.)

Crab Grass

A slender depressed grass with digitate inflorescences. Found on Canton by Degener, not seen there in 1973 or 1975, but found by us on Hull in the old village site. CANTON: Hatheway 518 (US); Degener & Hatheway 21315 (US); Degener & Degener 24645 (US), 24648 (US); Clegern 42 (BISH). HULL: Fosberg & Stoddart 54813 (US, HAW); Clegern 113 (BISH).

Refs.: Degener & Hatheway (1952), p. 34; Degener & Degener (1959), p. 5.

\**Digitaria ciliaris* ssp. *chrysolephara* (Fig. & De Not.) S.T. Blake

HULL: S.W. part of I. 16/8/65, Jenkin 4 (K) det. Veldkamp 1970.

\**Digitaria henryi* Rendle

Henry's Crab-grass

A prostrate slender slightly glaucous grass with digitate inflorescences on short pedicels, the racemes not spreading much.

Introduced on Canton by Degener in 1950, noted by him as established in 1958 (Degener & Degener 24647 (US)), not seen on Canton in 1973 or 1975. Possibly seen near old village in 1975.

Refs.: Degener & Gillaspay (1955), p. 34; Degener & Degener (1959), p. 5.

***Digitaria pacifica*** Stapf (*D. stenotaphrodes* sensu central Pacific authors, non (Nees) Stapf)

A robust, broad-leafed usually tufted grass, sometimes forming spreading masses; inflorescences digitate, racemes very stiffly erect. A very distinctive grass, endemic to the Central Pacific atolls, with its closest relative in the Tuamotu and Society atolls of southeastern Polynesia. It is to be expected on all of the Phoenix group, but has not been found on Birnie, Phoenix, or Sydney. Like many *Digitaria* species, it behaves in a weedy fashion when opportunity affords, and the continued disturbance on Canton has enabled it to become much more abundant than it probably was before.

Some specimens of *D. pacifica* approach *D. stenotaphrodes* of Southeast Polynesia in habit and number of racemes, e. g. Bryan 46 (US). However the elliptic spikelets of this sheet suggest that it is merely a depauperate specimen of *D. pacifica*. It is on this type of material that recent records of *D. stenotaphrodes* from the Central Pacific are based.

CANTON: Fosberg 30886 (US, BISH); Degener & Hatheway 21316 (US), 21318 (US); Luomala 5, 39, 41; Degener & Degener 24589 (US), 24638; Fosberg & Stoddart 54899 (US, HAW, K); Clegern 49 (BISH); bet. wharf & airfield, M.A. Foale 3 (K). ENDERBURY: Fosberg & Stoddart 54729 (US, HAW); Long 2107 (US), 2680 (US, K); Marshall 6; Clegern 160 (BISH); A.C. Brown, s n. (US). HULL: Long 2063; Fosberg & Stoddart 54829 (US, HAW, K); W. Side, Bryan 46 (US, K). GARDNER: Long 2476 (US), 2292 (UA); Fosberg 55775 (US, BISH, K). McKEAN: Long 2045 (US), 2426 (US), 2031 (US); Fosberg 55990 (US, BISH, K).

Refs.: Degener & Gillaspay (1955), p. 17; Degener & Degener (1959), p. 5; Luomala (1951), pp. 163, 172; Degener & Hatheway (1952), p. 33.

\**Digitaria setigera* Roth ex R. & S. (*D. pruriens* Fisch. ex Trin., *D. microbachne* sensu auct. non Presl). Crab Grass

Slender weak-stemmed diffusely spreading grass, flowering and fruiting culms ascending, racemes digitate or almost so, 4-7, appressed- erect in fruit, second glume usually less than half the length of spikelet.

A widespread Indo-Pacific species, here recorded for the first time from the Phoenix Islands, only known from Gardner, where it may possibly have been introduced by the Gilbertese. It is, however, a native plant in Polynesia.

GARDNER: Fosberg 55782 (US, HAW, K); Long 2504 (US).

\**Eleusine indica* (L.) Gaertn.

Goose-grass

A tough wiry grass with ascending stems and 2-4 digitately arranged spike-like flowering panicles and tiny rough grains.

Occasional in paths, roadsides, and around buildings on Canton and in old village site on Hull, not seen on Gardner in 1975.

CANTON: Degener & Hatheway 21254; Fosberg & Walker 30211 (US, BISH, K). HULL: Fosberg & Stoddart 54814 (US, HAW, K); Long 2003 (US, K). GARDNER: Long & Woodward 2468 (US).

Refs.: Luomala (1951), p. 172; Degener & Hatheway (1952), p. 34; Degener & Gillaspay (1955), p. 18.

\**Eragrostis amabilis* (L.) W. & A. (*E. tenella* (L.) Beauv.)

Love-grass

A fine, spreading soft grass, annual or in wet years possibly perennial, stems tufted, decumbent; inflorescences very finely much-branched, spikelets very small, compressed.

A pantropic weed of pioneer situations and waste ground, abundant on Canton, well established on Hull, especially abundant near the U.S.A.F. station; one tuft only seen on Sydney in 1973 in the coconut plantation. This seems to be the first record from Sydney; rare on Gardner in 1975 in coconut-*Morinda* forest, also a first record there.

CANTON: Degener & Hatheway 21297 (US); Clegern 62 (BISH). HULL: Bryan 47 (US); Long 2024 (US), Fosberg & Stoddart 54836 (US, HAW, K). SYDNEY: Fosberg & Stoddart 54856 (US, HAW, K). GARDNER: Fosberg 55751 (US, BISH, K).

Refs.: Degener & Hatheway (1952), p. 34; Degener & Gillaspay (1955), p. 18; Degener & Degener (1959), p. 5.

\**Eragrostis pectinacea* (Michx.) Nees

This was collected near the wharf on Canton in 1951 (Degener & Hatheway 21312 (US, BISH)) and reported by Degener and Hatheway (1952), p. 34 and Degener & Gillaspay (1955), p. 18, but was not relocated in 1973 or 1975. The specimen in US has been examined by Leroy Harvey in 1980 and confirmed as *E. pectinacea*, rather than *E. pilosa* (L.) Beauv. which is very similar but with narrower spikelets. There is some question as to whether these are actually distinct species, but for our purposes we will accept Harvey's determination.



***Eragrostis whitneyi* Fosb.**

Tiny tufted, many-stemmed annual grass, rarely producing bulbils in the inflorescence, which is of few very elongate usually curved spikelets. Another of the few coral atoll endemics, confined to the dry Central Pacific Atolls, except for a variety in the Leeward Hawaiian Atolls. Grows on sand, especially on low-lying fine compact sand, with *Sesuvium*, for example near the Enderbury Lagoon and in drying lagoonlets on the southwest corner of Hull. Related to the Hawaiian *E. paupera* and to the Australian *E. dielsii* and its allies. Rare on Sydney, as it was not found on either of our visits, 1973 and 1975. A habitat for it exists on Gardner, to the east of the passage into the lagoon, not visited and seen only from the air on leaving.

CANTON: Bryan 1343 (BISH); Degener & Degener 24614, 24586 (US, BISH); Degener & Hatheway 21319 (US, BISH); Fosberg & Walker 30206 (US); Hatheway 517 (US); Van Zwaluwenburg in 1940 (BISH). ENDERBURY: Fosberg & Stoddart 54734 (US, HAW, K); Long 2090, 2108 (US, HAW, BISH), 2111 (US, HAW, BISH), 2656, 2661 (US, BISH), 2668 (US, BISH), 2677 (US, BISH), 2683 (US, BISH); Woodward 1, 2, 3, 4 (US), 7; Fosberg 55710 (US, BISH, K); Browne in 1939 (BISH); Clegern 140 (BISH). HULL: Fosberg 55732 (US, BISH). SYDNEY: Long 2591 (US, HAW, BISH).

Refs.: Pickering (1876), pp. 240, 242?; Fosberg (1939), pp. 39-41; Degener & Hatheway (1952), pp. 33-34; Degener & Gillaspay (1955), p. 18; Degener & Degener (1959), pp. 5, 6; Luomala (1951), pp. 171-172.

***Lepturus* R. Br.**

The populations of this genus in the Phoenix Islands are most complex. It is one of the dominant herbs in many open areas and is common in woods and groves that are not too dense. In addition to the rather distinctive *L. pilgerianus*, forms that fit four of the described varieties of *L. repens* (Fosberg, 1955) have been found in the Phoenix Group. This may very well reflect the central Pacific location of the group as well as the fact that the islands harbor such concentrations of sea-birds. Seeds of this genus are admirably adapted both for floating and for "hitch-hiking" attached to bird feathers. The main areas of distribution of the four varieties concerned are arranged radially in several directions from the Phoenix islands. Such variability is a perfect example of the complexity that may be found in common strand species.

***Lepturus pilgerianus* Hansen & Potztl (*Lepturus repens* var. *palmyrensis* F. Br.)**

A coarse erect bunch-grass, rather stiff, basal branches, if produced, ascending to erect, not prostrate and rooting at nodes, inflorescence a terete jointed spike with the flowers and fruits borne in lateral depressions, covered by elliptic acute glumes; rachis disarticulating at maturity.

After seeing this grass in the field, we now agree that it is separable from *L. repens*, though scarcely on the basis of its being annual, as claimed by the authors of the

species. All *Lepturus* species behave as annuals in extremely dry conditions, but can grow and produce new shoots indefinitely if the moisture supply holds out. *L. pilgerianus* is closer to *L. gasparricensis*, of Wake and Pokak atolls, than to *L. repens*, from which latter it differs in its erect or ascending basal branches and broader, elliptic glumes with scabrous margins at tips, usually not exceeding the joints. It is, actually, somewhat intermediate between the two, as occasionally an adventitious root or two will appear on the lowest nodes of the branches. Possibly these and the occasional prostrate branches of *L. pilgerianus* may result from hybridity with *L. repens*, with which it is occasionally found. Fosberg 55793, from McKean, is somewhat loose and depressed and has glumes very slightly acuminate. Rare cases of such hybridity are known between *L. repens* and *L. gasparricensis*. There is some question whether or not *L. gasparricensis* might better be treated as a variety of *L. pilgerianus* but further study may settle this.

Possibly *L. repens* var. *maldenensis* F. Br. from Malden, belongs here, but the spikes are more slender and the glumes only about half as long. Some of the Phoenix Is. specimens approach this but we see no break in the series. *L. pilgerianus* is not endemic to Canton, but is found also on Phoenix, Hull, Sydney. On Phoenix it forms extensive dense stands. It is common in Enderbury and parts of Hull, but rare on Sydney. It is by no means rare on Canton as stated by Degener & Gillaspay, but abundant in places. It has not been found on Gardner.

In 1975, after a severe drought, the tall dense stands seen on Phoenix Islands in 1973 were lying flat, dry and appearing dead except that under the influence of some recent moisture a few green sprouts and branches were appearing from some clumps. In a slightly lower spot these were more numerous. These may be taken as an indication that the species is not an obligate annual.

CANTON: Degener & Hatheway 21291 (MO, US, isotype); Fosberg & Stoddart 54718 (US, HAW, K), 54719 (US, HAW), 54881 (US, HAW, K). ENDERBURY: Fosberg & Stoddart 54740 (US, HAW, K), 54731 (US), 54741 (US, HAW, K); Long 2104 (US), 2109 (US), 2115 (US), 2118 (US), 2654 (US). PHOENIX: Fosberg & Stoddart 54765 (US, HAW, K), 55800 (US, BISH, K), 54766 (US, HAW, K); Long 2078 (US), 2079 (US), 2079b (US), 2086 (US), 2099 (US), 2615 (US), 2623 (US). HULL: Fosberg & Stoddart 54830 (US, HAW, K); Long 2017 (US), 2050 (US) (spikes very slender), 2057 (US). SYDNEY: Fosberg & Stoddart 54861 (US, HAW, K); Long 2544 (US). McKEAN: Long 2027 (US), 2031 (US), 2032 (US), 2042 (US), 2047 (US), 2432 (US); Fosberg 55791 (US, BISH, K), 55796 (US, BISH, K), 55793 (US, BISH).

Refs.: Hansen & Potztl (1954), p. 268; Fosberg (1955), pp. 292-293; Degener & Gillaspay (1955), p. 18; Degener & Degener (1959), p. 6; Fosberg (1968), pp. 496-498; Pickering (1876), p. 243.

*Lepturus repens* var. *cinereus* (Burcham) Fosb. (*Lepturus cinereus* Burcham).

Lax, trailing slender plant, spikes 1 mm or less thick, glumes about 4 mm long, acute.

Uncommon but rather widely distributed in the western Pacific, found on Sydney and Gardner, not previously known from the Phoenix Islands.

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SYDNEY: Fosberg 55714 (US, BISH, K). GARDNER: Fosberg 55785 (US, K).

*Lepturus repens* (Forst. f.) R. Br. var. *repens*

Slender tufts, frequently bearing slender prostrate stolons rooting at nodes, slender jointed spikes, the glumes lanceolate, acute, not subulate or awned.

This form of the species, that originally described by Forster, is the common form in Southeastern Polynesia and only occurs sparingly in other parts of the Pacific. It was only found in 1973 near the old guano pit in the north third of Enderbury Island, also on Gardner in 1975.

ENDERBURY: Fosberg & Stoddart 54755 (US, HAW, K); Browne in 1939 (BISH). GARDNER: Fosberg 55748 (US, BISH, K), 55776 (US, BISH, K).

*Lepturus repens* var. *septentrionalis* Fosb.

More slender than var. *subulatus*, forming small hemispherical tufts, leaves a few cm long, spikes very slender, distinctly less than 1 mm thick.

This form is most abundant in the Northern Marshalls and Wake Island, but reaches Gardner Island. Common very locally on coral gravel near the west end and on the north side of Canton Island and on Gardner.

CANTON: Fosberg 55723 (US, BISH, K), 55736 (US, K). GARDNER: Long 2508 (BISH).

*Lepturus repens* var. *repens* appr. var. *subulatus*

Canton: Lister in 1891.

*Lepturus repens* var. *subulatus* Fosb.

Slender tufted grass usually producing runners or stolons from the bases of the tufts, which root and give rise to secondary tufts at the nodes; inflorescence a slender teret jointed spike with the flowers and fruits sunken in lateral depressions in the rachis, glumes strongly subulate awned, rachis disarticulating into cylindrical floating sections at maturity.

Less common than *L. pilgerianus* except on Sydney, not found on Birnie or Phoenix. In the Phoenix islands usually forming large soft bunches, sometimes lacking stolons but easily distinguished from *L. pilgerianus* by the subulate glumes.

CANTON: Fosberg & Walker 30212 (US, BISH, K); Degener & Hatheway 21311 (US); Schultz 23 (US) (sterile); Fosberg 55706 (US, BISH, K). ENDERBURY: Fosberg & Stoddart 54730 (US, HAW, K), 54738 (US, HAW, K), 54755 (US, HAW, K); Fosberg 55708 (US), 55707 (US); Long 2092 (US), 2649 (US). HULL: Fosberg & Stoddart 54808 (US, HAW, K); 54821 (US, HAW, K), 54834 (US, HAW, K); Long 2013 (US), 2056 (US). SYDNEY: Fosberg & Stoddart 54869 (US, HAW, K). GARDNER: Long 2472 (US), 2489 (US); Fosberg 55749 (US, BISH, K), 55780 (US).

Refs.: Pickering (1876), p. 240?; Fosberg (1955), p. 290; Degener & Gillaspay (1955), p. 18; Hatheway (1955), pp. 4-6; Degener & Degener (1959), p. 6.

**\**Panicum distachyon* L. (*Brachiaria distachya* (L.) Stapf)**

Prostrate mat-like grass, rooting at nodes, inflorescence a branched raceme of clavate spikelets.

Established on Canton around the Air terminal and here and there in the U.S.A.F. housing area. Collected and reported by Degener in 1958.

CANTON: Fosberg & Stoddart 54884 (US, HAW, K); Degener & Degener 24649 (US, BISH), 24656 (US, BISH).

Ref.: Degener & Degener, (1959), p. 6.

**\**Panicum miliaceum* L.**

This was not seen in 1973, though reported by Degener & Gillaspay (1955, p. 18) as locally present on Canton in 1950 (Degener & Hatheway 21314 (US)).

**\**Pennisetum ciliare* (L.) Link**

Rather low, much-branched annual (?), with long spike-like, often purplish panicles, the spikelet, surrounded by an involucre of bristles, giving the panicle a foxtail-like appearance.

Introduced on Canton by Degener in 1950-51 (as *P. setosum* L. Rich.), this grass had become locally abundant in 1958. It still persisted as occasional tufts in 1973 and 1975.

CANTON: Fosberg & Stoddart 54771 (US, HAW, K), 54905 (US, HAW, K).

Ref.: Degener and Degener (1959), pp. 6-7.

\**Setaria verticillata* (L.) Beauv., reported from Canton in 1955 (Degener & Hatheway 21253) and 1959, was not seen in 1973. Degener & Gillaspay (1955), pp.18-19; Hatheway (1955), p. 4; Degener & Degener (1959), p. 7.

\* *Tricholaena rosea* Nees, introduced on Canton by Degener in 1950-51 and reported by him in 1959 as widely naturalized in 1958, was not seen in 1973 or 1975.

## POLYGONACEAE

\**Coccoloba uvifera* L. (*Coccolobis uvifera* L.)

Sea-grape

Coarse shrub or small tree with orbicular entire very leathery leaves on extremely short petioles, with short, sheathing stipules; terminal racemes of small white flowers with 6 similar perianth segments, 6 stamens and a single pistil; fruiting perianth much enlarged, becoming fleshy, closely investing the nut-like fruit so as to form an orbicular dark reddish black drupe, these borne in pendent spike-like racemes.

Common around U.S.A.F. installations on Canton, a few isolated plants near road as much as 7-8 miles from station: not seen by us on Hull in 1973 or 1975, one tiny plant in abandoned Gilbertese village on Gardner.

CANTON: Fosberg 30878 (US). HULL: Long 1998 (US). GARDNER: Fosberg 55770 (US).

Refs.: Van Zwaluwenburg (1943), p. 3; Degener & Gillaspay (1955), pp. 20-21; Degener & Degener (1959), pp. 8-9.

## PORTULACACEAE

\**Portulaca cyanosperma* Egler

Prostrate, fleshy; leaves alternate, lanceolate or lance-linear, thickened, with abundant stipular hair; flowers in few-flowered terminal heads subtended by involucreal leaves; sepals 2, petals obovate, purple; seeds iridescent, bluish.

Introduced on Canton by Degener in 1950-51, reported by him as established in 1958, still persisting sparingly in 1973. Native in the Hawaiian Islands. A specimen said to be from Enderbury, collected by Clegern in 1973, originally determined as *P. samoensis* v. Poelln., seems rather to be *P. cyanosperma*. There may be a confusion of labels, as there is no other record of its being introduced on Enderbury. On reexamination, the specimen seems unusually hairy, and may be *Portulaca australis* (*P. samoensis*), which could be native on Enderbury.

CANTON: Fosberg & Stoddart 54913 (US, HAW, K). ENDERBURY: 1973, Clegern 166 (BISH).

Ref: Degener & Degener (1959), p. 9.

The similar but much larger-flowered \**Portulaca grandiflora* Hook. was seen in a sheltered garden on Canton in 1975.

*Portulaca lutea* Sol. ex Forst. f.

Giant Purslane

(Here taken in the broadest sense, including large-flowered, thickstemmed mostly upright plants, probably comprising more than one species).

Tap root rather thick, stems several to many from base, thick, green or often grayish with a corky epidermis, branched, usually ascending; leaves opposite, usually appearing to be more or less distichous, obovate, rounded at apex, cuneate at base, fleshy, with a few stipular hairs; flowers in few-flowered terminal heads subtended by several involucreal leaves; sepals 2, coherent, the resulting calyptra compressed and sharply keeled, caducous; petals 4-7, obovate 7-15 mm long, emarginate, yellow; stamens many, 15-45, style 1, its stigmatic branches 3-6, spreading, curved, hairy, ovary semi-inferior, one-celled, with many ovules on basal placentae; fruit a pyxis or circumscissile capsule, bearing many seeds on a cluster of stalks from the base of the capsule; seeds glossy, black.

Probably the most abundant plant on all the 8 islands studied, varying in flower size and other characters from island to island; flowers opening about 10 a.m., closing about 5 p.m. or later, the petals and stamens turning jelly-like as they shrivel. Degener has pointed out (1955) that on Canton the stamens and ovaries are eaten by hermit crabs. We found it impossible on Birnie and Sydney to find any fruits and seeds, though large numbers of plants were examined.

CANTON: Fosberg & Walker 30208; Degener & Hatheway 21285 (BM, BRI); Fosberg & Stoddart 54775 (US, HAW, K), 54893 (US, HAW, K); Fosberg 55735 (US, BISH, K); Clapp P-71-7 (US); Lamb in 1938 (BISH). BIRNIE: Fosberg & Stoddart 54721 (US, HAW, K); Long 2647 (US). ENDERBURY: Fosberg & Stoddart 4726 (US, HAW, K), 54727 (US, HAW, K), 54728 (US, HAW, K); Lamb in 1938 (BISH); Marshall 3, 8; Long 2613, 2667 (US), 2686 (US). PHOENIX: Fosberg & Stoddart 54764 (US, HAW, K), 54767 (US, HAW, K), 55798 (US, BISH, K), 55799 (US, BISH, K); Bryan 18; Long 2624 (US), 2082 (US). HULL: Fosberg & Stoddart 54828 (US, HAW), 54833 (US, HAW, K); Long 2046, 2043 (US) (very slender). SYDNEY: Fosberg & Stoddart 54870 (US, HAW, K), 54866 (US, HAW, K), 54875 (US, HAW); Long 2547 (US); Fosberg 55712 (US, BISH, K). GARDNER: reported by Catala (1952, p. 159) as a staple in the diet of the Gilbertese settlers (as *P. oleracea*). Long 2455 (US), 2499 (US); Fosberg 55759 (US), 55757 (US, BISH, K). McKEAN: Long 2038 (US), 2029 (US), 2026 (US); Fosberg 55787 (US, BISH, K), 55797 (US, BISH, K).

Fleshy plant with slender tap root and radiating prostrate branched red stems; ~~leaves small, opposite, obovate, apex rounded to subtruncate, with few stipular hairs;~~ flowers in several-flowered terminal heads subtended by several involucreal leaves, sepals 2, petals 3-5 mm long, emarginate, yellow, stamens 10-12, style with 3-4 branches, capsule about 3 mm across, circumscissile about at middle, seeds black, stellulate-tuberculate. Flowers open about 10 a.m. and close about noon.

Naturalized on Canton and presumably from there introduced around the U.S.A.F. stations on Enderbury and Hull. Probably introduced by the Gilbertese on Sydney, Hull and Gardner. It flourishes on bare coral sand and gravel and forms hybrid swarms with *P. lutea* when they grow together as on Canton (Fosberg & Stoddart 54772, 54773, 54774, 54906 (all US, HAW, K), Fosberg 55738, 55739 (both at US, BISH, K)), possibly also on Hull (Long 2043) and Sydney, and almost certainly on Gardner (Fosberg 55758 (US, BISH, K), 55760 (US)). The hybrids vary in color of stems, stature and flower size. The swarms have not been analyzed in detail, hence remain in rather doubtful status.

The Canton Island plants, at least, seem to correspond fairly well to var. *granulato-stellulata* v. Poelln., with tuberculate seeds, but as yet we have rather vague ideas as to the definition and limits of the varieties within *P. oleracea* L. Adequate study would necessitate several days observation on the ground, noting flower opening and closing times, number of stamens, stature, stem color, stem thickness, and seed characters.

CANTON: Fosberg 30881 (US), 30209 (US); Degener & Hatheway 21283; Fosberg & Stoddart 54817 (US, HAW, K), 54883 (US, HAW, K), 54907 (US, HAW, K); Fosberg 55737 (US, BISH, K). ENDERBURY: Fosberg & Stoddart 54746 (US, HAW, K). HULL: Fosberg & Stoddart 54817 (US, HAW, K). SYDNEY: Fosberg & Stoddart 54871 (US, HAW, K), 55711 (US, BISH, K). GARDNER: Long 2501 (US); Fosberg 55754 (US, BISH, K), 55760 (US).

Ref: Degener & Gillaspay (1955), p. 22.

## POTAMOGETONACEAE

*Ruppia maritima* var. *pacifica* St. John & Fosb.

A slender, submerged, rooted-aquatic with filiform leaves, slender stems and umbelloid clusters of asymmetric small fruits on long stipes. Found in Enderbury lagoon, not previously known from the Phoenix group. Tolerates brackish to highly saline water. Not found though looked for, in 1975, when the lagoon water was so low that most of the lagoon bottom was dry.

ENDERBURY: in lagoon, Fosberg & Stoddart 54749 (US, K, HAW).

## RUBIACEAE

\**Casasia clusiifolia* (Jacq.) Urb., an attractive shrub introduced from the Bahamas by Degener in 1950-51 (Degener & Degener 1959, p. 15), and apparently doing well in 1958, was not seen in 1973 or 1975.

### *Guettarda speciosa* L.

A handsome tree with dark bark and a dense crown, branchlets rather thick; leaves opposite, 10-15 or more cm long, broadly oval to broadly oblong, obtuse at apex, cordate at base, on short petioles, with large flat obovate caducous stipules; flowers very fragrant at night, in axillary secund symmetrical cymes, calyx small, cup-shaped, corolla large, white, salverform, lobes 5-8, with membranous crispate margins, these infolded in bud, opening in evening, falling the next day when exposed to hot sun or, on overcast days, after noon, anthers attached below sinuses, included; style filiform, of two types, either subequal with corolla tube and with a broadly cylindrical stigma with a drop of very sticky material on top, or 1/2-2/3 as long as corolla tube and with a more narrowly cylindrical stigma; fruit a depressed-globose white drupe with coarse fibers in the flesh and a large corky stone with a number of cells each with a single seed.

Common in forests on Hull, Gardner and Sydney, appearing more or less chlorotic, yellowish green, on the latter island. The stones float very readily and it is likely that the absence of the species from an island means that it cannot survive there, at least for a long time. Found once, by Luomala, on Canton. Reported by Hemsley as collected on Hull by J.T. Arundel.

CANTON: Luomala 19; Clapp P-71-31 (US). HULL: Fosberg & Stoddart 54807 (US, HAW, K), 54809 (US, HAW, K); Fosberg 5733 (US, BISH, K), 55729 (US, BISH, K); Long 2000 (US), 2001 (US), 2070 (US), 2023 (US). SYDNEY: Fosberg & Stoddart 54868 (US, HAW, K); Long 2587 (US, BISH); Bryan 35 (BISH). GARDNER: Fosberg 55743 (US, BISH, K), 55754 (US, BISH, K), 55766 (US, BISH).

Ref.: Bryan (1942), p. 60; Luomala (1951), pp. 167, 174; Pickering (1876), pp. 240, 241; Fosberg (1937), p. 262; Hemsley (1885), p. 116.

### *Morinda citrifolia* L.

Noni (Hawaii)

Shrub or small tree, smooth, branchlets rather thick; leaves large, glossy, broadly elliptic to ovate, petiolate, base obtuse, apex acutish, veins with pits or domatia in axils beneath; stipules fairly large, caducous; flowers in axillary pedunculate heads, only 1-3 in bloom at a time, as more flowers open the head tends to elongate, ovaries fused into a syncarp, calyx lobes very small, corollas salverform, 4-5 lobed, lobes linear-oblong; syncarp enlarging with maturity into a rather irregular large whitish potato-like compound drupe which develops a very disagreeable rancid odor when past maturity.



Native in the Pacific, but how far east is not known with any certainty. It was in all likelihood spread far beyond its original range by the aboriginal peoples, who had many uses for it. Locally abundant in coconut groves on Hull, one of the commonest trees or shrubs on Sydney and Gardner, forming the dominant understory in some of the coconut plantations. Found also on Canton.

CANTON: Degener 21412; Bryan 23 (BISH), 1341 (BISH), 1342 (BISH); Clapp P-71-1 (US). HULL: Fosberg & Stoddart 54838 (US, HAW, K); Long 2055 (US). SYDNEY: Fosberg & Stoddart 54853 (US, HAW, K); Long 2539 (US), 2570; Bryan 36 (BISH). GARDNER: Long 2458 (US); Fosberg 55747 (US, BISH, K), 55786 (US, BISH, K).

Refs.: Bryan (1942), p. 60; Degener & Gillaspay (1955), p. 30; Degener & Degener (1959), p. 15; Luomala (1951), pp. 166, 170, 174; Laxton (1951), p. 143; Maude (1952), p. 70; Groves (1951), p. 19.

## SOLANACEAE

\**Capsicum frutescens* L., reported by Degener (1959, p. 14) as growing in a garden on Canton in 1958, was not seen in 1973. However, by 1975 several varieties were again in cultivation in very sheltered gardens. Several varieties of \**Solanum lycopersicum* L. (*Lycopersicon esculentum* Mill.), also reported by Degener (Degener & Hatheway 21307), and not found in 1973 were seen on our visit in 1975, doubtless recently planted. These were variety *commune* Bailey, the large-fruited common garden tomato, and var. *galeni* (Mill.) Duckwill, the small-fruited cherry tomato, introduced on Canton in 1950-51, by Degener. \**Solanum melongena* var. *esculenta* Nees was reported by Degener & Degener 1959, p. 15, as growing in a garden on Canton in 1958, not seen by us in 1973, but was flourishing around a house in the U.S.A.F. residence area in 1975. \**Petunia hybrida* Nilm, reported by Degener, had also disappeared, as might have been anticipated, but was again seen in a pot in 1975. \**Nicotiana glauca* R. Grah. might more likely have survived, but was not seen anywhere. It was collected in 1951 (Degener & Hatheway 21305).

### \**Physalis angulata* L.

Ground Cherry or Husk Tomato

A spreading, much-branched herb with thin ovate, usually more or less toothed or scalloped petiolate leaves, small solitary axillary rotate whitish or pale cream-yellow flowers with brownish or greenish centers, and a small fleshy tomato-like berry enveloped in a much enlarged papery loose fruiting calyx.

Very rare in weedy disturbed places on Canton and Hull, on the latter in the abandoned Gilbertese village. The record from Enderbury may have been a temporarily established weed, as it was not seen by us in 1973 or 1975. It was found in September 1973 by Clegern.

CANTON: Degener & Hatheway 21411 (BISH); Fosberg & Stoddart 54894 (US, HAW, K); Fosberg 55803 (US, BISH); Degener & Degener 24654 (BISH).  
 ENDERBURY: Clegern 168 (BISH). HULL: Fosberg & Stoddart 54701 (US, HAW, K) (this collection possibly *P. lanceifolia* Nees).

Refs.: Degener & Gillaspay (1955), p. 30; Degener & Degener (1959), p. 15; Degener & Hatheway (1952), p. 34.

## SURIANACEAE

### *Suriana maritima* L.

Densely leafy green shrub up to 3 m tall; leaves alternate, crowded, linear-oblong, bright green, in loose rosettes on small branchlets, spreading in sunlight, closing, appressed to each other in rainy weather and at night; flowers axillary, 5-parted, petals yellow; stamens 5; pistils 5, fruits 5, arranged in a circle, each subglobose, about 1.5 mm across.

Common, especially near and on lagoon shores but also inland and on seaward beach-crests, present on Canton and Hull, only, among the islands studied.

CANTON: Degener & Hatheway 21305; Bryan 1328 (BISH), 1340 (BISH); Luomala 14 (BISH). HULL: Fosberg & Stoddart 54818 (US, HAW, K).

Refs.: Pickering (1876), p. 241; Bryan (1942), p. 46; Degener & Gillaspay (1955), p. 23; Hatheway (1955), pp. 6, 9; Luomala (1951), pp. 165, 173; Degener & Hatheway (1952), p. 34.

## TAMARICACEAE

### \**Tamarix aphylla* Karst.

Tamarisk, Athel

Much-branched tree of a pale grayish green color; leafless, the fine branchlets terete, fleshy and containing the photosynthetic tissue; flowers in complex terminal panicles, small, pink, with oblong petals; fruit a small capsule.

An Old-World tree of Mediterranean and other dry or semi-dry regions, introduced to Canton prior to 1949, it is still growing well about the site of the old British Settlement. It does not seem to be expanding its range any, in spite of its wind-blown seeds.

CANTON: Fosberg 39877 (US); Degener & Hatheway 21306; Fosberg & Stoddart 54781 (US, HAW, K); Luomala 23 (BISH); Clapp P-71-12 (US).

Refs.: Degener & Gillaspay (1955), p. 26; Degener & Degener (1959), p. 11; Luomala (1951), pp. 168, 173.

## TILIACEAE

### *Triumfetta procumbens* Forst. f.

Prostrate trailing elongate branched herb, stems and leaves pubescent; leaves alternate, thick, varying from ovate or orbicular to deeply 3-5 lobed, lobes rounded; flowers axillary, with 5 sepals, 5 thin yellow oblong petals, many stamens with capillary separate filaments, and a single pistil; fruit a large dry bur with weak, non-pungent spinous processes.

A native plant on most Pacific coral atolls, present on beaches and in the interior of all the Phoenix Islands studied except Birnie. Not found in recent years on Phoenix. Mentioned from Canton and Enderbury in notes with a specimen, Arundel 6 (K) collected October 1882.

CANTON: Lister s.n. (CGE); Schultz 19 (US); Fosberg & Walker 30215 (US); Degener & Hatheway 21281 (US, G), 21282 (G); Luomala 32 (US). ENDERBURY: Fosberg & Stoddart 54742 (US, HAW); Bryan 1334; Lamb s.n.; Marshall 8; Long 2103 (US), 2105 (US), 2113 (US), 2116 (US), 2652 (US), 2684, 2685. PHOENIX: Bryan in 1924? HULL: Fosberg & Stoddart 54791 (US, HAW, K); Long 2011, 2047 (US), 2051 (US), 2060, 2022 (US). SYDNEY: Fosberg & Stoddart 54872 (US, HAW, K); Long 2569. GARDNER: Long 2487 (US); U. S. Expl. Exp. s. n. (P); Fosberg 55773 (US, BISH, K).

Refs.: Degener & Gillaspay (1955), p. 24; Hatheway (1955), pp. 1, 7; Luomala (1951), pp. 171, 173; Pickering (1876), pp. 240, 241, 243; Van Zwaluwenburg (1942), p. 49.

## URTICACEAE

### *Laportea ruderalis* (Forst. f.) Chew (*Fleurya ruderalis* (Forst. f.) Gaud. ex Wedd.)

Succulent stemmed erect branched herb; leaves alternate, petiolate, ovate, strongly dentate, acuminate, with three strong nerves; flowers usually monoecious, borne in axillary cymes, individual flowers very small and inconspicuous; fruit a minute flattened pointed achene, with thickened margin, whitish.

Widespread on coral islands throughout the tropical Pacific, especially on coral gravel and sand. It is only found on three of the Phoenix Group, Enderbury, Gardner, and Hull. On the latter it is very abundant. It was mentioned as from these three islands in notes on a specimen, Arundel 8 (K), collected Oct. 1882.

ENDERBURY: Fosberg & Stoddart 54758 (US, HAW, K); Bryan 29 (BISH); Long 2117 (US). HULL: Fosberg & Stoddart 54789 (US, HAW, K). GARDNER: Long 2502 (US); Fosberg 55756 (US, BISH, K). "Fanning: Suwarrow: Enderbury: Hull: Gardner Islds.", Arundel s.n. (GH).

Ref.: Pickering (1876), pp. 240, 242.

\**Pilea microphylla* L.

Artillery-plant

This was seen planted in a sheltered spot on Canton in 1975.

## VERBENACEAE

\**Clerodendrum inerme* (L.) Gaertn.

Arching to sprawling glabrous shrub; leaves opposite, elliptic, blunt to acute; flowers in few-flowered axillary cymes; calyx gamosepalous, corolla white, salverform, somewhat zygomorphic, stamens and style long-exserted, maroon; fruit an obovoid to sub-globose drupe with thin black flesh, deeply 4-grooved and eventually drying and separating into 4 woody nutlets, about 1-1.5 cm high, 1 cm wide.

Probably not native in the Central Pacific east of the Marshall and Gilbert islands, extending west to the western Indian Ocean, growing as an ornamental in Canton around old British Settlement and planted in U.S.A.F. area, also in abandoned Gilbertese villages on Hull and Sydney. The Clegern specimen determined as var. *oceanicum* Gray.

CANTON: Fosberg & Stoddart 54776 (US, HAW, K); Fosberg 55720 (US, BISH, K); Clapp P-71-9 (US). HULL: Long 2008 (US); Clegern 111 (BISH). SYDNEY: Long 2592 (US, BISH).

\**Lantana camara* var. *aculeata* (L.) Mold.

Prickly, branched, aromatic shrub; leaves ovate, acute, crenate, bullate-rugose, petiolate; flowers in axillary, pedunculate, corymbose heads, corollas orange turning red toward outside of head, bilabiate, lower lip large on peripheral flowers; fruit a small globose lead-colored drupe, borne in heads.

Introduced as an ornamental, the *Lantana* has persisted in surprisingly healthy condition but has not spread as it does in wetter, less saline climates. It was found on

Canton and Hull, on the former in the old British Settlement and in the U.S.A.F. residential area, on Hull in the abandoned Gilbertese settlement.

CANTON: Fosberg & Stoddart 54777 (US, HAW, K); Clapp P-71-8 (US).  
HULL: Fosberg & Stoddart 54804 (US).

**\**Premna serratifolia* L.**

Aromatic shrub with ovate or oblong leaves and flat-topped paniculate cymes of small greenish flowers.

Seen only on Canton, planted around the dispensary. Although it is a common widespread atoll plant, this seems to be the only record of it from the Phoenix Islands. It was obviously brought in, but is not a plant often seen in cultivation.

A tree which may be *Premna serratifolia* L. appears on photos taken on Canton in 1971 by Roger Clapp, but the photos are not good enough for certain identification.

CANTON: Fosberg 55737 (US, BISH).

**\**Stachytarpheta indica* (L.) Vahl**

Spreading to ascending herb, stems appearing to branch dichotomously with a spike of flowers or fruits in each forking, leaves opposite, ovate, with obtuse apex, margins with obtusish teeth; flowers in slender spikes, sunken into grooves in the slender rachises, corolla bluish, zygomorphic, fruits lying in grooves in rachises; resembling but more slender than the following species.

Seen only in the dock area, in 1973, not noted previously.

CANTON: Fosberg & Stoddart 54896 (US, type of *Stachytarpheta jamaicensis* var. *parviflora* Mold.; HAW, K).

This collection has been made the basis of *Stachytarpheta jamaicensis* f. *parviflora* Moldenke. It is obviously closely related to that species but requires further study before it can be finally disposed of. Meanwhile we will leave it under the name by which we know it as a widespread weed. It has much more slender spikes and smaller flowers than *S. jamaicensis*.

**\**Stachytarpheta jamaicensis* (L.) Vahl**

Spreading slightly woody herb, the stems appearing repeatedly dichotomous with a spike of fruits or flowers in each forking; leaves opposite, ovate, with base decurrent into a petiole, apex obtuse, margin serrate with low obtuse teeth; flowers in terminal spikes with the calyx and ovary sunken in a groove in the thick rachis, the corolla light

purplish blue, curving out from the rachis, strongly zygomorphic and 2-lipped with lower lip longer; fruit lance-ellipsoid, sunken in the rachis.

Introduced on Canton by Degener in 1951, locally common in weedy places around the U.S.A.F. installation in 1973.

CANTON: Fosberg & Stoddart 54895 (US, HAW, K).

Ref.: Degener & Degener (1959), p. 14.

**\**Vitex trifolia* L.**

A shrub with leaves of 3 leaflets, white beneath, clusters of small bluish-purple 2-lipped flowers, and pea-like brownish green fruits. A small bush of this was seen in 1975, planted by a house in the USAF residence area on Canton. It is native in the Western Pacific, but probably will not survive without protection during dry periods on Canton.

## ZYGOPHYLLACEAE

***Tribulus cistoides* L.**

Stems herbaceous, hairy, prostrate to ascending, radiating from a root crown, sparsely or not branched; leaves opposite, pinnately compound, leaflets small, 1 cm long or less; flowers on axillary pedicels, 5-parted, petals yellow, 1-2 cm long, obovate, stamens 5, pistil one, ovary stiffly hairy, style short, stigma slightly lobed; fruit of 5 parts, united into a button-like thick disk with 10 spines, separating at maturity into 5 segments, each with 2 strong divergent spines.

Growing in open areas on Canton, Enderbury, Hull, Sydney, and McKean, often found where seabirds nest. It is very common on Canton, despite the fact that it was not seen by Degener and Gillaspay (1955, p. 23). It densely covers conspicuous areas on the lagoon coast of Sydney, and several patches including a large strip from beach top to lagoon on McKean.

CANTON: Fosberg & Stoddart 54716 (US, HAW, K). ENDERBURY: Fosberg & Stoddart 54750 (US, HAW, K); Fosberg 55709 (US, BISH, K). HULL: Fosberg & Stoddart 54790 (US, HAW, K). SYDNEY: Bryan s. n., 37; Woodward 2564 (US); Long 2537 (US); Long & Woodward 2574 (US); Fosberg & Stoddart 54857 (US, HAW, K); Arundel 52 (K). GARDNER: Long 2496 (US); Fosberg 55781 (US, BISH, K). McKEAN: Long 2044 (US), 2033 (US), 2441 (US); Fosberg 55789 (US, BISH, K).

Refs.: Van Zwaluwenburg (1941), p. 17; Degener & Gillaspay (1955), pp. 22-23; Luomala (1951), pp. 166, 173.

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